ALCOHOL AS FUEL IN BRAZIL:

AN ALTERNATIVE ENERGY POLICY AND POLITICS

Vol I

by

MARIA HELENA DE CASTRO SANTOS

B.S., Physics, Universidade de Brasília, Brazil
(1965)

B.A., Sociology and Political Science, Pontíficia
Universidade Católica, Brazil
(1971)

M.P.A., The Kennedy School of Government, Harvard University
(1975)

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Signature of Author: _____
Department of Political Science, January 10, 1985

Certified by: _____
Professor Nazli Choucri, Thesis Advisor

Accepted by: _____
Professor Harvey M. Sapolsky, Chairman, Graduate Program Committee

ALCOHOL AS FUEL IN BRAZIL: AN ALTERNATIVE ENERGY POLICY AND POLITICS

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ABSTRACT

The use of alcohol as fuel is not new in the world and less so in Brazil. Brazil is, however, the country that went farthest with regard to the use of alcohol as fuel. Since 1931, when the first official alcohol policy was established, alcohol mixed with gasoline has fueled Brazilian passenger cars. And, from 1980 onwards, part of the automobile fleet runs on pure alcohol. Today, alcohol-powered cars represent more than 90 percent of total passenger car sales and alcohol-fueled automobiles correspond to 15 percent of the national automobile fleet. Brazil is the only country in the world that managed to separate the automobile industry from petroleum.

This thesis is a policy study on fuel alcohol in Brazil from the 1930s, focusing primarily on the process of decision-making of the various policies over time.

The links of fuel alcohol with the interests and needs of both the sugar and energy sectors make this case study uniquely complex as the issues, goals and objectives of fuel alcohol policies vary over time and with the actors involved. The analysis here provided is, then, a product of the dynamic tension between the sugar policy and the fuel policy.

I attempted to take into consideration all relevant variables and actors for the decision-making process of the fuel alcohol policies, at each point in time. This included the basic parameters of decision (the world oil and sugar markets and their impact on Brazil's energy and economic policies) and the interests and motivations of the principal actors (public and private), who acted within the setting defined by the parameters of decision and who disputed the main issues to assure outcomes favorable to their preferences.

The decision-making process of fuel alcohol policy did not and does not take place in a vacuum. On the contrary, it takes place in a given political regime with certain patterns of interest representation and decision-making as well as other general features that characterize the relations between state and society. It is beyond the scope of this thesis to provide a comprehensive characterization of the political

regimes prevailing in Brazil during the period under analysis. The regime characteristics are, nevertheless, inductively and empirically constructed, appearing a fortiori through the patterns of bureaucratic politics. Special attention in this respect was given to the post-64 authoritarian regime in Brazil.

The analysis of fuel alcohol decision-making processes was divided into two periods: (i) from the 1930s to the mid 1970s (Volume I) when, given the country's early choice for petroleum as the basis of its liquid fuels needs, alcohol as a carburant was only "tolerated" while it was not preducicial to fuel policy; (ii) from 1975 onwards (Volume II) when, on account of the first oil shock, a favorable fuel policy helped create the National Alcohol Program. Finally, an attempt is made to assess the Program both from the perspective of the actors involved and from the perspective of the outside analyst. Is Proálcool a success?

Thesis Supervisor: Nazli Choucri

Title: Professor of Political Science

To my father,

Flavio Poppe de Figueiredo
who started everything

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ALCOHOL AS FUEL IN BRAZIL: AN ALTERNATIVE ENERGY POLICY AND POLITICS

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PREFACE

This is a policy study on fuel alcohol in Brazil from the 1930s, focusing primarily on the process of decision-making of the various policies over time.

The links of fuel alcohol with the interests and needs of both the sugar and energy sectors make this case study uniquely complex as the issues, goals, and objectives of fuel alcohol policies vary over time and with the actors involved. The analysis here provided is, then, a product of the dynamic tension between the sugar policy and the fuel policy.

I attempted to take into consideration all relevant variables and actors for the decision-making process of the fuel alcohol policies, at each point in time. This included the basic parameters of decision (the world oil and sugar markets and their impact on Brazil's energy and economic policies) and the interests and motivations of the principal actors (public and private), who acted within the setting defined by the parameters of decision and who disputed the main issues to assure outcomes favorable to their preferences.

The decision-making process of fuel alcohol policy did not and does not take place in a vacuum. On the contrary, it takes place in a given political regime with certain patterns of interest representation and decision-making as well as other general features that characterize the relations between state and society. It is beyond the scope of this paper to provide a comprehensive characterization of the political regimes prevailing in Brazil during the period under analysis. The regime characteristics are, nevertheless, inductively and empirically

constructed, appearing *a fortiori* through the patterns of bureaucratic politics. Special attention in this respect is given to the post-64 authoritarian regime in Brazil.

I tried to address the research directly to the formulation and implementation of the National Alcohol Program, created in 1975, only to discover that the use of alcohol as fuel in Brazil had such an important and rich history that it could be disregarded only at the expense of properly understanding the political and economic meaning of PNA issues.

An analysis of past fuel alcohol policies beginning in the 1930s (gasohol), as well as of the backgrounds of these policies, is provided in Volume I. This portion of the thesis was based on published memoirs of contemporary actors, a thorough review of basic legislation, articles published in the IAA review, *Brasil Açucareiro*, and interviews with ex-IAA officials. The objective of Volume I is to set the stage (actors, institutional framework, decision-making structure with respect to alcohol policy) on which the PNA was to develop (and greatly complicate, in terms of the number of public and private actors involved, the complexity of the institutional framework, and the fragmentation of the structure of decision-making).

Volume II analyzes the process of decision-making of phase one (gasohol) and phase two (cars driven on pure alcohol) of the National Alcohol Program. The main sources of data were Government documents, newspaper clippings,* interviews and legislation. A major concern of

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*Clippings from 1973 to 1982 of major newspapers (*Jornal do Brasil*, *O Globo*, *O Estado de São Paulo*, *Gazeta Mercantil*, *Jornal da Tarde*, *Diário Comércio e Indústria*, *Jornal do Comércio*, *Folha de Sao Paulo*, *Tribuna da Imprensa*) and the weekly newsletter *Relatório Reservado* were extensively and systematically examined.

this part of the work is to show the heavily political content of PNA decisions, no matter how economically rational they may appear to be. In the research of Volume II, through the eyes of the decision-makers, I tried to show that their technocratic approach was mainly, and always, political. I let the data speak for itself. It showed bureaucratic agencies vying to enhance their control over the PNA; the loci of the decision-making arenas located within the state apparatus; private actors, the so-called "big" capital (major alcohol producers, the principal suppliers of distillery equipment, and the automobile industry) reaching the State apparatus mainly through informal means; and the non-existence of rural workers in the structure of decision-making. The decision-making process of the National Alcohol Program for the various issues revealed a recurrent, well-defined pattern (see the Conclusions), which incorporated competing bureaucratic agencies and "big" capital.

VOLUME I:

ALCOHOL: SUGAR BY-PRODUCT OR FUEL?

AN HISTORICAL PERSPECTIVE

(1900 - 1975)

INTRODUCTION

Historical Setting

When President Geisel, in response to the world oil crisis sparked by OPEC's first round of price increases in 1974, announced plans to increase the use of alcohol as a fuel,[1] this was generally taken to be an innovative policy. At the end of an era of cheap oil, few remembered that the use of alcohol was not new to the world, and especially not to Brazil.

Even before the era of the automobile, countries such as France, Germany, and England had carried out technical studies to assess the potential use of alcohol in internal combustion engines.[2] These studies, which began at the end of the 19th century and continued into the first decades of the 20th, analyzed various combinations (both binary and ternary) of alcohol with gasoline, benzol, kerosene, ether, and other substances. Failures in combustion discovered to be due to the water contained in alcohol were corrected with the production of anhydrous alcohol (of a grade equal to, or higher than, 99.5% G.L., at 20º C). By the mid 1930s, tangible results had been achieved in the addition of alcohol to the carburant mixture, which had the effect of increasing the mixture's octane rating and enhancing its anti-knock property. Beyond a 25% alcohol

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[1] Speech delivered by President Geisel on October 9, 1975, O Globo, 10/10/75.

[2] Information on the use of alcohol as fuel and the technical studies developed by various countries is from Coutinho (1958 and 1958a) and Dé Carli (1978: 59-125). See also Nowell (no date) for a study of the countries which resorted in the 1930s to alcohol as a liquid fuel alternative to oil. Nowell analyzes the political process of determination of the energy market (coal, alcohol, oil). He focuses on the case of France, from the 1930s to the 1950s, when the choice for oil was finally made definitive (as had occurred in Brazil). Nowell's work came to my attention when this thesis was already completed. A comparative analysis of his study and the first volume of this thesis could be most fruitful.

level, the engine would perform less efficiently than with pure gasoline. A mixture of up to 10% alcohol, however, could be used with any engine of that time without any adjustments to the carburetor.

The original impetus behind adopting alcohol as a fuel lay in an attempt to stabilize the market for those agricultural products which could serve either as foodstuffs or as the raw material for the production of alcohol. Offering another major end-use would open up new markets for these products (above all the potato), which had been subject to periodic crises of overproduction. Yet, in the twenties, England and Germany abandoned attempts to use alcohol (from potatoes) in internal combustion engines when the prices of the raw material rose on the food market. The fuel alcohol industry survived only with government subsidies.

The idea of alcohol as a substitute for gasoline (rather than a stabilizing factor in the market for agricultural products) began to take shape in the twenties. The rapid development of the auto industry in the United States and to a lesser extent Western Europe prompted concern about the supply of petroleum products satisfying a growing demand.[3] In the thirties the concept of alcohol as an alternative liquid fuel was reinforced with import restrictions imposed as a response to the recession in world markets following the 1929 crisis. Despite a drastic cutback in the auto industry during the depression,[4] both countries which

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[3]The world production of vehicles rose from 2.4 million in 1920 to 6.3 million in 1929, of which the United States was responsible for 93% and 84% of total production, respectively. Western Europe manufactured the remainder. Motor Vehicles Manufacturers Association (MVMA) (1972). Apud. Eduardo A. de Almeida Guimarães and Maria Bernanda Gadelha, "O Setor Automobilístico no Brasil" (Research Report). Rio de Janeiro. FINEP, mimeo, 1980.

manufactured and those which imported automobiles confronted the problem of how to supply the existing fleet of vehicles with fuel. Many countries with insufficient domestic oil reserves passed legislation and created the institutional framework specifically to formulate, regulate, and execute policies relating to the mixture of alcohol with other carburants, especially gasoline.[5]

However, once the idea of alcohol as fuel had been accepted and positive results had been obtained in viability tests, it was abandoned. In the post-war period, coal was replaced by oil as the dominant source of world energy. The use of oil, which had proven itself vital in war time, was extended to major industries, such as automobiles, as well as to domestic heating. The important discoveries of the petroleum reserves of the Middle East[6] and their control by the major oil companies, guaranteed a propitious abundance and availability of that source of energy, ensuring the transition from a coal-based to an oil-based world energy system.[7] Thus began the era of cheap petroleum, in which alcohol, as a liquid fuel, could not compete.

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[4]In 1932, the annual production of vehicles decreased to 1.9 million, of which 1.3 million were produced in the United States and 500,000 in Western Europe. MVMA (1972).

[5]See José Calcavecchia, El Alcohol Carburante, Havana, 1934 (pp. 150-153), cited in Coutinho (1958a). Among the countries in which the use of alcohol in a carburant mixture was either obligatory or strongly recommended in the early 1930s were: Germany, France, Hungary, Austria, Czechoslovakia, Chile, Argentina, and Ecuador. Coutinho (1958a: 6) also cites several issues of Brasil Açucareiro, published between 1936 and 1945, as sources of information about the use of alcohol in carburant mixtures. Even the United States, a major producer of petroleum, adopted this practice to absorb alcohol surpluses during the years of Prohibition.

Attentive to international experiments with alcohol, Brazil in the early 1930s established an official policy for alcohol as fuel to be mixed with gasoline. Although the initial motivation for using a mixed carburant was similar to that of other countries with inadequate petroleum reserves -- to provide an ample fuel supply for their fleet of vehicles and to save foreign exchange, in 1933 the alcohol policy in Brazil became closely linked with supporting the sugar sector of the economy. Overproduction of sugar had led to a sharp drop in the prices of a ton of sugar cane and a sack of sugar.[8] The production of alcohol from molasses (a by-product of sugar manufacture), surplus sugar, and even directly from sugar cane came to be one of the fundamental elements of a policy designed by the Vargas government to bail out the sugar sector in a serious crisis. The old idea of adopting alcohol as fuel to stabilize agricultural product markets was then revived by Brazilian policy-makers.

Analytical Approach

Alcohol policy in Brazil can be seen, historically, as the outcome of the tensions of two distinctive policies: sugar and fuel. From 1933

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[6]Petroleum discoveries in the Middle East increased known reserves by 200% between 1939 and 1944, from 714 to 2,143 million tons, corresponding to 16% and 29.6% respectively of total world reserves. Figures are from "The Oil and Gas Journal" and "Geological Survey", U.S. Department of the Interior. Apud. Michel Grenon, Le Nouveau Petrole, Paris: Librairie Hachette, 1975.

[7]While actual levels of world coal consumption remained reasonably stable after the second world war, coal's share of total world energy consumption decreased steadily, giving way to petroleum, consumption of which increased at a rapid rate, especially from the 1950s on. The share of petroleum in the total consumption of energy increased from

onwards regulating the market and price of sugar became the principal objective of Brazilian alcohol policy.[9] During this time, alcohol production did not prejudice the national energy policy, nor upset the fuel market. Accordingly, its production and use as fuel was "tolerated" by the energy policy. When, however, in the fifties the country turned to a fuel policy based on cheap petroleum imports supplemented by domestic production which began with the creation of Petrobrás, the use of alcohol mixed with gasoline virtually disappeared, returning in significant terms only during the serious crisis of sugar overproduction in the mix-sixties. Despite this partial comeback, however, fuel alcohol was relegated to a subordinate status until 1975, when the National Alcohol Program (PNA), conceived as a part of the national energy policy in response to the world petroleum crisis, reawakened an interest in alcohol as an alternative energy source.

Yet, alcohol did not merely regain its earlier prominence. First,

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7 (cont.)
25% in 1949 to 40% in 1974 and, in 1967, reached and overtook in absolute terms the world consumption of coal (see the Report of the Workshop on Alternative Energy Strategies (Carrol L. Wilson, Project Director), Energy: Global Prospects 1985-2000: New York, St. Louis, and San Francisco: McGraw-Hill Book Company, 1977 (pp. 17-18); and Nazli Choucri (with Vincent Ferraro), International Politics of Energy Interdependence: The Case of Petroleum, Lexington, Mass, Toronto and London: Lexington Books, 1976 (pp. 21-22).

[8]For a brief account of the sugar crises in Brazil since colonial times with an emphasis on 1929 and its socio-economic effects, see Dé Carli (1942: 20-25) and Dé Carli (1940: 13-15). See also Carneiro (1966) and IAA (1972: 65-69).

[9]Although the production of alcohol from the residues of sugar manufacture for use as a fuel had been an official policy only since 1933, it had since the twenties served as a support system for the sugar sector and a solution for the recurrent crises of overproduction of sugar.

independent sources of financing for alcohol production became available. Additionally, whereas alcohol as a fuel had been produced mainly from molasses (a sugar by-product), with the establishment of the PNA, not only did the production of alcohol directly from the sugar cane increase substantially, diverting the raw material from the production of sugar itself, but so too did the area planted with sugar cane destined exclusively for the production of alcohol. As long as the sugar interests provided the main stimulus for alcohol production, a fuel alcohol policy could not develop fully. Under these circumstances, alcohol was merely a by-product of sugar, both in the technical sense of sugar processing and in its definition as an element of the policy designed to support the price of sugar, the primary product of the sugar cane industry. The energy policy, however, exercised the ultimate controlling power over the use of alcohol as fuel inasmuch as fuel requirements determined alcohol's use. Thus while in the 1950s energy policy inhibited the production of alcohol for addition to gasoline, following the world petroleum crisis of the 1970s, it made alcohol production viable, elevating it to the primary product of the sugar cane industry.[10]

Until now, for the sake of simplicity, "sugar policy" and "energy policy" have been treated as though they were themselves actors. A public policy, however, is a product of the interaction between various real actors, both public and private. On the one hand there are government agencies in charge of formulating and implementing a given policy; on the other, there are "clients" of this policy, that is, those groups

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[10]See Chapter 8, Section 8.1, for qualifications to this statement.

directly involved in and affected by it, who attempt to influence the policy decision.

At the time of the establishment of the National Alcohol Program, the anhydrous alcohol industry was virtually non-existent, except in the state of São Paulo.[11] Nonetheless, the use of alcohol as fuel had a very rich history. Intertwined with the sugar sector needs and interests, the fuel alcohol policy, regulated by extensive legislation, had been sponsored and promoted by the Institute of Sugar and Alcohol (IAA) with the intervention of other bureaucratic agencies, especially the National Petroleum Council (CNP). As the organ responsible for the fuel policy of the country,[12] the Council exercised control over specific aspects of the fuel alcohol policy. This policy, until the creation of the National Alcohol Program in 1975, was a product of the interaction between the IAA, the sugar producers, and, to a lesser extent, the sugar cane suppliers on the one hand, and the conflicts between the IAA and the CNP on the other. It was against this background of intricate links established between the alcohol industry, the sugar sector, and government agencies which determined forms of interest representation and structures of decision-making, that Proálcool was established. Proálcool greatly increased not only the number of self-interested actors but also the complexity of the institutional arrangements of the national alcohol policy.

The object of Volume I of this thesis is to provide the heretofore largely neglected political and institutional background of the alcohol policy in effect prior to the establishment of the PNA. Next, the

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[11] See pages 177 and 178.

decision-making process of Proálcool itself will be analyzed. This part of the thesis aims specifically to:

1. analyze historically alcohol policy in Brazil in terms of the tensions between the sugar and energy policies, identifying the phases in the evolution of this policy, the principal interest groups and government agencies involved, the principal policy instruments, and the relevant legislation.

2. examine the institutional arrangements responsible for executing alcohol policy as well as the conflicts between the IAA and the CNP and the change over time of the degree of control these agencies exercised over alcohol policy.

3. identify the forms of representation of the sugar cane interest groups, the channels through which they voiced their demands, the decision-making arenas in which they acted and their evolution over time.

This study will be divided into four parts. The first, covering the first 30 years of this century, will explore the antecedents of the fuel alcohol policy. From the beginning of the century alcohol was sought after to relieve the sugar sector during recurrent crises of overproduction. In the 1920s, the use of alcohol, or álcool-motor,[13] gained considerable importance. Part I will analyze the initiatives of sugar producers, their associations, and of the governments of the most important sugar-producing states to promote the use of alcohol as an outlet for accumulated sugar stocks.

In 1931, as noted above, the federal government established the first official fuel alcohol policy. From this point on, until 1975

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[12]Whereas it is true that Petrobrás from its inception shared with the CNP control over fuel policy, the CNP always maintained responsibility for fuel alcohol.

when the National Alcohol Program was launched, the fuel alcohol policy underwent a series of revisions. Understood as a product of the tensions between the sugar and energy policies, three periods in the evolution of alcohol policy can be distinguished. The first, the subject of Part II, extends approximately to the thirties and fourties. This period is characterized by the close association between alcohol and the price support policy for sugar. In fact, with the exception of a brief initial period when the aim of the program was to save foreign exchange and the second world war when fuel was in short supply, the principal motivation for the production of alcohol was to aid the sugar sector. Part III examines a period of transition in the 1950s, when the use of alcohol mixed with gasoline became clearly uneconomical. With petroleum at a low price on the international market, the price of gasohol became higher than that of pure gasoline. From the end of the 1950s until 1975, the availability and accessible price of oil made the use of alcohol as a carburant unfeasible. Moreover, even the sugar sector no longer depended on alcohol as a secondary market, turning instead to exporting (Part IV).

While each of these periods corresponds historically to changes in alcohol policy broadly defined, that is, from one favoring alcohol to support sugar to one discouraging its use (and a transition period), there was no concurrent change in the formal schemes of policy, as defined by their objectives, aims, policy instruments, and institutional framework. Whereas alcohol was primarily an element in propping

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[13] Álcool-Motor is the generic name for carburant mixtures which contain alcohol in a proportion which can vary from 5 to 100 percent.

up the price of sugar in the 1930s and 1940s, in this period two distinct political schemes can be distinguished. In the first, from 1933 when the Institute of Sugar and Alcohol (IAA) was formed, until 1938 when the National Petroleum Council (CNP) was established, the IAA had total control over both sugar and alcohol policies. In 1938 alcohol policy also came under the control of the CNP, which together with the IAA, determined the price and volume of alcohol to be added to gasoline. From this point on these two organs began to dispute these questions which were, in fact, part of the larger contest for the control of the fuel alcohol policy. The IAA gained the upper hand vis-à-vis the CNP during the second world war years, when alcohol gained importance due to the intense shortage of fuel. In the fifties, however, as gasoline became cheaper and the price of alcohol increased following that of sugar, the CNP won all disputes over the price and volume of alcohol to be mixed. By the end of the decade, this organ had imposed a method of determining these questions which in practice adapted the relevant existing legislation to suit its predominance and impeded the IAA from guaranteeing a compensatory price for alcohol in parity with that of sugar. It was only in 1964 that the legal basis for fuel alcohol policy was changed; the price of alcohol was linked to that of gasoline so that it would not have the effect of raising the price of the fuel. Moreover, a small (5%) maximum limit for the volume of alcohol to be mixed with gasoline was established. The legal definition of the new policy instruments confirmed the total control of the CNP over the fuel alcohol policy. This marked the beginning of the period of the policy against the mixture of alcohol with gasoline, which ended only in 1975 with the National Alcohol Program.

Thus, two periods can be identified when the alcohol policy as it was actually implemented and the formally defined policy diverge. In the first, the formal change in policy in 1938 preceded the change in policy in practice which would take place only at the end of the fifties. As a result, the control of the decision-making process between the principal government agencies involved, the IAA and the CNP, was disputed. Those interest groups affected by the fuel alcohol policy took part in the dispute, aligning themselves with one of the two organs: the sugar producers (usineiros) sided with the IAA and the gasoline distributors with the CNP. In the second period where the de facto and de jure alcohol policies were incongruous precisely the opposite occurred: while the alcohol policy had already changed in fact by the end of the fifties, the formal scheme of the policy would only be modified in 1964. It may be noted, however, that the dispute both at the bureaucratic level, between the two organs, and at the societal interest group level, had practically ended at the point when the victorious CNP pressed for the change at the concrete level of the fuel alcohol policy. The opposing parties knew, at this point, that the formal modificiation of the policy was a question of time.

In the chapters which follow, the fuel mixture policy will be analyzed based on the four periods identified above. Official alcohol policies established from 1931 on will be discussed in conjunction with the periods corresponding to their actual effect. The incongruities between the de facto and de jure policies, and the implications for bureaucratic policies, will be taken into consideration. An

assessment of goals, objectives, policy instruments and decision-making processes will be provided whenever policies favoring fuel alcohol were formulated and implemented. This includes policies developed from 1931 to the World War II.

PART I

ANTECEDENTS OF THE ALCOHOL FUEL POLICY

(1900-1930)

CHAPTER 1

Alcohol as a Relief for Sugar Crises: Sugar Producers' Initiatives

With the loss of leadership in the world sugar market at the end of the 17th century, Brazil began to substitute the domestic for the world market. The process was accelerated at the end of the 19th century when national sugar cane producers who had postponed modernization of the industry and consequently suffered high production costs[1] progressively lost ground in international markets to foreign competition, including the European beet sugar industry which in the 19th century was already equipped with advanced technology. However, the loss of foreign markets[2] neither slowed the rate of growth in sugar production,[3]

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[1]Other factors responsible for the high cost of production of Brazilian sugar at the end of the century, according to Carneiro, were: the increase in the price of slaves with the end of the slave trade; the increased price of land due to competition from coffee plantations; and the protective tariffs adopted by European and American countries (cf. Carneiro, 1966: 38).

[2]The restriction of the sugar market to domestic consumption is well illustrated by the following:

	Exports (in tons)
1891-1900	133,000
1900-1911	64,000
1911-1920	62,000
1921-1930	81,000
1931-1940	40,000

Source: Caio Prado Júnior, História Econômica do Brasil. São Paulo: Editora Brasiliense, 1965 (9th edition). Apud. Carneiro, 1966: 38.

nor put an end to recurrent crises of excess production.[4]

At the worst points of sugar crises, alcohol compensated for losses incurred in sugar cane harvests. At the beginning of the century, alcohol made from molasses was used mainly for domestic consumption, as the raw material for the young pharmaceutical and perfume industries, or for the manufacture of aguardente (a local white rum derived from sugar cane). Only what was left over was used to fuel the cars and trucks of the northeastern sugar producers, incidentally, with considerable success. Many sugar producers, however, preferred to use the molasses as animal fodder or even discard it in nearby rivers rather than incur the cost of the equipment necessary for the

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2(cont.)

Contributions to Exports
(in percent)

	sugar	coffee	rubber
1827	48.4 (first place)	27.4	-
1899	6.1 (third place)	73.9	10.9
1910	1.3 (last place)	44.9	43.8

Source: Dé Carli (without bibliographic references). Apud. IAA, 1972: 68-69.

[3]The greater demand for sugar resulted from the increase in population as well as in the purchasing power of some social strata, especially in urban areas (cf. IAA, 1972: 67).

[4]See footnote no. 8 of the Introduction, p. 22.

transformation of molasses into alcohol.[5] At this time, given the small market for alcohol, relief for the sugar crises was found in desdobramentos, a means of obtaining white rum of 45° G.L. by diluting sugar refinery alcohol, graded between 90° and 95° G.L. with water, a process which was considered illegal.[6]

During the sugar crisis of the late 19th and early 20th centuries, all means to expand the use of alcohol were attempted (Dé Carli, 1942: 21). The suggestion to increase the use of alcohol was voiced frequently in various agricultural congresses, meetings, and conferences of the sugar industry held in the principal sugar-producing states (IAA, 1949: 272);[7] prominent among these was the Industrial Usage of Alcohol Congress, sponsored by the National Agricultural Society in 1903 in Rio de Janeiro.[8] At the same time, the International Exhibition

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[5]Mello, 1942:13 and interviews with Dr. Nicodemus de Andrade on 5/12/81 and 5/18/81.

[6]Aguardente was normally produced directly from sugar cane in special distilleries, or from molasses produced by small sugar mills. In times of crisis, however, the usineiros (owners of large sugar refineries) also sold molasses to the aguardente producers.

In order to produce high-quality white sugar, the sugar cane juice underwent a process of sulfating which lightened it as well as separated out the impurities. These sulphur gases adhered to the molasses, even after passing through a centrifugal wringing process, which gave the aguardente a different taste. This was the way in which the illegal aguardente de cabaú was obtained. Source: Interviews with Dr. Nicodemus de Andrade on 5/12/81 and 5/18/81.

[7]The best source for information about sugar industry congresses, conferences, exhibitions, assemblies and meetings held before 1949 is unquestionably the publication of the IAA, Congressos Açucareiros do Brasil (Rio de Janeiro, 1949). The object of this publication was to provide a retrospective view of the industry in preparation for the First National Sugar Congress held in 1949.

of Equipment for Alcohol was convened to promote the use of alcohol as a solution to the sugar crisis in Brazil (IAA, 1949: 274). The 107 resolutions of the Congress can be summarized by Resolutions 3 and 4:

> 3rd. Recognizing that any expansion of the sugar market in this country and abroad would be difficult and slow, this Congress resolves to promote alternative uses of sugar cane alcohol (such as an agent for light, heat, and motor-power), in order to increase its consumption. This will stabilize production of both sugar and alcohol at current levels, guaranteeing the price of each, and hence support the sugar sector in the present crisis.
>
> 4th. The advantages of various uses of alcohol as a substitute for light, heat, and mechanical power having been brilliantly demonstrated by the Internatinal Exhibition of Equipment for Alcohol, this Congress is of the opinion that sugar cane workers and national and state authorities should take prompt and effective action to:
>
> a) popularize the industrial use of alcohol;
> b) increase its production; and
> c) reduce its cost. (IAA, 1949: 277-278)

Some of these suggestions were to be incorporated in the resolutions of several agricultural congresses and sugar conferences in subsequent years.

When the price of sugar rose on the world market, alcohol was forgotten (cf. Dé Carli, 1978: 101). Similarly, the congresses and conferences organized by the sugar sector to deal with the crisis were

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[8] Important meetings held before the Congress for the Industrial Usage of Alcohol at the beginning of the century were the First National Congress for Agriculture in 1901, and the First Sugar Conference in 1902, held in Bahia, and later, the Second Sugar Conference held in Recife in 1905. All were premised on increasing the industrial use of alcohol to aid the sugar cane sector. See IAA, 1949, and Dé Carli, 1978: 97, who relies for primary source material on A Lavoura, a publication of the National Agricultural Society.

dissolved. In the last of these meetings, the Fourth Conference of the Sugar Sector, held in Campos in 1911, "the effects of the euphoric phase which the sugar economy would enjoy were already being felt, and with this the meetings and congresses ended" (IAA, 1949: 225). These meetings would convene again only with the next crisis of the sector in the 1920s, when the use of alcohol as a alternative fuel first emerged as a viable prospect. Prior to this, the use of alcohol as a fuel had been given little consideration since there was no shortage of liquid fuel in the country. Transport was predominantly by railroad or mule, and heating principally by wood.

After the first world war, the destruction of the European beet sugar industry and the resulting high price of sugar on the world market stimulated the production and processing of sugar cane in producing countries. This was true in Brazil, after a slight delay, even with the high cost of production (cf. Carneiro, 1966: 39). The recovery of the beet sugar producing areas in the early twenties, however, produced a large accumulation of stocks in the world, which persisted until the 1929 crisis provided drastic interventionist measures in the sugar policies of various producing countries.

At the same time that sugar stocks once again rose sharply, the idea of alcohol as a substitute for gasoline gained momentum in the industrialized countries during the 1920s, when concern grew over the gap between supply and demand for petroleum products: demand for petroleum was outstripping supply, especially after the growth of the automobile industry.[9]

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[9]See Introduction, pp. 19, 20.

In Brazil, although the number of automobiles was comparatively small,[10] there was growing concern over developing a substitute for gasoline, as is evidenced by a January, 1923 article published in the Gazeta:

> A substitute for gasoline must be sought. It is said that the naphtha deposits are quickly being used up, as are those of coal. Thus, the world is threatened with a fuel shortage. For countries like ours, large alcohol producers, there is hope for a solution to this serious problem - the use of alcohol as a substitute for gasoline. (Gazeta, "O álcool como succedaneo da gasolina" 1/12/23).

By the time that meetings were once again organized to confront renewed problems in the sugar industry in the early twenties, the use of alcohol as a fuel was already being recommended to relieve the problems stemming from the excess production of sugar. The second Commission of the Third National Congress for Agriculture held in 1922, dedicated to the problems of the sugar industry, in addition to presenting proposals endorsing the wider use of alcohol in industry, also made specific suggestions in relation to fuel alcohol, including: the formation of a "National League for the Defense and Promotion of Álcool-Motor"; that álcool-motor be considered a "public utility" and in the "national interest"; and that within the Ministry of Agriculture, a division be created to solve technical problems of production and marketing of

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[10] In 1921, while Brazil owned only approximately 25,000 automobiles, the United States owned 10,505,000; England, 497,582; Canada, 464,448; France, 236,446; Germany, 91,384; Argentina, 75,000; Austria, 73,900; Holland, 58,500; Italy, 53,000; and all other countries, less than 50,000. (Dé Carli, 1978: 102. Dé Carli's original source was The Louisiana Sugar Planter).

alcool-motor (cf. IAA, 1949: 82-84). One of the speakers at the Congress called attention to the fact that

> (I)n the event of an armed conflict, a country which cannot depend on the necessary gasoline will be defeated. Even in peace, if petroleum producers, for any political or economic motive, stopped supplying this fuel for even a brief period of time, the consequences for importing countries would be grave. (Apud. Dé Carli, 1978: 122).

In a similar vein, the Congress for the Agriculture of the Northeast held in Recife in January, 1923, recommended that the sugar producing states of the Northeast show interest in the use of alcohol as a raw material for industry, and proposed that preferential treatment be given to vehicles, machines, and equipment which utilized alcohol as a fuel, as well as to a series of facilities for the transport, distribution, and storage of denatured or carburated alcohol (IAA, 1949: 89-90; Dé Carli, 1978: 122). This Congress also endorsed a suggestion that producer states should stimulate the sulphuric ether industry; the mixture of sulphuric ether and alcohol as the principal substitute for gasoline, was of "evident necessity to the country" (IAA, 1949: 90).

In this period, the potential use of alcohol as a carburant was emphasized. The National Agricultural Society, which was a principal organizer of agricultural congresses, conferences, and conventions in the first quarter of the century to deliberate over crises in the sugar industry, played an imported role in encouraging the use of carburant alcohol. In 1921, this Society promoted a series of experiments involving the use of alcohol as the fuel on one of its own trucks. It

released the results of the research to the state governments, promoted the use of alcohol as a substitute for gasoline, solicited a reduction in the municipal tax on cars powered by alcohol, and protested the fluctuation in the price of alcohol which might have prejudiced the success of the proposed measures (Dé Carli, 1978: 102-104).

Another significant proposal was legislation introduced in 1922 by the Federal Congressman from Pernambuco, Joaquim Bandeira, authorizing a series of incentives for the installation of distilleries and the use of alcohol as fuel, and an alternative sponsored by Congressman Lira Castro from Pará, which, along the same lines, would have created an Institute of Alcohol - a national body to coordinate and promote the "production of alcohol for transportation, lighting, and heating" (Cf. Dé Carli, 1978: 106-120). The preoccupation of these congressmen was that there be assured

> within our frontiers a fuel which guarantees the viability of many necessary industries whether in peace or in war ... (Speech by Congressman Joaquim Bandeira, Session on 12/4/22. Apud. Dé Carli, 1978: 112).

given that

> ...the North Americans, who own formidable petroleum deposits, dominate the gasoline and kerosene markets, and are therefore a formidable power, have announced the forthcoming exhaustion of their astonishing petroleum wells. (Speech by Congressman Lira Castro. Apud. Dé Carli, 1978: 113).

In this same year, in his message to Congress, President Epitácio Pessoa referred to the importance of alcohol as a substitute for gasoline:

> Of those projects already carried out and those still in progress at the Experimental Station /of Fuels and Minerals/, one deserving of special mention is the use of alcohol as a substitute for gasoline in internal combustion engines.
>
> The importance of the use of alcohol is highlighted by Brazil's colossal gasoline imports. Supporting the use of alcohol would also give a boost to our sugar industry. (Presidential Message of 1922 to Congress, President Epitácio Pessoa. Apud. Andrade, 1952: 94).

The Ministry of Agriculture determined that these studies would serve as a basis for the elaboration of legislation for the application of alcohol as a fuel (cf. Coutinho, 1958b: 181).

From this point on, attempts to increase the use of alcohol as a carburant were stepped up. The experiments at the Experimental Station for Fuels and Minerals were again referred to in the 1926 Presidential Message to Congress, this time by President Artur Bernardes (cf. Andrade, 1952: 94). However, there was still no structured central government policy with this objective. Rather, the initiatives in this area were left to state governments, individuals, firms, and some associations of sugar producers. Coutinho cites the governments of Ceará, Rio Grande do Norte, Paraiba, Alagoas and Rio de Janeiro as having adopted "measures for the exemption or reduction of taxes as a means of stimulating an increase in production and consumption of álcool-motor (cf. Coutinho, 1958b: 182). In Pernambuco, the governor decreed as early as 1919 that alcohol be used in state vehicles, and the state's sugar producers organized associations which promoted the consumption of alcohol as a fuel.[11]

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[11] Coutinho cites the Association of Alcohol Producers of Pernambuco,

Various mixtures of alcohol with ether, kerosene, gasoline, and so forth, generically designated álcool motor, then appeared commercially.[12] The first and most famous of these, USGA - a mixture of 75 percent alcohol and 25 percent ether - was produced on an industrial scale by the Serra Grande mill, Alagoas, which was owned by the Lyra family. This blend was launched in 1927 and distributed through the pumps of the usina in various cities of Alagoas and Pernambuco (Coutinho, 1958b: 182). In this same year, the Álcool-Motor Cooperative was founded in Pernambuco, which introduced Azulina, a mixture of alcohol and gasoline. While Azulina had largely failed by 1930, due in large part to the significant demand for alcoholic beverages,[13] (cf. Mattos, 1942: chapter V), USGA enjoyed considerable success. In its first year of production, consumption in the Northeast reached 450,000 liters per month, and in 1929, about 500 private cars and official vehicles of factories and workshops in that region used this blend as fuel.[14] Other mixtures would appear in the early thirties, with incentives conferred in the first official policy drafted for alcohol by the provisional Vargas government.

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[11](cont.)
the Álcool-Motor Cooperative and the Central Commission for the Distribution and Control over Production of Sugar and Alcohol. His source is the work of Julio de Santa Cruz Oliveira, Problemas Econômicos e Financeiros, published in 1935 in Recife by Diário da Manhã.

[12]See Introduction to Volume I, footnote no. 13.

[13]Drinking alcohol is graded between 74° and 96° Gay Lussac at 15° C. It is also used in the chemical and pharmaceutical industries as a medium for other substances or as the raw material for certain products. (cf. Mello, 1942: 25).

[14]Cf. Jornal do Brasil, "Pequena Cronologia de uma Indústria", 11/2/1975.

PART II

THE FUEL ALCOHOL POLICY

(1931 - 1949)

CHAPTER 2

Fuel Alcohol and State Intervention: Saving Foreign Exchange and Supporting the Sugar Sector (1931-1949)

2.1. State Intervention in the Sugar Sector

The 1929 crisis exacerbated the problems of excess sugar production, coinciding as it did with an unprecedented harvest,[1] which had been due in part to the quick recovery of Sao Paulo sugar plantations from a recent attack of mosaic disease,[2] and, ironically, in part to measures adopted to support the sugar industry by the Meeting of the Sugar Sector in 1928 in Recife.[3] As a result of the crash, domestic consumption shrank, world prices and exports fell drastically, and consequently, all who depended on the sugar industry for their livelihood, from mill owner to plantation worker, were threatened with bankruptcy and destitution.[4]

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[1] Sugar production, in 60 kg sacks:

1925-26	5,282,071
1926-27	6,378,360
1927-28	6,992,551
1928-29	8,000,407
1929-30	10,804,034

Source: Dé Carli, 1942: 23.

While production in São Paulo grew by 616% between the harvests of 1925-26 and 1929-30 (155,348 and 1,113,417 60 kg sacks, respectively), production in the state of Rio grew by 144% (from 861,070 to 2,102,109 60 kg sacks of sugar) during the same period. In 1929-30 the biggest crops ever obtained were registered in Pernambuco and Alagoas, 4,603,127 and 1,450,986 sacks of sugar respectively (Dé Carli, 1940: 14).

[2] See Queda (1972: 86-90) for a careful analysis of the outbreak of mosaic disease in the São Paulo sugar plantations, and how it was rapidly contained by quick action on the part of the São Paulo state government.

Students of Brazilian sugar policy essentially agree that State intervention in the sugar sector at this juncture was prompted by the direct appeals of producers.[5]

In the first quarter of the century, meetings, congresses and symposiums organized by sugar producers during periods of crisis had limited the scope of their calls for official intervention in the industry to enlisting the support of the governments of sugar producing states in regulating production levels and domestic trade in order to stabilize prices.[6] Joaquim de Melo wrote of the Recife Meeting of the Sugar Sector in 1928:

> Notwithstanding the intrinsic tendency toward centralization of the plan to support the sugar industry (a confederation of cooperatives from the producing states would be formed with headquarters in the national capital), or, perhaps because of this, the plan failed. The great majority of sugar producers, who exhibited still very pronounced individualistic tendencies, were fundamentally opposed to the control of the harvest and market.

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[3]The great expansion in sugar production after the harvests of 1928-29 and 1929-30 is ascribed by Joaquim de Melo to the modernization of the usinas in both North and South which was in turn made possible by the support of the regional Cooperatives created by the Meeting of the Sugar Sector in Recife, and of the state governments (Melo, 1942a: 15,16).

[4]In 1930 the average price per 60 kg sack of granulated sugar on the Rio de Janeiro market was 28$166, representing a drop of 56.5% from the average price for 1928. The price of a ton of sugar cane suffered a similar decline over the same period. Rural wages dropped by about 50%, falling to 1$00 per day. Many usineiros opted to close their usinas (Dé Carli, 1940: 14 and Dé Carli, 1942: 23-24).

[5]See for example Dé Carli, 1940: 13-14; Melo, 1942a: 17; Szmrecsányi, 1979: 165-66, 169; and Numberg, 1979: 42-45.

[6]See the resolutions of the Congresses and Conferences of the Sugar Industry in IAA, 1949.

> Some came to propose legal action against the cooperatives of their states, under the pretext that they threatened to hamper their freedom of trade. This paradoxical reaction of those who should have had the keenest interest in maintaining them rendered the cooperatives inoperative, reducing their role to largely perfunctory interest groups whose simple purpose was /political/ representation. The producers lacked the indispensable support of the federal government, which would have been exercised through an administrative organ with jurisdiction in every sugar producing state and power of sanction over any infraction. The Central Commission did not even meet in Rio ..." (Melo, 1942a: 16)

The gravity of the post-1929 crisis led the sugar producers to reverse their earlier position against "hampering their freedom of trade", and accept the intervention and "power of sanction" of the federal government. Sugar producers from various states rallied together, and took their case for state action to maintain the price for their product to the Government Palace.[7] According to Numberg, various historical circumstances acted to the effect of making the producers ask for intervention from the State, which was ready for this (Numberg, 1979: 45). From the government's perspective, State intervention as a solution to the sugar crisis was entirely consistent with the policy of dirigismo econômico (economic management)[8] of the Provisional Vargas Government. This policy, which took effect after the 1930 Revolution and would become consolidated during the Estado Novo

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[7] Interview with Nelson Coutinho, 4/10/81, who called attention to the fact that the request for intervention voiced by the producers is found in the preamble of the decree which created the Commission for the Protection of Sugar Production (no. 20,761/31).

(New State) centered on a global economic strategy of "inward" development, which directed production toward the domestic market in response to the world depression of 1929. Corresponding to the process of import-substituting industrialization (which developed during the forties and reached its peak in the fifties) was a policy for the agricultural sector which accorded priority to domestic demand for food products. Only after domestic demand was satisfied could agricultural goods be exported, which had the objective of guaranteeing the food supply to the cities required by industrialization and of shielding the sector from world crises, such as that of 1929.

Federal intervention in the sugar sector had the immediate objective of stabilizing internal prices and alleviating losses by exporting. It was first coordinated by the Commission for the Defense of Sugar Production (CDPA), created by Decree no. 20,761/31, which encompassed representatives of the federal government[9] and six delegates from the principal sugar producing states.[10] In measures adopted in 1931 and 1932 stocks were regulated,[11] a tax for the protection of sugar was put into effect,[12] and the first overtures to limit production were made.[13]

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[8]Three doctoral theses on State intervention in the sugar industry frame this intervention in the context of the policy of "economic management" of the Vargas government. In addition to identifying the general aspects of this policy and its repercussions for industrialization, they point out similarities in state policy toward different agricultural sectors, above all those of coffee and sugar. See Queda (1972: 8-14; Gnaccarini (1972: 32-48); and Numberg (1979: 13-18).

[9]Representatives of the Ministry of Labor, Industry and Trade, Ministry of Finance, and of the Bank of Brazil, the financial agent of the Commission.

[10]Pernambuco, Sergipe, Alagoas, Bahia, Rio de Janeiro, and São Paulo.

Production quotas would come to constitute the fundamental instrument for the sugar price support policy of the federal government during the Vargas era. Federal intervention in the sugar sector was subsequently extended along the decade with Leonardo Truda's domestic market policy and the creation of the Institute of Sugar and Alcohol. Abandoning the strictly economic field, the State, through the IAA, regulated relations between the big sugar producers and the cane suppliers with the promulgation of the Sugar Cane Production Statute in 1941, during the administration of Barbosa Lima Sobrinho (the third President of the IAA).[14]

While federal intervention was welcomed by Northeast sugar producers, planters from the Center-South region, principally from São Paulo, resisted these measures. Unlike in the Northeast, sugar in São Paulo was in the process of expansion.[15] The cleavage between these two sugar

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[11]The decree initiating State intervention in the sugar industry (no. 20,401, September 15, 1931) established the compulsory withdrawal of 10% of the sugar production of each *usina* from the retail market, to be stored in warehouses designated by the state governments. This portion of the output would act as regulating stocks, which would either be released onto the domestic market or exported depending on the fluctuation of the domestic price, with the aim of maintaining domestic prices at a constant level. A few months later, the CDPA was set up and took over the administration of these regulating stocks. Excess sugar was acquired and stocked for release onto the domestic market or for export (at great loss), or transformed into alcohol. This policy instrument was maintained after the establishment of the IAA.

[12]A tax for the protection of sugar was established, with a minimum of 3000 *reis* per 60 kg sack of sugar produced in national *usinas*, by article 3 of Decree 20,761/31, which created the CDPA. This tax was earmarked to finance the measures for the protection of sugar production. It was renewed in article 10 of Decree no. 22,789/33 which created the IAA, and was extended to underwrite anhydrous alcohol production.

[13]The principle of limiting production was introduced in article 14 of Decree 20,761/31 which created the CDPA and in article 17 of Decree no. 21,010/32 which regulated it. It took on more precise outlines with

producing regions would permeate the sugar price support policy in the following years. This division reflected the progressive loss of hegemony over the sugar producing sector by the Northeast to the Center-South from the late 1920s to the mid-1960s.[16] Be that as it may, the formulation and implementation of policies bolstering the sugar sector grew out of a process of bargaining between government decision-makers, sugar producers (from both the Northeast and the Center-South) and, to a lesser extent, the sugar cane suppliers. This process of accomodation

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13(cont)
Decree no. 22,152/31, where the criteria for setting production ceilings were established (average production over the preceding five years), which anticipated exceptions and ways of resolving them. Both the limit on production and the criteria for setting it were to become the objects of extensive legislation in the following years (see footnote 19 below).

[14]See pages 92 and 93.

[15]See footnote 16.

[16]Sugar, which played an important role in the economy of the state of São Paulo at the beginning of the 19th century, was displaced by coffee in the middle of the same century, when coffee exports supplanted those of sugar. Sugar reappeared, however, around Campinas, Piracicaba, and Porto Feliz during crises in the coffee producing sector in the first half of the 20th century, above all in 1913 and 1921.

Sugar production in São Paulo grew slowly between the end of the last century and the 1922-23 harvest, despite the impetus provided by the First World War. From that harvest on, there was a startling fall in production due to the outbreak of pestilence, especially mosaic disease. The swift action on the part of the São Paulo state government, immediately setting up an Experimental Station at Piracicaba to conduct research into the various strains of sugar cane resistent to mosaic disease, meant that São Paulo emerged from the crisis as one of the country's leading producers. Thus, São Paulo production, which had represented only 8.7% of total Brazilian production between the harvests of 1925-26 and 1929-30, attained in the five year period between 1930-31 and 1934-35 an average of 17.3% of national production (The corresponding data for Pernambuco are 45.3% and 31.3%, respectively.) (cf. Queda, 1972: 86-90). Also contributing to the gains scored by São Paulo in its production share was the limited impact of the 1929 crisis. Whereas this crisis

and compromise between the various interests is apparent in the creation of the Sugar and Alcohol Institute in 1933,[17] the promulgation of the Sugar Cane Production Statute in 1941,[18] and even the lengthy process of defining the criteria for setting production ceilings,[19] in which the Northeast producers, supported by the IAA, were pitted against those of the Center South.

16(cont.)
dramatically affected the sugar economy as a whole, its effects were relatively mild in São Paulo and Rio de Janeiro, when compared to the Northeast. The center-south states benefitted from modern usinas which were able to produce sugar at a lower cost, and from their proximity to the major production centers of the country.

The rapid containment of the mosaic disease by the effforts of the Experimental Station at Piracicaba, and the establishment in the 1920s of the first workshops for repairing machinery from the usinas, reflected the economic and industrial supremacy of São Paulo. Some authors argue that São Paulo was advantaged as a sugar producer by virtue of its industrial dynamism. By attracting capital and an immigrant labor force (both from other Brazilian states and from abroad), it enlarged its internal market; public investment in infrastructure to meet the needs of new industrial enterprises extended and improved electricity and transportation networks.

São Paulo was able to use its industrial superiority to circumvent IAA intervention on behalf of the Northeast by means of limiting sugar production. São Paulo usineiros won a delay in complying with production ceilings, which permitted its sugar industry to continue to expand. The agreement finally reached in 1939 to limit sugar production had represented a compromise between the interests of São Paulo and those of the Northeast (see footnote 19 below). Yet, this compromise agreement would be violated in the years to come. The interruption of the coastal trade between the Center-South and the Northeast by the actions of German submarines during the Second World War benefitted the sugar industry in the Center-South. The government, concerned about sugar supplies in the Center-South, which was not yet self-sufficient, adopted a series of measures which encouraged production and facilitated the legal establishment of new usinas in the state of São Paulo, which had previously been prohibited (see Queda, 1972: 104-105 for a description of this process). Thus the number of usinas increased from a total of 34 during the 1940/41 harvest to 42 by the 1947/48 harvest. The largest single increase occurred during the 1946/47 harvest, when 71 usinas were registed in São Paulo as a direct consequence of decree-law no. 9827/46. This decree, promulgated after the Estado Novo had ended and within the liberal spirit of the post-war period, revised

16(cont.)
the sugar production quotas assigned to each State and Federal Territory. New guidelines for limiting production were issued, focusing on: (a) consumption levels; (b) indices for the expansion of sugar production in each federal unit; and (c) the readjustments of legal quotas of usinas which production capacity exceeded those quotas (Article 1). In other words, decree no. 9827 in effect ratified the expansion of the sugar industry in São Paulo which had taken place during the Second World War, and rewarded its high productivity, conceding this increase in production limits to regional demands. This decree, according to Szmerecsányi, made the process of the loss of Northeastern hegemony irreversible. With the new spatial distribution of sugar production, the Center-South region increased its share of the total quota for the country from 39.9% at the 1944/45 harvest to 46.8% of this, São Paulo's contribution rose from 17.6% to 22%, while Pernambuco saw its share decline from 37.7% to 29.9% (see Szmerecsányi, 1979: 215, 217).

At the First National Sugar Congress, held in 1949, the usineiros of the Northeast and the Center-South intensely debated the criteria for limiting production. The conflict was taken to the Executive Commission of the IAA, where the producers of the Center-South emerged victorious. IAA Resolution no. 501 of 1951 (see Gnaccarini, 1972: 87-88) raised the total quota for the country and established that the reallocation of quotas for those usinas which had already reached their production limits for 120 working days should be based on the highest production levels achieved between the harvests of 1944/45 and 1949/50. For those which had not reached this limit, the normal daily capacity for each usina and its greatest yield in the period between the 1944/45 and 1949/50 harvests would be taken into account (Article 2). In 1952, another Resolution, no. 647, raised the limit on national production, and reaffirmed the criteria set forth in Resolution no. 501. In 1957, Resolution no. 1284 favored the Center-South once again; in addition to authorizing yet another increase in the total production quota for the country, maintaining the system of allocating quotas based on the highest production figures for each usina in the preceding five year period, it abolished state quotas, instead assigning quotas on an usina-by-usina basis. The benefits these Resolutions brought to São Paulo are evident in production figures. Each increase in national production levels was distributed more heavily in the Center-South region, and especially in São Paulo. In the harvest of 1951/52, São Paulo equalled the production of Pernambuco, and in that of 1953/54, overtook it. In the 1970/71 harvest, Pernambuco produced 18.4% of the national total, while São Paulo produced 47.5%, "inverting the positions each held forty years earlier" (cf. Queda, 1972: 109).

The deathblow to Northeastern hegemony over the sugar economy was dealt by law no. 4870/65 which established guidelines for setting sugar cane prices favoring the Center-South, and rejected the so-called "single price policy". The question of a uniform price was first raised during

16(cont.)
the Estado Novo, when Northeastern usineiros complained that high transport costs incurred in shipping their product to the country's main markets (São Paulo and Rio de Janeiro) did not allow them to compete with the usinas of the Center-South. In 1951, the second Vargas government, with the IAA Resolution no. 619, set a single selling price per sack of sugar for all usinas. The difference between the selling price and the retail price (greatest in the Center-South states) would be collected by the Bank of Brazil and applied to offsetting the cost of freight, enabling sugar to be sold at the same price in all markets, regardless of point of origin. It was also anticipated that a portion of the funds collected could be used to aid the industrialization of the sugar and alcohol industries. Usineiros from the Center-South, especially those from São Paulo, protested the law by witholding payment of the equalizing contribution established by the IAA. In 1965, on the occasion of the promulgation of Law no. 4,870, these same usineiros were responsible for the override of President Castello Branco's veto of article 77, which cancelled all debts arising from taxes, surtaxes, and contributions destined to equalize the price and subsidize less competitive producing regions incurred between the harvests of 1963/64 and 1965/66. "The fiery words of the President of the Republic went for nothing. The 'pressure-groups', through their representatives in Congress managed to defeat the veto, so sanctioning the noisy, illict aggrandizement. This fact shows very well the extent of the power of that powerful group /São Paulo usineiros/ in this country" (Jungman, 1971: 51 and also 41-45, 50).

(Sources for the preceding discussion were Queda, 1972 and Gnaccarini, 1972, and to a lesser extent, Szmerecsanyi, 1971 and Velloso, 1955).

17 In the early months of 1933, the draft of Decree no 22,789, prepared by a Commission of government officials, which created the IAA, was released to the public in order to solicit amendments and reactions from both members of government and usineiros. Months later, after various suggestions had been incorporated into the bill, it was sent to the head of the Provisional Government and enacted into law on June 1, 1933. A second decree, no. 22,981, enacted shortly thereafter, clarified and amended the first. Usineiros successfully pressed for modifications reducing state intervention in sugar policy. The first significant change was in the representation of usineiros within the IAA; their numbers were increased, representatives of the sugar cane suppliers were included, and the manner in which they were to be chosen was specified. In other modifications, the criteria for assigning production quotas was made less rigid; State Commissions, which established quotas for individual usinas, came to include one representative of the usineiros and one of the sugar cane planters; mechanisms for the revision of quotas based on appeals from producers were created; and a portion of the tax levied on each sack of sugar as a bonus for alcohol producers came to be redistributed within the sugar cane industry,

17(cont.)
among those usineiros who produced alcohol from sugar cane. (See the text of the draft of decree no. 22,789, published in Economia e Agricultura, Year I, Vol. I, 1933, pp. 30-33, and the texts of decrees 22,789 and 22,981 in Velloso, 1955: 85-167. See also Szmerecsányi, 1979: 78-179.)

18With the creation of the IAA the price of sugar was regulated and the usineiros, who during the preceding period of price instability had preferred to share agricultural risks with the cane suppliers, now pressured these suppliers, assumed their production quotas, and with the increase in their crops, their usinas became self-sufficient. The majority of suppliers had been in the past senhores de engenho (owners of traditional sugar mills); despite their loss of economic power, they still wielded considerable political power based on their control over the rural electorate. With this influence, the suppliers won the promulgation on the 23rd of January 1932 of State Decree no. 111 from the Government of Pernambuco, which regulated their commercial transactions with the usineiros. In 1936 this state decree was transformed into a federal law, Law no. 178, which obliged the usineiros to accept sugar cane from the suppliers. Yet, none of these legal writs was sufficient to stop the advance of the usinas. and the pressure being brought to bear on the suppliers. The State intervened forcefully to protect the suppliers with the Sugar Cane Production Statute of November 21, 1941. This statute, which from its initial formulation to final implementation took about a year and a half, illustrates well the bargaining process between the authors of the sugar policy (a Study Commission composed of technicians from the IAA and its President), on the one hand, and the usineiros and cane suppliers on the other. The fact that the final version which became law was the 15th speaks for itself. A summary follows of the fascinating description given by Chermont de Miranda (1943: 142-180) of this process.

The process can be divided into two stages, the elaboration of the bill, and its enactment into law. The first was characterized by a series of changes in the text of the bill after internal discussions at the IAA, during the meetings of the Study Commission, and the attempts on the part of producers to discover what was in the text. The intention of the President of the IAA, Barbosa Lima Sobrinho, was to release its contents only after the Commission had reached the final version, but the 8th version of the text was leaked prematurely. The repercussions were enormous. Producers reacted, above all, against the right of suppliers to exercise an option to buy a plot of land which they had been working for more than ten years -- which they decried as expropriation -- and the restriction, to a maximum of 50%, on the quantity of its own sugar cane which a usina could process. The pressure intensified to offically make the bill public. Barbosa Lima resisted, but did allow the participation of representatives of the usineiros at the discussions of the Study Commission. After two meetings, Pernambuco and São Paulo withdrew their delegates until the bill was made public. Finally, the 12th version was

18(cont.)
officially released, beginning the second phase in the development of the Statute. This phase was marked by intense public debate, which dominated all vehicles of mass communication and involved sociologists, economists, politicians, and jurists. The debate was pitched at public opinion. Some newspapers campaigned systematically against the "extremism" and "unconstitutionality" of the bill. They appealed to expert opinion, which, along with the press, forecast the destruction of the sugar industry. Supporting the bill were the Correio da Manhã, a few intellectuals, and the Interventor (temporary governor appointed by the President of the Republic) of the state of Rio de Janeiro. A month after the publication of the bill, the IAA convened a Producers Conference, inviting concrete suggestions concerning the bill, or the presentation of a new text. After receiving what came to be known as the "Amendment of the Delegation of the Usineiros" and the contribution from the Suppliers Delegation, the IAA Study Commission met again to analyze these and other suggestions received during the period of public debate. Finally, the 15th version was signed into law on November 21st by the President of the Republic. The legal statute dropped the provision for suppliers to purchase the land which they had been working for ten years, and reduced from 50% to 40% the proportion of sugar cane that the usinas were obliged to receive from the suppliers. The protection of the rural worker, which had been cut out, reappeared in the final version, especially after the endorsement lent by President Getulio Vargas in his speech of May 1st.

In the following years, a series of decrees were passed which strengthened the Statute, thereby intensifying State intervention in the economy of the sugar sector. In 1946, with the downfall of the Estado Novo and a new Constitution, the usineiros returned to the fore, in relation to the question of litigation with the suppliers and various other interventionalist aspects of the legal framework of the sugar policy during the Vargas regime (such as production ceilings and the single price policy). After unsuccessful attempts in the courts, they reverted to "pressure on the Executive and Legislative branches" (Jungman, 1971: 46-49). Even the abolition of the IAA was advocated. While representatives from the Northeast and Rio de Janeiro defended the Institute in the Congress, the IAA came out of this process considerably weakened (cf. Szmerecsányi, 1979: 213).

(Apart from Chermont de Miranda, Jungman (1971) is an excellent source for the "battle" of the Statute, its antecedents and its implementation (see pp 25-56). See also Numberg, 1979, Chapter III for a careful analysis of this process.)

19The limitation of production raised two types of conflict: one relating to the principle of limiting production in itself, and the other to the criteria for determining the production quotas.

An interventionist alcohol policy was also inaugurated with the provisional Vargas government. Unlike with sugar, the initiative for the policy originated basically in the federal government, which tried to stimulate private initiative as a measure for saving foreign exchange, and, from 1933 on, as a fundamental element in the sugar price support policy, as we shall see below.

19(cont.)
The principle of limiting production was subject from the beginning to strong and persistent opposition from the usineiros of the Center-South, especially those from São Paulo. Although the legal foundation for limiting production was laid in 1932 (in decree no. 22,152), it was not until 1939 that production quotas were finally set and enforced by law (no. 1,130) for every usina and engenho in the country. In that year, the IAA outlined the first of its Crop Plans, which would annually determine the production limits for the country and each individual producer, according to domestic and world market demand. Throughout this period, producers launched endless appeals against the decisions arrived at by the Institute and its legal right to fix quotas (Pina, 1972: 23). The federal government, according to Truda, preferred to act, first through the CDPA and later through the IAA, with the maximum prudence so that, on the one hand, the Institute would gather all information necessary to arrive at just and equitable quotas, and on the other hand, the producers could adapt to the new situation (Truda, 1971: 161). The federal government's actions included an intense campaign, led by Truda, to convince the usineiros to accept the limitation of production. Truda, the first President of the Institute, managed in 1935, during the National Sugar Convention held in Rio, to gain a motion of support for the IAA policy for the protection of sugar signed by the representatives of São Paulo and Rio de Janeiro, as well as the Northeastern producing states (cf. Editor's note in Truda, 1971: 140-141).

An examination of the extensive legislation for setting the production quotas reveals the compromise between the criteria based on the average production of each establishment over the previous five years (in the interest of the northeastern usineiros, and supported by the IAA), and the criteria based on the capacity of the machinery and area planted (in the interest of the São Paulo producers, who were in a process of expansion). Thus, the first criteria for determining the quotas, established by Decree no. 22,152/32, was the average production over the previous five years of each sugar producing establishment; this criteria was reinforced in the draft of the decree which set up the IAA. Offsetting the provisions of this decree, decree no. 22,789 set forth new

2.2. Fuel Alcohol Policy before the IAA: Saving Foreign Exchange (1931 - 1933)

Fuel Alcohol as Independent from Sugar:

General consensus in the literature on fuel alcohol in Brazil argues that the development of the alcohol industry was inextricably linked to and dependent upon the economy of the sugar sector. While accepting this assertion as largely correct for the period up to the promulgation of Proálcool in 1975, this section demonstrates an alternate influence exercised by national energy policy. We have already

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19(cont.)
guidelines for fixing quotas according to the capacity of the machinery, and the area of sugar cane under cultivation (Article no. 28). Decree no. 22,981/33 reinstated the criteria of the average production over the preceding five years for the country's overall production limit, but nonetheless continued to apply the "capacity of the machinery and the current area planted" as points of reference for fixing individual quotas (Article no. 58). A year later the criteria for limiting production was once again revised. In response to Truda's campaign for acceptance of the production limits, the Association of São Paulo Usineiros proposed to the Executive Commission of the IAA what came to be known as the "Paulista Fórmula," which based the criteria for fixing quotas on the capacity of the usina over 150 working days, multiplied by a coefficient corresponding to manufactured output. The Executive Commission and its President accepted the "Paulista Fórmula" in part; the production capacity of the usinas would serve as the basis for setting quotas, and the number of working days would be determined by the Institute. However, the Commission decided in favor of a variable coefficient of industrial output, and, in a special mention of the producers of Pernambuco, ruled that upon no usina could be imposed a production quota of less than half its average production over the previous five years. In their reasoning, in some regions where weather permitted a prolongation of the harvest for a number of months, it was natural that the usinas "have not worried very much about the capacity of their mills," as they still had "a total volume of production that was considerable in some cases" (Minutes of the first Extraordinary Session of the Executive Commission of the IAA, March 6, 1934. Apud. Dé Carli, 1940: 55). The Executive Commission proposal was sent to the Consulative Commission, and, after long deliberation, transformed into an IAA Resolution (3/20/34), endorsing the criteria of limiting the crops based both on the five year production average and the capacity

seen that in the 1920s a stimulus for the use of alcohol as a fuel substitute arose partly from a separate concern over what was perceived at the time to be shrinking world gasoline supplies caused by rapidly rising demand (see Introduction, pp. 19,20).

Another motive behind the use of alcohol as a fuel was to save foreign exchange. As early as the twenties, accelerating importation of oil represented a drain on foreign currency which prompted concern in a country with no known petroleum reserves. With the great depression of 1929 and an unprecedented crisis in the sugar industry, the problem of the shortage of foreign currency to pay for imports became critical. In response, the provisional Vargas government adopted various measures:

> One of these consisted of substituting imported with locally manufactured goods wherever viable. In this lay the origin of the idea of making use of álcool-motor to help the nation in its Herculean effort toward recovery. The idea was to have alcohol take the place of gasoline (Pereira, 1942: 6).

In this spirit, the provisional government drafted the first official policy for fuel alcohol which, although linked to sugar by a common raw material, sugar cane, was independent of its price support policy. Pereira (1942, 1976), Melo (1942), and Dé Carli (1978), among others, have all emphasized the initial independence of alcohol policy from that of sugar. A superficial examination of the pertinent legislation confirms

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of the machinery (see for a discussion of the "Paulista Fórmula" De Carli, 1940: 46, passim).

This "compromise criteria" would, however, be reformulated in the following years based on production capacity, thereby favoring the expansion of the sugar industry in São Paulo and its growing hegemony, at the expense of the Northeast (see footnote 16).

this interpretation. First, seven months separate the first alcohol decree (no. 19,717, February 20, 1931) from the first decree establishing "measures for the defense of the sugar trade and industry" (no. 20,401, September 15, 1931). Similarly, the Commission for Studies on Álcool-Motor (CEAM) (created by a Resolution of the Ministry of Agriculture on August 4, 1931), which was charged with coordinating all studies on extending the use of álcool-motor in the country, was set up before the Commission for the Defense of Sugar Production (CDPA) (Decree no. 20,761, December 7, 1931), whose aim was to promote policies favorable to the sugar cane industry. Moreover, in none of the decrees on fuel alcohol is mention made of sugar, and vice-versa, until the promulgation of Decree no. 22,152 at the end of 1932.

Fuel Alcohol: Policies and Instruments:

The alcohol policy promoted by the provisional Vargas government implemented two distinct programs. The first, which had been in place in the late twenties, developed carburant mixtures with hydrated alcohol, denatured by one or more substances, including gasoline. The proportion of alcohol in these mixtures was normally high, a prerequisite for the stability of mixtures using hydrated alcohol as a base. Because the water contained in the alcohol caused problems with miscibility and impaired the performance of car engines,[20] it was necessary to produce an-

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[20]Melo described the inconveniences of the use of hydrated alcohol as follows:

> The quantity of water contained in drinkable alcohol makes its mixture with gasoline difficult, especially at low tem-

hydrous, or dehydrated, alcohol (99.5° G.L. at 20° C). Thus, the provisional government established a second program to develop a mixture of gasoline and 5% anhydrous alcohol. The government's intention in simultaneously pursuing two different programs was to produce the first mixture, for which the know-how already existed, while research and development continued for the second, which would then gradually replace the carburant mixture with hydrous alcohol. While the proportion of anhydrous alcohol used in the second mixture was, for technical reasons, much less than that of hydrated alcohol in the first, this did not necessarily imply the replacement of a smaller volume of imported gasoline. In practice, the total volume of alcohol (both anhydrous and hydrated) in fact mixed with gasoline reached only the minimum volume stipulated by law (the equivalent of 5% of imported gasoline) in 1936.[21]

The first measure taken by the provisional government was the promulgation of Decree no. 19,717/31 which:

> 1st) required gasoline importers to acquire, for mixture with gasoline, domestically-produced anhydrous alcohol, in a minimum proportion of 5% to the volume of gasoline.

20(cont.)

> peratures. The acidity and other impurities in this type of alcohol also cause general damage to engines. As its water content gives it a greater density than gasoline, drinkable alcohol settles at the bottom of the tank, while gasoline remains at the top, and they only really mix after the first movements of the car, or, when the external temperature rises. These inconveniences occur, principally, for mixtures rich in gasoline. In order for a mixture to remain more or less stable, it should be composed of about 80% alcohol and 20% gasoline, and the carburant should be regulated and modified for the mixture to produce good results (Melo, 1946: 25,26).

A deadline of July 1, 1932 was established for the acquisition of hydrated alcohol (of not less than 96° G.L. at 15° C) from which absolute anhydrous alcohol could be derived. (Art. 1)

2nd) permitted importers to add to the alcohol and gasoline mixture other products which helped the miscibility as long as the efficiency of the car engine did not suffer. The Ministry of Agriculture was responsible for approving the formula for each type of carburant which the importers intended to use (Art. 4), while the Treasury was responsible for designating the substance to be added to alcohol in order to denature it. The gasoline importers would enjoy an exemption from sales tax on the alcohol which they were obliged to acquire (Art. 5). Later, the Ministry of Agriculture assumed the function of designating the official denaturalizer to the Treasury and alcohol producers (Decree no. 20,536/61, Article 1).

This decree (no. 19,717/31), the crux of the national alcohol policy in this period, clearly promoted both programs of carburant mixture with hydrated and anhydrous alcohol.

In June, a Resolution from the Ministry of Agriculture stipulated that 50% of the volume of alcohol produced by each usina should be denatured. In order to put into effect Decree no. 19,717, the Government ordered half the alcohol produced in the country to be destined for fuel.[22]

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[21]Compare the second column of Table 47 with the first column of Table 43.

[22]The São Paulo usineiros rose up against this measure, petitioning the government that they be permitted to dispose of the alcohol they produced in the harvest of 1931/32 without denaturing it. They were conceded a one-time reduction of the alcohol to be denatured to 20%, for the harvest of 1931/32 (cf. Pereira, 1942: 11, 12).

In Decree no. 19,717 and the Ministry of Agriculture Resolution, the Government contemplated the use of neither direct stimulation nor special financing for its program of expanding the network of distilleries. Rather, it limited its promotional efforts to a series of incentives and penalties directed at alcohol producers, gasoline importers and consumers, a system to monitor compliance with the regulations, and measures to encourage the consumption of fuel alcohol. The catalog of incentives and penalties included tax exemption for denatured alcohol (Decree no 19,717/31 Article 8, confirmed by Decree no. 21,201, Article 2); a reduction of 20% on the import duty for automobiles which could be adapted to run on alcohol (whose internal combustion engines had compression rates higher than 1 to 6); an increase of 50% on the import duty of cylinder heads used in low compression rate engines which ran on gasoline (Decree no. 19,717/31 Article 18), and a corresponding decrease of 20% for those which bettered engine compression rates of less than 6 to 1, thus enabling them to run on alcohol (Decree no. 21,650/32); the exemption from import duty for all material and equipment used in the construction of usinas producing anhydrous alcohol up to March 31, 1931 (Decree no. 19,717/31, Article 17; the limit was extended to September 30, 1933 by Decree no. 22,538/33); a minimum reduction of 50% in the transport cost of denatured alcohol relative to that for gasoline (Decree no. 21,201/32 Article 2); and, an exemption from Customs duties for containers imported for transporting alcohol to be used as a carburant until June 30, 1933 (Decree no. 21,650/32 Article 1). An array of fiscal penalties for violators of the regulations laid out in the principal decree setting forth alcohol policy was stipulated in its 16th article. Mech-

anisms to enforce these penalties were established in Decree no. 20,356 of September 1, 1931; a "technical inspection service" was created for this end and placed under the authority of the Fuel and Mineral Station (Ministry of Agriculture).

To stimulate the consumption of álcool-motor, the government made it compulsory for official cars to use a carburant with a minimum of 10% alcohol (Decree no. 19,717/31 Article 9). In order to facilitate distribution, decree no. 21,531 of June 14, 1932, authorized an initial credit to the Ministry of Agriculture to install álcool-motor pumps in the national capital, and decree no. 21,613 of July 12, provided supplementary funds to purchase ether, gasoline, and any other products necessary for the preparation of alcohol-based blends.

The institutional framework mounted between 1931 and 1933 to administer alcohol policy divided responsibility for implementing the main decree no. 19,717 between the Ministries of Agriculture and of Finance (article 19). As a derivative of sugar cane, alcohol fell under the jurisdication of the Secretary of Agriculture; because the purchase of gasoline represented a drain on foreign exchange and gold, it fell under the purview of the Secretary of Finance (cf. Pereira, 1942: 7). While the Secretary of Finance authorized tax exemptions and levied import duties in accordance with the incentive system established in the main decree, the Ministry of Agriculture exercised substantially greater powers. It was responsible for monitoring and giving technical assistance to alcohol producers and gasoline importers via the Fuel and Mineral Station; for stimulating the production of anhydrous alcohol, rewarding its manufacturers and promoting contracts for the installation of usinas; and for subsidizing the cost of distributing álcool-motor.

The Ministry of Agriculture also performed the role of broker among the various interests at stake through its Commission of Studies of Álcool-Motor, CEAM. Although the CEAM did not formally participate in the decision-making process, it served as intermediary between the bureaucratic agencies which administered the alcohol policy and the affected interest groups. Given that the execution of the measures adopted by the Government to increase the domestic use of álcool-motor was "not solely the responsibility of the Ministry /of Agriculture/, but also of the Ministries of Finance and of Labour, Industry, and Trade", the Commission was composed of representatives from all three Ministries. Its jurisdiction was delimited by the Resolution which created it:

> All complaints, petitions or suggestions connected with the subject /the expansion of the domestic consumption of álcool-motor/ should be sent to this Commission, in order to reconcile, whenever possible, the different interests of the National Treasury and of the distributors and consumers of álcool-motor, so that it may formulate and propose appropriate solutions in accordance with measures taken by the forementioned Ministries, either individually or collectively (Unnumbered Resolution, Ministry of Agriculture, 8/4/31).

The CEAM performed its role as intermediary effectively, especially in its dealings with the interest groups, as demonstrated by the smooth delivery of alcohol to the gasoline importers. With the authority granted by Decree no. 21,213 on March 28, 1932, the CEAM assumed the purchase of alcohol, formerly the responsibility of the Bank of Brazil (Decree no. 20,642, November 10, 1931). It also took on all aspects of mediation

between the alcohol producers and the gasoline importers, including the responsibility for monitoring compliance with the decree and fixing the maximum purchase price for alcohol. The preamble of the decree recognized the superiority of the CEAM in relation to the Bank of Brazil, since the Commission was capable of acquiring more alcohol at a cheaper price simply by promoting direct settlements between the interested parties. This role of conciliating interests was to be officially expanded by Decree no. 21,650 of July 19, 1932, which extended the authority of the CEAM to the principal centers of alcohol production by instituting Alcool-Motor Sub-Commissions, subordinate to the Commission. At the Sub-Commission meetings, in addition to representatives from the Ministry of Agriculture, the State Revenue Comptroller and the State Secretary of Agriculture, "a non-voting representative of the alcohol producers and one of the gasoline importers could participate" (article 5, paragraph 1).

Evaluation of the Fuel Alcohol Policy:

Any evaluation of the alcohol policy instituted in the first years of the provisional Vargas government must recognize the reasonable success achieved in promoting a hydrated alcohol-based carburant, at the same time that takes account of the failure of the program to mix gasoline and 5% anhydrous alcohol.

Despite resistance from the gasoline importers (who feared consumers would not buy an alcohol-based fuel)[23] and the distrust, if not outright

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[23]Of public hesitancy Pereira writes,

> (A)t the beginning, during the experimental phase when the mixture based on hydrated alcohol caused distur-

hostility, of the alcohol producers,[24] as well as the problems between the two (which centered on contracts for the purchase and sale of alcohol, and which were fairly well resolved by the the steps taken by the CEAM), in 1931 and 1932 various carburant mixtures based on hydrated alcohol and approved by the Ministry of Agriculture appeared on the market: USGA and Azulina in Pernambuco and Alagoas first launched in 1927; Nog in Campos; Motorina in Paraíba; and Cruzeiro do Sul in São Paulo. Official figures record that by 1932, 19,265.8 liters of álcool-motor (composed of 63.5% alcohol, 36.83% gasoline and 0.12% kerosene and other substances) were produced. In 1933, although the production of álcool-motor dropped to 14,630.8 liters, there was a significant increase in its proportion of alcohol (88.6%) and an accompanying decrease in the proportion of gasoline (11.20%), while the levels of kerosene and other substances rose slightly (0.19%) (see Table 47).

In contrast, the results of the gasoline - 5% anhydrous alcohol mixture were disappointing. In the first place, production of anhyrous alcohol (100,000 liters) began a full two years after the promulgation of

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23(cont.)

> bances in the engine, it was an act of patriotism to confront the general disbelief and criticism, much of it justified (Pereira, 1942: 12).

And Melo adds,

> (T)he gasoline importing firms and companies were reluctant, at first, to accept the alcohol mixture as a carburant. They were afraid that it would be rejected by the majority of consumers, who would continue to prefer the pure substance. This would force them to maintain large stocks of the new fuel until demand for it increased (Melo, 1942: 26).

[24]See footnote 22 above.

the alcohol policy decree (no. 19,717/31) and, secondly, anhyrous alcohol was mixed for the first time with gasoline only in 1934, and even then in a proportion far below that prescribed by law (0.3%). In fact, the volume of anhydrous alcohol delivered for mixing was with rare exception always below the legal minimum (see Tables 43 and 44 and Figure VIII).

Difficulties in producing anhydrous alcohol began with the need to install or expand large modern distilleries. The initiative behind alcohol policy, coming entirely from the government and motivated by anticipated savings in foreign exchange, was insufficient to encourage the usineiros to invest in distilleries to manufacture anhydrous alcohol. At a time of severe depression in the sugar industry, and with the selling price of alcohol undetermined, the government limited itself to setting up, as seen above, a weak system of incentives and penalties for the production and consumption of álcool-motor. Government measures governing specifically anhydrous alcohol were limited to establishing technical standards for its production (Decree no. 20,356/31), granting a prize to the first usina to produce anhydrous alcohol (which was quite insignificant in view of the investment required) within the time limit set in Decree no. 19,717 (Decree no. 21,201/32 Article 1), and authorizing the Ministry of Agriculture to award contracts over a six month period "to private firms, associations, and syndicates for the establishment of usinas for the production of absolute (anhydrous) alcohol" (Decree no. 21,201/32, Article 1). In addition, the already cited advantages of tax exemption and the reduction of freight rates for denatured alcohol were offered for a 15 year period, and, during the

installment phase, material needed to construct usinas was exempted from import duties (Articles 2 and 3).

The difficulty in increasing the production of anhydrous alcohol is reflected in the extensions conceded by the Ministry of Agriculture both for the receipt of proposals for the installation of anhydrous alcohol distilleries (Decree no. 21,848/32), and for the addition of anhydrous alcohol to carburant mixtures (see Decree no. 20,169 of 7/1/31 and Decree no. 21,600 of 7/5/32). By the end of 1932, the government was forced to acknowledge the impossibility of mobilizing the resources of the usineiros with such a weak system of incentives and penalities, and a motivation (saving foreign exchange) which touched only peripherally the interests of this group. Accordingly, the first government measures were adopted to provide resources destined explicitly to increase the production of alcohol. At the same time, álcool-motor and sugar were first officially linked. Decree no. 22,152 of November 28, 1932, authorized the CDPA to utilize a portion of the sugar protection fund to increase alcohol production during 1933. The amount targeted for this end was to be submitted for approval by the Ministry of Labor, Industry and Trade in subsequent years. This measure signals an important change in the allocation of resources and the financing of álcool-motor policies, which would be reinforced in the coming years with the policies to consolidate the domestic market, and the creation of the Sugar and Alcohol Institute.

2.3. The IAA and the Consolidation of the Domestic Market: Fuel Alcohol as an Element of Sugar Support Policies (1933 - 1942)

The Consolidation of the Domestic Market:

Although some writers emphasize the importance of developing a "national carburant" independently from the issue of the sugar crisis in attempting to demonstrate that the "real intention of the government" was both to protect the vitality of the sugar industry and to replace the "foreign fuel" (cf. Pereira, 1942: 15-23 and Melo, 1942: 14), the truth is that after 1933 bolstering the sugar industry came to be the most important issue. Nonetheless, support for the claim that the government's concern about a "national carburant" based on alcohol was always secondary to its preoccupation with the shortage of foreign exchange can be gathered from a speech delivered by Vargas in Recife on September 5, 1933. After referring to the critical situation of Brazilian sugar in view of the international market conditions, the head of the provisional government stated:

> In these difficult circumstances, it is incumbent upon us to find uses for the sugar cane crop other than for sugar ...
>
> The Government's idea is to attempt, here in Brazil, to produce alcohol as a fuel to replace gasoline, a widely consumed foreign product, whose importation creates a drain on gold at a time when it is most needed. The use of our own liquid fuel, which is conventionally called álcool-motor, presents other advantages of an economic nature worthy of mention, such as the creation of a domestic fuel industry and the alleviation of, and perhaps solution to, the crisis in which the sugar industry is floundering.[25]

In this speech, despite referring first to the problems in the sugar sector, Vargas seems to accord priority to the use of *alcool-motor* as a means of saving foreign exchange and only after this names "the other economic advantages": the creation of a Brazilian fuel industry and the protection of sugar.

The nationalistic concern for the development of a "national carburant" based on alcohol would not extend beyond government circles.[26] Rather, nationalistic efforts to achieve self-sufficiency in liquid fuels would, in the following years, focus on finding petroleum, at any cost, within the borders of Brazil. Whether petroleum exploration would be governed by a system of concessions to private capital (Brazilian and foreign), or undertaken under government monopoly became a subject of national debate, dividing not only the government, but also civil society. With the victory of the most extreme nationalistic position, Petrobras was created in 1954.[27]

Leonardo Truda was brought by Vargas from Rio Grande do Sul to serve as one of the directors of the Bank of Brazil, where he came to learn of the chaos plaguing the Brazilian sugar industry. Charged by the provisional government with attending to the crisis in sugar, Truda, in his capacity of representative of the Bank of Brazil, assumed the presidency of the

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[25] Vargas, 1938: 135. Speech delivered in Recife on the 5th of September, 1933.

[26] Interview with Nelson Coutinho on 4/10/1981, and with Nicodemus de Andrade on 6/12/81.

Commission for the Defense of Sugar Production (CDPA), created in late 1931. After a process of trial and error, alcohol, together with the limitation of production, would emerge as an important policy instrument in the price support program for sugar instituted by the CDPA during 1932.[28] Already by the end of that year, with Decree no. 22,152, Truda launched the policy which came to be known as the "consolidation of the domestic market" (política do equilíbrio estatístico). This decree, as explained above, allowed for the use of a portion of the Fund for the Protection of Sugar to expand the capacity of the alcohol industry. In fact, this represented for sugar a self-supporting measure: sugar subsidized the alcohol distilleries, which, by consuming excess sugar (a provision laid down by article 8 of the decree), adjusted the supply to effective market demand (cf. Pereira, 1942: 18). This idea of promoting market equilibrium for sugar with the production of alcohol was to be further developed with Decree no. 22,789 of June 1, 1933, which established the Sugar and Alcohol Institute, and Decree No. 22,981 and its accompanying Regulation of July 25, 1933.

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[27] For a detailed analysis of petroleum as a political issue in Brazil see Gabriel Cohn, Petróleo e Nacionalismo (São Paulo: Difusão Europeia do Livro, 1968), and Mário Victor, A Batalha do Petróleo Brasileiro (Rio de Janeiro: Editora Civilização Brasileira, 1970). John Wirth, The Politics of Brazilian Development: 1930-1954 (Stanford, California: Stanford University Press, 1970) and Peter Seaborn Smith, Oil and Politics in Modern Brazil (Toronto: The MacMillan Company of Canada Ltd, 1976) are also excellent sources.

[28] See pp. 44 and 45 and ff. 11, 12, 13 and 19 above. See also Szmrecsányi, 1979: 172-178.

The main points of the policy for the consolidation of the domestic market can be summarized as follows:

1. The export of sugar surplus, at prices which entailed sacrifices for the producers,[29] was deemed necessary as an escape valve in order to assure the equilibrium of the market and the survival of the sugar industry. It was, however, to be a temporary measure while the means for a more rational and economically sound solution were prepared. These means were:
2. Limiting production to satisfy domestic demand. This would also be transitory, as expressed explicitly in Article 28 of the Transitory Dispositions of Decree no. 22,789/33, until the capacity to stabilize the market and price for sugar on a regular and lasting basis was achieved. This would be brought about by:
3. The transformation of surplus sugar (which would still be generated despite limited production) and sugar cane into alcohol. Because the prospects for expanding the use of alcohol industrially were not promising in the initial phase of industrialization, the solution was sought in increasing the production and consumption of álcool-motor.

Limiting production, which was an essential element in bolstering the price of sugar, met, as discussed earlier, with strong resistance from the Center-South sugar producers, especially those from São Paulo.[30]

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[29]The quotas for equilibrium or for exports imposed on the sugar manufacturers were also called "sacrifice quotas". These quotas, according to Truda, were really "equilibrium quotas" for the internal market. See Truda, 1971: 201-208.

On this subject Truda wrote:

> Protecting the sugar sector was made possible, and can continue producing tangible results ... only if the principle of limiting production remains untouched - a principle which was not easy to concede nor accept, but which has been far more difficult to maintain inviolable; a principle which often meets, even from those completely in agreement with it generally, the constraints of individual cases, which always seem deserving of an exception; a principle which has made the fight tougher, in both the spheres of personal interest and regional interests. (Truda, 1971: 220)

In order to meet this resistance from the sugar producers, Truda waged an intense campaign for them to accept a limitation on production, delivering innumerable speeches and holding conferences in the principal producing centers of the country. The essence of Truda's argument[31] lay in the assertion that limiting production was a necessary but temporary evil. It was necessary because, even at prices which involved great sacrifice, export possibilities could still disappear, given the problem of overproduction afflicting the world sugar market since the first World War. Self-imposed limits became the norm for all producing countries, and the fixing of export quotas as a result of International Agreements among these countries was likely to occur.[32] Moreover, the financial limits of the IAA to subsidize exports

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[30] See pp. 45 and 46, and footnote 19 above.

[31] Truda's arguments are contained in a series of speeches and lectures delivered between 1933 and 1934, and collected in the book A Defesa da Produção Açucareira, published by the IAA in 1934.

were such that Institute resources had to be diverted from the implementation of the final solution to the sugar crisis, that is, the large-scale production of álcool-motor (cf. Truda, 1971: 78-86 and 133-138). Limiting production would be temporary, according to Truda, because it would cease to be necessary after an alcohol industry had been established (which, however, would need time and the producers' cooperation). Truda went on to claim that the limit on production would be temporary to the extent that it was safe to forecast a short-term increase in domestic sugar consumption due to population growth and the country's recovery from its economic depression (Truda, 1971: 130). All in all, he emphasized that what was being proposed was a limit not on the sugar-cane crop, but on the production of sugar. The decrease of sugar was to be compensated for by an increase in alcohol; this was a crucial aspect of the sugar protection policy. In short, limiting production was necessary to

> Eliminate overproduction, which represents a sacrifice for the producer, a loss for the economy, and only apparent and transitory advantages for the consumer. In compensation, the producer is offered the possibility of transforming the excess of raw material, all that is left over the sugar cane crop, into another product of immense importance for the economy - /álcool/. (Truda, 1971: 87)

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[32] In fact, after the breakdown of the Chadbourn Agreement of 1931, a new International Agreement between sugar exporting countries came into effect in 1937, which Brazil joined. For a description and analysis of the International Sugar Agreements until the present, see IAA, 1972: 169-175. For a succinct analysis of the organization of the international sugar market, see Szmrecsányi, 1979: 93-106. The best

The principles of the policy of consolidating the domestic market turned the sugar and alcohol policies into a single policy, with alcohol loseing the relative independence it had enjoyed in the early years of the Provisional Vargas Government, when it was not linked to the sugar industry as an indirect support for sugar. Therefore, government action towards the producers followed a two-pronged course: first, it pressured them to accept the limit on sugar production, and second, attempted to convince them that alcohol was the definitive way out of the sugar crisis. Next, the government would try to interest them in investing in the expansion and installation of distilleries. The willingness of the usineiros to make such an investment would, however, hinge on the extent to which they accepted the principle of limiting production.

The notion of a single policy for sugar and alcohol - with the principle of one being compensatory for the other - would be expressed by the merger of the Commission for the Defense of Sugar Production (CDPA), and the Commission for Studies on Álcool-Motor (CEAM), forming the Sugar and Alcohol Institute (IAA), as well as by this new body's explicit objectives, namely, to implement the policy of consolidating the domestic market, as formulated in Article 1 of the Regulation appended to Decree no. 22,981/33 and further detailed in articles 3 and 4:

> The Sugar and Alcohol Institute ... aims to guarantee the stability of the sugar market, developing, at the same time, both the production and consumption of domestically produced álcool-motor.

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32 (cont.)
source for information and a systematic analysis of the international sugar market and Brazil's participation in it is the work of Omer Mont'Alegre, most of which was published in Brasil Açucareiro, from 1954 on.

In spite of the complementary - or compensatory - aspect of the sugar and alcohol policy, an examination of the two main decrees of this policy reveals more direct action by the State with regard to alcohol. In fact, IAA jurisdiction over sugar retained the same basic instruments for intervention as those exercised under the previous policy:

(1) A tax for the support of sugar. An obligatory tax of three thousand réis on each 60 kg sack of sugar from the usina (Decree no. 22,789/33, Article 10).

(2) Regulating inventory. It was incumbent upon the IAA - as it had been on the CDPA[33] - to stock any sugar produced over the established quota, and to dispose of it either through the domestic market, by exporting it, or transforming it into alcohol, whichever was more advisable according to the price flucutations of the domestic market (cf. Decree no. 22,769/33, Articles 9, 15, 16, and 17; Decree no. 22,981, articles 4, 56, Regulation of the IAA appended to Decree no. 22,981/33, article 2, paragraphs d and e).

(3) Limiting production. The official establishment of production quotas for each sugar mill would begin, as seen above, only many years later, in 1939, with Decree-Law no. 1,130, which would serve as the basis for annual Crop Plans.[34] These became the

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[33] See footnote 11 above.

[34] The Crop Plans, or "Plans for the Defense of Sugar," formulated on the basis of Decree-Law no. 1130/39, annually fixed the national production limit and its distribution among every usina in the country, proportional to their official quotas. These official quotas were revised periodically. The country's sugar production was freed from restrictions on various occasions for differ-

chief instrument for State intervention in the sugar industry. The criteria for fixing quotas would be revised over the course of the following decades.[35] Thus, the important decrees laying down sugar and alcohol policy in this period represent merely one moment in a long process of bargaining between the decision-makers and the sugar producers, in which the limitation on production was perceived to be transitory (cf. Decree no. 22,789/33, Article 28).

As noted, alcohol policy, while previously successful in developing a mixed carburant of several elements based on hydrated alcohol, was largely unsuccessful in its efforts to mix gasoline and anhydrous alcohol in a proportion of 5%. Therefore, not only was an increase needed in the production and consumption of álcool-motor, but, more specifically, a framework had to be devised to implement the gasoline-anhydrous alcohol mixture policy. For this, new instruments were created and existing ones reinforced. The result was an increase and intensification in direct State intervention both in the production and marketing of alcohol.

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34 (cont.)
ent reasons (a liberal outlook on the part of governments, a failure in the harvest, pressure from the usineiros, favorable conditions on the international market), and in other instances was again limited. In any case, changes in policy were always determined by the Crop Plans, which set the parameters for the production and distribution of centrifugal sugar in Brazil, including: fixing the total volume of sugar to be produced and its distribution among the producing regions, among the states in each region, and among the usinas of each state (production quotas); fixing the prices of sugar and of the raw material; setting the onset and the end of the period for milling in each producing zone; and establishing production norms and rules regulating the marketing of sugar. (For a detailed description of the contents of the Crop Plans, see IAA, 1972: 91-97. For a general analysis of the Crop Plans from 1939 to 1975, see Szmrecsányi, 1979: 334-361.)

35 See footnotes 16 and 19 above.

The system of incentives and penalties of the pre-IAA alcohol policy (1931-1933), devised to expand the production and consumption of fuel alcohol, was basically maintained (cf. Decree 22,789/33, articles 5,6, and 7; Decree no. 22,981, article 2 and the Regulation appended to Decree no. 22,981/33, article 68; Decree no. 23,664/33, article 2; Decree no. 23,837/34; Decree no. 24,318/34, articles 2 and 14; and Law 432/37), especially the fiscal incentives for anhydrous alcohol production (Decree 22,981/33, article 2; Regulation appended to Decree no. 22,981/33, article 68). It was acknowledged, however, that between 1931 and 1933, this system of inducement was insufficient for the production of anhydrous alcohol. The Provisional Government failed in a time of crisis in the sugar sector to entice sugar producers to invest in distilleries for the dehydration of alcohol. In this context, the Government opted to produce this type of alcohol itself, with the IAA taking on the task of:

> installing in the most appropriate places large central distilleries for the production and dehydration of alcohol ... (Regulation appended to Decree no. 22,981/33, article 4, paragraph a).

A total of four Central Distilleries were set up in the principal producing areas of the country - Pernambuco, Rio de Janeiro, Minas Gerais, and Alagoas. Raw material (surplus sugar cane, sugar, and molasses) was supplied from the main usinas of the regions which were not equipped to produce anhydrous alcohol.[36] Once the Central Distilleries were installed, these usinas

> will be obliged to deliver raw material, both of the type and amount determined by the Institute, necessary for the functioning of the Distilleries (Regulation appended to Decree 22,981/33, article 36).

State initiative was intended to be complementary to private undertakings not only in relation to the production of alcohol but also in the marshalling of resources. In this vein, the IAA was to:

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[36]Three Central Distilleries were initially planned: one in Rio de Janeiro, one in Pernambuco, and a third in Alagoas. Of the big producing states, São Paulo was excluded, given the great dispersion of its usinas. In this case it was considered preferable to finance private distilleries annexed to the usinas. This was done with great success, as evidenced by the very rapid increase in São Paulo's production of anhydrous alcohol (see Table 28). Rio de Janeiro and Pernambuco achieved similar results, relying on the help of the Central Distilleries, inaugurated, respectively in August, 1938, in Campos - Martins Lage Central Distillery, now Jacques Richer, with a capacity of 90,000 liters per day - and in October, 1940, in Cidade do Cabo - President Vargas Central Distillery, with a capacity of 120,000 liters per day. The distillery planned for Alagoas was not set up at this time because the state producers preferred individual financing, which, as opposed to what transpired in São Paulo, did not produce positive results (see Table 28).

It was not until the late 1950s, as a consequence of the attempts of Gomes Maranhão, then President of the IAA, to promote a return to the principles of the consolidation of the domestic market policy (which had, in practice, been abandoned for some time), as the solution to the cronic overproduction of sugar during that decade that the idea of setting up a Central Distillery in Alagoas was resurrected. In January, 1961, the Central Distillery of Alagoas was inaugurated at Rio Largo, with a capacity of producing 50,000 liters per day.

A fourth Central Distillery, not initially planned, was inaugurated at Ponte Nova, Minas Gerais, in 1951, although its construction had begun in the early 1940s: the Leonardo Truda Central Distillery, with a production capacity of 25,000 liters per day. The distillery materialized as a solution for the sugar cane surplus of the region, which, even with action on the part of the IAA, could not be avoided. Cane mills provided to the region were never utilized. (For an analysis of the Central Distillery issue, see Pereira, 1942: 56-73).

> help financially, by signed contracts, ... with cooperatives, syndicates, firms, or producers who want either to install equipment or adapt existing installations for the production of anhydrous alcohol (Regulation appended to Decree 22,981/33, article 3, paragraph b).

In addition, Truda stressed:

> The Institute preferred not to assume sole responsibility for the task of building the /central/ distilleries of anhydrous alcohol, but rather to undertake it as a joint venture with the producers. The Institute would provide the needed financial resources at such low costs that they would in effect amount to a reimbursement of a substantial part of the taxes collected on sugar production (Truda, 1971: 286).[37]

The provision of resources to develop the álcool-motor industry was another problem identified in the scheme of the previous policy. In fact, between 1931 and 1933, there was no system for channeling resources and financial backing specifically earmarked for the development of that industry. The credit which was made available to the Ministry of Agriculture was restricted to specific aspects of the Ministry's own activities. It was not until the end of 1932 that Decree no. 22,152 made provisions for allocating resources to the expansion of alcohol production, which were resources diverted from the Sugar Defense Fund.[38] The main decree establishing the consolida-

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[37] The directives for this were established by a non-referenced Resolution of the IAA, reproduced in Truda, 1971: 286-289.

tion of the domestic market policy (no. 22,789/33), however, redressed past neglect by creating resources specifically for the development of the fuel alcohol industry:

> In order to execute the measures for the protection of sugar production set up by this decree, such as the support and stimulation of production and the development of anhydrous alcohol, a tax of 3$000 per 60 kg sack is established for all sugar produced in this country's usinas (Decree 22,789/33, article 10).[39]

The Institute was expected to pass revenue derived from this tax on sugar earmarked for the álcool-motor program on to the mill owners, either by financing their association with the Central Distilleries, or by supporting those who, either individually or collectively, wanted to install or adapt distilleries for the production of anhydrous alcohol.

The Institute took more drastic action on the marketing and distribution of alcohol. In the scheme set up by the previous policy, the State, through the CEAM, had acted as an intermediary between the interested parties, ensuring that the gasoline importers received the alcohol produced by the usineiros. In order to solve the problems of mediating between the two groups, especially as far as the purchase and sale of alcohol was concerned, the IAA came to exercise an absolute monopoly

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[38] See p. 64.

[39] Other sources for IAA funds were a tax of $002 (two réis) on each kilo of imported gasoline (Decree 20,356/31), and the profits from the álcool-motor pumps installed by the Ministry of Agriculture in the city of Rio de Janeiro (cf. Szmerecsányi, 1979: 186).

over the marketing of alcohol. In addition to setting the amount of anhydrous alcohol that was to be bought by the gasoline producers each month, and the alcohol quota for each mill, the Institute was responsible for buying all alcohol produced by the usinas and selling it, together with the alcohol produced in its own distilleries, to: (i) gasoline importers, (ii) directly to the public, in carburant mixture, from either the existing álcool-motor pumps, or those that were to be installed, (iii) to the producers of mixtures approved by the Institute, and (iv) to official bodies. The IAA Álcool-Motor Section took on the operations for both the purchase and sale of alcohol, and for its distribution.[40] The Institute was also responsible for fixing the purchase price of alcohol for the usineiros, and the selling price to the gasoline importers, besides the retail price of carburants produced by the importers. Also within its jurisdiction lay the approval of the formulas of the carburants to enter the market, and the control of their sale. In effect, the principal decrees governing alcohol policy in this period conferred upon the IAA near total control over the product, from its production to its sale (in pure or mixed carburant form) to the consumer. This was a range of action far wider than it enjoyed for sugar.

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[40]The Álcool-Motor Section had the distinctive characteristic of being fiscally autonomous. The Section's own resources derived from the difference between the price which it paid for alcohol in the Federal District, and the price for which it sold the product to the gasoline importing companies, a difference of 50 réis per liter.

According to Pereira:

> It makes one think ... that the financial independence enjoyed by the Section, and the special use of its profits, was aimed at making alcohol equal to the regime which prevailed for sugar (Pereira, 1942: 78).

One possible explanation for the lesser role played by the State with respect to sugar is the intense bargaining process which developed between the sugar policy-makers and the representatives of the sugar sector. Unlike alcohol, sugar had an established tradition of private sector industry which had well-defined interests. This was especially visible in connection with the question of limiting production, when this bargaining process between the different interests, as has been seen, delayed the establishment of official production quotas for every individual usina or banguê in the country. Gnaccarini offers another explanation: the self-imposed ideological limits which the policy-makers responsible for intervening in the sugar sector placed on State penetration in the economy (cf. Gnaccarini, 1972: 67). In this case, the more extensive state interference in alcohol can be explained by the lack of interest or resistance on the part of the usineiros to the production of fuel alcohol, which in fact, was closely linked to the question of limiting production, given that they were inseparable and complementary instruments in the policy to consolidate the domestic market. The willingness of producers to invest in the expansion of anhydrous alcohol production, as has been seen, varied in direct proportion to their acceptance of the principle of limiting production. Even after the problem of funding the distilleries had been surmounted, the producers still considered the price paid to them by the IAA for alcohol to be insufficient to cover their costs.[41] Thus, the State penetrated into the alcohol sector to fill the void left by the private sector, which did not come forward in sufficient numbers.

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[41]See Pereira, 1942: 51 and 52.

In so doing, the State performed a role which was to become classic during the process of Brazilian industrialization. The initiative for the alcohol policy, then, would always come from the State: a genuine bargaining process between conflicting interests was never set up. Rather, the process can better be characterized as one of action (by the State) and reaction, or non-reaction (by the usineiros).

IAA as the Center and Locus of Decision of the Sugar and Alcohol Policy

The institutional framework set up in order to implement the sugar and alcohol policy in this period, as discussed above, revolved around the Sugar and Alcohol Institute, a body which was created specifically for this purpose. The IAA, which was the decision-making center for the policy to consolidate the domestic market, was responsible not only for formulating the directives of this policy, but also for implementing them. The Institute also assumed the functions of inspection and promotion of alcohol, which included the authorization of technical assistance to the sugar and alcohol producers. This assistance was actually supplied by the Institute of Technology[42] of the Ministry of Agriculture. The financing was to be handled by the Bank of Brazil, as agreed to in the contract signed by the bank and the Federal Government (represented by the Ministries of Agriculture and Finance) on August 21, 1933, and according to the terms set down by Decree 22,789/33

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[42]The Institute of Technology superceded the Fuel and Mineral Experimental Station. A contract between the IAA and the Institute of Technology, Ministry of Agriculture, signed on September 9, 1933, gave

(article 11) and the Regulation appended to Decree 22,981/33 (articles 45 to 52).

The IAA was to be led by an Executive Commission, composed of eight members: four delegates appointed by the Federal Government to represent the Ministries of Finance, Agriculture, Labor, Industry and Trade, and the bank, or banking consortium, to be contracted (the Bank of Brazil); and four other delegates, chosen by representatives of the usineiros from states whose sugar production exceeded 200,000 sacks;[43] that is, Pernambuco, Alagoas, Rio de Janeiro, and São Paulo. Those representatives of the usineiros who were not chosen for the Executive Commission, together with the representatives of the cane planters from states with an annual sugar cane harvest of more than 160,000 tons,[44] would form the Advisory Council. The representatives of the usineiros and the cane producers would have a mandate for three years, as did the President and Vice-President of the Institute. These Institute officers would be selected from among the delegates who comprised the Executive Commission. It became a tradition that the choice

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42 (cont.)
responsibility to the latter to conduct research projects on the better utilization of alcohol, and related activities, as determined by the Regulation appended to Decree no. 22,981, article 25.

[43]Either a union or association of usineiros of the state, or, in the absence of this, a meeting of the usineiros called by the local government, would draw up a list of three names from which the state government would choose a represenative to go the IAA (cf. Regulation appended to Decree no. 22,981/33, article 6).

[44]The representatives of the sugar cane planters were selected by a process similar to that of the representatives of the usineiros (cf. Regulation appended to Decree no. 22,981/33, article 10).

of the President of the Institute would fall to the delegate from the Bank of Brazil (cf. IAA, 1972: 83. See also Table 55).

Although a large part of the powers of this body were concentrated in the hands of its President, the Executive Commission "helped the President in the management of the Institute," exercised the power to authorize operations relating to the purchase and sale of sugar and alcohol, and prepared and voted on (together with the Advisory Council) the annual budget for the Institute. Through the state delegates, the Commission also had to build a permanent bridge to the producers and planters of the states involved (cf. Regulation appended to Decree 22,981/33, articles 16 and 18). The Commission was to meet at least once a week. The main responsibility of the Advisory Council, on the other hand, was to "present the Executive Commission with any suggestions that in their estimation would be of interest to the sugar and alcohol industries" (cf. Regulation appended to Decree 22,891/33, article 19). In contrast to the Executive Commission, the Council was to meet only once a year, at minimum.

It is clear, then, that the center of decision-making for the policy to consolidate the domestic market was the IAA, and within this Institute, the Executive Commission, whose President, a Federal Government representative, assumed special powers. It should be noted that, whereas the usineiros had formal channels of access to the central locus of decision-making, the suppliers were to be restricted to the Advisory Council, with only a weak link to that center.

In the following years, however, the suppliers, together with the banguezeiros[45] (over whom they enjoyed a better position), were to gain

access to the Executive Commission, with their situation at times improving, at others worsening, vis-à-vis the usineiros, as shown in Table 54. The relative position of each of these groups would oscillate until the promulgation of the Sugar Cane Production Statute (Decree-Law no. 3,855/41), which abolished the Advisory Council and modified the composition of the Executive Commission (as originally set forth in Decree no. 22,789/33). Joining representatives from the Ministries of Finance, Agriculture, Labor, Industry and Trade, and the Bank of Brazil, and four from the usineiros were one representative from the Ministry of Transport and Public Works, three from the suppliers, and one from the banguezeiros. This Executive Commission, on which producers and suppliers together comprised 60% of the delegates, would remain unchanged until 1967,[46] when Decree no. 61,777

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[45]The banguezeiros were owners of engenhos or banguês, which were becoming obsolete next to usinas. The banguês were sugar mills located in areas of small sugar cane crops. The raw material was brought to the mill by slow, inefficient means of transportation. The banguês used primitive techniques, producing only brown sugar with little and imperfect crystallization. They were replaced by usinas with far more complex industrial methods which permitted them to make better use of the raw material, and to have greater milling capacity. The usinas manufactured white sugar, usina type, demerara sugar (raw sugar) and refined crystallized sugar. Few banguês were able to transform themselves into usinas, leading to a situation whereby "the old, respectable senhores de engenhos, with their ostentatious lives," were turned into merely "suppliers of sugar cane to the usinas established in their regions" (Nobre de Lacerda, without reference, apud. IAA, 1972: 107).

For a brief description of the supersession of the banguês by the usinas, the production techniques, and their development, see IAA, 1972: 101-109. For a description of the social and economic transformation which accompanied the replacement process, especially on the national level, see Dé Carli, 1942: 16-19.

[46]The increase in the formal representation of the sugar producers and sugar cane suppliers on the Executive Commission of the IAA fixed by

restructured the IAA. The composition of the Commission, which came to be known as the Deliberative Council (CONDEL), was again revised, this time in favor the the government bureaucracy, whose representatives were increased to 55% of the total number of delegates. This reversal in the relative position of the two groups within the Commission was maintained from this point on, consistent with the preference accorded to technocrats in the development model adopted in 1964.[47]

The influence of the producers, and to a lesser extent of the suppliers, over the policies of the Institute was and remains today admitedly significant, even after the reduction in 1967 in the number of their delegates. This is true both at the formal and informal levels. Besides having delegates on the Executive Commission, the producers are assured of another formal means of access to Institute decision-making through pleas, which can be lodged at any time of year on any subject regulated by the IAA. Pleas are normally entered by an individual producer or by representative associations, depending on whether the problem is specific to one usina or has wider applicability.

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46 (cont.)
the Statute would be offset by an increase in the concentration of power in the hands of the President of the Institute and the greater weight assigned to the votes of the ministerial delegates (see pp. 92,93).

47 To the two representatives of the usineiros and the two of the suppliers (established by Decree no. 61,777/87), was added a representative from the National Confederation of Agriculture (CNA) (Decree no. 63,013/68). This latter was replaced for a brief period by a commission made up of the representative from the CNA, a representative from the National Confederation of Industry (CNI), and one from the National Confederation of Trade (CNC) (Decree no. 63,491/68). In 1969, the representatives of the usineiros and suppliers returned to their former situation, and another representative of the government bureaucracy, from the Ministry of Foreign Affairs, was added (Decree no. 66,034).

Normally, they are submitted in writing to the President of the Institute. Yet another forum for participation is the meetings of the Executive Commission. Joining the delegates from the states represented on the Commission, non-voting representatives from the states which were not chosen were invited by the President to express their views about the items on the agenda. This became common practice, formalizing, to a certain extent, an informal representation of interests. Today this custom has been discontinued, and the representatives of states which have no formal delegation to the Institute are permitted merely to observe the debates.[48] Finally, personal contacts and patronage serve as informal means of access to the decision-making process for producers and suppliers.[49]

Both the formal and informal means of access to the administration of the Institute are used extensively immediately preceding the approval of each Crop Plan by the Executive Commission and its successor, the Deliberative Council. Over a period of time it became standard practice for the President to invite representatives of producers and suppliers to examine the draft of the Plan one week before its approval.

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47 (cont.)
The final modification took place in 1978, when the Ministry of Mines and Energy also gained representation on the CONDEL (Decree no. 8,149). See Table 54.

[48]Interviews with Nelson Coutinho on 4/10/81, Elizabeth Serôdio de Carvalho on 4/13/81, and Nicodemus de Andrade on 5/18/81.

[49]For an analysis of the practice of patronage and even corruption within the Institute over time, see Numberg, 1979, pp. 88-96. Numberg interprets this phenomenon as a result of the bureaucratic dilemma of the IAA in needing to extend its regulatory power over the sugar community while depending on its support to implement its policies, and also

There would then follow a period of intense discussions, during which strong producer lobbies would be formed.[50]

The consolidation of the formal representation of the suppliers at the center of decision-making of the sugar and alcohol policy with the promulgation of the Sugar Cane Production Statute serves as evidence for what Numberg called the "implicit objective" of the IAA. In addition to its explicitly defined objective to execute the policy to consolidate the domestic market and protect the sugar industry as a whole (cf. Decree nos. 22,789/33, 22,981/33, and the appended Regulation), the Institute also acted as an intermediary among the conflicting interests of the many groups comprising the sugar community, and, at the same time, protected the economically weaker groups, the Northeast producers, from the encroachment of the Center-South,[51] and the sugar cane suppliers and the rural workers against the producers (cf. Numberg, 1978: 53-54). The role of the IAA as intermediary between conflicting interests and as the "protector of the weak" are well exemplified by the fight for the promulgation of the Statute. In this case, embodying a conflict of interests between the producers and the cane suppliers, the IAA represented the interests of the suppliers before the producers. Despite an intense process of bargaining between the sugar producers and the Institute, the final version of the Statute conferred great powers of intervention in the sugar cane sector upon the IAA, in order to pro-

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49 (cont.)
as symptomatic of the existing system of patronage at the national level. The author further shows that the Institute was especially sensitive to the influence of the northeastern usineiros.

[50]Interview with Nicodemus de Andrade on 5/18/81.

tect the suppliers.[52] Yet, the Statute was considered by many observers to be implemented only partially in relation to sugar cane suppliers, and it was unanimously recognized to be a total failure in the case of the rural worker. The sections of the legislation referring to this social group were vague and never implemented. The President of the IAA himself admitted at the time that the rural worker in fact was not the principal objective of the Statute (cf. Numberg, 1978: 74). All in all the usineiros and cane suppliers interests superseded the State attempt to protect the rural workers.

As noted, the decision-making center of the institutional framework set up to implement the policy to consolidate the domestic market was, until this time, the IAA, which in turn was controlled by its Executive Commission, with a large part of the power of decision concentrated in the figure of the President. Through formal and informal channels, the sugar producers and sugar cane suppliers, the target groups of the policy, exerted influence on the decision-making center. Yet, with regard to alcohol questions remain about the inter-agency relationships of the established institutional system, as well as the relationship between the agencies and the target groups of this policy. It is important to stress that in contrast with the scheme of the policy during the years 1931-33, the decision-making was concentrated practically exclusively in one agency, the IAA. This avoided the division of the decision-making process under the earlier scheme between the Ministries of Agriculture and Finance,[53] which in

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[51] For an analysis of the actions of the Institute specifically in connection with the protection of the Northeast, and its responsiveness to the influence of the northeastern usineiros, see Numberg, 1979: 81-96.

[52] See footnote 18 above.

[53] See pp. 59, 60.

effect meant that the parameters of action for the gasoline importers and the alcohol producers were set up by two separate bodies only tenuously linked to one another at the formal level of the alcohol policy.[54] Under the new scheme, however, whereas the basic parameters for action by the target groups of this policy were set up only by the IAA, in fact the financial agent assumed specific and independent powers, becoming responsible for not only collecting but also allocating the resources of the sugar and alcohol program (cf. Decree 22,789 articles 12 and 13). The intervention by the financial agent, the Bank of Brazil, in the policy to consolidate the domestic market could be limited only by the Executive, which passed judgement on the terms of financing for sugar and alcohol contracts agreed upon by the Bank and the Ministries of Finance and Agriculture. Thus, the Bank of Brazil enjoyed considerable bargaining power in the formulation and implementation of the sugar and alcohol policy. It constituted a parallel power to the Institute, controlling all resources earmarked to finance this policy as well as those necessary for the functioning and operation of IAA itself (cf. Regulation appended to Decree 22,891/33 article 48). This bargaining power was enhanced further by the fact that the Bank, unlike the Institute, acted independently of pressure groups (usineiros, alcohol producers, sugar cane suppliers, gasoline importers, and consumers) attempting to influence decisions in their favor. It was for this reason that the choice of President of the Institute for many years tended to fall to the representative of the Bank. In the words of Barbosa Lima Sobrinho:

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[54]This formal relation was at the technical level, referring to the approval and inspection of the formula of the type of carburant to be produced (see p. 57).

> The President was, as a rule, the delegate from the Bank of Brazil. As the representative of that institution, by virtue of the financial contracts between the Bank and the Institute, he could easily veto resolutions of the Executive Commission which involved the financial interests of the Bank (Barbosa Lima Sobrinho, 1946: 14).

In 1938, this process of independence in relation to the central agency was complicated by the creation of the National Petroleum Council, an agent which would come to hold significant bargaining power in the alcohol policy, to the point of making it unviable in the late fifties.

The Deepening of State Intervention in the Sugar Sector

With the advent of the Estado Novo, state intervention in the political, economic, and social life of the country became very marked. The sugar cane sector was no exception. Gnaccarini claims that, at this time, a change occurred in the sugar policy to the extent that the idea of dirigismo econômico was accepted ideologically (cf. Gnaccarini, 1972: 81). It is true that until then both Truda's rhetoric and the pertinent legislation considered the limiting of sugar production (a crucial aspect of state intervention in the sugar industry) to be temporary.[55] In December 1937, however, Truda was replaced as President of the IAA by the Vice-President, Andrade de Queiroz. He was soon superseded by Barbosa Lima Sobrinho, who remained in the post of

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[55] See article 28 of the Temporary Dispositions of Decree 22,789/33, and article 50 of the Regulation appended to Decree no. 22,981/33. For Truda's ideas on the temporary nature of the controls on sugar production, see Truda, 1971, especially pp. 250-252 and 255.

President throughout the entire Estado Novo (see Table 55). The impact of these changes was soon felt.

Perhaps the most important aspect of state intervention in the sugar sector during the Estado Novo was its independence from the decisions of the common courts. In this respect Andrade de Queiroz clearly favored state intervention, fearful that

> The limitation of sugar production, by going through the common courts, will perhaps be fundamentally undermined, and become incapable of halting the crisis which this speech demonstrates, and even proves.[56]

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[56]Speech by Andrade Queiroz, Minutes of the Executive Commission (15th), April 20, 1938. Apud. Dē Carli, 1940: 90.

The following is the complete quotation by Andrade de Queiroz speaking on the producers' resistance to the limit on sugar production from which the above was excerpted:

> (F)rom all appearances, they intend to resort to the judicial system. Without wishing to cast dispersions on our judiciary, I am forced to acknowledge, along with various other authors, the danger that this represents for the defense of the sugar sector.
>
> It is common practice in the courts, when rendering decisions on an economic matter, to create extremely difficulty situations for governments. It is a phenomenon that one author recently described as "a contradiction between economic realities and the strictness of the judicial framework for interpretation" (Tchernoff, Ententes Economiques et Financiēres, 1933).
>
> This being the case, in countries where the economy is modernizing, special law courts are being organized to keep pace with new conditions which demand new solutions. In our ranks, this tendency is apparent in various sectors: fiscal, with the Contributors' Council; labor, with the National Labor Council; and Special Justice, in the process of being organized, etc.

Following the speech by Andrade de Queiroz, Decree Law 576/38 was promulgated. In its article 3, it stipulated that IAA decisions concerned with production quotas, including their transference to other usinas, were "first in the exclusive jurisdiction of the President of the Institute, and secondly, of the Executive Commission, by unanimous vote." It further established that appeals against IAA resolutions could be directed only to the Ministry of Agriculture, and, as a last resort, to the President of the Republic, with "no other body or authority having the right to deliberate upon this matter.[57] Moreover, Decree Law 644/38 extended the control of the IAA over the refining of sugar destined for domestic consumption.[58] Finally, one should recall, in 1939 the sugar quota for each sugar mill in the country was finally set (decree no. 1,1130/39), after which the Crop Plans were drawn up on an annual basis. This constituted, as was seen, the policy tool par excellence for state intervention in the sugar economy.[59] Also in 1939, Decree Law 1,831 consolidated the norms for the control of the sugar economy, and, in article 82, chapter XII, conferred upon the IAA a monopoly over the export of sugar.

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56 (cont.)

> The limitation on sugar production, by going through the common courts, will perhaps be fundamentally undermined, and become incapable of halting the crisis which this speech demonstrates, and even proves.

[57]This last part was revoked by Decree Law 1130/39.

[58]In Decree Law 644/38, the sugar refineries were brought under the inspection of the IAA, which also extended its control over the refining and processing of raw sugar in engenhos. The Institute was

The Sugar Cane Production Statute (Decree Law 3,855/41) was the culmination of the intervention by the Estado Novo. This Statute extended government intervention to the commercial and social relations between the usineiros and the sugar cane planters by regulating the supply and use of cane by the usinas; setting the price and form of payment for delivered cane; distributing between the mill owners and the planters the cost of a possible limit on production and the benefits of a possible expansion; and fixing norms for production assistance, as well as maxims for the resolution of litigation between the mills and their suppliers.[60] As has already been seen, the Statute also established a means of access for the suppliers (and banguezeiros) to the Executive Commission at the same time it abolished the Advisory Council. In a further modification in the center of decision-making in the IAA, the President of the Republic now assumed from the head of the state government the responsibility to nominate the representatives of the usineiros, sugar cane suppliers, and banguezeiros to the Executive Commission (article 162). The President of the Institute was given not only the right to vote as a member of the Executive Commission but also the deciding vote in the event of a stalemate (article 164)

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58 (cont.)
given the additional responsibility of setting up and operating refineries, as well as control over the National Sugar Mill Company, with refineries throughout the country (Szmerecsányi, 1979: 196).

[59] See pp. 72, 73 and footnote 34 above.

[60] To enforce these rules, Conciliation Commissions were formed (made up of one representative for the suppliers and one for the producers, and presided over by an Institute official chosen by the President), which were affiliated with the Regional Commissions of the IAA. Also established for this same purpose was the Judgement Section (made up of one representative of the suppliers and one of the usineiros,

as well as the power to veto the decisions of the Commission not passed by the majority of the delegates from the Ministries. In other words, accompanying the formal increase in the representation of the sugar producers and cane suppliers came an increased concentration of decision-making power in the hands of the President of the Institute, privileges for the ministerial delegates, and even the transfer to the Executive branch of the final choice of who was to represent the sugar industry.

While there is no doubt that the IAA's power to intervene in the sugar economy grew extraordinarily during the period of the Estado Novo, a different picture emerges in relation to alcohol. As has been seen, the main decrees setting forth the policy to consolidate the domestic market were strongly interventionist in relation to the alcohol policy (the same not being true for sugar), therefore leaving little room for an increased state presence. In fact, few pieces of legislation governing alcohol were filed in this period, and the majority of those which were filed concerned the regulation of aspects of this policy not covered by the principal decrees.[61] While government inter-

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60 (cont.)
and presided over by a commissioner from the Ministry of Agriculture) which was linked to the Executive Commission. The Judgement Section was meant to serve as an organ of ultimate appeal against decisions rendered at the lower two levels (cf. Decree 3,855/41, Title VI, Chapter II).

[61]For the period until the repercussions of the Second World War were felt in Brazil (beginning in 1941) which brought a concern over liquid fuels, the following pieces of legislation should be mentioned: Decree Law 23,837/34, which obligated official cars to use álcool-motor (reinforcing previous legislation); Law 432/37, which exempted from import duty material to manufacture barrels, containers, tanks and tankers destined to store and transport anhydrous alcohol (which represented one step forward in relation to the former legislation which had allowed for the exemption of customs duties for importing barrels and containers);

vention in alcohol policy remained essentially unaltered, the entrance of a new bureaucratic body onto the scene, the National Petroleum Council (CNP), would come to weaken the decision-making power of the IAA, and bring important modifications to the scheme of the policy.

The Institute of Sugar and Alcohol and the National Petroleum Council Conflicts over the Fuel Alcohol Policy

The CNP represented a first attempt to solve the oil question. As has been mentioned, this question became a highly politicized issue nationwide, which was to mobilize and divide the country for more than 2 decades. The fact that oil was chosen in the thirties to achieve self-sufficiency in liquid fuels set a definite limit on the fuel alcohol policy. This policy was able to develop only to the point that it was not prejudicial to the oil policy, a fact which can be observed in the following decades. This "veto power", so to speak, of the oil policy over the alcohol policy, was embodied in the CNP. Though not always explicitly established by law, the Council assumed de facto control, over a period of time, over fundamental aspects of the alcohol policy, such as the price of anhydrous alcohol and the proportion of this product in mixture with gasoline.

The CNP (which was established by Law no. 538, of July 7, 1938) was responsible for issuing the rules which regulated the supply of petroleum and its products. Although there was no explicit reference

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61 (cont.)
Decree-Law I582/39, which extended and altered the contract with the Bank of Brazil for the financing, support, and defense of sugar and alcohol; Resolution no. 3/39 of the IAA, which regulated the presentation

to alcohol, the preamble of Decree-Law no. 737 (which was promulgated shortly thereafter on September 23, 1938) reveals the repercussions of the creation of the CNP on the alcohol policy:

> (considering that) this organ /the CNP/ is charged with the management of all the legal dispositions and regulations governing the country's supply of oil, including any decisions as to the nature and quality of its refined products, and with the judgement as to the advisability of adding anhydrous alcohol in various cases (author's emphasis).

This decree[62] is the only one in this period to refer to the question of the proportion of alcohol in the carburant mixture. It does not, however, define precisely the hierarchy of authority of the IAA vis-à-vis the CNP in connection with this question. In fact the text of the decree determines that the gasoline producers are obliged to add domesticaly produced anhydrous alcohol to gasoline whenever appropriate, and in a proportion to be settled (article I) by mutual agreement between the CNP and the IAA (article 2). Although the text of the decree places the two bodies on the same level for decisions establishing the proportion of alcohol in the carburant mixture, the decree's preamble presupposes that the CNP holds the ultimate power of decision on this question. This asymmetric power relation between the

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61 (cont.)
of projects for the financing of distilleries; Decree-Law I98/40, which obliged the owners to install automatic meters in the aguardente and alcohol factories in order to record the amount produced; and Decree-Law 3,494/41, which further detailed the previous decree.

62 The aim of Decree 737/38 was to extend the obligation to mix anhydrous alcohol and domestically produced gasoline, given that with the commencement of operations in 1938 of the Mataripe refinery came expectations of a growth in the refining capacity of the country.

two bodies became quite clear in 1941, when, as it had done in previous years, the IAA altered the proportion of alcohol to be acquired by the gasoline importers[63] for mixture with gasoline to 20% (unnumbered resolution of the IAA of February 21, 1941).[64]

Decree-Law 737/38 made no reference to the process of price determination for alcohol. Decree 538/38 (which created the CNP) stipulated that the CNP, whenever it was considered appropriate, would set the maximum and minimim prices for the sale of refined products (article 10). Accordingly, in reference to the mixture, the CNP had authority to fix the price of gasoline, but not that of alcohol. This authority for this lay, by law, with the IAA (Regulation appended to Decree 22,981/33, article 3, paragraphs i, j, and k). However, despite the fact that the IAA retained some say in the price of alcohol, various incidents suggest that this authority had in fact been usurped by the CNP.[65]

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[63]Whereas decree no. 737/38 referred to the gasoline producers, the other pieces of legislation of the period concerned with the obligation to mix alcohol and gasoline referred to the gasoline importers. An explanation may be that although the aim of decree 737 was to extend the requirement to mix alcohol and gasoline refined in the country at that time, domestically produced gasoline was insignificant, and moreover, refined far from the alcohol distilleries (in Bahía). This legislation, therefore, in reality applied only to the gasoline importers.

[64]This episode unfolded according to a general pattern which, in the absense of legal norms, evolved to determine the level of alcohol to be added to gasoline which gasoline importers were obligated to purchase. The Presidents of the CNP and the IAA reached agreement on the amount of alcohol to be mixed, and following from this, calculated the corresponding proportion of the gasoline to be supplied by the importers which this level of alcohol represented. Finally, the proportion was then determined by an IAA Resolution directed to the gasoline importers which came into effect after being agreed to by the CNP (see the Minutes of CE/IAA, February 21, 1941).

Between 1933 and 1938 the Institute maintained the price of anhydrous alcohol stable at Rs. $900. In 1939, however, the CNP, which had come into being the previous year, increased the price of gasoline because of the effects of the war. The Supply Commission of the Federal District (the body in charge of controlling the retail prices of basic goods in wartime) calculated the price of the carburant mixture incorrectly, "as if both fuels, gasoline and alcohol, had increased in price, which was not the case with the latter" (Pereira, 1942a: 353). The IAA, judging that the reigning price for a liter of alcohol, Rs.$900, was insufficient to stimulate an expansion of the fuel alcohol industry, calculated an increase for alcohol. The carburant distributors, when informed of the new price, protested to both the IAA and the Supply Commission. The President of the Institute then contacted the President of the CNP, seeking a favorable solution. The final solution was, however, frankly unfavorable to the Institute: while the Commission did recognize its error in calculating the price of the carburant mixture, it did not accept the price increase for alcohol. Rather, it lowered the price of the mixture, declaring that it was inappropriate for the IAA to have taken the initiative in increasing the price of alcohol without previously consulting the CNP, the body recognized by the Commission to exercise this authority. The IAA communicated its complaints to the CNP.

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[65]Most of the information summarized here concerning the struggle between the IAA and the CNP over setting the price of alcohol is contained in the Minutes of the Executive Commission of the IAA during the period from October 1939 to July 1942.

In 1941 a new deadlock appeared between the two bodies over the price of alcohol. In this case the CNP, when adjusting the price of gasoline, adjusted the price of the mixture and that of alcohol as well, without any prior consultation with the IAA. The weakness of the Institute's position was manifested in the type of protest it lodged against the Council: it did not dispute the authority of the CNP over a subject legally within the jurisdication of the Institute, but objected to the consequences of the CNP making this decision by itself. The IAA complained of its embarassment before alcohol producers when it was unable to explain the difference between the price of alcohol delivered to the pumps and that sold to the public, as well as the lack of relation the final price of the mixture bore to the change in its alcohol content. This apparent favoring of the gasoline distributing companies, the Institute went on to argue, was already provoking the alcohol producers to resist supplying their product to those companies. The IAA claimed it was powerless in this situation as it was ignorant of what share of the final price of the mixture represented profits and what represented the general costs incurred by these companies. By using its principal weapon against the CNP, the dissatifaction of the alcohol producers during time of war when the shortage of fuels was a major national concern, the Institute was able to obtain a slight increase of Rs.$050 per liter of alcohol. This modest increase was still considered insufficient to compensate alcohol produced directly from sugar cane, "the only way of expanding production rapidly" (Pereira, 1942a: 15).

Finally in 1942, probably as a function of the pressures brought on by the war, the IAA was authorized by Decree Law no. 4,382 to fix

the purchase price of alcohol (article I) and, in agreement with the CNP, the retail price of álcool-motor at the public pumps (article 3). In other words, the authority of the IAA to fix the selling price of álcool-motor was restricted to the public pumps. In any case, the IAA did manage to increase the purchase price of anhydrous alcohol, as set down by the 1942/43 Crop Plan (approved by a Resolution of the Executive Commission dated June 24, 1942). The price of alcohol established differed according to the origin of the raw material used, to assure parity between the prices of alcohol and sugar (Pereira, 1942a: 15).

After the war the wheelings and dealings continued between the IAA and the CNP over the proportion of alcohol in the mixture and its price, until the late fifties, by which time the CNP had achieved clear predominance in these matters, as will be seen below.

Evaluating the Fuel Alcohol Policy as a Support for Sugar

A few observations should be offered as an evaluation of the alcohol policy as an integral part of the sugar production policy of the period from 1933, when the Sugar and Alcohol Institute was established, to 1942, when the turmoil of the war made itself felt in a way which was significant for Brazil.

It has been demonstrated that the policy tools adopted for the period 1931-33 (basically a system of incentives and penalties directed at both producers and consumers) were sufficient to expand the production of a carburant mixture of multiple elements based on hydrated alcohol. The same was not true of the blend of gasoline and 5% an-

hydrous alcohol. The expansion of the production of anhydrous alcohol, which performed better in the car engines, demanded considerable investment on the part of the usineiros at precisely a time of grave sugar crisis. The basic motivation for the alcohol policy of this period (avoiding a drain on foreign exchange) had hardly any effect on the usineiros, especially when one considers that the price of alcohol and the guarantee of a market were not adequately solved.[66]

In 1933, with the policy to consolidate the domestic market, the government, through the newly created Sugar and Alcohol Institute and its President, Leonardo Truda, set out to convince the producers, in an arduous process of discussions and bargaining, that the immediate remedy for the grave sugar crisis lay in limiting production and expanding exports, and, its long-term solution in transforming excess sugar cane and sugar into alcohol.[67] As has been seen, the usineiros strongly resisted State intervention in the sugar industry, and accepted production quotas for the usinas only in 1939. Their willingness to invest in alcohol production would vary in direct proportion to their acceptance of the principle of limiting production, or, in other words, the acceptance of the consolidation of the domestic market policy as a whole. In short, the effectiveness of the instruments set up for the expansion of alcohol production as a part of the policy to consolidate the domestic market depended upon the degree of doubt, if not outright resistance, the usineiros displayed toward alcohol as a solution to the sugar crisis.

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[66] See pp. 63, 64.

[67] See pp. 68, 69.

The resistance to alcohol did not, however, originate exclusively from producers. The use of alcohol as a fuel would also meet with the resistance of consumers -- fearful of the effects of alcohol on the engines of their vehicles -- and consequently from the gasoline importers, who were obliged by law to mix alcohol to the gasoline they distributed. The IAA responded to the consumers' "lamentable discrediting of álcool-motor" with an intense campaign (waged through the Álcool-Motor Section) directed at consumers to counteract this perception and increase the use of the carburant mixture. In addition to commissioning technical studies on the effects, advantages, and disadvantages of the use of álcool-motor in internal combustion engines from the recently created Institute of Technology of the Ministry of Agriculture and largely publicize the results of the studies,[68] the IAA also waged an intense publicity campaign on behalf of the national carburant aimed at public corporations and offices, offering it on all public bidding.[69]

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[68]Studies and experiments were developed during this time over a six year period by the engineer Eduardo Sabino de Oliveira in the laboratories of the National Institute of Technology and the Polytechnic School of São Paulo on the effects of álcool-motor (with different proportions of alcohol and gasoline) on internal combustion engines. The results of his experiments were published by the IAA in 1942 in the form of a book, O Álcool-Motor e Motor à Explosão. Sabino de Oliveira concluded that:

> The 10% alcohol mixture is equivalent to an improved gasoline, exhibiting all the good qualities of gasoline plus the further advantage of being more resistant to detonation (engine knocking). This permits the optimal use of engines, as it produces a slight increase in engine power and a clear decrease in consumption in certain favorable cases (p. 295).

[69]Similarly, Decree no. 23,837/34 reinforced the earlier legal document obliging official cars to use álcool-motor.

Apart from the resistance of the producers to alcohol as a solution for the sugar problem, and the consumers to the use of álcool-motor, another snag which the policy encountered was the price paid to alcohol producers, which they considered insufficient to cover their costs (cf. Pereira, 1942: 51, 52). This question, left unresolved by the previous alcohol policy in effect from 1931-1933, could not be settled by the consolidation of the domestic market policy either. Recall the repeated attempts by the IAA to raise the price of alcohol which had limited success, each time meeting with the opposition from the CNP which, in the final analysis, controlled the selling price of the carburant mixture and, consequently, of the alcohol in the mixture.

The Government did take a series of decisions aimed at redressing the problem of resources needed for the implementation of the policy of mixing gasoline with 5% anhydrous alcohol, which had been the biggest problem in the policy structure of the period 1931-33. It decided to: (1) allot resources specifically to the alcohol program; (2) become a producer by setting-up central distilleries; and (3) finance the establishment of private distilleries by the usineiros acting either individually or in association, as well as offering to finance 50% of the capital necessary for the participation in the installation of the central distilleries. The Government intended to mobilize the producers to invest in the expansion of alcohol production in such a way that its own participation would be complementary to private initiative.

The IAA could not obtain the collaboration of the usineiros for the central distilleries; the producers from the states of Pernambuco,

Rio de Janeiro, and Alagoas had abandoned the idea of participating after the initial contacts (cf. Pereira, 1942: 59). This possibility had, however, already been foreseen by the Institute, as expressed in the final paragraphs of the IAA Resolution on the financing of private individuals with 50% of the capital necessary for the installation of central distilleries:

> It is clear that, in the event the Institute is not able to obtain the cooperation of the producers to carry out the aforestated plan, the resolution referring to the installation of central distilleries will not be altered, but, given this situation, the Institute will take upon itself the onus and duty, as well as the benefits, of the installation and operations of these establishments.[70]

Thus, as has been seen, between 1938 and 1961, the IAA, on its own, installed central distilleries in Rio de Janeiro, Pernambuco, Minas Gerais, and Alagoas.[71]

The producers, however, criticized the economic and energy efficiency of the central distilleries, which compared unfavorably with those annexed to the usinas, and demanded more resources for the latter. The Institute answered these criticisms with appeals to the common good: the equitable utilization of the surplus from all usinas, it argued, supersedes the arguments of the greater efficiency and lower costs of the annexed distilleries.[72]

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[70] IAA Resolution, no reference. Apud. Truda, 1971: 289.

[71] See footnote 36 above.

[72] On this subject, see especially the defense of the central distilleries by Barbosa Lima Sobrinho in his Final Report on leaving the Presidency of the Institute. (Barbosa Lima Sobrinho, 1946: 322-329.)

The cost of financing the private distilleries vis-à-vis the resources spent on the construction of the central distilleries until 1941 can be seen in the following chart:

Central Distilleries

Construction Cost:

Central Distillery of the state of Rio de Janeiro	21,322:491$850
"Presidente Vargas" Central Distillery	26,354:121$183
Ponta Nova Central Distillery	4,395:669$100

Purchase Cost:

Bahia Central Distillery - Santo Amaro	1,623:612$800
	53,695:894$933

Financing of Private Distilleries

Cia. Geral de Melhoramentos em Pernambuco S/A - Usina Cucaú	613:329$600
Cia. Industrial Paulista de Álcool S/A	1,444:012$800
Destilaria dos Produtores de Pernambuco S/A	1,522:826$550
Destilaria da Usina Santa Teresinha S/A	3,534:041$600
Usina Brasileiro S/A	2,853:534$000
Usina Catende S/A	2,811:405$800
Usina Tiuma	2,750:000$000
Usina Central Barreiros	210:000$000
	15,741:150$351
Total	69,437:045$284

Source: IAA, apud. Melo, 1942: 36-37.

It is evident that the cost of financing the private distilleries corresponded to 22.7% of the total resources used for the expansion of alcohol production. The majority of firms benefitting from government financing were located in Pernambuco.

The private distilleries, despite their relatively modest allocation of financial resources, played a significant role in the expansion

of anhydrous alcohol production. Whereas in 1933 there was only one anhydrous alcohol distillery in the country -- annexed to the Piracicaba usina in São Paulo, with a production capacity of 100,000 liters -- in 1940 there were 35 private distilleries and two central ones producing a total volume of 53.5 million liters of anhydrous alcohol, of which 85% was produced in the private distilleries. In 1942 the overall total from both types of distilleries reaching 82.2 million liters of anhydrous alcohol. From that year on, production fell as a result of the difficulties created by the war in importing dehydrating agents; it began to expand again in the post-war period (see Tables 26 and 28).

Pernambuco, Rio de Janeiro, and São Paulo all rapidly increased their production of anhydrous alcohol. In 1940, Rio and São Paulo's production was roughly comparable (15.7 and 15.2 million liters respectively), while Pernambuco produced 18.0 million liters. Whereas Rio de Janeiro and Pernambuco benefitted from the production of the central distilleries and Institute financing for the usinas for the installation of annexed distilleries, São Paulo relied exclusively on individual and state government financing, in large part because its usinas were too dispersed to take advantage of state incentives. Alagoas producers, like their counterparts in São Paulo, opted for individual financing over the central distillery planned for that state by the IAA, but, unlike in São Paulo, this was largely a failure, with the number of anhydrous alcohol distilleries and the volume of production more or less stagnating (see Table 28). Thus, "Alagoas, one of the four big sugar proudcers, was left behind in the production of alcohol, being relegated to an inferior position which was inconsis-

tents with its position within the sugar industry" (cf. Pereira, 1942: 59, 60).

Thus in spite of all the difficulties that have been pointed out, there occurred a rapid growth in the country's anhydrous alcohol production. The production of álcool-motor expanded rapidly, increasing from about 14,6 million liters in 1933 to 462.5 million liters in 1941. The only significant fall in production, about 19% in 1937, was due to the decrease in Northeastern sugar production following the harvest losses sustained in the region during the 1936/37 growing season (cf. Table 47). Moreover, the substitution of the gasoline-anhydrous mixture for the blend of multiple elements is also clearly shown in an analysis of Table 47. In general, until 1940 (again with the exception of 1937), whereas the proportion of alcohol (anhydrous and hydrated) in the mixture decreased, that of gasoline increased. The addition of kerosene and other substances to álcool-motor also tended, on the whole, to decrease, with the noticeable exception of 1937 when kerosene reached its peak for the above mentioned reason. While no separate data on the volume of anhydrous alcohol (disaggregated from hydrated) used in mixture is available, it can be noted that whereas the mixture based on hydrated alcohol needed a high proportion of that product in order to remain stable, this was not true of the gasoline-anhydrous mixture. Therefore, the decrease in the total proportion of alcohol in the álcool-motor produced suggests there was a decrease in the proportion of hydrated and an increase in the use of anhydrous alcohol. In addition, available information on the volume of anhydrous delivered for mixture reveals this level to differ from the quantity effectively mixed by only the variation in stocks retained by the gaso-

line companies. If it is assumed that the companies were not interested in maintaining large stocks of the anhydrous alcohol they were obliged to buy, then the volume of this type of alcohol delivered for mixture will serve as a crude gauge of the proportion of anhydrous alcohol actually mixed. By this measure, the volume delivered shows a tendence to increase in relation to the total volume of álcool-motor produced until 1943, after which it decreased during the remaining war years because of the difficulty of importing the dehydrating agents. Using the total of alcohol (anhydrous and hydrated) actually mixed as a guide also shows that the proportion of anhydrous grows quickly after 1934, from 7.6% in that year to 63.3% in 1936, and subsequently levelling off at approximately 75% until 1941, after which it begins to fall. It can thus be safely concluded that, until the war, anhydrous alcohol increasingly replaced hydrated alcohol in the carburant mixture.

However, an examination of Table 43 indicates that the legal quota of anhydrous alcohol fixed by the IAA was never reached. While at first glance it appears that this would not bode well for fulfilling the objectives of the gasoline-anhydrous alcohol policy, in fact the quota of 5% anhydrous alcohol which the gasoline importers were obliged to buy in relation to imported gasoline was effectively reached in 1938, and even surpassed in the following years.[73] Between 1938 and 1940, the IAA, exercising the powers conferred upon it by law (Regula-

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[73]Despite the provisions of Decree 737/38 mandating the mixing of alcohol and gasoline refined domestically, both the specialized literature and the statistics supplied by the IAA during this period refer to quotas of anhydrous alcohol to be mixed with imported gasoline. See footnote 63 above.

tion appended to Decree no. 22,981/33, article 2, paragraph e), raised the legal quota of alcohol that had to be bought by the gasoline importers to 10%.[74] This action on the part of the IAA was prompted by the forecast that anhydrous alcohol production would surpass the quota of 5%, which would in turn lead to problems for the Institute such as overstocking and surplus alcohol.

As an element in the protection of the sugar industry, however, alcohol left much to be desired. An examination of Figure I shows that the consolidation of the domestic market policy worked reasonably well until the end of the war, with accumulated stocks in the years between 1935 and 1945 being negligible (cf. Table 21) in comparison with other periods in the history of the sugar sector characterized by overproduction.[75] However, this can be attributed more to exports, in spite of the difficult conditions on the world market, and even to the limited success of the limitation placed on production after 1939, than to the transformation of sugar cane and surplus sugar into alcohol. Data provided in Table 22 demonstrate that the transformation of sugar into alcohol which occurred from 1938 to 1942 and later in 1949 as a result of stimuli from the Institute,[76] with the exception of 1938, accounted for a much smaller proportion of the surplus sugar (that is, production less apparent consumption) than did exports. Further exam-

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[74] It appears that the CNP first came to exert its substantial power in the determination of the proportion of the mixture only in 1941, when the quota was raised to 20%.

[75] The periods which suffered from overproduction in the view of specialists in the sugar sector are the immediate post-war years, the fifties ("chronic overproduction"), the mid-sixties, and 1975-77.

ination of this Table shows that, again except for 1938, even where the proportion of excess sugar absorbed by exports was low (50% or less), the proportion absorbed by the transformation of sugar into alcohol was lower still, and the surplus instead contributed to stocks. There is no available data on the direct transformation of sugar cane into alcohol which would permit an evaluation of the specific contribution of this process in the battle against the overproduction of sugar. All that is known is that the proportion of alcohol from cane taken together with that from sugar in relation to total alcohol production showed a tendency to increase between the 1935/36 and 1941/42 harvests (see Table 46). According to Barbosa Lima Sobrinho, however, "/the/ production of alcohol directly from sugar cane became increasingly important during the war" (Barbosa Lima Sobrinho, 1945: 307).

In any event, even with a growth in the production of direct alcohol during this period, Table 46 shows that the growth of total alcohol production between 1935 and 1942 was due fundamentally to the increase in the production of residual alcohol. It is safe to assert that this was true for the entire period under study, 1933-1942.

In short, during this period there was a significant increase in alcohol production, especially anhydrous alcohol. This permitted both the growth of álcool-motor production and the progressive re-

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[76] The producers could freely transfer the surplus from sugar production to alcohol. In addition to this measure, during the harvest of 1941/42, the Institute taxed sugar exceeding set limits, and offered bonuses for alcohol produced from the surplus raw material (cf. Barbosa Lima Sobrinho, 1946:20).

placement of the mixture with various elements based on hydrated alcohol with the gasoline-anhydrous mixture. In this sense, it can be claimed that the objective of the policy to consolidate the domestic market to increase alcohol production, especially anhydrous alcohol for mixture with gasoline, was a success. But, as this alcohol was largely residual, the objective of Truda's policy to employ alcohol as the core of a support policy for sugar was not attained. This is because direct alcohol is the true instrument needed to put an end to overproduction of sugar, in that it limits sugar production without limiting sugar cane production (cf. Truda, 1971: 57).

Prices considered too low by producers to cover costs (despite the relative success of the IAA in 1942[77] in obtaining an increase in the purchase price of alcohol) appears to be the factor most responsible for impeding the expansion of alcohol production, even on the part of those producers who no longer opposed the policy of protecting sugar by means of alcohol. Pereira, in 1942, wrote on this subject:

> Alcohol absorbed only a small part of the surplus, not only because of inadequate equipment, but also because the price of alcohol did not encourage anyone to go ahead with using the raw material to manufacture this product, and even less the conversion of sugar, deeming it preferable to try to export, or wait for a possible liberation /of production limits/ (Pereira, 1942: 51, 52).

The question of price, however, would only be settled in 1948 when parity was established between the price of sugar and that of direct alcohol, with the objective of rendering the choice for

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[77] See pp. 98, 99.

usineiros of producing alcohol or sugar from the sugar cane one which was economically indifferent (Decree 25,174-A). But, at this time, other conditions necessary for the policy to consolidate the domestic market based on the limitation of sugar production and a growth in alcohol production were missing.

CHAPTER 3

The Second World War and the Post-War Liberalization Policy

3.1. The War Period: Alcohol as a Premium Fuel (1942-1946)

The Wartime Alcohol Policy

The Second World War, unlike the First, caused the exports of Brazilian sugar to fall (see Table 21). The continental European market, dominated by Germany and its allies, was closed, as was the American and British markets, these because of the risk posed by Axis submarines to the transportation of sugar over long distances and the maximum use of ships for the war effort (cf. Szmrecsányi, 1979: 202). In compensation, the price of sugar increased on the world market (see Table 18), thereby avoiding greater losses for the IAA. Yet, the action of German submarines along the Brazilian coast interrupted Brazil's coastal trade, dividing the country into two sugar regions: the Northeast, which was plagued by overproduction, and the Center-South, with a production shortage. The most important consequence of this situation was the lifting of production limits in the Center-South through a series of measures taken by the Government,[1] which was concerned about this region's supply. This had the effect of reinforcing the loss of Northeastern hegemony in the sugar industry to the Center-South.[2]

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[1] These measures eroded the control of the IAA, increased the limits of the quotas for the already installed *usinas*, permitted the installation of previously prohibited, new *usinas*, and transferred to the *usinas* and more advanced *engenhos* of the Center-South the share of North-

The war placed great strategic importance on alcohol because of the threat of a shortage of liquid fuels. Álcool-motor would be given an opportunity to overcome a series of problems which it had encountered up to that time. The first measure which reflects the concern over the shortage of fuels, Decree-Law 3,755, was passed in early 1941. This established the National Commission for Fuels and Lubricants, whose aim was to coordinate production and distribution policy for these products. This Commission, comprised of the President of the National Petroleum Council, the President of the Sugar and Alcohol Institute, a representative from the National Commission of Gasogênio (gas generation), and one from the Mines and Metals Council, was presided over by the Secretary-General of the National Security Council. The meetings were held at the Security Council headquarters and were attended by the military ministers. Thus the question of the fuel shortage had become one of national security.

It was not until 1942, after the Japanese attack on Pearl Harbor and the action of German submarines along the Brazilian coast, that the war made itself felt in Brazil. In that year, with Decree-Law 4,292 (5/7/42) the CNP assumed responsibility for guaranteeing the supply of and rationing petroleum and its products. In addition, a series of measures were taken to increase alcohol production.

The "alcohol war package", to use a contemporary expression, took shape basically during the second half of 1942, with the adoption of

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1 (cont.)
eastern production immobilized by the war. For a detailed description of these measures, see Queda, 1972: 104-105, and Szmrecsányi, 1979: 209-213.

[2]See footnote 16, pp. 46-49.

only a few important measures carrying over into 1943. The first legal provision was the enactment of the above mentioned Decree-Law 4,382 (6/15/42), by which the IAA was empowered to fix the purchase price of alcohol (article I). It should be recalled that in previous years the authority to do this was legally ascribed to the IAA by the core decrees of the policy to consolidate the domestic market, but this had been nullified by the action of the CNP. The Institute now not only increased the price of anhydrous alcohol,[3] but also set a differential price which varied according to the raw material used,[4] thereby taking into account the differences in costs. The IAA also guaranteed a parity price between sugar and alcohol.[5] Thus, the IAA took the first steps to guarantee a minimum price for alcohol satisfactory to producers, which had been a major obstacle to the expansion of alcohol production. These measures formed part of the Crop Plan for 1942/43, which was passed in IAA Resolution no. 31 on June 24, 1942.

The Crop Plan for 1942/43 was conceived as a plan for a wartime economy. Article I states:

> The present situation imposes on the Sugar and Alcohol Institute the need to elaborate a plan which, given the necessity for domestic fuels, should in its characteristics and objectives be considered as a plan for a wartime economy.

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[3]Since 1933, the price of anhydrous alcohol had been frozen at $900 per liter, increasing only slightly by $050 per liter in 1941.

[4]The price per liter varied from 1$100 CIF for alcohol made from lean molasses to 1$300 for that deriving from the production of sugar within the set limit.

[5]1$300 per liter was paid for alcohol manufactured from within-limit production, corresponding to sugar at 58$300 FOB, Recife.

The objective of the Plan was to attain the highest possible levels of alcohol production. For this purpose was earmarked "the maximum amount of raw material which could be made available without prejudicing the production of sugar intended for domestic consumption" (article 2). The idea was to fill the distilleries, that is, to exhaust production capacity over the maximum period which these factories could operate; 250 days was arrived at as a basis for the principal producing states. In order to put this plan into action, a quota for sugar consumption was established (15.2 million sacks of sugar, 2.2 million being stocks), and the rest was destined for alcohol production (article 3). Sugar production that exceeded the limit would be permitted only in those sugar mills where the distillery operated at full capacity for 250 days (article 10). Moreover, the IAA could extend the power of requisitioning, whenever necessary, to molasses for alcohol production and drinkable alcohol, the latter with a view to dehydration (articles 19 and 20).

One month later, with Decree Law 4,461 (7/10/42), the IAA assumed total control over the alcohol trade from the producers' end. The producers needed prior authorization from the Institute to sell their product, and the IAA gained the authority to "fix the price and conditions for the sale of alcohol of any type and for any end-use, and also to requisition, whenever necessary, all domestic alcohol production of any grade" (article 1). The IAA was to place the alcohol to be used as a fuel at the disposal of the CNP, which retained the authority to ration fuel alcohol consumption (articles 2 and 3).

To guard against the danger of all alcohol being used as fuel,

it was necessary to guarantee alcohol production for industry. Resolution no. 34 (7/30/42), which enacted the Plan for the Development of Alcohol Production, stipulated that all distilleries throughout the country, even those producing anhydrous alcohol, were to set aside 20% of production for the industrial alcohol market. This Plan was complemented by another, the Plan for the Control of Alcohol Production, which was established two weeks later by Resolution no. 39. The Plan, whose conception of the alcohol problem was comprehensive, was intended to guarantee both maximum anhydrous alcohol production and a minimum level of production of hydrated alcohol for industrial and commercial ends.[6] For this purpose the rationing of hydrated alcohol under the authority of the IAA was introduced (articles 3 and 4), and a higher selling price for this type of alcohol was assured (2$000 per liter). Thus, "a higher price for industrial alcohol" was created "to cover the bonuses /especially/ for alcohol produced directly from sugar cane or molasses" (Barbosa Lima Sobrinho, 1946: 47). The production of drinkable alcohol was forbidden in anhydrous alcohol distilleries, as was the desdobramento of alcohol to aguardente. Finally, on the 22nd of September, Decree Law 4,722 declared that the country's alcohol industry was of national interest (article I), guaranteeing for a period of four years beginning with the 1943/44 harvest minimum prices for alcohol produced directly from sugar cane or fat molasses (1$450 per liter).

Despite this series of measures, anhydrous alcohol production decreased from 1943 on due to war-imposed difficulty in importing de-

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[6] See the Preamble of IAA Resolution no. 39/42.

hydrating agents, especially benzol. The production of anhydrous alcohol would pick up again only after the war, when the pressure resulting from the shortage of liquid fuels was alleviated.

The difficulty of importing dehydrating agents was already apparent in Resolution no. 62 of the IAA, which included measures complementary to the Crop Defense Plan of 43/44. As a result of this Resolution the IAA would be able to authorize the production of hydrated alcohol in anhydrous distilleries if it was not, for whatever reason, technically possible to produce anhydrous alcohol (article 15). The Crop Plan of 43/44, which was passed by Resolution no. 61 (6/30/43), raised the price of alcohol in keeping with the differentiation according to grade and source of the raw material.[7] A new feature was the creation of the Alcohol Reserves, formed with resources generated from the difference between the price paid by the consumer and the price granted to the producer, with the objective of opportunely rewarding producers who complied with the Crop Plan.

The Plan for Requisitioning Aguardente for the 1943/44 harvest (Resolution no. 65 of August 24, 1943) requisitioned 75% of the aguar-

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[7]This Plan favored alcohol derived from the raw material which corresponded to over-the-limit sugar production (alcohol production of more than 7 liters per sack of sugar, or from autonomous distilleries), for which Cr$1.45 per liter was paid (the lowest price of Cr$1.10 was paid for residual alcohol of grades lower than 92º G.L. at 15º C). It is worth noting, however, that in the Crop Plan of 42/43, the highest bonus was paid for alcohol which was made from production falling within the limit. This apparent contradiction was undoubtedly due to the favorable conditions for the expansion of the product which developed in the Center-South during the war. That this type of production was favored indicates:

> "a true reversal in relation to the immediately preceeding period, including the first years of the war,

dente in stock in the usinas of the Central-Southern states for transformation into alcohol to compensate for the difficulties in marketing Northeastern alcohol production and the insufficient production of São Paulo, Rio de Janeiro, and Minas Gerais. To direct and execute the Plan, the Special Service for the Requisition and Redistillation of Aguardente (SERRA) was set up. The results obtained were considered auspicious, especially in the state of São Paulo: by the end of the 43/44 harvest, 4,902,897 liters of alcohol had been obtained from the redistillation of 9,995,278 liters of aguardente, 90% (4,436,678 liters) in São Paulo (cf. Barbosa Lima Sobrinho, 1946: 314). Nonetheless, the total of all alcohol produced by the redistillation of aguardente represented less than 4% of the total volume of alcohol obtained from that harvest.

At the end of the year, Decree Law no. 5,998 (11/18/43) reconfirmed the total control of the IAA over the production and distribution of alcohol: alcohol could leave the usinas and distilleries only with the authorization of the IAA, and penalties were established for producers who failed to comply with this requirement, as well as for consumers and distributors who used the product for ends other than those determined by the Institute. The control over the flow of alcohol was thus strengthened in an attempt to combat the black market which had sprung up for that product.

In 1944, specific plans for the support of alcohol production, sep-

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7 (cont.)

> when the concern of the Institute had still been to slow the growth of /sugar/ production, by appropriating all sugar above the limit" (Szmerecsányi, 1979: 209, 210).

arate from the sugar support plans, were set up. The alcohol policy remained essentially to stimulate the production of alcohol, especially anhydrous alcohol for use as a fuel, and at the same time guarantee the sypply of hydrated for industry. A differential minimum price for each type of alcohol was endorsed, which especially rewarded direct alcohol by taxing alcohol for industrial use. These revenues were deposited in the Alcohol Reserves. The desdobramento of alcohol into aguardente continued to be prohibited. These provisions are detailed in the first Alcohol Support Plan for the harvest of 1944/45 (Resolution no. 86 of July 13, 1944). The only part which deserves special mention is the importance attached to the authority of the IAA to "facilitate and promote the supply of dehydrating agents" in light of the difficulties brought about by the war, and the clarity of the procedures and criteria for determining alcohol prices. Producers were guaranteed a final price according to the raw material, grade of alcohol, and type of distillery (annexed or autonomous), while prices for the buyer were determined according to the end-use of the alcohol (for fuel or for industry). The IAA was further obligated to deliver anhydrous alcohol to the Oil Companies at a price not higher than that paid to the producers.

Thus the war, by conferring strategic importance upon alcohol, had the effect of strengthening the IAA vis-à-vis the CNP. The Institute assumed total control over the production, trade (including price fixing), and distribution of alcohol, right up to its delivery to the Oil Companies. From that point on, the CNP maintained control, reserving the authority to adjust the proportion of alchool supplied by the IAA to be

mixed and the retail price to conform with the necessities of fuel and specifically álcool-motor rationing. It should be stressed, however, that the control of the CNP over the "point" of consumption lasted only briefly, being practically neutralized by the effects of the Coordination of Economic Mobilization.[8] In Directive no. 3 (October 17, 1942) the Coordination took over complete control of the importing, transportation, storage, processing, supply, distribution, and pricing of liquid fuels, with "the CNP continuing to be entrusted with the study, direction and inspection of activities related to the production of petroleum in Brazil." This directive, therefore, rendered virtually ineffective Decree Law 4,292/42 which had been passed only a few months earlier, and, as has been seen, made the CNP responsible for the supply and rationing of petroleum and its products.

Evaluating the Wartime Alcohol Policy

An evaluation of the alcohol policy during the war period must center on the role of alcohol as a fuel. Because the importance of

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[8]With Brazil's entry into the war in mind, the President of the Republic in Decree-Law 4,750 (9/28/42), decreed the mobilization of all economic utilities and resources in the country "whatever their origin, character, ownership, or entailment", including the mobilization of human labor. In order to direct this mobilization, the President appointed a Coordinator of Economic Mobilization who was made directly responsible to him. The appointed Coordinator, João Alberto Lins de Barros, was accorded full powers of coordinating, planning, and executing all economic activity during the war effort. He was allowed to deal with and intervene in any subject, under the jurisdiction of any body. The Coordinator of Economic Mobilization, then, took on powers which in peacetime belonged to the Ministry of Labor, Trade and Industry, the Federal Council for Foreign Trade, the Ministry

alcohol was at this time seen entirely in function of the necessity of relieving the vital problem of the fuel shortage, any evaluation of the role played by alcohol as a support for sugar, so important in the pre-war years, now loses its significance.

It was seen that despite the "alcohol war package" the production of anhydrous alcohol for fuel decreased significantly from 82.2 million liters in 1942 to 50.2 million liters in the following year, to a low of 22.8 million liters in 1945, due to the difficulties of importing dehydrating agents. A recovery was initiatied in 1945.

Hydrated alcohol performed far better. Throughout the war, as has been seen, it was necessary to guarantee by any means, including the use of rationing, a minimum supply of this type of alcohol to industry and commerce. Given the lack of anhydrous alcohol on the market, demand for fuel use grew, thereby requiring a change in the previous situation characterized by a more or less constant production volume of hydrated alcohol.[9] In fact, from 1942 on, it can be observed that the growth rate of hydrated alcohol, although slow, was always in a positive direction (see Figure VII and Table 26). Total alcohol production, however, could not maintain pre-war levels, as the increase in the production of hydrated was insufficient to compensate for the fall in the production of anhydrous alcohol.

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8 (cont.)
of Agriculture, the IAA, and the CNP. These powers were restored to these ministries with the abolition of the post of Coordinator at the conclusion of the war (Decree Law 8,400, 12/19/45).

[9]While the production of anhydrous alcohol experienced a high rate of growth between 1933 and 1942, the quantity of hydrated alcohol exhibited small increases and declines which, on the whole, tended to cancel

The consequences of all this were both a reduction in the volume of álcool-motor produced during the war and a reversal of the previous tendency (see Table 47) to progressively diminish the proportion of alcohol, kerosene, and other substances in the mixture in favor of gasoline. This had been due to the increased use of the gasoline-anhydrous alcohol mixture, which required a smaller proportion of alcohol than did the fuel mixed from various elements based on hydrated alcohol which it replaced. During the war, the proportion of alcohol once again increased, going from 15% in 1940 to a peak of 61% in 1943, thereafter declining steadily until it reached its pre-war level in 1947 (16%). The increase in the proportion of alcohol in the carburant mixture was, naturally, accounted for by hydrated alcohol. In fact, although the level of anhydrous alcohol in mixture tended to increase up until 1942, after which it began to decline, when taken as a proportion of the total volume of alcohol mixed, it actually begins to decrease from as early as 1941 (falling from 81% of all alcohol mixed in 1940 to 31% in 1944), precisely when the inversion began in the relative levels of alcohol and gasoline in the álcool-motor produced.[10] Gasoline, which had enjoyed an 85% share of the mixture in 1940, would regain this level only in 1947. It fell to its lowest point in 1943, when it contributed 39% of the total volume of álcool-motor produced in that year. Finally the share of the "other substances" in álcool-motor were sig-

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9 (cont.)
each other out, resulting in a reasonably constant level of production during that period (see Figure VII, Table 26).

[10]Refer to the considerations expressed on taking the data referring to the volume of anhydrous alcohol delivered for mixture as an approximation of the volume of anhydrous alcohol effectively mixed (see pp. 106-107).

nificantly larger between 1942 and 1944 than in the previous years (cf. Table 47).

The tendency to substitute alcohol for scarce gasoline during the war, as evidenced by the shifting proportions of these substances in álcool-motor, was recognized in legal form in the first year of Brazil's involvement in the war:

> As long as the crisis in the supply of gasoline lasts, the National Petroleum Council will be able to authorize a reduction in the percentage of the denaturing agent to be applied to alcohol intended for use as a fuel, or even dispense with the denaturing altogether in those regions where it is necessary to do so (Decree Law 4,822, October 10, 1942, article 1).

In other words, with the "anything goes" of the war, pure alcohol could be used as a fuel, which, as has been mentioned, had been the case in the Northeast ever since the twenties. According to testimony of Moacyr Soares Pereira:

> There was not enough usable alcohol to satisfy demand. Those who could used it in pure form in cars and trucks in preference to the heavy, dirty, and unpleasant gasogênios of charcoal. All types were utilized, from anhydrous to hydrated of the lowest grade (Pereira, 1976: 38).

A complete evaluation of the contribution of alcohol to the war effort would require a comparison of the consumption of this product as a carburant with the consumption of gasoline. Unhappily, however, there are no data available which would permit such a comparison.

3.2. The Post-War Period: The Weakening of the Consolidation of the Domestic Market Policy (1946-1949)

The Liberalization of Sugar Policy: Endangering the IAA

With the end of the war and the demise of the Estado Novo dawned a new period of liberalization of the political regime. This change spilled over into the economy, where privatismo was strengthened over the estatismo which had been so widespread during the previous regime.

The effect on sugar was immediate. Whereas production in the Center-South had been liberated during the war because sugar flows from the Northeast had been blocked, production was now liberated for ideological reasons. Thus, Decree nc. 9827 (7/10/46) ordered a general revision of the quotas for the sugar mills of each state, allowing a readjustment for mills which were under the limit, establishing criteria which favored high productivity, and making the increase in production limits subordinate to regional, not national, necessities. The IAA Resolution no. 124 (9/14/46) raised the limit on national production to 23 million sacks, an increase of approximately 40% with respect to the previous limit (cf. Szmrecsányi, 1979: 217). As a consequence, not only did sugar production expand rapidly (54% in 4 years, from 15.3 million sacks in 1945 to 23.6 million in 1948),[11] but also "the previously mentioned shift of the sugar producing center from the Northeast to the Center-South, and more specifically São Paulo, was accelerated" (Szmrecsányi, 1979: 216).[12]

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[11] See Table 21.

[12] See footnote 16, Chapter 2.

The increase in the overall limit on sugar production and the loosening of the control by the IAA over the alcohol trade were not sufficient to satisfy the mill owners, who, as has been seen, waged a persistent campaign of resistance to the limit on production and other interventionist aspects of the consolidation of the domestic market policy. With the Constitution of 1946 and the recuperation of the autonomy of the courts from the executive branch, the usineiros, citing §4 of article 141 which stated that "The Law shall not exclude from judicial review any injury to individual rights",

> understood that the time had come to rebel against the control of production, the single price policy, the process of litigation with suppliers, the fixing of the price of a ton of sugar cane, and many other measures of public law which made up the legal framework of the sugar economy (Jungman, 1971: 40).

In other words, the constitutionality itself of the policy to consolidate the domestic market was being questioned to the extent that the basic principles of its primary decrees (Decree nos. 22,781/33 and 22,981/33 and the Regulation accompanying the latter) were being contested, as were those of the Sugar Cane Crop Statute (Decree Law 3,855/41). For this purpose the usineiros, according to Jungman, had employed "eminent lawyers", whose case rested on the allegation that the sugar legislation originated in the Estado Novo, and with the country's return to democracy this legislation no longer made sense. Furthermore, State intervention in the economy could only take place "by means of special law", as stipulated in article 146 of the Constitution (cf. Jungman, 1971:40). According to this same author, the

usineiros of São Paulo were especially combatative in this process, "discontent with the single price policy and the limit on production which impeded the expansion of their industrial output" (Jungman, 1971: 41).

In this fight between the sugar industrialists and the IAA, the Institute won when the Supreme Federal Court confirmed the constitutionality of the sugar legislation. But, although the Institute was victorious, it emerged from the fight considerably weakened. During this period its abolition was advocated more than once by, above all, the São Paulo usineiros. For instance, in 1947, a bill from the Finance Minister of the Dutra Government proposed the abolition of the Institute and its replacement with a Rural Bank whose principal aim would be to finance the sugar cane crop and the sugar and alcohol usinas. Later, along similar lines, the Salte Plan suggested creating a special sugar division within the Ministry of Agriculture. According to Szmercsányi, the IAA was not abolished only because such a move was strongly opposed by the newly sworn-in Members of Congress from the Northeast and the state of Rio.[13] Once again in evidence are the opposing positions of the São Paulo and the Northeastern usineiros, and the alignment of the latter with the IAA, which, as has been suggested, had as one of its (implicit) aims the protection of the Northeast from the incursions of the Center-South.

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[13]Information about the attempt to abolish the IAA is reported in various issues of Brasil Açucareiro in 1947, and in the September/October issue of 1948, as cited by Szmrecsányi, 1979: footnote no. 84, p. 213.

Sugar Surplus and the Attempt to Resume the Policy of Promoting the Domestic Market

Once the War had ended, the liberal sugar policy no longer favored alcohol as an important part of the sugar cane economy, despite a partial recuperation of anhydrous alcohol to pre-war levels (cf. Table 26 and Figure VII).[14] Furthermore, the era of cheap oil worldwide, which, as has been indicated, would drastically reduce, and in the medium term make inviable, the use of alcohol as an alternative liquid fuel, was just beginning. The fuel policy of the Dutra Government was consistent with the world tendency; in the post-war period, the álcool-motor industry seemed to have very little chance of survival in both sugar and fuel policies.

However, as a consequence of the rapid growth of sugar production resulting from Decree 9,827/46 and the complementary IAA Resolutions, stock levels considered alarming accumulated in 1946 and 1947 (the largest since the establishment of the IAA) (see Table 21). There followed an attempt to return to the principles of the policy which had promoted the domestic market. Resolution no. 154 (1/15/48) reflected this attempt in creating the Fund for the Compensation of Sugar Prices "with the aim of assuring that production be protected and the market balanced" (article 1). The Sugar Defense Plan of 1948/49 (Resolution no. 183, 6/26/48) also represented a return to the previous policy. Moreover, for the first time since the pre-war period, a clear distinction was made between intra- and extra-limit production.

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[14] In 1947, the quantity of anhydrous alcohol produced neared 1940 levels. Post-war production, however, never reached the high levels of 1941 and 1942. After 1942, the problems of importing dehydrating agents exercised their impact on production.

Within days after the passage of this Plan, Decree-Law 25,174-A (5/3/48) treated alcohol according to the terms of the Plan. The preamble of the decree, which resurrected the idea of the alcohol industry as in the "national interest", made clear that alcohol would both be an element in the protection of sugar (overproduction resulting from the stimulus given to the sugar industry was acknowledged), and would serve to improve the balance of trade by decreasing oil imports. One of the consequences of the Dutra Government's policy of not restricting imports was the rapid depletion of the foreign exchange reserves accumulated during the war. As a consequence, the Government, concerned over the steadily worsening deficit in the balance of payments, reinvoked the motive of saving foreign exchange used by the Provisional Vargas Government for encouraging the álcool-motor industry.

With the restoration of the principles of the policy to consolidate the domestic market, fuel alcohol resumed a prominent place in the sugar and alcohol policy, this time with the dual purpose of protecting sugar and saving foreign exchange. The IAA, which had promoted the policy of consolidating the domestic market, once again advanced alcohol production in order to develop the anhydrous alcohol industry for use as a fuel and to expand the consumption of álcool-motor (article 1). In addition, a mechanism to determine alcohol prices sufficient to cover costs of production was finally established. As has been seen, this had been a weakness of the consolidation of the domestic market policy, impeding the necessary production of anhydrous alcohol. Thus, after many attempts made during the war,[15] a parity price was guaranteed unequivocally be-

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[15]See Crop Plan 1942/43 (Resolution no. 31/42), Resolution no. 79/44 and the Alcohol Defense Plan for 1944/45 (Resolution no. 86/44).

tween alcohol derived directly from cane or molasses and from sugar (crystallized, ready-loaded at Rio de Janeiro usina) (article 2), such that in economic terms it was immaterial to the producer whether sugar or the highest cost direct alcohol was manufactured. As previously mentioned, this would be the best way to prevent overproduction in the sugar sector in that it would divert the raw material from sugar to alcohol production without loss of profit, thus limiting sugar - but not cane - production. To set the parity price between sugar and direct alcohol, anhydrous alcohol was taken as a base (article 3). All alcohol produced beyond 7 liters per sack of usina sugar was considered direct (article 5). This parity price was to benefit only those usinas which complied with the Alcohol Defense Plan.

This decree clearly defined the powers of the IAA vis-à-vis the CNP regarding the fixing of the price of alcohol and the volume of anhydrous alcohol to be mixed. Article 6 established that the IAA would determine the selling price of anhydrous alcohol delivered to the Gasoline Distribution Companies (as stipulated by Decree 22,779/33, article 4, paragraph 1). The CNP was to be responsible for adjusting the selling price of the carburant mixtures, in function of the price and quantity of anhydrous alcohol acquired from the IAA by the Gasoline Companies (article 9). Article 7 established that the Institute was to inform the CNP at the beginning of each harvest of the estimated volume of anhydrous alcohol to be produced. From there the two bodies were to settle the proportion of anhydrous alcohol to be mixed with gasoline by common agreement, and in keeping with article 2 of Decree-Law 737/38.

The Alcohol Plan for 1948/49 (Resolution 210 of September 16, 1948)

set forth the terms of compliance with Decree-Law no. 25,174-A, which aimed at encouraging the production of anhydrous alcohol to be used as a fuel. The parity price guaranteed by the IAA was established at Cr$ 2.50 per liter of direct anhydrous alcohol in the usina, corresponding to the price for crystallized sugar set by the Crop Plan 1948/49 for the state of Rio de Janeiro. For lower grade direct alcohol, the guaranteed price was less, decreasing commensurately with the grade of alcohol; the lowest price was Cr$ 1.80 per liter for direct alcohol graded between 92º and 93.9º G.L. at 15ºC. The use of raw material corresponding to 650,000 sacks of sugar from the usinas of the states of Pernambuco, Rio de Janeiro, and São Paulo was earmarked for direct anhydrous alcohol production (article 3), as were 650,000 sacks of sugar from engenhos (article 4). The Plan also created the Anhydrous Alcohol Fund, a special fund to encourage the production of alcohol for use as a fuel, without delving into the already existing Alcohol Reserve. The resources for this Fund were to come from the sale of anhydrous alcohol by the IAA to the Gasoline Companies, set at Cr$ 2.60 per liter. This Plan also introduced the establishment of a production goal for anhydrous alcohol, both direct and residual, to be used in carburant mixtures: 114 million liters.

From the institutional point of view, it can be claimed that Decree no. 25,174-A strengthened the IAA vis-à-vis the CNP, bolstering its legal powers and its control over anhydrous alcohol (which in practice had been contested by the CNP in the pre-war period), from its production to its delivery to the Gasoline Companies. This law was of great importance for the policy to promote the domestic market. First,

as has been mentioned, this dissertation conceptualizes alcohol policy as a product of the tension between the sugar and fuel policies. From this point of view, it can be claimed that as the IAA was institutionally strengthened, so too were the chances of implementing the sugar protection policy, as well as the prospects for success of the mixed fuel policy, despite the obstacles posed by the CNP. Second, the weakness (from the point of view of implementation) of the policy to promote the domestic market, the lack of a compensatory price for alcohol, was resolved satisfactorily.

While the establishment of a compensatory price for alcohol adequately completed a set of tools for implementing the policy, this was done in a context which made the policy unviable. As seen, the pressure from the usineiros against intervention in the sugar sector, and their legal battle with the IAA, politically weakened the Institute considerably, in a sense neutralizing the institutional strength established at the formal level by Decree no. 25,174-A. This pressure from the usineiros was reinforced not only by the liberalizing political climate, but also by the liberal economic policy of the Dutra Government. It is true that the rapid drain on foreign exchange accumulated during the war made some restrictions on the free exchange policy necessary. But, petroleum products were exempted from the list of goods which required special import permits under Decree Law no. 25,071/48. Thus, the Dutra Government followed the post-war tendency, basing its fuel policy on oil, which was becoming cheap and abundant. As the FIPE report pointed out, it is difficult to reconcile this decree, which placed no obstacles in the way of importing cheap petroleum, with Decree no. 25,174-A, which called for an increase in anhydrous alcohol production for carburant mixture (CESP/FIPE, 1980: 221). In these circumstances,

the price of anhydrous alcohol, which had to be set at a level sufficient to cover producers' costs, was not competitive with that of gasoline.

Thus, although in 1948 the production of anhydrous alcohol reached 65.4 million liters, representing an increase of 29.5% over the previous year, the following year witnessed a rapid decrease in the quantity produced, falling to 18.6 million liters in 1950 - a level which was lower than that of the worst war year (22.8 million liters in 1945) (cf. Table 26 and Figure VII). In the harvest of 1948/49, the production fell far short of the goal of 114 million liters of anhydrous fuel alcohol. In fact, an examination of Table 27 reveals that the total of all anhydrous alcohol produced did not exceed 75.1 million liters.

Upon leaving the presidency of the IAA at the beginning of the Dutra Government, Barbosa Lima Sobrinho forecast the effects of cheap gasoline on the alcohol policy. He warned:

> It would be wrong for Brazil to lose all interest in alcohol production just because gasoline can now be bought cheaply. A good carburant reserve is a hedge against any eventuality. The production of residual alcohol will increase substantially in the coming harvests, and we should never undervalue alcohol production as a solution to the problems of excess sugar (Barbosa Lima Sobrinho, 1946: 320-21).

Barbosa Lima Sobrinho seemed to foresee what came about in Brazil beginning in the sixties: in the face of a liquid fuel policy based on cheap oil, fuel alcohol would only have good prospects during great sugar crises when sugar was in surplus. Alcohol, as a permanent means of protecting sugar by avoiding overproduction, as idealized by

Truda, was no longer viable from the moment when gasoline prices became cheaper and the IAA as an instrument of State intervention in sugar policy was weakened. This process was to become more marked in the following decade.

PART III

THE TRANSITION YEARS

(1950 - 1960)

CHAPTER 4

Fuel Alcohol Misses its Opportunity: The Early Years of Cheap Petroleum

Liberalization of Production and Chronic Surplus of Sugar

The 1950s were marked by a chronic overproduction of sugar, despite the rapid expansion of domestic consumption beginning in the post-war period, and also by reasonably successful efforts to increase exports[1] during the years of the most acute sugar surpluses (see Table 21 and Figure I). Until the end of the decade, when there was an attempt to return to the policy of promoting the domestic market, the principle of free production was in effect,[2] which in fact had been recommended by the First National Sugar Conference held in Petrópolis, Rio de Janeiro, in 1949.[3] In accordance with this principle, three IAA Resolutions were passed raising the national sugar quota: numbers 501/51, 647/52, and 1284/57. As of result of these measures, sugar production increased from 23.4 million sacks in 1950 to 55.2 million sacks ten years later. The readjustment of the quota for each *usina* was made on

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[1]For a more detailed analysis of the attempts made by the Institute to increase exports, and the participation of Brazil in the International Sugar Agreements in the fifties, see Szmerecsányi, 1978: 236-54.

[2]Resolution 378/50 of the 29th of March freed production throughout the country for the 1950/51 harvest (article 1), and set forth that the IAA would adopt measures allowing the maximum possible use of raw material in sugar production at those mills with the greatest yield.

[3]From this Congress, see recommendation item IV, "Economic Policy", and especially the subsection "Limitation" (Annals of the First National Sugar Congress, p. 152 passim).

the basis of the mill's best annual output during the preceding five years; Resolution 1284/57 introduced the new feature of dividing the increase in the national sugar quota among the usinas directly, thereby abolishing state quotas. Thus, the usinas with the highest productivity were rewarded, and the comparative advantage which the Center-South had been consolidating over the Northeast since the 1930s was officially sanctioned.[4]

The IAA, however, during the term of its president Gileno dē Carli (December 1951-August 1954) did attempt to contain the expansion of the Center-South for the benefit of the Northeast. Following Vargas' recommendations[5] and heeding the complaints lodged by the usineiros of the Northeast about the higher net price received by the usinas of the Center-South, the IAA, in Resolution 619/51, created what came to be known as the "single price policy" (política do preço unico), which established a uniform price in all markets in the country. This had the effect of nullifying the comparative advantages of freight and production costs which the Center-South enjoyed over the Northeast. The Center-Southern usineiros protested immediately to the Courts, invoking the same principles and arguments as those used in the post-war period against State intervention in the economy.[6] Equally swift and

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[4]For a more detailed analysis of the role these Resolutions played in accelerating the transfer of the economic center of sugar from the Northeast to the Center-South, see footnote 16, Chapter 2.

[5]In response to the plea from the usineiros for an increase in the price of sugar, Vargas recommended that a just price which was the same for all producers be fixed (see Dē Carli, 1978: 161-162).

strong was the reaction against the policy begun in 1953 to contain São Paulo's industrial expansion by impeding the establishment of new usinas. This was to be accomplished by denying the financial assistance for new usinas which was available in other sugar producing areas of the country. In compensation, São Paulo was granted preference in financing to anhydrous alcohol distilleries, in an attempt to diminish the sugar and sugar cane surpluses of that state. The "sugar question", as the policy of containment of São Paulo came to be known, died together with Getúlio Vargas.[7]

With the death of Vargas and the departure of Dé Carli from the presidency of the Institute, the policy of free sugar production continued unrestricted. Nevertheless, in 1957, rising stock levels, which were equivalent to 14.6% of total production, once again prompted concern. The rate of growth of production, which had been 10% in 1957, reached 20% in 1957. Efforts to increase exports were intensified, with considerable success: total exports soared from 400,000 60 kg. sacks in 1956 to 12.9 million sacks in 1957, a level which was more or less sustained during the following years (cf. Table 21 and Figure I).[8]

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[6] See footnote no. 16, Chapter 2, and pp. 124-126. For a more detailed discussion of the single price policy, and the reaction of the usineiros, see Dé Carli, 1953: 87, 96, and 1954: 9-50; Jungman, 1971: 41-47, 50-51; and Gnaccarini, 1972: 95-97. The opinions of some eminent jurists are recorded in Dé Carli, 1954: 55-56 (Francisco Campos), 67-82 (Pontes de Miranda), 83-96 (Castro Nunes), 97-115 (San Tiago Dantas), and 117-128 (Seabra Fagundes).

[7] See Dé Carli, 1978: 197-209 and Dé Carli, 1954a.

[8] In 1957 sugar represented 5% of the total value of Brazilian exports (its highest level since the end of the nineteenth century), and,

However, sugar exports were unable to compete in world markets unsubsidized; as their volume increased, the IAA was forced to turn to SUMOC and CACEX in order to maintain the subsidy to sugar. A definitive solution to this burden would have been a reduction of costs and an increase in productivity of the sugar industry, in order to make the price of Brazilian sugar competitive on the international market, but this would be possible only in the longer term. Accordingly, the Institute, under the presidency of Gomes Maranhão, tried to return to the principles of the policy to consolidate the domestic market. The 1959/60 Sugar Crop Plan, for the first time in many years, authorized a total sugar production smaller than the production of the previous harvest (50.9 million sacks). Other measures were taken at the same time, such as setting start dates for grinding in the usinas (Resolution 1367/59) and strengthening the Institute's powers to monitor compliance (Resolution 1402/59 and 1419/59). Additionally, Resolution 1411/59 extended to the 1960/61 and 1961/62 Crop Plans the principle of limiting production, maintaining the national production limit constant at 50.9 million sacks. Furthermore, Resolution 1412/59 allowed "retention stocks" to be withdrawn from the market by the IAA in order to preserve market equilibrium. The attitude toward exports mirrored Truda's policy to consolidate the domestic market: given the instability and limitations of the international sugar market, a system of price support for sugar was brought into being which was based fundamentally on the domestic market.[9] Notwithstanding the inauguration of the Central

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8 (cont.)
in 1958 its share of exports was lower than only coffee and cocoa, then Brazil's principal export commodities (Conjuntura Econômico, 1958. Apud Szmerecsányi, 1978: 250).

Distillery of Alagoas in January 1961 with a capacity of 50,000 liters per day, fuel alcohol no longer formed an element in the protection of sugar, as will be seen below.

Fuel Alcohol and Sugar Protection under the Vargas Government

For fuel alcohol, the fifties represented a continuation of the policies of the previous decade: despite tools adequate to stimulate anhydrous alcohol production, this type of alcohol became untenable as a permanent source of support for sugar because of the nation's fuel policy based on the import of cheap petroleum and on the expectation of achieving domestic self-sufficiency in the short term in petroleum and its products. Nevertheless, during the Vargas Government, and especially under the presidency of Gileno Dé Carli, the Institute did attempt to solve the problem of the sugar surplus with the use of fuel alcohol. In Resolution 501/51, for the first time a special quota for direct alcohol production was established which was equivalent to 10% of the national quota for *usina* sugar production. Also in 1951, when the Institute was restructured, the Special Service for Anhydrous and Industrial Alcohol (SEAAI) was created. SEAAI replaced the old *Álcool-Motor* Section, acquiring higher status within the organizational hierarchy of the Institute. On the same level as the Divisions, it was directly subordinate to the IAA Presidency (cf. Smrecsányi, 1978: 232).

Dé Carli adopted the explicit policy of supporting sugar by means of producing alcohol. In a report to the Chamber of Deputies in 1952,

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[9] See Nelson Coutinho, "A Agroindústria Canavieira do Nordeste", *Brasil-Açucareiro*, XXVII, vol. LIV, no. 2 (August) 1959: 21-37, cited in Szmerecsányi, 1978: 253.

he asserted that it was impossible to solve the problem of the overproduction of sugar by exporting to a world market already saturated with the commodity. Rather, the better solution was to expand the alcohol industry to produce anhydrous alcohol for mixture with gasoline. This carburant mixture, stated the President of the IAA, was the logical solution for both the economic problem of sugar and the alcohol problem (Dé Carli, 1953: 201-203). In fact, Dé Carli was the first President of the Institute to use the legal authority conferred on the IAA by Decree-Law 25,174A of 1948, to include in the selling price of anhydrous alcohol to the gasoline companies a small amount destined for the expansion of the alcohol industry.[10] Thus, after large excesses of sugar were observed in 1952 -- the increase in stocks corresponded to 13.8% of production (cf. Table 21) -- the Sugar Crop Plan of 1952/53 (Resolution 677 of June 6, 1952) reverted to a reliance on alcohol. It stipulated that permitting extra-limit sugar production to be commercialized would depend on the usinas utilizing 80% of the capacity of their distilleries, or 120 working days, or production equivalent to 9 liters of alcohol per sack of sugar (articles 2 and 3). One month later the Institute gave a boost to the creation of autonomous distilleries for direct alcohol production (anhydrous or hydrated) whose minimum capacity was 10,000 liters per day by establishing price parity between this type of alcohol and crystallized sugar (ready-loaded at the usina). Parity was authorized with the proviso that this price whould not exceed 90% of the price established for the same type of alcohol in annexed

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[10]See Dé Carli, 1953: 204.

distilleries (Resolution 703, 7/24/52). In the same year, in response to an appeal from usineiros from all parts of the country (who met at a National Convention in Campos) for the Institute to promote the transformation of sugar and cane surpluses to fuel alcohol, Dé Carli asked the Bank of Brazil to make credit available to facilitate the quick installation of distilleries in those states with an overproduction of sugar. The Bank denied the Institute's request, "taking into consideration that the fuel alcohol policy ... was not a very stable one within the national economy" (Dé Carli, 1954: 37). When relating this fact to the National Sugar Producers Convention in 1954, in Rio de Janeiro, the President of the IAA said:

> The Institute has done everything to increase and guarantee the diversion of a substantial amount of excess sugar to alcohol production. ... /I/ judged, and still judge, with conviction, that the solution to the problem of the excess is really the transformation into anhydrous alcohol of that which can naturally be transformed (Dé Carli, 1954: 43).

Thus Dé Carli acknowledged the difficulties of going ahead with the plan to support sugar prices on a permanent basis by the manufacture of fuel alcohol.

Fuel Alcohol and the Support for Aguardente under the Vargas Government

In the 1950s, in addition to bailing out sugar, anhydrous alcohol would have another stimulus, or, "salvationist mission", namely, to bail out the aguardente industry which at that time was experiencing diffi-

culties. In light of the prominent overproduction of the sector and the underhanded competition from the alcohol producers, who produced aguardente by illegal means (desdobramento), beginning in 1952 the Institute responded to demands from producers and established Aguardente Defense Plans. Such plans to requisition aguardente in order to transform it into anhydrous alcohol to be used as fuel were not a novelty; during the Second World War this expedient had been used to alleviate the problem of the fuel shortage. But now the main motivation became one of helping an unprotected group within the alcohol community. In order to justify the Aguardente Plans, the President of the Institute added to this purpose that of saving foreign exchange and even considerations of a moral nature. Dé Carli wrote:

> When the producers came to sue for intervention, I could not help but see that fundamentally intervention by the Institute was helping, in a morally gainful manner, a population which was degraded, undernourished, and worn out from a drink such as Brazilian aguardente. ... I could not refrain from formulating a Plan of this scope, which would give more fuel to Brazil and less cachaça to the drinker (Dé Carli, 1953: 222).

At first, the measures for the protection of aguardente affected only the producers from the state of Rio de Janeiro. Resolution 676 (5/30/52) requisitioned 50% of that state's aguardente production for "transformation into alcohol for carburant mixture for internal combustion engines" (article 1). Soon, however, producers from other states begged the IAA to extend to them the same benefits accorded to the producers of the state of Rio. A month and a half later, Resolution 698 (7/10/52) approved the Aguardente Defense Plan for the harvest of 1952/53,

which requisitioned all aguardente produced from that harvest (article 6), for transformation into anhydrous alcohol for carburant use in the Central Distilleries, or in private ones contracted by the IAA (article 1). In order to compensate for the requisitioned aguardente and the freight costs to the dehydrating distilleries, an Aguardente Fund was created. Its income derived from a tax of Cr$ 2.00 levied on each liter of the product released for sale.[11] To execute the Aguardente Defense Plans, a Special Service for the Control of Requisition and Redistilling of Aguardente (SECRRA) was set up within the IAA.[12]

The results from the stimuli to anhydrous alcohol production as an aid for both sugar and aguardente were fast and palpable. In fact, an examination of Table 26 and Figure VII shows that from 1952 on, while hydrated alcohol production was reasonably constant, the quantity of anhydrous alcohol produced grewat a rapid rate until 1959, with the single exception of a sharp fall in 1956 resulting from the failure of the sugar cane crop of 1955/56. However, data are unavailable which would allow for an evaluation of the relative contributions of the Aguardente Defense Plans and the defense of sugar to the increase of anhydrous alcohol produced during that period.

The alcohol produced was actually mixed with gasoline in much smaller proportions than those proposed by the IAA and the alcohol producers (see below), seldom reaching or surpassing the "legal quota",

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[11]Up to 50% of the individual production of each usina was liberated for free commerce, despite the requisitioning of all aguardente produced in the country.

[12]For a detailed analysis of the Aguardente Plans, see Dé Carli, 1953: 220-239, 243-258; 1954: 11-47; and Gileno Dé Carli, "Plano de

which was equal to 5% of the gasoline consumed the previous year (cf. Figure VIII and Table 44).[13] In 1953, in a speech to the Chamber of Deputies defending the Aguardente Plans, Dé Carli expressed confidence that there was nothing to fear from the expansion of sugar cane production, since, at that time, the quantity of alcohol produced was much less than that which could be mixed with gasoline (Dé Carli, 1954: 19, 20). However, the CNP, who articulated fuel policy in that decade, would not permit an increase in the proportion of alcohol in the carburant mixture. This led to a great accumulation of anhydrous stocks at the end of the decade. At the harvest of 1958/59, for example, there were 44.5 million liters with no outlet, which represented 21 million liters in excess more than the previous year (cf. Dé Carli, 1978: 185).

In these circumstances, it is not surprising that aguardente was in a precarious situation. To begin with, the requisitioning price of aguardente was fixed below the actual redistilling cost in order to discourage production beyond the aguardente production quota set by the CNP.[14] Alcohol producers also brought adverse pressure to bear on the Aguardente Plans. First, they argued that the redistillation of aguardente was extremely uneconomical,[15] and the Aguardente Plans would

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12 (cont.)
Defesa da Aguardente" Brasil Açucareiro, vol. XL, no. 2 (August) 1952: 65-68, cited in Szmerecsányi, 1978. See also Szmerecsányi, 1978: 374-380.

[13]The 5% was not in fact a legal limit, but one fixed in practice. For more on this subject, see pp. 149-152 below.

[14]SECCRA Report, Minutes of the 142nd Session of the Executive Commission of the IAA of 12/17/59. Apud. Dé Carli, 1978: 193.

produce losses, necessitating sugar and alcohol funds to finance them. The aguardente producers, in turn, argued the opposite, claiming that the Aguardente Fund often supported sugar (Dé Carli, 1978: 183, 191, and 194). The alcohol producers complained further that because molasses storage depots were filled instead with aguardente, they were forced to dump alcohol into rivers. They went on to say that trucks were rendered useless due to corrosion caused by the aguardente transported in them (Dé Carli, 1978: 182). The adverse pressure and accusations against the Aguardente Plans came mainly from the São Paulo usineiros. São Paulo was the chief center for the production of both alcohol and aguardente, and both were overproduced. São Paulo producers relieved their surpluses of alcohol, moreover, with the desdobramento of that commodity into aguardente,[16] a process which the Aguardente Plans prohibited.[17] In 1959, São Paulo was virtually drowning in alcohol: the dehydrating distilleries had stopped operations pending the depletion of the aguardente remaining from the preceding harvest.[18] The IAA was

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[15] According to Watson (cited in Szmerecsányi, 1978), whereas 43 liters of alcohol are produced from 100 liters of aguardente, the same tonnage of cane which produces 100 liters of aguardente produces 70 liters of alcohol, without the high costs of redistillation. See F.C. Watson, "Exame sobre a safra de Cana, produção de açúcar e aguardente no Brasil em 1957/58" in Brasil-Açucareiro, XXVI, vol. LII, nos. 3 and 4 (September and October) 1958: 33-39 and 20-26).

[16] Interview with Nicodemus de Andrade, 5/18/81.

[17] The desdobramento of alcohol into aguardente, although illegal, was a traditional recourse of the usineiros when confronted with an alcohol surplus. The Aguardente Plans strengthened this prohibition, and made recourse to this practice more difficult.

[18] Report by Metódio Maranhão, representative of the usineiros of Pernambuco. Minutes of the 90th Session of the Executive Commission of the IAA, 8/20/59. Apud. Dé Carli, 1978: 190.

pressured by both representative associations of the usineiros and their delegates at the Executive Commission of the Institute. In Commission meetings held prior to the passage of the Aguardente Plans, with the aguardente producers represented by the delegate for the banquezeiros, a "true battle" unfolded. As long as those Plans remained in effect, the usineiros contested them in the courts.[19] Finally bowing to these pressures, the 1959/60 Aguardente Plan was buried during the 142nd Session of the Executive Commission of the IAA on December 17, 1959, in the words of Dé Carli, with a "first class funeral" (cf. Dé Carli, 1978: 195).

Fuel Alcohol and the Early Years of Cheap Petroleum: The IAA Loses the Battle

At the close of the decade, the situation of alcohol was no better than that of aguardente. Throughout the 1950s a fuel policy was consolidated which had been formulated during the second Vargas Government[20] to meet an increasing demand for petroleum products, in consideration of: the country's limited capacity to import; an expected rise in the price of petroleum and its products;[21] and possible disruptions

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[19]The usineiros appealed ten times against the IAA. The Institute won on the first nine occasions, but lost on the tenth (Interview with Dr. Nicodemus de Andrade, 5/18/81).

[20]For an analysis of the fuel policy of the second Vargas Government, formulated in anticipation of a liquid fuel crisis which did not occur, see Castro-Santos, 1979: 20-22.

[21]In the post-war period, the price of petroleum and petroleum products initially rose, then dropped by more than half between 1947 and 1949. From 1950 on, however, a restraint on competition among the large Oil Companies stabilized prices (the quotation for Arab oil in the

in the international petroleum market.[22] Although these expectations failed to materialize,[23] the government proceeded to formulate its policy based on the growth of domestic petroleum production, with the aim of attaining self-sufficiency in production and refining in the near future. When Petrobrás commenced operations, it appeared that this objective would be fulfilled within a brief period, given the rapid growth in the production of crude oil following discoveries in the fields of the Recôncavo of Bahia,[24] and the extraordinary growth in the country's refining capacity.[25] This expectation of soon to be

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21 (cont.)
Persian Gulf was US$ 1.75/barrel), except in 1953 and 1957 when prices increased about 25%. From 1957 until the crisis of 1973, the tendency was clearly for prices to decline. (For a detailed analysis of oil prices since the war, see Morris A. Adelman, The World Petroleum Market, Baltimore and London: Johns Hopkins University Press, 1972, especially chapters V and VI.)

The Vargas Government formulated its fuel policy at precisely the moment when the prices of oil and petroleum products appeared to be breaking out of their downward slide. It was feared that the tendency of declining prices would be reversed, especially given a possible disruption of the international market (see footnote no. 22 below). The increase of 25% in the price of oil in 1953 only reinforced those fears.

[22]During this period, the Korean War and the dispute between Iran and the Anglo-Iranian Oil Company over Iranian oil were sources of concern.

[23]First, the domestic consumption of petroleum did not grow at the expected rate, partially because of the drastic reduction in automobile imports. Secondly the price of oil did not increase as much as expected (see footnote no. 21 above). Finally, the availability of oil on the international market was not interrupted as feared; the Anglo-Iranian Company channeled their investments to Kuwait, which was able to easily replace the Iranian oil (see Castro Santos, 1979: 21).

[24]Domestic oil production, which had been 3% of total consumption in 1955, the first year of Petrobrás' operations, increased to 32% in 1960 (see Table 10).

attained self-sufficiency made the addition of alcohol to the carburant mixture "dispensable". Furthermore, gasoline prices did not increase as fast as sugar prices, and, therefore, alcohol drove the price of the carburant mixture higher than that of pure gasoline. On this point Dé Carli wrote the following:

> As long as marginal increases in the price of sugar were inconsequential, parity was tolerable for the consumer of the alcohol-gasline carburant mixture. But, as inflation caused a substantial increase in price, one which surpassed reasonable levels due to production costs, the twin prices of sugar and alcohol rose noticeably higher than the price of gasoline (Dé Carli, 1978: 212).[26]

Exacerbating the price increase of alcohol was the indispensable need for cheap gasoline of the newly-established domestic automobile industry. From the point of view of fuel policy, the presence of alcohol in the carburant mixture at the end of the decade was not merely unnecessary, it was totally undesirable. Addressing the CNP on December 20, 1957 about a general restructuring of prices in the country, President Kubitschek stated in reference to fuel prices:

> "I do not agree, under any circumstances, with a fuel price increase. It would be completely contradictory to the Government's policy. Steps must be taken to alter the cost structure instead." (Apud. Dé Carli, 1978: 187.)

This was, according to Dé Carli, the death stroke for the parity price between sugar and alcohol.

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[25] In 1955, 23% of the petroleum consumed was refined in the country. Five years later this proportion had increased to 49%, and by 1964, it had reached 80% (see Table 10).

Formally, there were no substantial modifications in the scheme of the alcohol policy, however. The only change in the entire decade was Resolution no. 4/53 of the CNP which created an "alcohol supplement". This supplement, representing a small portion of the retail price of gasoline, worked as a kind of fund to cushion any increases in the price of anhydrous alcohol (which depended, in turn, on increases in the price of sugar) and in the volume effectively mixed, thereby protecting the gasoline companies from these oscillations.[27] Nevertheless, there are various indications of what has been called "passive resistance" on the part of the CNP to alcohol,[28] and even "strong resistance from certain technical sectors of the government to the gasoline-alcohol mixture" (Pereira, 1976: 41).

Thus, each year when the CNP and IAA met to determine the price and volume of alcohol in the mixture, veritable battles erupted,[29] from which the CNP invariably emerged victorious. As has been seen, Decree-Law 25,174A/48 authorized the CNP to adjust the price of the carburant mixture for the consumer, taking into account the price and volume of anhydrous alcohol delivered by the IAA to the gasoline com-

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[26]From the section of the justification for Bill no. 400 sent to Congress by Dé Carli on May 29, 1959.

[27]The consumer was charged for the alcohol supplement in advance, over a three month period, on the assumption that the quantity of gasoline and the mixture to be sold would be equal. Any difference would be compensated for in the supplement of the following quarter. An interpretation of Resolution 4/53 of the CNP, and a detailed analysis of its working mechanisms, are found in the working paper "Preço do Álcool para a Mistura Carburante: Relacionamento e Conflito entre o CNP e o IAA 1931-1975", prepared by Héctor A. Poggiese.

[28]Interview with Nicodemus de Andrade, 5/18/81.

panies. The two bodies agreed to set the volume of anhydrous alcohol to be mixed according to the volume to be produced in the next harvest, which was to be estimated by the IAA. Citing the rise in price of the final mixture vis-à-vis pure gasoline, and backed by the government's fuel policy,[30] the CNP allowed the level of anhydrous alcohol to be added to the mixture to be equivalent to only a maximum of 5% of all the gasoline consumed the previous year. Similarly, it did not allow the retail price of the mixture to be adjusted, which impeded the Distribution Companies' ability to pay the price asked by the IAA for anhydrous alcohol. Thus in 1959 the Council guaranteed only the price which was paid for anhydrous alcohol during the previous harvest (at a time of rapidly escalating inflation), and only up to 180 million liters; the remainder was relegated to the responsibility of the Institute. (Dé Carli, 1978: 186).

It is interesting that the existing legal documents were "adapted" to accomodate the new circumstances surrounding the proportion of anhydrous alcohol to be mixed with gasoline. First, it was established that the volume of alcohol to be mixed would be linked to the volume of gasoline consumed during the previous year, in accordance with "recognized principles".[31] Yet, in the only explicit reference on this sub-

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[29] Idem.

[30] In addition to the fact that the final carburant mixture was more expensive, the CNP also offered as a rationale for its decision that because the proportion of petroleum products derived from refining were fixed, the addition of alcohol to gasoline would upset the planning for the country's self-sufficiency in refining (interviews with Nicodemus de Andrade, 5/18/81 and 5/25/81).

[31] An expression used by Nelson Coutinho when referring to the Bill sent to Congress by Dé Carli in May 1959, during the 121st Session

ject in Decree no. 19,717/31, gasoline importers were obliged to acquire at least 5% more anhydrous alcohol than the volume of gasoline which they intended to dispose of in the present year. As this consumption increased each year, linking the alcohol level in the mixture to the previous year's gasoline consumption would have the effect of lessening the amount of alcohol. This was very expedient in a period when alcohol increased the price of the mixture. Moreover, the legal limit of 5% was not mentioned in the only other existing legal document on this subject, Decree-Law 737/38. This decree required gasoline producers to add anhydrous alcohol to gasoline "whenever convenient, and in a proportion to be determined". Its intent had been to make the addition of anhydrous alcohol to domestic gasoline obligatory when the nation's first refinery, the Mataripe Refinery in Bahia, began operations in 1938. According to Pereira, the wording "whenever convenient" was used in order that this refinery not be forced to acquire alcohol for addition to the gasoline it produced, as Bahia was not an alcohol producing state. Later, in Pereira's words:

> ...the country's gasoline production increased, and today it is mainly produced here /Rio de Janeiro/. As a result, Decree-Law 737 is not well suited to the situation, and the expression "whenever convenient" is being used to the detriment of alcohol.[32]

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31 (cont.)
of the Executive Commission of the IAA, on November 5, 1959 (Apud. Dé Carli, 1978: 192).

[32]Declaration by Moacyr Soares Pereira. Minutes of the 121st Session of the Executive Commission of the IAA, November 5, 1959 (Apud. Dé Carli, 1978: 193).

In its disputes with the IAA, the CNP picked out from the two existing decrees on the addition of alcohol to gasoline that which best served its interests, consenting to the maximum proportion of 5% "whenever convenient".

Under the system imposed by the CNP to determine the proportion of anhydrous alcohol in the mixture with gasoline, the IAA found itself saddled with an increasing quantity of alcohol with no outlet, for which it was obliged by law to pay a price on parity with that of sugar. At the end of the decade the Institute accordingly made several attempts to break this system and increase the amount of anhydrous alcohol added to gasoline. In 1958 the IAA proposed a constant and uniform 10% level for alcohol for all gasoline distributing and producing regions of the country; the mixture was understood to incorporate "not only the imported oil, but also that produced domestically" (Coutinho, 1958e: 11). Coutinho relates that, despite the great effort on the part of the Institute to fix the proportion of alcohol in the mixture at 10%, the CNP only permitted, as always, 5%.[33]

The last attempts by the Institute to increase the proportion of alcohol in the mixture were made in the final year of the decade, during the administration of Gomes Maranhão. Bill no. 400 (sponsored by Dé Carli, at that time a Congressman), which proposed a proportion of 13% anhydrous alcohol to be added to gasoline (domestic and imported) was put before the Chamber of Deputies. Dé Carli, who already realized that the rapid increase in the price of sugar and consequently of alcohol made the price of the alcohol-gasoline mixture intolerable for the con-

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[33]Interview with Nelson Coutinho, 4/10/81.

sumer, proposed ending the parity of price for alcohol and sugar, and instead fixing the price of alcohol in line with the price of gasoline (cf. Dē Carli, 1978: 210-217). At the same time, in correspondence with the CNP, the Institute proposed the same proportion of 13% in the mixture, also recommending that the use of the mixture be extended to states which consumed pure gasoline, thus achieving uniformity throughout the country. Despite the fact that the timing of this proposal coincided with Gomes Maranhão's attempt to resurrect the policy favoring the domestic market, the Institute made no mention of increasing alcohol production as a price support for sugar. Rather, it acknowledged a "necessity to limit alcohol production in the country, consistent with the national policy to produce petroleum and its products" (IAA, 1959: 264). Thus, in order to justify the request for an increase in the proportion of alcohol in the mixture, the Institute argued that an increased use of alcohol would result in a savings of 100 million dollars in foreign exchange at a time of a critical shortage of hard currency, and in an improvement in the quality of fuel, especially with respect to its octane rating (IAA, 1959: 263, 265). The pressure from the Institute, and its conversations with the CNP, brought about the creation of a Commission in March 1959 which was composed of 5 members from each body to study the question. In this bargaining process, Gomes Maranhão enlisted the support of CACEX, which had convened a meeting which various government bodies urging them to save foreign exchange. After this meeting, Gomes Maranhão suggested to the Director of CACEX that the problem under study by the IAA and the CNP went beyond the purview of these two bodies, and rather that it was a problem of concern to the entire government given the great potential

savings in foreign exchange (cf. IAA, 1959: 264-265).

The São Paulo alcohol producers, who were confronting a crisis of overproduction of anhydrous alcohol of catastrophic proportions,[34] also exerted pressure on the CNP. In early 1959, the Association of Usineiros and the Union for the Sugar Industry of São Paulo appeared before the CNP to ask for an outlet for the alcohol surplus, which in the harvest of 1958/59 had reached 32 million liters. The CNP demonstrated a willingness to respond to the São Paulo usineiros, provided they agreed to a sacrifice in the selling price of alcohol. New agreements were promised for the harvest of 1959/60 (cf. IAA, 1959a: 268); the bargaining process was repeated on a harvest to harvest basis. It is interesting that the São Paulo usineiros appealed directly to the CNP, correctly identifying what had in fact become the decision-making center for alcohol policy.

In the end, neither was Dê Carli's bill approved in the Chamber of Deputies,[35] nor did Gomes Maranhão obtain the 13% level for alcohol

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[34] São Paulo, the major alcohol producer since the late 1940s, replaced Pernambuco as the most important anhydrous producing center beginning with the 1954/55 harvest (except in 1956/57). Its production after 1954/55 approached 50% of all anhydrous alcohol produced in the country, reaching, in the harvests of 1959/60 and 1960/61 63.2% and 66.6%, respectively. At the same time (once again with the exception of the 1956/57 harvest), São Paulo converted most of its alcohol production to anhydrous alcohol in response to the special stimuli given to the anhydrous distilleries in São Paulo by Dê Carli's sugar policy. In the harvests of 1958/59 and 1959/60, 63% of the alcohol produced in São Paulo was anhydrous. While Pernambuco had maintained a higher proportion of anhydrous alcohol to its total alcohol production up until the 1958/59 harvest (between 70% and 80% from the 1952/53 harvest on), by the end of the decade the amount of total alcohol produced was incomparably smaller than that in São Paulo: 57.2 million liters and 191 million liters for Pernambuco and São Paulo, respectively, in the 1959/60 harvest (see Table 29).

in the mixture that he had petitioned for. Table 44 and Figure VIII attest to the limited success of these attempts to increase the proportion of anhydrous alcohol in the carburant mixture. During the fifties the proportion of anhydrous alcohol only significantly exceeded the 5% stipulated by the CNP on two occasions, in 1958 and 1959, when the proportion reached 7% and 7.5% respectively of the total gasoline consumed the previous year. These levels, obtained in the years of the greatest pressure from the IAA and the São Paulo usineiros, were, however, far below the requested proportions.

The principal argument used by the CNP to impede the increase in the price and amount of alcohol to be mixed, that is, that such an increase would cause the price of the final gasoline-anhydrous alcohol mixture to rise, had a basis in law. The CNP was supported by the

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[35] Dé Carli filed the following report about the fate of his Bill in the Chamber of Deputies:

> Immediately after presenting the bill, we were invited by a friend, an important sugar and cement industrialist, to a meeting at the National Petroleum Council, when Congress was still located in the city of Rio de Janeiro. The technicians and attorneys of the National Petroleum Council wanted a member of Congress to take responsibility for defeating a certain bill which had been sent to the Chamber of Deputies with which they heartily disagreed, as they opposed any measures to make the alcohol-gasoline mixture compulsory.
>
> Arriving at the scheduled meeting, whose agenda was not really known to the intermediary, we heard the opposition to the bill and the request that we should lead the fight against it. To the surprise of everyone, including the technicians and the intermediary, we declared that this was impossible, since we were the author of the Bill no. 400. That embarrassing meeting was broken up immediately, but not before the National Petroleum Council's dissension from the proposed, but never debated, program, which would have changed the entire alcohol policy, had been made perfectly clear (Dé Carli, 1978: 217).

Regulation appended to Decree 22,981/33 - the central decree of the policy to consolidate the domestic market - which stipulated that both the buying price of alcohol acquired from the usineiros for mixture, and the selling price of the carburants produced, should be fixed so as not to burden the consumer of the carburant (article 4, paragraph i). The buying price of alcohol was also to be set so as not to cause losses for the usineiros (article 4, paragraph i). When this decree was promulgated in 1933, the IAA enjoyed complete control over the process of fixing the price of the carburant mixture. With the creation of the CNP, however, as has been seen, this responsibility was divided between the IAA, which maintained control over the production "end", and therefore, the defense of the interests of the alcohol producers, and the CNP, which was in charge of the distribution "end", and, therefore, concerned with the defense of the interests of the carburant consumers. At the end of the fifties, when the interests of the alcohol producers and consumers came into sharp conflict for the reasons discussed above, an impasse was reached. Both bodies had legal bases from which to act, and in opposite directions. This (legal) impasse would be resolved de facto in favor of the CNP, as already seen, but it would not be resolved de jure until the following decade.

At the close of the fifties, the tension between the sugar and fuel policies, as a function of which alcohol policy was defined historically, erupted in favor of the fuel policy, which is to say in favor of the CNP. In the final instance, the CNP held more bargaining power in the sense that it controlled the use of fuel alcohol, and, therefore, its outlet. Because of its relatively weaker position, the

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[36] As a matter of fact, the CNP was more concerned with the Government liquid fuels policy based on petroleum and the assurance of cheap gasoline to the newly created automobile industry than with consumers, who have never had the ability to articulate their interests.

IAA could not find an outlet for the anhydrous alcohol stocks which accumulated in spite of repeated attempts, nor could it obtain a better price for that small portion of the product which was mixed with gasoline. Accordingly, the Institute was not able to guarantee price parity with sugar to the alcohol producers. In fact, beginning with the Alcohol Defense Plan of 1959/60, the IAA no longer offered this guarantee to the producers. Because consumers' interests coincided with CNP's they benefitted from this situation.

In 1961, the IAA itself, through the Superintendent of the Alcohol service, acknowledged the precarious situation of alcohol:

> The problem is very complex, and will become even more so because, with the completion of the Duque de Caxias Refinery, Brazil will become self-sufficient in refining capacity. On the other hand, one of the arguments used by the National Petroleum Council is that we should try to find another end-use for alcohol, even as an export commodity. ... It makes for better business to sell alcohol and import gasoline (Minutes of the 26th Session of the Executive Commission of the IAA, on March 23, 1961. Apud. Dé Carli, 1978: 196).

The new decade began with producers and the IAA itself searching for alternative uses for alcohol and residual molasses. This marked the death of the fuel alcohol policy, and with it any possibility of fuel alcohol playing a part in a permanent system of supporting the price of sugar -- Truda's ideal. Fuel alcohol would only become relevant once again with the National Alcohol Program inaugurated in 1975, and, circumstantially, in the mid-sixties as a result of the crisis provoked by the alarming overproduction of sugar at that time. In the following decade, the defense of sugar was sought in exports, which

formed an element in a new policy emphasizing modernization and an increase in productivity in the sugar industry.

PART IV

THE COLLAPSE OF THE FUEL ALCOHOL POLICY

(1960 - 1975)

CHAPTER 5

Alcohol Neglected: The Modernization of the Sugar Industry

The Modernization of Sugar and the Turn from the Domestic to the Export Market

The effort made by Gomes Maranhão to limit sugar production, which had suffered from worsening overproduction at the end of the 1950s, lost its force with the highly favorable world market conditions in the early sixties. The economic embargo placed on Cuba after its revolution by the United States created an opening for Brazil in the preferential North American market. With the passage of the new Sugar Act of 1962,[1] Brazil was awarded a permanent quota which grew over time, commensurate with the demonstrated ability of the Brazilian sugar industry to deliver larger quantities of sugar each year (Numberg, 1979: 132). Moreover, repeated failures of the Cuban harvests diminished that country's exports to the free world market, which opened new opportunities for Brazilian sugar (cf. Szmerecsányi, 1978: 255).

Although the full impact of these tendencies were felt in the medium term, these new opportunities for exporting had the immediate effect of causing a definitive break in the sugar policy which oriented production toward the domestic market. The managers of the IAA committed the Institute to an expansionist policy, sustained increasingly by exports.

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[1] According to Numberg, Brazil managed to get the "lion's share" of the Cuban quota when it was distributed among various producing countries. For an analysis of the IAA's actions in this regard, and the reaction of the American government, see Numberg, 1979: 101-104.

In 1961 a series of measures were adopted. Decree no. 50,818 (6/22/61) established an Exports Division within the IAA which was assigned the function of coordinating the export of sugar and other commodities derived from sugar cane. A month and a half later the Fund for the Recuperation of the Sugar Industry was created (Decree no. 51,104 - 8/1/61) using the earnings from Brazilian exports to the preferential North American market. The resources of this Fund, in turn, would be used to give financial assistance and credit on highly favorable terms to sugar producers, especially those from the Northeast. In late 1961, another Fund was established, the Consolidation and Development of the Sugar Industry (Decree 156 - 11/17/61), whose resources derived from earnings from exports to both the preferential North American market and the free world market, as well as from a levy of Cr$ 50.00 (old) on each sack of sugar. The objectives of the Fund for Recuperation were deemphasized in favor of stimulating exports, as per Decree 156 (cf. Szmrecsányi, 1978: 256-259).

In the early 1960s, the international price of sugar did not respond to the special circumstances described above, nor did the overall volume of exports increase -- to the contrary, they decreased. Nevertheless, Brazil's growing share of the preferential North American market, rising domestic consumption, and falling levels of sugar production[2] during this same period (cf. Table 21 and Figure I) prompted decision

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[2]The declining trend in sugar production in the early 1960s was caused in part by the production limit imposed by the Institute at the end of the previous decade. As previously mentioned, the harvests of 1959/60 and 1962/63 were limited to 50.9 million sacks of sugar, in an attempt by Gomes Maranhão to return to the principles of the policy to consolidate the domestic market. In direct opposition to this policy, however, the Crop Plan for 1961/62 increased the national production

makers to adopt a policy of expansion. Based on an optimistic projection of high growth rates in domestic consumption, the Ministry of Industry and Trade - to which the IAA had been subordinated since 1960 - proposed to the Brazilian President in April 1963 a program which was later called the Plan for the Expansion of the National Sugar Industry. This Plan set a goal for sugar production to reach 100 million sacks by 1971. Of these 100 million sacks, 80% were to be destined for the domestic market and 20% for export and stocks. In December, with the consent of the President, the IAA (Resolution 1761 and 1762 - 12/12/63) approved the new national limit for sugar production. To reach this goal, an increase of 38 million sacks in the effective capacity of the industry relative to the previous five years was required. Sixty percent of this increase was to be obtained through raising the quotas of the existing usinas, and the remainder by creating new mills, whose quotas would be set in open bidding (cf. Szmrecsányi, 1978: 263-265).

These and other measures to expand output,[3] as well as the leap in the price of sugar on the international market (which almost tripled in relation to the previous year) (see Table 18), encouraged producers to invest heavily in increasing their production capacity. The quick result was a grave crisis of overproduction in the sector. Production

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2 (cont.)
quota to 58.5 million sacks, in response to the opening of the preferential American market.

This fall in sugar production can also be attributed to climatic factors and the social upheavals of the period, specifically to the litigation between the suppliers and the usineiros, as well as to labor problems, especially in the Northeast (IAA, Plano de Expansão da Indústria Açucareira Nacional, Rio de Janeiro, 1964, mimeo. Apud. Szmrecsányi, 1978: 271).

grew by 12% in 1964 and again by 36% in 1965, when excellent climatic conditions in both the Northeast and Center South gave rise to an exceptional sugar harvest of 77.7 million sacks. In 1964 domestic consumption and exports decreased, and while both recovered somewhat in 1965, their totals remained well below the production level for these years. As a consequence, inventories grew to an unprecedented level, equalling 14% and 18.5% of total sugar production in 1964 and 1965, respectively (cf. Table 21 and Figure I). At the same time, the price of sugar on the free world market, which had peaked in 1963 and 1964, dropped sharply beginning in 1965 (cf. Table 18), rendering exports once again uncompetitive in foreign markets, even when taking into account profits earned on the preferential American market.

To strengthen the IAA's power to control the market and limit production, various emergency measures were taken between 1965 and 1968 of which Law 4,870 (12/1/65) stands out as critical.[4] In addition to buttressing the IAA, it contained arrangements aimed at improving agricultural and industrial output in the sugar industry, as well as checking the disparities bewteen the sugar producing regions of the Northeast and the Center South. The principle of limiting production to support the price of sugar was reaffirmed, however, with an important addition:

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[3]For a detailed analysis of these measures, see Szmrecsányi, 1978: 256-268 and 270-276.

[4]In addition to Law 4,870/65 (see the text below), other legal documents which reinforced the powers of the IAA of inspection and control include: Decree Law 16 (8/10/66), which established penalties for underground production, trade, and transport of sugar and alcohol, and Decree Law 56 (11/18/66), which governed sugar and alcohol production and their outlets.

exports, which previously had been a temporary recourse due to the instability of the international market, were now to be permanently integrated into the system to support sugar. A production limit was established which took account of both domestic consumption and export possibilities. With this, the tendency delineated since the 1950s was now formalized. In order to finance export activities a Special Export Fund was perceived as necessary. This Fund was established in 1967 with Decree Law no. 308; 35% of the Institute's revenue was earmarked for this Fund. These resources were provided from a levy exacted on each sack of sugar and each liter of non-fuel alcohol, as well as from the net income earned from exports. This Fund had the important objective of covering the losses of the IAA incurred in subsidizing exports[5] when the price on the international market was less than the price paid by the IAA to the usineiros.[6] It also protected the Northeast by according priority to its non-onerous exports. In the same vein, Decree Law no. 35 (11/18/66) made special credit available to subsidize sugar cane, sugar, and alcohol, as well as to supplement wages, in the harvests of 1963/64 and 1965/66. Moreover, IAA Resolution no. 1974 (8/13/66) divided the country into two sugar producing regions, the North/Northeast and the Center South, with the quotas for one region transferrable to the other only with the express permission of the IAA.

The 1965/66 Crop Plan, which was based on the recently promulgated Law 4870, established a national production quota of 65 million sacks,

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[5]Interview with Elizabeth Serôdio de Carvalho on 8/26/80.

[6]Recall that with Decree Law 1831/39 the IAA gained a monopoly over sugar exports.

representing a reduction of approximately 10% relative to the estimated crop production. The greatest impact of this restraint on production was felt in São Paulo. A second version of the Plan, elaborated at the insistence of the National Monetary Council, provoked the resignation of the President of the Institute. Crop production surpassed forecasts, reaching 75.9 million sacks.[7] Subsequent Crop Plans continued to established national production limits, despite the fact that those limits were surpassed.[8]

The situation improved gradually. In 1969 the prices on the free world market began to rise (cf. Tables 18 and 19). Brazil acquired a reasonable quota in the new International Sugar Agreement, and an ever growing share of the preferential American market counterbalanced, to some extent, the low prices prevailing on the world free market. On the other hand, the late sixties coincided with the adoption of a development model in which exports were the key element in generating the necessary foreign exchange to sustain the high rates of economic growth. In order to make the sugar sector more dynamic such that its exports could fulfill this function, it was absolutely essential to reduce costs and/or increase productivity in both agricultural and industrial operations. This modernization was a pre-requisite to guaranteeing an adequate supply of quality sugar at a competitive price.

To attain this objective, the sugar policy of the seventies set forth three goals:[9] (a) to eliminate inefficient producers; (b) to

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[7] See Szmrecsányi, 1978: 349.

[8] For an analysis and description of the Sugar Defense Plans between 1939 and 1975, see Szmrecsányi, 1979: 334-361.

modernize the industrial sector; and (c) to establish an agricultural research program whose aim was to improve the quality of sugar cane and develop new strains to ensure greater industrial and agricultural productivity. The resources to support this modernization program were to come from the Special Export Fund.

To eliminate inefficient producers a series of measures were taken which included Acts of the President of the IAA, decrees, and laws. Among the laws, no. 5,654 (5/14/71) and Decree Law 1,186 (8/27/71) are significant and worthy of mention. Law no. 5,654, in instituting the Sugar Industry Rationalization Program, established a new national production limit of 100 million sacks; canceled the registration of usinas inoperative for three consecutive harvests with the IAA; and abolished state quotas in favor of regionally-based ones which could, moreover, be redistributed amongst states within a particular region (thereby working to the advantage of the most efficient states). The new quotas system gave a financial stimulus to the merger, redistribution, and relocation of the usinas. Also significant was the Act of the President of the IAA no. 21/71, which established that the quotas of those usinas which showed an industrial output greater than the average for their region should be increased proportionately.

With these measures, the protection traditionally afforded by the IAA for the least privileged and least efficient sugar producers dissipated. In fact, the number of usinas in the country was reduced from 297 to 208; 24 were eliminated in the Northeast and 47 in the Center-

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[9]For a careful analysis of the modernization program of the sugar cane industry beginning in the 1970s see Numberg, 1979: 131-154 and 216-243, and Szmrecsányi, 1978: 290-306.

South, the majority of which were in Rio de Janeiro.[10] The concentration in land ownership and the growth in the number of capital-intensive firms resulting from this process led to the elimination of the small family usinas (the old engenhos) and the displacement of rural workers (many of whom became bõias-frias or temporary workers), and also caused difficulties for the sugar suppliers (most of whom were unable to market their sugar cane after the disappearance or relocation of the usinas which they had previously supplied) (see Numberg, 1979: 221-223). The "protectionist barriers" remained only at the regional level. Thus the "inefficiency" of the North/Northeast continued to be protected from the encroachment of the Center South.

Paralleling efforts to modernize operations were those to improve the quality of cane. The National Program for the Improvement of Sugar Cane (PLANASUCAR) was created for this end by a decision of the IAA on July 29, 1971, and approved by the Minister for Industry and Trade one month later. PLANASUCAR went into effect in 1972, endowed with "relative financial autonomy and considerable administrative flexibility". Its objective was to create and distribute new strains of sugar cane with a high level of agricultural and industrial productivity.[11]

The modernization program of the sugar industry was on course when a failure in the sugar beet and cane crops drove up prices on the international market at an unprecedented rate. In 1972 prices increased by

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[10] See A. Fonseca, "Política Governamental de Investimento no Setor Açucareiro", Brasil-Açucareiro, vol. LXXXVI, no. 4, October, 1979: 41-52, cited by Numberg, 1979: 221.

[11] For a careful description of the creation of PLANASUCAR, its organizational structure, and an evaluation of its program, see Szmrecsányi, 1978: 290-295 and 457-468.

approximately 60% over 1971; in 1973, by 30% in relation to 1972; and in 1974, they more than tripled, reaching 29.66 cents (U.S.) per pound (cf. Table 19). Brazilian exports expanded by 112% in 1972, and by another 13% in 1973, when they totalled 49.5 million sacks (see Table 21 and Figure I).

What Numberg calls the second phase in the modernization of the sugar industry began with a substantial accumulation of resources in the Special Export Fund, which, as has been seen, was created with the principal objective of sustaining exports during those periods when government subsidies were necessary. However, the Institute came under pressure from the usineiros to redistribute the profits accumulated "at their expense".[12] In response, the Federal Government promulgated Decree-Law no. 1266 (3/26/73), which made the assets of the Special Export Fund available for the rationalization of sugar planting and processing, the capitalization of the sector's agricultural and industrial operations, and the reduction of the financial costs of production and trade.[13] Moreover, credit was conceded to enterprises in the sugar sector on extremely favorable terms, that is, with no adjustment for inflation, interest rates far below inflation rates, long grace periods, and long-term debt amortization.[14]

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[12]Interview with Nicodemus de Andrade on 5/18/81.

[13]See on this subject A.T. Carmo, "Novos Recursos para o Açúcar, Decreto-Lei no. 1266", Brasil Açucareiro, Ano XLI, Vol. LXXXI, no. 4, April 1973: 9-11, Apud. Szmrecsányi, 1978: 304.

[14]For an analysis of the terms of credit for the modernization program of the industry, see Numberg, 1979: 225-228.

Euphoria was widespread, especially in the higher echelons of the IAA, although some usineiros and suppliers voiced pessimism based on the possibility of world overproduction which the extremely high prices might engender (cf. Numberg, 1979: 135-142). In fact, in November 1974, prices began to fall as rapidly as they had risen. Similarly, Brazilian exports fell, at an average rates of 26% between 1974 and 1976, when they recovered. At the same time, while total sugar production grew 14% in 1976 and 21% in 1977 (when it set a production record of 138.4 million sacks of sugar), consumption grew at a far lower rates, and even decreased in 1976. In spite of the impressive recuperation of exports in 1977, which practically doubled in relation to the previous year, sugar stocks nevertheless accumulated in alarming proportions. The increase in inventory levels represented 12.3% of total sugar production in 1976 and 13.3% in 1977 (cf. Table 21 and Figure I).

The sugar industry entered the second half of the seventies in a precarious situation. The resources of the Special Export Fund were depleted, and the industry as a whole was paying a high price for tying its modernization program so closely to the international market.

The CNP Establishes de jure Control over the Fuel Alcohol Policy

The 1960s began with a total lack of interest in the use of anhydrous alcohol as a carburant, given the fuel policy which had gone into effect at the end of the preceding decade. This policy, based on importing crude oil for refining at low prices, the prospect of Brazil's self-sufficiency in refining in the short term, and the expectation of growing domestic production of crude oil, discouraged the addition of alcohol to gasoline as this made the final price of the carburant more

expensive than that of pure gasoline. As discussed above, during the fifties the CNP, who represented, so to speak, the interests of the fuel policy, clashed with the IAA, whose primary concern was the sugar policy (and in whose view fuel alcohol could be an escape valve for the chronic overproduction of the period), over the price and quantity of alcohol to be added to the carburant mixture. The fuel policy was disinterested in, and even boycotted, the carburant mixture policy. Thus it was not surprising that the "defeat" of the IAA in its dispute with the CNP meant that fuel alcohol no longer received the stimulus of the sugar policy. This situation was exacerbated by the sugar policies of the sixties and more so, of the seventies, when, as seen, the sugar industry was rationalized and modernized. Emphasis was placed on exports, which were no longer subsidized and which no longer served as a source of relief to recurrent sugar crises. Rather, exports became an element in making the sector more dynamic. Thus, with the definitive end to the policy to consolidate the domestic market, the sugar policy dispensed with fuel alcohol, to which it would not resort again until the serious overproduction crisis of the mid-sixties.[15]

As commented earlier, although the fifties ended with the carburant mixture policy having changed de facto, it had not yet done so de jure. This policy was modified legally in the early 1960s. Law no. 4452,[16]

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[15] A second large scale crisis, which occurred in the mid-70s, relied on the PNA for relief.

[16] The legal documents which in the 60s created the system for setting the price and quantity of anhydrous alcohol to be mixed with gasoline, and which reflected the conflictual relationship between the CNP and the IAA, are analyzed in detail in the working paper, "Álcool Para Mistura Carburante: Quota Legal e Percentagem, Relacionamento e Conflito entre o CNP e o IAA, 1931-1975", prepared by Hétor A. Poggiese.

which regulated the ICM (a kind of sales tax), stipulated that the CNP was to determine the consumer price of petroleum based on the cost of the refined gasoline plus, as compensation for the IAA, the cost of the anhydrous alcohol in the carburant mixture (article 13). Moreover, the price fixed by the CNP would not be subject to the approval of any body with control over any facet of supply and prices (article 14). In other words, the decision-making power of the CNP over prices was strengthened: the price of alcohol paid by the distribution companies (set by the IAA) was adjusted to the price of the mixture (set by the CNP). This represented a reversal of earlier legislation, when the system of setting prices had originated with the IAA. CNP Resolution no. 6 (6/8/65) set out in detail how the IAA was to be compensated, which was in such a way as to limit the selling price of anhydrous alcohol, set by the Institute, to the maximum cost of refined gasoline. In accordance with the resolution, the CNP would compensate the IAA with a portion of the selling price of gasoline (Decree 4452/64 as discussed above) for the difference between the cost of refined gasoline (y) (fixed by the CNP and charged by the IAA to the distribution companies) and the selling price of anhydrous alcohol (x). Therefore, if $x > y$, there would be no compensation. Any compensation was to be paid on the delivery of anhydrous alcohol to the distributors, with an upper limit of 5% of the total domestic consumption of gasoline, calculated on the basis of the previous year's consumption. In sum, this Resolution legalized four basic precepts of the carburant mixture policy that had in practice been in force since the fifties:[17]

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[17] See pp. 149-150.

(i) the price of alcohol was tied to that of gasoline (and no longer to sugar);

(ii) the CNP ultimately set the price of alcohol in that it fixed the price of gasoline;

(iii) the maximum volume of alcohol permitted for mixture with gasoline corresponded to 5% of the gasoline consumed during the previous year;

(iv) the CNP determined the (maximum) proportions of the mixture, given that it would compensate the IAA only up to 5%.

Decree 15,190 (9/8/66) modified the system for determining the price and amount of anhydrous alcohol to be added to gasoline. The structure it established remained in effect until the PNA. New limits were set for the price of anhydrous alcohol for mixture (x), fixed by the IAA. The addition of anhydrous could not raise the consumer price of gasoline by more than 1% of the cost of refined gasoline (y), set by the CNP. The anhydrous alcohol delivered to the distributors would be priced at the cost of refined gasoline (y), with the transport cost of gasoline added whenever necessary.[18] The 1% surcharge on the retail price would be used to compensate the IAA for the difference between the price of anhydrous alcohol set by the Institute (x), and the cost of refined gasoline (y), set by the CNP. Compensation was still limited to the amount of anhydrous alcohol corresponding to 5% of the previous

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[18]The shipping cost of gasoline was factored into the retail price established by the CNP. If by creating new centers for mixing carburants in the interior of the country, the freight costs were lowered, the value of the new costs would be added to the invoice price of anhydrous alcohol when delivered to these mixing centers (article 4).

year's gasoline consumption, though the CNP and the IAA could, if they both agreed, increase this level up to 10%. For the first time, a technical limit of 25% for the addition of alcohol to gasoline was also set. These two possibilities of a higher proportion of anhydrous alcohol in the carburant mixture may reflect the climate in which Decree no. 59,190/66 was promulgated, one of a grave crisis of overproduction of sugar. In fact, the proportion of anhydrous alcohol in the mixture tended to increase from 1964 on, reaching 6.1% in 1966 and 6.6% in 1967 of the gasoline consumed during the previous year (cf. Figure VIII and Table 44). Of course these levels were still far below the maximum of 10%. Yet, 1966 and 1967 were the only two years during this entire period when the proportion of anhydrous alcohol in the carburant mixture exceeded the 5% limit. The heavy pressure on the IAA and the usineiros from accumulated stocks with no outlet may explain why the preamble of this decree, which otherwise confirmed the superiority of the CNP -- which maintained firm control over both the volume of alcohol in the mixture and its price -- contained conciliatory overtones to both bodies. A list of arguments for and against the presence of alcohol in gasoline made by both the IAA and the CNP was presented.[19]

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[19] Included among the "considerings" of Decree 59,990/66 were: "Considering that the alcohol industry is of national interest; that with the development of oil refining national gasoline production will rapidly approach self-sufficiency; that anhydrous alcohol production needs an outlet, which can only be guaranteed by its addition to gasoline; that the anhydrous alcohol-gasoline mixture has a higher octane rating than pure gasoline; that the high anti-knocking property of alcohol makes for greater efficiency in engines; and, finally, the necessity of avoiding a major price increase in the carburant mixture, in view of the obvious advantage of maintaining urban and highway transport at economic levels ...".

CNP control over prices grew in the coming years. In 1974, in order to fix the wholesale price of anhydrous alcohol charged to the distributors, the IAA was forced to consult the CNP not only for the cost of refined gasoline, but also about the readjustment index to be applied. Moreover, after determining a price, the IAA had still to submit it to the CNP for approval.[20]

Thus, in sum, the 1960s and the first half of the 1970s were extremely unfavorable years for fuel alcohol.

Searching for Policies and New Uses of Alcohol

By the beginning of the period, the unfavorable situation of fuel alcohol had already taken clear shape. This forced both producers and decision-making to search for alternative uses for alcohol and other sugar by-products.

An examination of Figure VII and Table 26 shows that between 1959 and 1964 the production of anhydrous alcohol dropped sharply and quickly, from 341.5 million liters to 62.2 million. In contrast, after an initial leap of 139.4 to 287.7 million liters between 1959 and 1960, the volume of hydrated alcohol grew at a fairly constant rate until the end of the decade, especially when compared with the intense fluctuations of anhydrous alcohol production during the same period. After a rapid fall in the volume produced in the early sixties, anhydrous alcohol suddenly increased 392% between 1964 and 1965, when it reached 305.9 million liters. It continued on an upward course until 1967, when it peaked at 432.6 million liters, after which it declined rapidly to 98.4 million

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[20]Information from SEAAI, Cabinet Minutes, 6/11/74.

liters in 1969. The brusque fluctuation of anhydrous alcohol between 1964 and 1969 is explained by the grave crisis of sugar overproduction in this period. In these years, fuel alcohol was once again used as a remedy for the sugar crisis. As mentioned above, it is precisely, and only, for two years during this period that the proportion of alcohol in the carburant mixture was more than 5% of the volume of gasoline consumed in the previous year, as prescribed by law.

In order to stimulate the supply of industrial alcohol in this new phase, Decree 60,493 (3/14/67) set up a Special Study Group for problems related to setting the price of alcohol for industrial consumption. The hope was that the availability of this type of alcohol at a reasonable price would facilitate the creation or expansion of important sectors of the chemical industry. Some months later, IAA Resolution no. 1,993 (8/3/67) enacted the Plan for the Control and Distribution of Industrial Alcohol, regulating the Institute's control over the sale of any grade of alcohol intended for industrial use.

Pernambuco, the largest alcohol producer after São Paulo, redirected its production, beginning in the 1960s, to hydrated alcohol, on average allocating more than 90% of its total alcohol production to this type of alcohol between the harvests of 68/69 and 75/76 (cf. Table 29). The idea was to use hydrated alcohol, both from Pernambuco and other states of the Northeast, as a raw material for butadiene used in synthetic rubber production by COPERBO - the Synthetic Rubber Company of Pernambuco, in Recife. However, the cost of synthetic rubber production using alcohol as the raw material was 30% higher than that of the equivalent product manufactured from petrochemicals.[21] The Government

responded to this dilemma, given the need to reduce imports, by adopting a policy of making synthetic rubber from both types of raw material to satisfy domestic demand until such a time when petrochemical-based rubber could alone supply the market. In light of concern over a possible shortage of the raw material for COPERBO, given the region's limited productive capacity (about 130 million liters) and production requirements (100 million liters) (cf. Carneiro, 1965: 22-24), the Government in 1966 promulgated Decree no. 58,373. Among its provisions was the creation of a Special Study Group for problems related to the utilization of alcohol and its links with COPERBO, to guarantee the use of all Northeastern alcohol produced, and to expand the synthetic rubber market by exporting.

Concern over the adequacy of the supply of the raw material to COPERBO was not without foundation. Exacerbating an already insufficient regional production of alcohol, molasses was gaining favor as an alternative by product of sugar (Szmrecsányi, 1978: 268-269). Beginning in 1966, there was a great demand for molasses in foreign markets, especially in Western Europe and the United States, for use as cattle fodder. As a consequence, the price of the commodity rose substantially on the world market, to the point where many producers preferred to shut down their annexed alcohol distilleries and switch to exporting molasses.[22] Molasses exports were basically from the Northeast, channelled through the ports of Alagoas and Pernambuco.[23]

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[21] See Carneiro, 1965: 22. According to this author, this was due to the more intensive use of manual labor in the successive industrial processes in the transformation of alcohol: from cane to molasses and from molasses to alcohol.

For São Paulo, however, exporting molasses was an inadequate solution to the problem of overproduction. The fact that the usinas were widely dispersed throughout the state meant that the product had to be transported over long distances to reach port, thereby greatly increasing its final cost.[24] Neither was the export of alcohol a good solution. As the domestic product was unable to compete in foreign markets with synthetic alcohol produced from petroleum at a much lower cost, São Paulo lost interest in this activity after the 1968/69 harvest (only Pernambuco continued to export alcohol for reasons specific to that state).[25] Thus, in order to find outlets for the large produc-

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[22] Export of Molasses (in metric tons)

1966/67	127,000
1967/68	153,259
1968/69	120,094
1969/70	227,984
1970/71	355,600
1971/72*	450,000

*estimated

Source: Simões de Almeida, 1972: 71.

[23] On the export of molasses, see Simões de Almeida, 1972:71 and Szmrecsányi, 1978: 268-269.

[24] Interview with Nicodemus de Andrade on 5/18/81.

[25] Export of Alcohol (in liters)

	São Paulo	Pernambuco
1965/66	37,436,878	-
1966/67	74,000,000	-
1967/68	55,000,000	-
1968/69	-	6,567,478
1969/70	-	6,600,000
1970/71	-	4,400,000
1971/72*	-	11,000,000

*estimated

Source: Simões de Almeida, 1972: 71.

tion surplus other than the hydrated alcohol market, of which São Paulo commanded a considerable share,[26] the continued production of anhydrous alcohol to be used in the carburant mixture remained the only alternative, notwithstanding all the difficulties imposed by the CNP in connection with the price and quantity of alcohol to be mixed. In the harvest of 1965/66 more than 70% of all anhydrous alcohol produced in the country came from São Paulo. From the harvest of 71/72 until that of 75/76, when Proálcool was launched, São Paulo's share of national production was always higher than 93%, and reached 98% in the harvests of 73/74 and 74/75 (cf. Table 29). Therefore, it was not surprising that with the demand for great quantities of anhydrous alcohol during the first phase of the PNA (National Alcohol Program), São Paulo rapidly took the lead.

The 1970s began with concern on the part of sugar and alcohol experts about the absence of an official alcohol policy, given the imminet self-sufficiency of the country in petrochemicals.[27] Until then ethyl alcohol of agroindustrial origin had been the principal input of

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25 (cont.)
According to Simões de Almeida, Pernambuco sustained alcohol exports because of the Votorantin Group, which had an interest in maintaining the Uruguayan market, captured in open bidding.

[26]Beginning with the harvest of 1960/61, São Paulo produced 50% or more of the total hydrated alcohol in the country; its share increased to at least 60% between the harvests of 65/66 and 67/68. From the 68/69 harvest on, the share of the São Paulo producers decreased commensurate with the increase of that of their Pernambucan counterparts (see Table 29).

[27]The information given in the text is based on Carneiro, 1970, 1970a, and 1971. Carneiro is an attentive observer and careful analyst of structural changes in the hydrated alcohol market during the 1970s.

the domestic chemical industry, serving as raw material for the production of acetic products (Rhodia-SP, Hoechst-SP, Victor Sence-RJ), polyethylene (Union Carbide-SP, Eletroteno-SP), synthetic rubber (COPERBO-PE), pharmaceuticals, cosmetics, and other product lines. In 1970, the annual demand for alcohol from industry was in the vicinity of 245 million liters, equal to about 40% of all alcohol produced in the country in that year. However, the supply of alcohol was subject to unforeseeable fluctuations in cost, price, and availability, given that its raw material production was subject to climatic conditions. Accordingly, with the anticipated self-sufficiency in petrochemicals in the early 70s and, therefore, their manufacture on a commercial scale, the days of alcohol were numbered, given that a "preference for another, lower cost raw material with a more stable supply would be inevitable in the industrial market" (Carneiro, 1970:67). It was therefore necessary to search for alternative uses for hydrated alcohol, and, ultimately, for molasses. Nonetheless, the Alcohol Defense Plan of 1970/71 gave no sign whatsoever of serious concern about a structural change in the hydrated alcohol market. Rather, it was merely intended, according to Carneiro:

> ...to compensate, temporarily, the reduction in the industrial market for cane alcohol with an increase in anhydrous alcohol production destined for the carburant mixture, the volume of which was to be 332 million liters, as opposed to 61 million the previous year (Carneiro, 1970a: 11).

The estimate for hydrated alcohol was 338 million liters. The plans that followed stressed this tendency to "compensate" for any reduction in the hydrated alcohol market by increasing the production of anhydrous

alcohol, estimating for the harvest of 71/72 a production of 288 million liters of hydrated and 366 million liters of anhydrous alcohol (Carneiro, 1971: 11), and for the harvest of 72/73, 310 and 410 million liters respectively (Szmrecsányi, 1979: 373).

Neither type of alcohol was produced in the estimated amounts, however. While the volume of anhydrous alcohol did substantially surpass that of hydrated during 1971 and 1972, from this year on once again the growth tendency was inverted, with the volume of hydrated falling and of anhydrous rising (cf. Table 26 and Figure VII). The topsy-turvy behavior of hydrated and anhydrous alcohol can be attributed to the uncertainties of the market for hydrated alcohol, and the lack of a policy which planned for alternative uses for industrial alcohol and molasses. The two types of alcohol alternated sharp and sudden upturns and downturns in production levels in the early 1970s. It was not until 1975, when the National Alcohol Program was launched, that the behavior of anhydrous and hydrated alcohol became more clearly defined. Between 1976 and 1979, the first phase of the Program which was based on the carburant mixture, anhydrous production grew at extraordinarily high rates. From that year until 1982, when Proálcool was in its phase of engines powered exclusively by alcohol, hydrated alcohol was produced in greater quantities. In 1982, the two types of alcohol would again change places in production, for reasons to be seen below (see Volume II).

The Weakening of IAA Decision-Making Power Over Sugar and Alcohol Policy

It has been demonstrated that because of both the fuel and sugar

policies of the period between 1960 and 1975, alcohol played a secondary role in the sugar industry. Institutional indicators of this situation are:

(i) the disappearance of the Special Service for Anhydrous and Industrial Alcohol (SEAAI) in the restructuring of the IAA (Decree 75,613 - 4/15/75). Whereas the SEAAI, which had the status of a Division, had reported directly to the Presidency of the Institute, alcohol was now accomodated together with other sugar by-products within one of the Divisions[28] of the Department for the Control of Production, which was linked directly to the Presidency of the IAA;

(ii) abolition of the Central Distilleries, also by Decree 75,613/75 (article 9). As early as 1972 the Directorate of SEAAI declared that these distilleries

> "were installed in order to absorb the surplus of molasses in those regions by producing anhydrous alcohol as fuel. However, in order to attend to the contingencies of the industrial alcohol market, which has priority, they also produce hydrated alcohol. At the moment, only the Jacques Richer Central Distillery is producing carburant. (...) In these circumstances, the current administration of the IAA has considered transferring these distilleries to the private sector" (Simões de Almeida, 1972: 72).

(iii) Beginning with the harvest of 74/75, there were no longer separate Alcohol Plans per se; rather, they became reintegrated into the Sugar Crop Plans.

The powers of the IAA with respect to alcohol at the beginning of the 1970s were as follows:

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[28]The divisions of the Department for the Control of Production were: Sugar Division, Cane Division, and Alcohol and By-Products Division.

(i) control of the distribution of all types of alcohol;

(ii) a distribution monopoly for anhydrous alcohol destined for the carburant mixture;

(iii) determining the exportable surpluses of alcohol and molasses, bearing in mind the supply for the domestic market, in agreement with CACEX (see below).

The secondary importance of alcohol in the sugar industry during this period was accompanied, as seen, by a marked erosion of the decision-making power of the IAA with respect to sugar and alcohol policies. This process, which began in the late 1950s, was accentuated in the mix-sixties when economic and political power in Brazil were centralized in the Executive, and the bureaucratic apparatus was fragmented. With the proliferation of agencies with jurisdiction over various aspects of economic policy, conflict of authority inevitably arose. These conflicts occurred amongst the recently created bodies, but, even more so, between these and existing bodies, especially the old autarkies created during the first Vargas government to regulate specific economic sectors (coffee, sugar, and so forth).

Thus, after 1960, when its President lost the status of a Minister -- before then he had reported directly to the President of the Republic -- the IAA found itself in the second echelon of the Ministry of Industry and Trade. The autarky was further weakened after 1967 by the administrative reforms of President Costa e Silva (Decree Law 200-2/25/67). Control over the price of sugar passed to the National Supply Superintendency (SUNAB), created in 1963; after 1967, this authority was assumed by the Interministerial Council on Prices (CIP),

which set the consumer price of standard refined crystallized sugar. The IAA retained control over the volume and price of exported sugar (demerara), and usina sugar (non-refined standard crystallized).[29]

Moreover, the Bank of Brazil, the Financial Agent of the IAA, which had maintained veto power over the allocation of its resources ever since the creation of the Institute, was now joined by two other bodies, the National Monetary Council and the Central Bank. The National Monetary Council, beginning in 1964, came to control the financing of the sugar industry. The Central Bank exercised authority over the concession of credit for new plant equipment, modernization, and expansion of the sugar industry, including alcohol distilleries (Szmrecsányi, 1979: 274). The veto power of the Bank of Brazil over sugar and alcohol policies was significantly enhanced when the IAA was forced to rely increasingly on the Bank for large loans after the resources of the Special Export Fund were drained by the sugar policy of the early 70s.[30] Additionally, the IAA came to depend on the Ministry of Industry and Trade and the Ministry of Finance even for funding for its administrative operations (cf. Numberg, 1978: 274).

All control over the export of alcohol and the increasingly important molasses was removed from the IAA in 1966 and handed over to the National Council for Foreign Trade (CONCEX) of the Bank of Brazil (CONCEX Resolution no. 9 - 12/15/66). Arguing that it was impossible to guarantee the domestic supply of alcohol in light of the huge pur-

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[29]Interview with Elizabeth Serôdio de Carvalho on 4/13/81.

[30]See pp. 167-169.

chases of molasses by various firms direct from the usinas and producers' cooperatives, which represented a volume greater than that available for export, the IAA convinced CONCEX to accept that the Department of Foreign Trade (CACEX) should consult the IAA before freeing molasses and alcohol for export. Thus the Alcohol Plans came to determine the volume of these goods considered as superfluous to the domestic market.[31]

All decision-making authority with respect to fuel alcohol was also lost by the IAA, and assumed entirely by the CNP. It should also be noted that with the promulgation of the Rural Worker Statute of 1963, the IAA lost the authority of arbitration in the socio-economic relations among the rural workers, the suppliers, and the usineiros. There were also important internal changes taking place at the IAA. Decree 61,777 of November 24, 1967 established the following modifications:

(i) the president of the Institute came to be the representative of the Ministry of Industry and Trade (MIC) at the IAA. It should be recalled that prior to this time almost all IAA presidents had been the delegate of the Bank of Brazil (see Table 55).

(ii) The Executive Commission was abolished, and replaced by the Deliberative Council (CONDEL). While there were no significant changes in its jurisdiction, its composition was profoundly altered. The proportion of producers' representatives to delegates from the government bureaucracy was practically inverted: whereas the Sugar Cane Production Statute had allowed for 8 producers' delegates (4

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[31]The bargaining process between the IAA and CONCEX is discussed in Simões de Almeida, 1972: 70-71.

> representatives of the usineiros, 3 of the suppliers, and 1 of the banguezeiros) at the Executive Commission, Decree no. 61,777 cut this number down to 4 (2 representatives of the usineiros and 2 of the suppliers) and added to the existing government representatives (delegates from the Bank of Brazil, the Ministry of Finance, the Ministry of Agriculture, the Ministry of Labor, and the Ministry of Transport and Public Works - later the Ministry of Transport), delegates from the Ministry of the Interior, the Ministry of Planning, and the Ministry of Industry and Trade (which was separated from the Ministry of Labor), for a total of eight.

Moreover, while the number of producer representatives remained unaltered until the present day, the number of delegates from the government bureaucracy was increased yet again with the addition of one representative each from the Ministry of Foreign Affairs and the Ministry for Mines and Energy. Reflecting the post-1964 bureaucratizing tendency, the proportion of producers' representatives in relation to those of the government bureaucracy stands today at 2 to 5.

Beyond the reduction in numbers, a modification in the system of producer representation was introduced. By Decree 63,013 of 1968, a representative of the National Confederation of Agriculture (CNA) was invited to participate in CONDEL. In that same year a Consultative Commission of CONDEL was created, composed of a representative from the CNA, one from the National Confederation of Industry (CNI), and another from the National Confederation of Commerce (CNC). The life of this Commission, however, was of short duration. In 1969, Decree no. 64,034 returned the system to the former situation (see Table 54).

There were also informal channels of representation to the Sugar and Alcohol Institute. The IAA has been viewed in the literature as not only protecting the Northeast against the encroachment of the Center-South, but also, or because of this, as extremely susceptible to the demands of the northeastern usineiros. In other words, it has been argued that the IAA was controlled by a northeastern sugar elite. An examination of Table 55 supports this claim in that the overwhelming majority of Institute Presidents came from the Northeast. This is true even of the most recent ones, who presided over the IAA when it was charged with implementing the modernization program for the sugar industry. In the period now under study, however, coinciding with the definitive loss of the hegemony of the Northeast to the Center-South was the weakening of the IAA as the institution responsible for sugar and alcohol policy. As shown above, national economic policy in the post-68 period which centered on rapid economic growth based on the modernization and rationalization of the productive and bureaucratic sectors not only eliminated inefficient producers, but also seriously undermined the power of old bureaucratic institutions. The IAA, like other sectorally specific autarkies, were trampled on by new agencies created to control and implement the new economic policy. Possibly the weakening of the Northeastern sugar elite which controlled the Institute, and the concomitant weakening of the IAA itself, were mutually reinforcing processes.

Because the sugar elites of the Center-South could rely on the Institute only to a limited extent for the defense of their interests, they sought other channels for influencing sugar and alcohol policy decisions. To this end, the Central Cooperative of Sugar and Alcohol Producers of the State of

São Paulo (COPERSUCAR), and the Cooperative of the Sugar and Alcohol Producers of the State of Rio de Janeiro (COPERFLU) were created. By the late 1960s, these functioned clearly as interest groups for the sugar producers of the São Paulo and Rio de Janeiro. As the modernization program for the sugar industry proceeded, concentrating capital and production on a large scale in the Center-South, both groups but especially COPERSUCAR increasingly strengthened their bargaining power, gaining direct access to the upper decision-making circles in the government.[32] This development weakened even further the IAA as the decision-making center for sugar and alcohol policy.

In the mid-seventies, the sugar sector found itself in an extremely difficult situation: stocks were accumulating, the world market price of sugar continued to slide, and the resources of the Special Export Fund were depleted. Furthermore, with the anticipation of self-sufficiency in petrochemicals in the near future and the availability of cheaper substitutes for ethyl alcohol as the raw material for the chemical industry, the alcohol market exhibited erratic behavior, with no clear tendency in future demand for either hydrated or anhydrous alcohol. Against this background, the National Alcohol Program, lauched in 1975, could not have come at a better time for the sugar industry.

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[32]For an interesting analysis of the role of the Cooperatives of the Center-South vis-à-vis the IAA in connection with the alcohol and sugar policies, see Numberg, 1979: 173-195.

VOLUME II:

ALCOHOL: FROM SUGAR BY-PRODUCT TO FUEL

THE NATIONAL ALCOHOL PROGRAM

(1975 - 1982)

INTRODUCTION TO VOLUME II

An Overview of Past Alcohol Policy

From its origins in 1931 amidst concern over the shortage of foreign exchange when the provisional Vargas government formed the Commission for Studies on Álcool-Motor (CEAM), to its official role in propping up sugar prices with the creation of the Sugar and Alcohol Institute (IAA) in 1933, the carburant mixture policy was basically a product of State initiative, and it evolved through a process of action on the part of the government and reaction by the producers. Conceptualizing the historical development of fuel alcohol policy in Brazil (See Volume I) as a result of the tension between the needs and interests of the sugar and fuel sectors[1] revealed that a series of conditions were necessary for the success of a program aimed at achieving rapid growth in the production of alcohol for mixture with gasoline based on private enterprise (the sugar cane agro-industry). For the sugar producers, the most important of these were:

(1) a crisis situation in the sugar sector (a sina qua non for mobilizing the producers), distinguished by a decreasing volume and value of sugar exports, an accumulation of stocks, and, until the creation of the Sugar and Alcohol Institute, declining prices of cane and processed sugar.

(2) separate financial resources for the alcohol program, independent from those meant for the sugar sector and from the investments of the usineiros themselves (precisely because of (1) above).

(3) adequate policy instruments to stimulate alcohol production, including:

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[1] As noted in the Introduction to Volume I, the sugar and fuel sectors or the sugar and fuel policies interact through real actors, both public and private.

- terms of credit for the expansion and/or construction of new distilleries acceptable to the producers (low interest rates, long repayment terms);
- a government guarantee of a minimum price for alcohol.

(4) an 'adequate' institutional framework (see below).

Whereas it had been possible for the government and producers to come to terms on the financial resources and means of stimulating production through a long process which began in 1931 with the creation of the CEAM and ended in 1948 with Decree-Law no. 25,174-A establishing price parity between sugar and alcohol, consensus on the institutional framework for the policy continued to elude the parties involved. From the perspective of the provisional Vargas government, to apply the policy of dirigismo econômico[1a] to the sugar industry would have necessitated institutionalized state intervention to rescue the sector in crisis due to excess production by means of alcohol production;[2] convincing the usineiros of the viability of this policy; and, by the effective use of the policy instruments, guaranteeing the sale of alcohol on terms which would encourage them to invest in the expansion of alcohol production. At the same time, the institutional system had to be capable of politically controlling sugar and alcohol producers by channeling their demands to a well-defined power center within the State

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[1a] See Volume I, pp. 43-44.

[2] The so-called "consolidation of the domestic market policy", intended by the provisional Vargas government to be a permanent solution to the recurrent sugar crises, was based on adjusting supply to the capacity for consumption in the country. The underlying principle of

apparatus. The IAA was created to fulfill this objective. State intervention was accepted and even welcomed by a substantial number of usineiros, especially those from the Northeast. For these producers, an 'adequate' institutional framework could be defined as one consisting of a clearly defined center of decision-making to which they could direct their demands and a bureaucratic agency responsive to those demands that would, moreover, 'represent' their interests before other State agencies involved in framing and implementing alcohol policy. The IAA met these requirements.

In contrast, Center-South producers, principally from São Paulo, where production was constantly expanding, always protested State intervention. In their view, State intervention should have been kept to the bare minimum necessary to guarantee the price and concede other subsidies to the sector. Relations between the usineiros of the Center-South and the IAA were, therefore, perpetually tense. These producers formed cooperatives in the sixties, COPERSUCAR and COPERFLU, which, as they grew more powerful, dispensed with the IAA as an intermediary between their own interests and the country's decision-makers.

These four conditions, while necessary for the successful implementation of the mixed carburant policy, were not sufficient. The sufficient condition missing was the demand for a fuel policy favorable toward alcohol. Historically, this condition materialized in Brazil when the government sought a substitute for gasoline because of an oil

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2 (cont.)
this policy was to export, even at prices below the cost of production, any surplus which could not be avoided by the better mechanisms for supporting the sugar industry, namely, limiting sugar production and transforming surplus sugar and cane into alcohol.

shortage on the international market (in the 1920s, 1930s, and during the Second World War), and/or when the government became alarmed over the country's balance of payments (as in the 1930s).

Alcohol was not to receive this needed boost. The creation of the National Petroleum Council (CNP) in the late 1930s signalled the Brazilian government's option for an energy policy based on petroleum. This choice was reaffirmed after the Second World War when oil replaced coal as the basis of the world energy system, and the era of cheap oil began. From this point on, alcohol as a liquid fuel had no chance whatsoever of competing with oil. In Brazil, the mixed carburant policy, then based on supporting sugar prices, would be 'tolerated' only as long as it was not prejudicial to fuel policy. The tension between the two policies is illustrated by the conflictual relations between the IAA, representing sugar interests and responsible for sugar policy, and the CNP, charged with regulating the nation's supply of petroleum. The dispute between the two bodies revolved around the annual fixing of the quantity of anhydrous alcohol to be added to gasoline and its price; the CNP steadily gained control over decisions governing these aspects of the mixed-carburant policy. During the 1950s national energy policy relied on importing cheap petroleum and on the expectation of achieving self-sufficiency in oil production and refining in the not so distant future. In fact, after Petrobrás commenced operations, the refining capacity of the country increased rapidly, and the domestic production of oil was encouraged by discoveries along the coast of Bahia (Recôncavo Bahiano) (see Table 10). While the price of gasoline was expected to steadily decline, that of alcohol increased substantially during this period due

to its price parity with sugar. Consequently, the price of the alcohol-gasoline mixture became more expensive than that of pure gasoline. The establishment of the automobile industry in the country at the end of the decade heightened the need for cheap gasoline. The National Petroleum Council exercised its veto in eliminating any possibility of the IAA guaranteeing a minimum price for the alcohol producer. From then on, until the launching of the National Alcohol Program, anhydrous alcohol was only mixed with gasoline in significant proportions during a grave sugar crisis brought on by excess production in the mix-sixties.

The Setting

In 1973, the rapid increase in oil prices and the embargo on exports of crude oil to the United States and the Netherlands by the Arab members of OPEC provoked an unprecedented international crisis, dramatizing the vulnerability of oil importing countries. Now compounding the serious effects on the balance of payments of oil importers was the question of the availability of oil. In fact, it was then possible to speak of the "political availability" of oil. OPEC, comprised of national governments, and thus, unlike other cartels, pursuing political as well as economic objectives, was able to determine not only price increases but also supply cuts and even embargos on the export of the product to select countries. Moreover, tensions among OPEC member countries (especially among the Arab members) and within some of them would pose a permanent threat of disruption of the international oil market, as later vividly demonstrated by the Iranian Revolution and the Iran-Iraq War. The Gulf War, to be sure, produced more concern than actual disruptive effects.

For Brazil as for other oil importing countries, reducing dependence on foreign oil gained high priority. The energy policy of these countries turned to measures to conserve energy, increase production from domestic sources of energy, especially oil where it existed, and to search for alternative sources.

Thus, the first oil shock reestablished in Brazil the conditions which historically had brought about a fuel policy favorable to alcohol, namely, serious problems with both the balance of payments and the questionable availability of oil on the world market. The country was now far more vulnerable to the oil shortage than in the twenties and thirties. Its economic growth and rapid industrialization, especially after the Second World War, created every greater energy requirements. While in contrast to other oil-importing countries energy in Brazil is generated essentially by its abundant hydraulic resources, in 1973 accounting for more than 90% of all electric energy produced (FINEP/Department of Energy, 1979), domestic oil production never satisfied more than 40% of total national demand,[3] and even less after 1970. In 1973, this proportion fell to 22%, when oil represented 43% of the total primary energy consumed in the country (MME, 1983). The transportation system based on roads (the decision to establish a road network as the core of the country's transportation system was made in the 1950s when the development of the automobile industry was in full swing) was responsible for the bulk of the consumption of petroleum (59%) (FINEP/Department of Energy, 1979). If to this is added the growth of fuel oil-

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[3]The best results were obtained in 1967, when national production reached 38% of all petroleum consumed in the country, and in 1968 and 1969, when it fell only slightly to 37% (see Tables 10 and 11).

intensive industries following the recessionary period from 1964 to 1967,[4] the result will necessarily be a substantial increase in oil imports.[5]

The sharp rise in oil prices in 1973 had immediate effects on the Brazil's balance of payments. Oil imports, which in 1972 had represented 11% of the value of total imports, came in 1974 to account for 22% and even more in the following years. The current accounts deficit between 1973 and 1974 grew 320%, from around 1.7 billion dollars to 7.1 billion. While the deficit was reduced somewhat in the next three years, it mushroomed again with the second oil shock (See Table 4).

Against this background, it is not surprising that the Brazilian government reacted to the international oil crisis of 1973 by stepping up the exploration and production of petroleum by Petrobrás, neglected during the years of cheap oil, and opening some parts of the country to both national and foreign private companies as well as to state governments to also explore for petroleum under "risk contracts". And, in its search for alternative sources of energy, the government conferred special attention on the policy of adding alcohol to gasoline (automotive gasoline in 1973 accounted for 55.1% of all petroleum products consumed in the transportation sector, FINEP/Department of Energy, 1979).[6]

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[4]These industries whose use of fuel oil was especially intensive were cement, steel, food products, paper and cellulose, textiles, and chemicals (FINEP/Department of Energy, 1979).

[5]Between 1968 and 1976 crude oil imports more than tripled, from 15.2 to 47.8 million cubic meters (see Tables 10 and 11).

[6]Whereas an increase in the use of coal to substitute for fuel oil in the industrial sector was considered immediately (71.8% of all fuel oil consumed in the country in 1973 was absorbed by this sector), as

In view of the fact that the main impulse for the use of alcohol as a fuel this time derived from the energy policy itself (and not from the sugar policy as in previous decades), it is plausible to hypothesize that the National Alcohol Program, and specifically the policy to promote gasohol in its first phase, would be successfully formulated and implemented. This success was still by no means assured, however, due to a series of complications:

(1) The first oil shock was interpreted in top government circles more as a "warning signal" than a real emergency situation (as the second oil shock certainly was). The balance of payments recovered remarkably well to the first and subsequent oil price hikes. In fact, though at first the balance of payments declined from a 2,179 million dollar surplus in 1973 to a 936 and 950 million dollar deficit in 1974 and 1975, it recovered in the following three years right up to the second oil shock, to surpluses of 1,192, 630, and 4,262 million dollars in 1976, 1977, and 1978. This improvement was enabled by the massive net influx of foreign capital (see Table 4)[7] and as a consequence a rapid build-up of the foreign debt (see Table 7), despite a worsening in trade relations which followed the oil price increases (see Table 8). Also contributing to the recovery of the balance of payments was the relative stability of the international oil

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6 (cont.)
made explicit in the II PND (National Development Plan), the replacement of diesel in the transportation sector (in 1973 this sector consumed 91.6% of all diesel in the country, and within the sector, diesel oil represented 36.6% of all petroleum products absorbed by the sector), which was far more difficult, would be considered only after the second oil shock (Data from FINEP/Department of Energy, 1979).

[7]Between 1973 and 1974, the net capital movement increased 78%, from 3.5 to 6.2 billion dollars. In 1978, despite the oscillations of the previous years, it reached 11.9 billion dollars, an increase of 240% in relation to the net movement of capital in 1973 (see Table 4).

market in the three year period preceding the second oil shock. As a consequence, concern of a national security nature about the supply of oil for the smooth functioning of the economy lessened, and thus the status of the sugar industry increased in relative importance in the formulation of policy regulating the alcohol-gasoline mixture.

(2) The sugar industry, which had enjoyed a climate of euphoria from 1972 to 1974 when prices on the international market rose rapidly and exports reached record levels, suddenly found itself in an unprecedented crisis of overproduction, which would fully manifest itself in the harvest of 1976-77, with stocks accumulating at alarming rates (see Figure I and Table 21). The mobilization of the sugar producers and the position adopted by the IAA on the mixed carburant policy were influenced by these two extremes in the situation of the industry. Thus, for example, at first, the support of the usineiros for the mixed carburant policy would be guarded, with the exception of São Paulo for specific reasons.[8]

(3) Competition developed during the period of the formulation of Proálcool among bureaucratic agencies for control over the program. The President resolved the conflict with the creation of the National Alcohol Commission, on which would be represented each of the vying bureaucratic agencies. The result was an extremely fragmented system of decision-making plagued by a series of problems which would make the implementation of the first phase of the program more difficult. There was no clearly defined locus of decision-making, nor even an arena where it might have been possible to develop a bargaining process between the diverse interest groups involved. Nor was any leadership among the bureaucratic agencies which made up the National Alcohol Commission established. The pre-existing channels which

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[8] São Paulo, the biggest alcohol producing state in the country, could not find outlets for its large anhydrous surplus during the unfavorable situation prevailing in the 60's and early 70's for this type of alcohol. By 1975, when the PNA was established, 98% of all anhydrous alcohol produced came from this state.

> transmitted the demands of interest groups to the bureaucratic agencies were rendered inoperative at the same time that no new channels were created. Consequently, the interest groups did not know where or to whom to direct themselves.

As a result of these three factors, the Government was divided over the objectives of Proálcool, with different bureaucratic agencies endorsing one of the following:

(i) alcohol as a fuel and as raw material for the chemical industries, to alleviate the balance of payments by decreasing oil imports.

(ii) alcohol as a fuel to lessen the country's dependence on imported energy sources.

(iii) alcohol, for whatever use, as an element in supporting the sugar industry.

Yet a fourth position was the opposition of certain sectors of the government bureaucracy to Proálcool based on concern over the economic viability of the Program and inflationary pressures it might unleash.

Despite these complications, the proposed production goal for alcohol (3 billion liters in 1980) in the first phase of the PNA was fulfilled. This was due to the weak world sugar market in the second half of the 1970s and the resulting severe domestic crisis of overproduction.

As the gasohol phase of Proálcool drew to a close, the gestation period of the pure alcohol-driven car phase began. Further expansion of alcohol production would depend on the successful implementation of phase two of the PNA. The success of this phase, in turn, required

more resources,[9] the development of the technology for internal combustion engines fueled by pure alcohol, the commitment of the automobile industry to the Program, and the acceptance on the part of consumers of the alcohol car. Moreover, debilitating problems inherited from phase one, such as a fragmented decision-making structure, a long process for approving proposed distillery projects, and an inadequate system of distribution and storage of alcohol needed to be resolved. The challenges to the Program were paramount, and were it not for the second oil shock and the Iran-Iraq war, the Program would likely have floundered.

The successive oil price hikes by OPEC during 1979 found Brazil dependent on petroleum for 42% of its total energy needs, only 2% less than at the time of the first oil shock. The one million barrels/day of imported crude corresponded to 85% of the country's total petroleum requirements. Moreover, as the 1979 price hikes started from a price level four times higher that the October 1973 level, the macro-economic effects triggered by the second oil shock were proportionally more profound than those of the first shock. Thus, despite a remarkable 20% growth in exports the deficit in the balance of trade almost tripled in 1979. In this same year, the balance of payments showed a deficit of US$ 3.2 million in contrast to a US$ 4.3 million surplus in 1978.

In June 1979, President Figueiredo in a significant speech to the nation declared the country to be in a state of "wartime economy". Energy

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[9] The capacity to expand distilleries annexed to the usinas was nearly exhausted. Any further expansion of alcohol production capacity would depend on the construction of autonomous distilleries, which were three times more costly.

was to receive maximum priority with the aim of attaining self-sufficiency in the not too distant future. To coordinate energy policy a National Energy Commission was created. The proposed energy policy shared many of the same priorities as the policy formulated in response to the first oil shock: to rely on hydraulic resources to generate electricity; to increase domestic oil production by both stepping up Petrobrás exploration and development and expanding the area open for risk contracts; to find substitutes for petroleum products; and to promote energy conservation measures. Characteristic of this policy, however, as distinct from the preceding energy policy, was its objective to put into use substitutes for all three main oil products. Thus the National Alcohol Program was greatly accelerated, and fuel oil was progressively replaced in fuel-oil intensive industrial sectors primarily by coal, but also by charcoal and wood. Substituting for diesel oil presented difficulties, but a satisfactory, economical solution was reached by adapting Petrobrás' refining structure in conjunction with the "Bottom of the Barrel Program" and an efficient sales policy for oil products.[10]

The National Alcohol Program, as the most consolidated program for energy alternatives, received special emphasis. In June 1979 a new production goal was established: 10.7 billion liters in 1985, 86% of which was to be used as fuel (anhydrous and hydrated alcohol). The National Development Council decided to invest 5 billion dollars in the Program, despite the problem providing these resources would pose.[11] At this same time the institutional system to administer the Program

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[10]See chapter 8, pp. 367-368.

[11]See chapter 8, pp. 421-432.

underwent substantial reform. Eventually interest groups who dealt with the PNA ceased complaining of a lack of channels for influencing decisions concerning alcohol policy. While there were then at least three centers of decision-making, these were clearly recognizable.[12] Finding solutions for the other problems cited above, such as the simplification of processing proposals for new distilleries, the construction of an adequate distribution and storage system, and the development of technology for pure alcohol-powered cars, was received more attention.

On the negative side, despite Government pressures on the automobile industry to participate in the Program, and the incentives offered to buyers of alcohol cars, as of the middle of 1980 little progress in increasing the production and sales of alcohol automobiles had been achieved. This changed beginning in September 1980 with the Iran-Iraq war, which provided an important incentive for the second phase of the PNA. The Iraqi cutoff of about 50% of total daily oil imports and the fear of a major disruption in the world petroleum market prompted the Government to convene a series of emergency meetings to prepare a response to the new situation. The emergency climate created in the country, when contradictory statements from different Government officials were the norm, led consumers to believe that the rationing of gasoline and frequent price increases were distinct possibilities.

Consumers turned in large numbers to the alcohol car, marking the beginning of what has been called here the "euphoria phase", in which

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[12] See chapter 8, pp. 383-390 and the Conclusions, pp. 498-523.

the auto manufacturers cooperated fully. Three months later, in December 1980, 75% of all passenger cars sold were powered by alcohol. This situation, however, was to completely reverse itself five months later, in the "discrediting phase". The "recovery phase" began in the first months of 1982. At the end of that year, the sales of automobiles running on alcohol had again reached the 70% mark. Many reasons account for these wide swings in consumer behavior and, consequently, in the attitudes of the car manufacturers toward Proálcool.[13]

Unquestionably, a major cause of the "discrediting phase" was the ever worsening situation of the economy. In 1981, when world oil prices began to stabilize and even decline in real terms, it seemed to the oil importing countries that the worst was over, and there remained only the task of adjusting their economies to the effects of the second oil shock. For Brazil, in contrast with the first oil shock, this was a most arduous task for at least two reasons. The first was that, as noted above, the macroeconomic effects of the 1979 oil price hikes were far more profound. Secondly, despite a remarkable recuperation in the balance of trade, the increasing reliance on foreign loans to improve the balance of payments not only caused the gross debt to soar, but also rendered debt service more onerous with each passing year. To cope with the situation, severe cuts were made in public expenditure. Seriously affected were the energy programs, especially those for oil product alternatives, given the stabilization of the petroleum market. In 1981, the National Alcohol Program suffered budgetary cuts and, in June, all credit contracts for distillery projects were tempor-

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[13] See chapter 9, pp. 451-478.

arily suspended. The slowdown of the Program was notorious; its production goal of 10.7 billion liters of alcohol was postponed to 1987.

Coinciding with the stabilization of the world oil market was the steady decline of sugar prices on the world market following a brief, favorable period (from mid-1979 to the end of 1980). By mid-1981, these prices had slumped to the same, very low level of the 1977-1978 period. This time, however, the interests and needs of the sugar sector were not able to accelerate alcohol production. The PNA, however, was sufficiently consolidated to function as a safety valve, thus avoiding a domestic crisis of sugar overproduction (as had invariably occurred in the past following a period of high sugar prices in the international market). And while the interests and needs of the sugar and alcohol sector could not boost alcohol production, at a time when the world sugar market was very weak, they were certainly influential in breaking the consumers' negative image of the alcohol car during the "discrediting phase". Currently, the sector is lobbying intensively to expand the National Alcohol Program to include light loading vehicles, something which has caused the automobile industry considerable anxiety.[14]

The aim of Volume II of this thesis is to analyze the decision-making process in the first phase of Proálcool (1973-1978), which was to develop the alcohol-gasoline mixture (Part V), and in the second phase of the Program (1979-1982), which was to promote the pure alcohol driven cars (Part VI). Specifically, it is intended to:

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[14]See chapter 9, pp. 476-478.

(i) analyze the formulation and implementation of phase one and phase two of Proálcool, identifying the principal issues and actors (interest groups and bureaucratic agencies) formerly and currently associated with alcohol policy and the PNA, their political orientation, conflicts, and shifting coalitions, and examining the principal policy tools adopted and the pertinent legislation.

(ii) analyze the institutional framework put in place, identifying any changes in the loci and mechanisms of decision-making, and comparing this with the institutional arrangements overseeing the pre-PNA alcohol policy.

(iii) evaluate the results of each phase of Proálcool, suggesting the reasons for and conditions contributing to or hindering its success, with an emphasis on the above-mentioned political and institutional aspects.

Analytical Approach

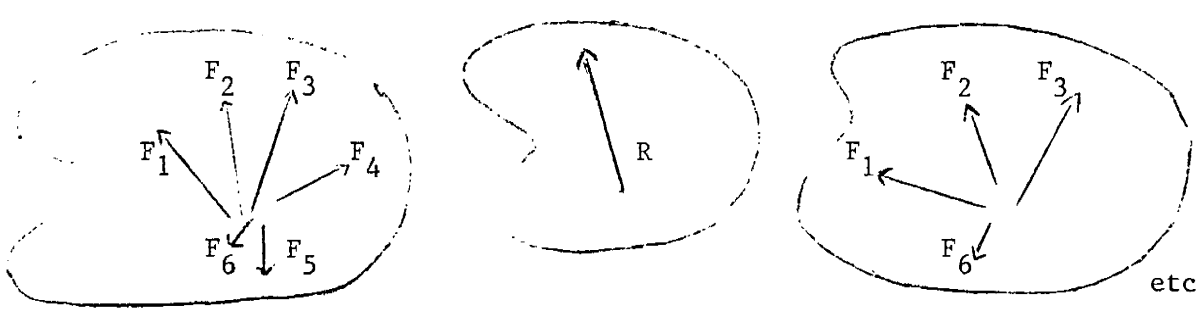
The analytical approach used in this work to analyze the decision-making process of Proálcool identifies the basic parameters of decision (the world oil and sugar markets and their impact on Brazil's energy and economic policies). Within the setting defined by such parameters, the principal actors (public and private), guided by different interests and motivations), contested the main issues to win outcomes favorable to their policy preferences.

Although the technical and economic aspects of a policy form the basic parameters for decision, the largely neglected political and institutional aspects are essential for a correct understanding of policy-

making. The institutional aspects shape and are shaped by the political actions of the actors, thereby serving at the same time as parameter and object of the political action.[15] Given a range of possibilities determined by the parameters of decision, it is at the political level in the last instance that a certain course of action is decided upon. The course of action finally chosen can be interpreted as a type of "resultant" among the different "vectors" which represent the "political force"[15a] of the various actors in confrontation. The "arrangement" or "composition" of these "political-force-vectors" in permanent confrontation in the decision-making arena, would comprise, at each point, a "bargaining situation". When a "resultant" is obtained the "bargaining situation" comes momentarily to a halt or a "stop". The institutional arrangement of the decision-making structure is (frequently) readjusted to the new bargaining situation which is again set in motion in the next juncture, as the political game is perpetual.

The decision-making process can be represented schematically as:

Figure 1: The Bargaining Situation in the Decision-Making Process



bargaining situation 1 | resultant from bargaining situation 1 | bargaining situation 2

[15] For an insightful discussion of the two facets of the institutional aspects in political decision-making see Reis, 1981, especially chapter 3.

[15a] Borrowed from the language of Physics.

The intensity (or the module) of the "political-force vector" of each actor will depend on his power resources, whereas the direction of the vector will be related to his priorities and policy preferences. Moreover, the preference for a determined policy alternative will be conditioned by the interests and motivations of the actors which will, in turn, be affected by the basic economic and political parameters which encompass the decision-making situation.[16] Finally, each "resultant" is generally symbolized by a piece of legislation, a memorandum of intent, or the like, usually expressing the winning preference.

I then adopted in this work the bargaining politics frame of analysis. It is important to note, however, that the "bargaining situations" are, in fact, "constrained bargaining situations."[16a] Constrained by the international environment (mainly by the world oil and sugar markets situation) as well as, in the domestic front, by limited issues, arenas and participation in alcohol policy-making. Those domestic constraints are attributable to, among other factors, the economic model and the political regime prevailing in the country.

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[16]This is not to argue that the conjunctural economic and political parameters are the only ones which influence the motivation and interests of the actors. Structural parameters, such as the adoption of a determined economic model within the capitalist system, or a certain polital regime or yet the more permanent attributes of the actors, such as their position in the hierarchies of power, prestige, and wealth, in Weberian parlance, are clearly essential to the motivation of the actors. Rather, the framework is intended to emphasize the conjunctural, the variable, in such a way as to be able to understand the change in behavior of the actors, who, nonetheless, continue the same in relation to the structural parameters or their more permanent attributes.

[16a]For the sake of simplicity, "constrained bargaining situations", "constrained decision-making structure" or "constrained decision-making process" will be referred to in this work with the word "constrained" omitted.

As noted in the Preface, although it is beyond the scope of this work to provide a comprehensive description of the post-64 authoritarian regime in Brazil within which the decision-making process of the PNA takes place, the regime characteristics are constructed inductively, appearing a fortiori through the patterns of bureaucratic politics. One assumption is, however, readily made: the post-64 authoritarianism in Brazil significantly reinforced the characteristic of the State apparatus as the privileged arena of policy-making. The analysis of the decision-making process of the National Alcohol Program must, therefore, unveil how the State apparatus accomodates divergent interests in the formulation and implementation of the fuel alcohol policy. In other words, how did the State apparatus accomodate the "bargaining situations" as characterized above.[16b]

The conceptual approach here described will guide the analysis of the decision-making process of both phase one - the Gasohol Phase - and phase two - the Phase of Pure Alcohol Fueled Cars. Both phases will be divided into two distinct processes, formulation and implementation. This distinction is of course purely analytical; in practice, the processes are intertwined. Implementation is formulation in progress, refined by a series of adjustments (most of them of an incremental nature). The analytical break between the two processes will, therefore, be a determined point where it can be reasonably asserted that a "resultant" with regard to some of the issues at stake was obtained or where a

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[16b] See below, in the Conclusions, the section "The Decision-Making Structure of the Alcohol Policy", pp. 498-524.

certain event introduces meaningful changes in the decision-making environment.

ALCOHOL AS FUEL IN BRAZIL:

AN ALTERNATIVE ENERGY POLICY AND POLITICS

Vol. 1

by

MARIA HELENA DE CASTRO SANTOS

B.S., Physics, Universidade de Brasília, Brazil
(1965)

B.A., Sociology and Political Science, Pontíficia
Universidade Católica, Brazil
(1971)

M.P.A., The Kennedy School of Government, Harvard University
(1975)

Submitted to the Department of
Political Science
in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

February 1985

Signature of Author: M Helena Castro Santos
Department of Political Science, January 10, 1985

Certified by: Nazli Choucri
Professor Nazli Choucri, Thesis Advisor

Accepted by: Harvey M Sapolsky
Professor Harvey M. Sapolsky, Chairman, Graduate Program Committee

PART V

THE DECISION-MAKING PROCESS OF THE NATIONAL ALCOHOL PROGRAM: THE GASOHOL PHASE (1973 - 1978)

CHAPTER 6:

The Formulation Process: Bargain and Conflict

(December 1973-November 1975)

The formulation process of Proálcool began in December 1973, when the Minister of Industry and Trade at that time, Pratini de Morais, proposed incentives for the production of alcohol to be consumed as fuel, and formally ended on November 11, 1975, when decree no. 76,593 established the National Alcohol Program. During this phase, an analytical break can be distinguished at the point when the first draft of the decree establishing the PNA was made public on October 31, 1975. This break represents a snapshot of the "bargaining situation" in which the various actors were involved. During the short span of time from the resumption of the "bargaining situation" to the conclusion of the formulation phase, the negotiations, claims, and counter-claims mobilizing all actors, both public and private, intensified. In this period, each decision previously arrived upon and expressed in the text of the draft legislation was subject to question. The final text of the decree no. 76,593 reflects important changes in the "bargaining situation", with new winners and losers, and some compromise solutions, as will be seen below.

The first section of this chapter deals with the basic parameters of decision of the fuel alcohol policy -- the international oil and sugar markets and their repercussions for the Brazilian economy. High petroleum prices would be of paramount importance in defining the country's economic and energy policies. The strength or weakness of the

sugar market would help or hinder government efforts to adjust to the first oil shock. Both market situations, by influencing the actors' motivations and policy preferences, combined to determine the fuel alcohol policy. The second section focuses on alcohol policy-related issues and on how changes in the international sugar and oil markets, as well as the different positions occupied in the government bureaucracy or in the socio-economic structure of the country, shaped the motivations and preferences of public and private actors. Finally, section three deals with the bargaining that marked the intense conflict over the control of the National Alcohol Program, and which characterized the changing "bargaining situations" during the dispute.

6.1. Parameters of Decision

The basic parameters of alcohol policy were set by the presence or absence of a crisis in oil and sugar supplies on the domestic and world markets. The volume and value of exports and the accumulation of stocks are taken here as the principal indicators of a crisis situation in the sugar sector. In petroleum, a crisis could develop as a result of: (i) the threat of a "political" shortage (such as the 1973 embargo) or the threat of a shortage due to a disruption of the international market by (potential) conflicts among or within the member countries of OPEC, especially the OAPEC countries; or (ii) price increases. In the first case, a crisis is advanced by the political calculations of national rulers in response to the movements of OPEC countries; in the second, crisis is indicated by its macroeconomic effects (balance of payments' deficits, foreign indebtedness, and inflation rates). This is represented schematically in Figure 2.

Adjusting to the First Oil Shock: Brazil as an "Island of Prosperity"[1]

The alarm over the uncertain availability of petroleum on the world market, perceived as a threat to national security, which had reached acute proportions at the end of 1973, dissipated in 1974 and 1975. Optimism had resurfaced as early as March, 1974; the following is indicative of its first cautious manifestations:

> A few months ago the fear that the supply of oil would undergo a cut of proportions sufficient to set off a severe economic recession in the industrialized countries

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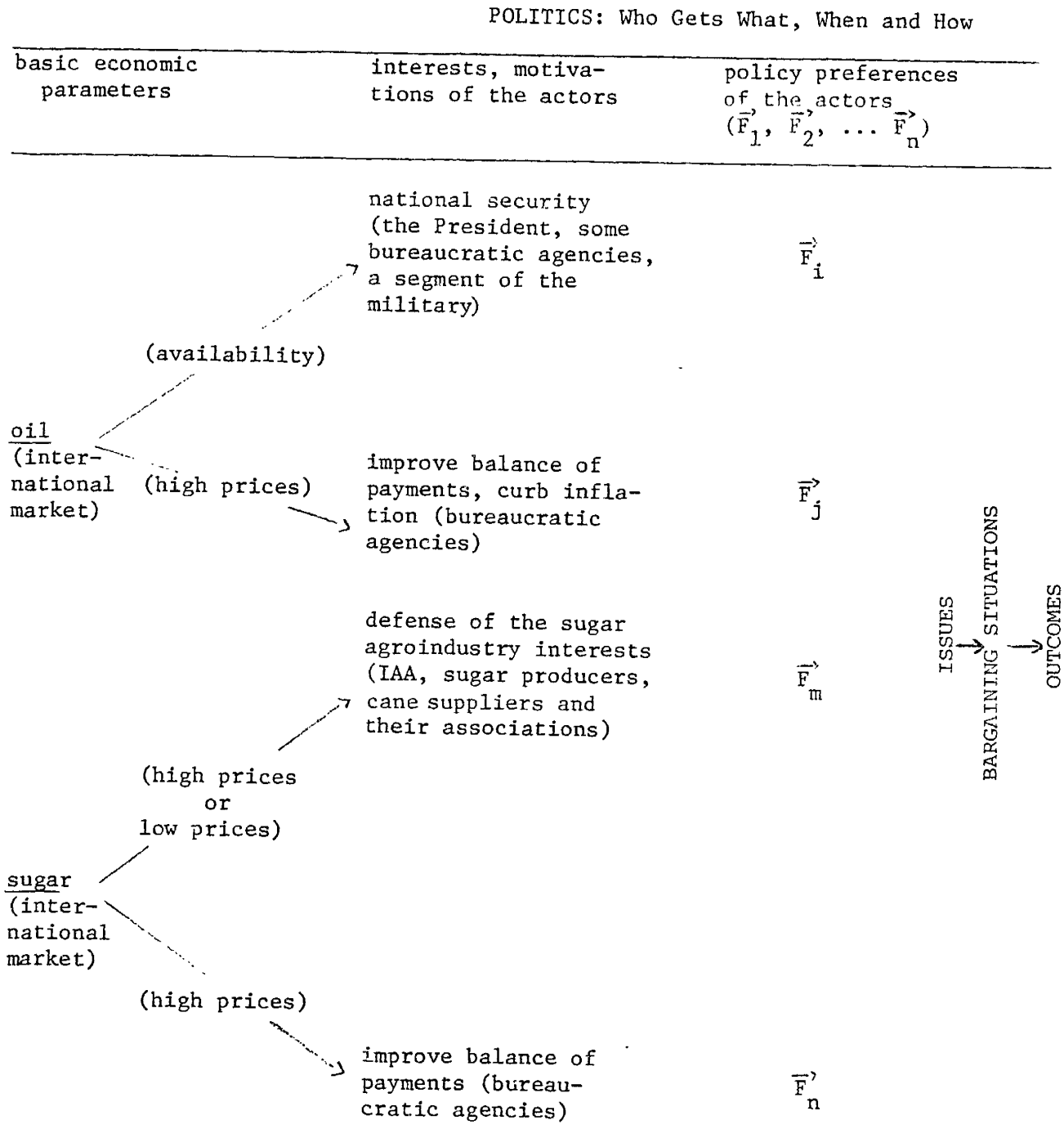
[1] "Island of Prosperity" is an expression frequently present in the official rhetoric during this period.

Figure 2

Process of Decision in Alcohol Policy



$\vec{F}_i$, $\vec{F}_j$, $\vec{F}_m$ and $\vec{F}_n$ will vary according to whether a crisis exists in the oil and sugar sectors, or whether the actors perceive there to be one.

> was justified. Today this threat has waned. The world can depend on an adequate supply, but not without substantially reducing the rate of growth of consumption and not without overcoming some momentary difficulties.[1a]

The prospects for a guaranteed oil supply for the domestic market were brightened by the discovery of oil in the Campos basin at the end of 1974, and the foreign activities of Braspetro (the foreign arm of Petrobrás) which centered on negotiating risk contracts for exploration for crude oil to supply Brazilian refineries, especially in Iraq.[2]

The overriding concern during these years then focused not on supply but on the effects which high oil prices would produce on the country's balance of payments, inflation rate, and economy in general. The price paid by Petrobrás per barrel of oil rose from an average c.i.f. price of US$ 3.86 in 1973 to US$ 12.55 in 1974. This price increase is reflected in the rising importance of oil in trade. Crude oil imports in 1973 totalled 606 million dollars (f.o.b.), representing 11% of both total imports and exports. In 1974, the import bill had jumped to 2.5 billion dollars, and the share of oil had correspondingly increased to 22% of imports and 32% of exports of the country. To be sure, the increased proportions of oil in trade is due not only to higher oil prices directly but also to the deterioriation of world trade which these prices provoked (See Table 8, Table 12, and Figure V). This situation was basically unchanged in 1975.

The effects of the soaring price of oil on the country's trade balance were drastic. Negligible deficits after 1971 and even a modest

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[1a] Indústria e Desenvolvimento, vol. 3, March 1974, p. 24.

surplus of 7 million dollars in 1973 were quickly transformed into a staggering 4.69 billion dollar deficit in 1974. Government measures to restrict imports and stimulate exports reduced this defict somewhat to 3.54 billion dollars in 1975 (see Table 4). Like the country's trade balance, the rate of inflation also suffered, more than doubling in one year, from 15.5% in 1973 to 34.5% in 1974. While the effects of the oil crisis[3] are not entirely responsible for this jump in the inflation rate, they undoubtedly aggravated structural tendencies in that direction.[4]

The Geisel government, inaugurated in March 1974 during the first oil shock,[5] framed the question of the effects of the price of oil on the economy in the following way: how to maintain the balance of payments in equilibrium and control inflation without reducing the rapid growth rates of GDP (around 10% per year) achieved during the previous 5 years. These objectives were incorporated into the Second National Development Plan:

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[2]See Petrobrás Reports, 1974 and 1975.

[3]One of the immediate consequences of the increase in oil prices was the increase in the rate of inflation in the industrialized countries. The repercussions on the Brazilian economy would be felt through the price increases of imported goods, such as capital goods and basic inputs such as fertilizers, as well as through the shortage of raw materials with petroleum as an input for the chemical and petrochemical industries. The recession in the industrialized countries, brought on by measures to control inflation, would make exporting, especially of manufactured goods, more difficult for Brazil. Therefore, improving the trade balance by increasing exports would be as problematic as controlling imports.

[4]To the oil crisis and structural tendencies may also be added a conjunctural factor, an artificial curb on prices reportedly enacted during the final months of 1973. See RR, 6/24-30/74, "Crise sem Correção".

> To maintain the accelerated growth of previous years with an expansion of job opportunities greater than in the preceding decade to keep pace with the growth of the workforce entering the labor market.
>
> To reaffirm the policy of containing inflation by the gradualist method.
>
> To maintain the balance of payments in relative equilibrium. (II PND, 1975-1979: 28)

While the strategy to maintain the balance of payments in check was based in part on a system of incentives for exporting, its core was the capture of foreign resources. According to the Second National Development Plan:

> The principal concern is to adapt the economic structure quickly and securely to the necessities of the new situation. This should make viable, with a careful and judicious use of foreign credit, the possibility of accelerated development (II PND, 1975-1979: 27).

The document went on to emphasize the need for underdeveloped countries which import oil to have access to the financial centers of Europe and the United States, where a good part of Arab money was recycled. It spoke further of the importance of creating new international funds with resources from the oil-exporting and the industrialized countries, or of the creation of direct channels of credit specifically from the Arab countries to the less developed oil-importers (II PND, 1975-1979: 27).

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[5]Oil's highest price level, determined in an OPEC meeting on December 9, 1973, was reached in January 1974 (see Figure III), when the price practically quadrupled in relation to January 1973. The "posted price" of "Arabian Light" (generally taken as the indicator of OPEC oil), rose from US$ 3.011 per barrel in October 1973, to US$ 11.651 in January, 1974 (International Crude Oil and Product Prices, Beirut, Lebanon).

Within this context, energy policy, although considered important in "reducing /Brazil's/ dependence on foreign sources of energy" (II PND, 1975-1979: 17) was subordinated to the greater objective of growth: "For Brazil, the correct position is to confront the energy crisis without sacrificing high growth rates" (II PND, 1975-1979: 82). This, as has been seen, was to take place at the same time that equilibrium was to be achieved in the balance of payments and inflation was to be brought under control. Schematically,

high oil prices → Economic Policy: adjustment to high oil prices (balance of payments, inflation) with high growth rates → Energy Policy

The energy policy formulated during this period can be summarized by the following points included in the Second National Development Plan:

(1) Increasing domestic energy sources:
   - massive investment in exploration and production of oil
   - maximum use of hydroelectric energy, replacing petroleum to the greatest extent possible (construction of large hydroelectric power stations).

(2) Limiting the consumption of petroleum, especially for transport, by allowing gasoline prices to rise in line with the market, promoting urban public transport systems, electrifying the railways, adding alcohol to gasoline, and introducing conservation measures.

(3) Developing alternative energy sources:
   - foment the shale oil program
   - increase the use of coal, especially for industrial use (replacing fuel oil).

The lack of emphasis given to the use of alcohol in national energy policy at the end of 1974 is readily apparent. Before its role as a substitute for gasoline in the mixed carburant policy was defined in late 1975, alcohol was dealt with merely as one in a series of means of reducing oil consumption. During 1974, the pronouncements of the Minister of Mines and Energy, following the general outlines of the Second National Development Plan, did not even mention alcohol as an alternative source of energy. Rather, the alternative energy source which received prominence, apart from shale oil, was nuclear power. In fact, the Brazil-German Nuclear Agreement was in the process of being negotiated during 1974, and signed on June 12, 1975. It provided for the construction of two (with an option for eight more) 1,300 megawatt reactors by 1985, using uranium enriched by the experimental German jet-nozzle process.[6] This commitment to nuclear power demonstrates the priority accorded to electricity in national energy policy.

Critics of the energy policy formulated in response to the first oil shock faulted the policy for the absence of a global view, emphasizing two basic problems:

> (i) In abolishing the subsidy for gasoline only,[7] and allowing for a limited replacement of gasoline by alcohol and fuel oil by Brazilian coal, the limited flexibility of the refining structure is ignored. The proportions of petroleum products possible given Petrobras' refining structure are relatively fixed.

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[6] See OG 4/15/74, "Ueki diz ..."; ESP, 6/31/74, "Realismo no Ministerio das Minas e Energia"; ESP, 11/15/74, "Um Elogio ao MDB". An excellent article summarizing the Brazilian-German Nuclear Agreement, its formulation and its international implications, is Norman Gall, "Atoms for Brazil, Dangers for All", Foreign Policy (Summer, 1976): 155-201.

> Therefore, any substantial reduction in gasoline consumption is of limited importance, since a concomitant reduction in the imports of crude oil is not possible; the quantity needed to produce fuel and diesel oil would remain practically the same.[8]

(ii) The emphasis placed on the use of electricity, including as a replacement for petroleum, brings with it a series of difficulties. Only the electrification of public transportation makes economic sense. Electrification of railroads is extremely expensive, and opinions diverge over its economic viability. As far as the industrial use of energy is concerned, specialists say that the replacement of petroleum is only technically and economically feasible in processes using mechanical energy. The replacement of thermal energy by electric energy would be economically untenable, even with high oil prices.

The critics of the energy policy concluded that there was a risk of producing, in the next decade, an excess supply of electricity and a shortage of fuels.[9]

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[7]This policy was made explicit by the Minister of Mines and Energy on announcing, 17 days after the first gasoline price rise, that whereas consumption of this product had gone down 7%, the consumption of diesel and fuel oil continued as usual, with signs that they might even increase. The Minister admitted that "in adopting a policy of realistic prices, with most of the burden on gasoline consumers, the government intended to attain precisely these results," (OG, 4/15/74, "Ueki diz ...").

[8]The refining structure of Petrobrás would, however, become reasonably flexible over time, making it possible to produce more medium products (See Table 16). This fact, coupled with the reduction in consumption due to the policy of realistic prices, the contraction in economic activity, and the partial replacement of petroleum with alternative energy sources (especially alcohol and coal), as well as the policy of selling petroleum products abroad, brought oil imports down from

In point of fact, very little concrete action was taken on energy policy during 1974. Concern over the availability of oil on the international market had cooled, and in spite of the immediate adverse effects which high oil prices had wrought on the balance of payments and rate of inflation, there was optimism in official circles for the rapid recovery of the economy.[10] Confidence remained steady in the mechanisms for combating inflation, in the potential to expand exports, and in the ability to garner foreign resources.[11] The discovery of petroleum fields in the Campos basin,[12] and the stepping up of exploration abroad by Braspetro reinforced the official optimism. Brazil was thought, at that time, to be an "island of prosperity" (ilha de prosperidade) in a shaken world.

8(cont.)
1,000,000 b/d in 1979 to 850,000 b/d in 1981, after the second oil shock (see pp. 367-368 for a more in-depth explanation of this point).

[9]See, for example, Sérgio H.H. de Abranches (ed.), "Plano de Ação para o Setor de Energia" (FINEP, mimeo, 1978); Antonio Barros de Castro, "O Setor Energético no Brasil: Problemas de Política e Planejamento" (FINEP, mimeo, 1978), and "A Política Energética em Questão" in A Economia Política da Crise: Problemas e Impasses da Política Econômica Brasileira (Rio de Janeiro, Vozes e Achiamé, 1982); Hélio Mattar, "Programa Energético Nacional: Possibilidades e Impactos" (paper presented at the seminar "Energia e Desenvolvimento", sponsored by CENDEC/IPEA, ILPES/CEPAL, and PNUD, October 6-9, 1980).

[10]See, in general, the various articles of Negócios em Exame and Indústria e Desenvolvimento for the period in question. One article displaying this optimism is "O Brasil e a Crise" in Negócios em Exame (no. 77, January/February 1974), pp. 8-13.

[11]See, for example, in Negócios em Exame (no. 78, March 1974) the pronouncements of the ex-Finance Minister, Delfim Neto ("Por que a empresa privada", pp. 8-9) and the new Minister, Mário Henrique Simonsen ("Uma Pré-Estreia do Programa de Simonsen", pp. 10-13).

In October 1975, however, a host of economic difficulties had surfaced which rendered critical the balance of payments situation. These included the growth in the external debt, the reduction in reserves, the failure of exports to meet expectations, insufficient foreign resources to cover the current account deficit, the higher than anticipated 10% increase in oil prices and the likelihood of periodic increases in the future. In an important speech to the nation on October 9, Geisel, acknowledging this situation, outlined a series of drastic measures to reduce as much as possible the deficit in the balance of payments,[13] which, while still avoiding recession, did now admit of a lower rate of growth. Among these measures were included two which form an important part of energy policy, the Alcohol Program and the controversial "risk contracts."[14]

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[12]It has been reported that Petrobrás managed to secure almost immediately substantial loans in London to finance research and pay for the purchase of equipment. The initial target for production was 300,000 barrels/day (far exceeding the total production of the country, which, at the end of 1974, was around 190,000 barrels/day). The future self-sufficiency of the country in oil was even contemplated. (See, for example, JB 11/28/74, "A rica dieta de Campos", "Balanço Commercial terá superávit com descoberta de petróleo", "Árabe diz que caminho para auto-suficiência já começou"; JB 12/5/74, "Ângelo de Sá vê Petrobrás com crédito ilimitado"; RR, 12/9-15/74, "Petróleo político" and "Controle necessário"; RR, 12/16-21/74, "Depoimento para a história"; and JB, 6/19/75, "Auto-suficiência em óleo é um fato para Shigeaki Ueki").

[13]More specifically, they were intended to reduce to a minimum the trade deficit, whiie maintaining stable the level of reserves so that the current account deficit would be transferred onto the service acccount, and to maintain the then current level of foreign debt.

[14]The measures announced to ameliorate the balance of payments can be summarized as:

(i) measures with short term effects

Thus, while oil was a basic parameter of decision in the formulation of alcohol policy, its availability was not an issue. Rather, concern about drastic cuts in supply were soon mitigated. Instead, it would exercise its impact on alcohol policy indirectly, essentially through the adverse effects on the balance of payments caused by the rapid increases in price.

The Sugar Euphoria:

The influence of sugar, the other basic parameter of alcohol policy, was felt in two ways: first, through the balance of payments (and

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14 (cont.)

- an increase in the price of petroleum products (25% for gasoline and 10% for diesel and fuel oil, with no changes in the L.P.G.), thereby keeping to a minimum effects on productive activities and avoiding rationing

(ii) measures with medium-term effects

- incentives for exports (primary products and manufactured goods) and restrictions on imports (an increase of 100% in the import duty on a number of luxury goods, and 30% on a series of intermediary goods)
- a 15% restriction in the imports of the Ministries and State enterprises
- import substitution (in wheat, steel, non-ferrous metals, petro-chemicals, fertilizers, agricultural preservatives, paper and cellulose, and equipment)
- Alcohol Program - addition of up to 20% alcohol to gasoline, and its introduction as a raw material in the chemical industry
- Production from the offshore fields of Rio de Janeiro

(iii) measures with long-term effects:

- anticipated Petrobrás discoveries
- anticipated discoveries from the risk contracts
- shale oil production

the importance of sugar exports to the trade balance), and second, through the interests of the sugar agro-industry. In both cases the attitudes and preferences of the actors involved in the alcohol policy would vary according to whether the sugar sector was in crisis, real or perceived.

In 1973, there was a climate of euphoria in sugar sector circles. The world was experiencing a sugar shortage of crisis proportions, which was first felt in Brazil in the final weeks of 1971. The structural causes of the crisis are generally ascribed to the tendency of growing world demand for sugar in a situation where traditional producers were already stretched to the limit of available industrial capacity (in many cases lengthening the milling period at the expense of productivity), with few prospects for expansion (Mont'Alegre, 1975d).[15] Prices escalated rapidly. The average price of sugar rose 61.5% between 1971 and 1972 on the world market, and another 29.9% in 1973, going from 4.50 US cents per pound in 1971 to 9.45 in 1973 (see Table 19). In January 1972, quotas for the world free market (regulated by the international sugar agreements) were suspended. Prices on the preferential North American and British Commonwealth markets, normally higher than those on the world free market, were in 1974 below them, provoking concern about the supply for the domestic markets.[16] Various supplying countries actually set limits on sugar deliveries to London.

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14 (cont.)
(The speech by Geisel on October 9, 1975, is reproduced in its entirety in O Globo, October 10, under the title, "Governo enfrenta os efeitos da crise mundial".)

[15] According to Mont'Alegre, the combination of these structural causes, together with the failure of the sugar cane and beet harvests, had brought about the world shortage of 1972-74 (Mont'Alegre, 1975d).

In 1973, as one of the world's three major sugar exporters,[17] Brazil played an important role during the UNCTAD meeting convened to renew the 1968 International Sugar Agreement due to expire on December 31, despite the collapse of the meeting. "It is clear that from now on no decision will be made on the world free market without Brazil's voice having been heard," asserted Tavares do Carmo, President of the Sugar and Alcohol Institute, in a speech in October, 1973, to the Commission for Regional Affairs of the Senate (Tavares do Carmo, 1974a: 24). On this same occasion the President of the IAA declared "(T)he future of the sugar agro-industry in Brazil lies in the international market, and, specifically, on the world free market"

15(cont.)
Mont'Alegre, the IAA representative in London, is an attentive observer and a careful analyst of the international sugar market. His was one of the few voices wary of the expansionist sugar policy in Brazil. For an analysis of the shortage crisis of 1972-74, see Mont'Alegre 1974a, 1974b, 1974c, 1974d, 1975a, 1975b, 1975c, 1975d, 1976, and 1981, all published in Brasil Açucareiro.

[16]The two Preferential Agreements were not renewed, both expiring on December 31, 1974. At least in the case of America, the fact that the Sugar Act (a law renewed periodically by the US congress regulating the Preferential Agreement) was allowed to lapse is partly explained by the shortage of sugar on the international market, and the fear that the countries chosen to supply the US market would not fulfill their quotas. For an analysis of these preferential markets and their influence on the international sugar market, see Mont'Alegre, 1974b, 1974d, and 1975d.

[17]Brazil became a major world exporter in 1972, when net sugar exports, which had in the previous five years been between 1 and 1.2 million metric tons, soared to 2.6 million metric tons on the world open market. In 1973, Brazil became the leading world exporter of sugar (2.97 million metric tons), followed by Australia (2.12 million metric tons), and Cuba (1.77 million metric tons). From this point on, these three countries, unquestionably the world's largest exporters, alternated their positions (Data from International Sugar Organization Yearbook, 1976 and 1980).

(Tavares do Carmo, 1974a: 24). The sugar policy was one of an ambitious expansion of production, with a vast modernization program for the cultivation and processing of sugar cane (see Volume I, pages 165 to 168). A few voices warned of possible world overproduction in two or three years, given the large investments by traditional exporters and the entry onto the world market of new producers, attracted by the high price the commodity brought at that time.[18]

To these admonitions the director of the Export Division of the IAA responded:

> As for the apparent risk of our country investing in order to increase production with misgivings that consumption on the world open market will not absorb this growth in production, my opinion, and the dominant one among those who study the sugar problem, including international bodies which have in their service top quality technicians, is that in the 70s production has been and will always be less than consumption (COPERFLU, 1973: 108).[19]

In fact the IAA demonstrated great confidence in the estimates of international bodies such as the UNFAO, which forecasted a worsening of the sugar shortage in the future if there were no expansion of production. The forecast by Albert Viton of the FAO was particularly influential. He believed that the traditional cycles of sugar (short periods

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[18] Of the producers, Cândido Toledo was prominent among those who warned of the dangers of overproduction. He repeated these warnings during the First, Second, and Third National Sugar Producers Meetings in Campos, Rio de Janeiro, in August 1973, 1974, and 1975. Of the experts who studied the sugar market, Mont'Alegre was one of the more vocal and astute pessimists (see footnote 15 above).

[19] The new director of the Export Division of the IAA, on the occasion of the Second National Sugar Producers Meeting in August 1974, was more wary, proposing a more cautious policy to expand production,

of high prices, followed by a corresponding huge expansion of production, which in turn results in a prolonged period of low prices) would not occur this time: "Certain circumstances ... diminish the influence of production on market trends. There has been - to mention only the most important - a reduction in existing plantations in many underdeveloped countries" (Viton, 1974: 29). At a conference held by the New York Sugar Club on March 27, 1974, Viton expressed his belief that unless the world entered into a serious economic depression, the 70s would be marked by periods of sugar shortages, interspersed with periods of unstable equilibrium. Viton went on to praise the "audacity" of Brazil in launching an intensive program to increase sugar production, a policy which, in his estimation, would be immensely profitable.

In 1972, Brazilian sugar exports rose sharply by 112%, and in 1973, by 13%, to 2.97 million metric tons worth US$ 600 million (see Table 22). In 1974, sugar topped Brazil's list of exports, surpassing even coffee.[20] Not surprisingly, in 1974, there were high hopes that sugar exports would improve the nation's balance of payments. Prices rose on an unprecedented scale, reaching in November their maximum of 63.11 US cents per pound (ready to embark, f.o.b. stowed) (Mont'Alegre, 1975d: 10).

From December, prices began to decline rapidly, falling in 5 months by nearly one third. On the last market day in 1974, sugar was negotiated at 46.33 US cents per pound, on the terms of f.o.b.-stowed. By May 31,

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19 (cont.)
"within a specified plan for security, because otherwise we could have a crisis with unforeseeable consequences" (COPERFLU, 1974: 74). His voice, however, appears to have fallen on deaf ears.

1975 this value had slumped to 15.28 US cents/pound (Mont'Alegre, 1975d: 8). This sharp reversal in the price tendency on the open market can be principally ascribed to the contraction of consumption, above all in the industrialized countries (unlike the traditional cycles of sugar prices, in which the reversal is caused by surplus supply). These countries, affected by inflation and recession, underwent a change of habit and diet, investing heavily in artificial sweeteners and other sugar substitutes.[21] In addition, the underdeveloped sugar importing countries adopted measures restricting sugar consumption to avoid an excessive drain on foreign exchange. Moreover, many sugar importing countries had been pursuing policies aimed at achieving self-sufficiency. During the course of the preceding 20 years, countries which had previously imported sugar joined the world open market as small and medium scale exporters. Accordingly, the volume of sugar exports on the world free market increased at a much slower rate than the growth in world consumption (cf. Mont'Alegre, 1976). In 1978, it was estimated that 1/6 of the total world sugar production was traded on the world free market. The remaining 5/6 was either consumed by sugar producing countries or exported through bilateral agreements (see Agroanalysis, vol.2, no. 13/14: 15-22, July 1978).

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[20] In 1974, while the value of sugar exports reached US$ 1.3 billion, coffee exports remained at approximately 1 billion dollars (Central Bank Reports).

[21] In 1975, the consumption of sugar declined by 30% in comparison with the previous year in Japan, by 8% in Canada, and by 15% in the European Economic Community. In the United States the reduction was far more drastic: 49% between 1973 and 1974, and a further 14.2% in

In spite of a shrinking market and falling prices, official expectations were that sugar would remain a top export earner, sharing with coffee the highest receipts, and counterbalance the poor performance of other agricultural products.[22] At the Third National Sugar Producers Meeting in Campos in August 1975, when the contraction of world consumption was already apparent, the official policy clung to plans to expand sugar production. Tavares do Carmo announced a program, approved at the ministerial level, which established a goal of 170 million sacks of sugar for 1980, of which 42.5% would be earmarked for exports and for rebuilding sugar reserves (Tavares do Carmo, 1976: 294). The President of the IAA saw the fall in the price of sugar as normal, following upon an artificial rise. The new policy of the mixed carburant, moreover, represented an important escape valve for the sugar industry "in the eventuality, although remote, of a return to overproduction" (Tavares do Carmo, 1976: 297).

Investment in new usinas beginning in 1973, stimulated by the record price of sugar, would produce an unprecedented accumulation of stocks (see Table 21 and Figure I) in the 1976/77 harvest. Yet, while

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21 (cont.)
1975. In all, the annual consumption of cane and beet sugar per capita fell from 102.1 lb in 1973 to 87.6 lb in 1975, exactly 10 pounds less than in 1960. A consumer boycott, as well as the steadily increasing use of corn syrup, from 22.2 lb per capita in 1973 to 24.4 in 1975, contributed to this drop in consumption. Between December 1974 and June 1975, this drop was calculated at 1.7 million short tons (see Mont' Alegre, 1976).

[22]See, for example, RR, 2/17-23/75 "Açucar Vai Bem"; RR, 3/3-9/75, "Atrito Superado"; RR, 3/17-23/75, "Dolçe Vita no Açucar"; RR, 4/14-20/75, "Doce ou Amargo?"; and RR, 7/1-7/75, "Recuperação do Açucar".

the sugar sector approached the brink of a grave crisis, the situation was not read accurately, either by the decision-makers or by the producers. Their perceptions, not the reality of the impending crisis, determined their policy preferences.

6.2. Actors, Motivations, Issues and Policy Preferences

Actors:

The principal actors in this phase of the formulation of Proálcool were:

(i) "public" actors: the President, Ernesto Geisel; the Ministry of Industry and Trade (MIC), the Ministry of Mines and Energy (MME), the Ministry of Planning (SEPLAN), and the Ministry of Agriculture; the Institute of Sugar and Alcohol (IAA), Petrobras,[23] and the National Petroleum Council (CNP); and the Aerospace Technical Center (CTA) and the Secretary of Industrial Technology (STI/MIC).

(ii) "private" actors: the Central Cooperative of Sugar and Alcohol of the State of São Paulo (COPERSUCAR), the Syndicate of the Alcohol Production Industry of the State of São Paulo, the Cooperative of Sugar and Alcohol Producers of the State of Rio de Janeiro (COPERFLU) and the Syndicate of the Sugar and Refining Industry of the States of Rio de Janeiro and Espírito Santo; associations representing producers of other regions and the cane suppliers; and the Brazilian Association of Chemical Industries (ABIQUIM).[24]

Motivations:

During this period, the preferences which these actors expressed for the future direction of alcohol policy were governed on the one hand by the acute awareness of what effects a sudden increase in oil prices

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[23] The IAA and Petrobrás, although formally under the control of the Ministry of Industry and Trade and the Ministry of Mines and Energy respectively, operated independently. Petrobrás conducted activities separate from the Ministry of Mines and Energy (MME), whereas the IAA

would produce on the balance of payments, and, on the other, by the extremely favorable price and broad demand for sugar on the international market up to the end of 1974. Even after this date and the fall in sugar prices, the situation was perceived to be one of temporary adjustment of the market, but still definitely propitious for Brazilian exports. Policy alternatives not prejudicial to sugar exports could be expected to enjoy ample support since they would serve the interests of both those actors concerned with the balance of payments and those connected with the sugar cane industry. The balance of payments was the prime concern of the President, his immediate aides, and the Ministries overseeing economic affairs. The other actors, including "public" ones such as the IAA who stood to gain from any policy favoring sugar, "legitimized" their position by expressing concern over the balance of payments and in so doing, placing themselves squarely behind the objectives of the President of the Republic and his government.[25]

The convergence of interests of the various actors involved in the alcohol policy in not prejudicing sugar exports would, initially,

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23 (cont.)
actually engaged in activities in opposition to the Ministry of Industry and Trade (MIC). This conflictual situation was fueled by tensions between the Minister of Industry and Trade and the President of the Sugar and Alcohol Institute which had their origins in the politics accompanying the succession of the previous government.

[24]The activity of the automobile industry was secondary during this phase.

[25]The term "government" here refers to the Ministries governing economic affairs and the President of the Republic. It is especially meant to connote the presidency when the objective of a particular actor is to "legitimize" or strengthen the force of his proposal over those of other actors.

suggest that conflict over the formulation of the policy should have been minimal. In fact, noticeably intense conflict arose. There are two principal factors which explain this apparent paradox:

(i) the specific structure of alcohol production in São Paulo.

(ii) unyielding competition among bureaucratic agencies for control over the PNA.

The entire gestation period of the PNA was pervaded and complicated by these two factors.

Issues:

The beginning of the formulation period of Proálcool is taken to be December 1973, when the Minister of Industry and Trade at that time, Pratini de Morais, declared that new, higher oil prices justified the mixture of alcohol with gasoline, thereby creating new opportunities for sugar cane. To satisfy future demand for alcohol, it would be necessary to expand the area under cultivation, which, the Minister added, was imperative for the national interest which would be served by a steady flow of sugar exports. Pratini de Morais reasoned that the promising outlook for sugar cane on the international market recommended that sugar no longer be a peripheral but now a vital export commodity.[26] The Minister of Industry and Trade was motivated to propose a return to the mixed carburant policy evidently to take advantage of the high oil prices to strengthen the sugar industry by reducing the shortage of raw material

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[26] JB, 12/11/73, "Pratini vê maior uso de álcool na gasolina", and GM, 12/11/73, "MIC estimula produção de álcool combustível".

and establishing minimum prices for sugar and cane (a frequent and consistent demand of the usineiros and cane suppliers), thus guaranteeing Brazilian sugar exports on a highly favorable market.

The expansion of alcohol production (annexed vs. autonomous distilleries). Whereas all actors affected by the mixed carburant policy agreed that in order to make this policy viable it would be necessary to enlarge the area cultivated by cane, they could not come to terms on how to do so. This was, from the outset, the principal issue of the gestation phase of Proálcool. It soon evolved into essentially an issue of contention between the IAA and COPERSUCAR, who, in reacting to Pratini de Morais' proposal, placed themselves in opposite camps. The producers of the other regions would only indirectly take a stand on this question, but, in general, were more sympathetic to the viewpoint of the IAA. COPERFLU adopted a clear position, firmly supporting the Institute.[27]

The IAA argued that the expansion of alcohol production would require not only that the area of the cane crop be increased, but also that part of this would have to be explicitly designated for alcohol production. Moreover, alcohol obtained directly from cane (direct alcohol) should be produced in autonomous distilleries not located in sugar producing regions. The IAA feared that the mixed carburant policy would divert cane, already in short supply, from sugar production, which would result in a missed opportunity for exporting sugar on an

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[27] See page 238 below.

extremely favorable market - adding to the resources of the Special Export Fund -and Brazil's failure to fulfill its international obligations.[28]

The Special Export Fund, as explained above, was established by decree-law no. 308 in 1967 with a portion of the taxes levied on each sack of sugar and each liter of alcohol not for use as a carburant (about 35% of IAA receipts), and the net income from exports. The price paid to the producer for sugar for export was approximately the same as that for sugar intended for the domestic market (determined by the IAA on the basis of a survey of production costs for the previous harvest, and authorized by SEPLAN). The resources of this Fund swelled during the period of euphoria on the international sugar market. As the IAA had a monopoly over the sugar trade, the volume of the Fund's resources would be an important power asset for the Institute. In this light, it is understandable why the Institute tried to guarantee the maximum net income possible from sugar exports. During times of high sugar prices on the international market, its interests as an institutional actor clashed with those of its "clients" -- the sugar producers and cane planters. In spite of the fact that a substantial part of the resources of the Special Export Fund reverted to the producers (through the Sugar Agro-Industry Modernization Program which offered credit at very low interest rates), they demanded a greater share of the Fund's profits.

The position of the IAA on alcohol policy was registered in Resolution no. 2081 of May 13, 1974. Article 1 of this resolution stated:

> The installation of new autonomous distilleries for the production of alcohol obtained directly from the crushing of cane will now be permitted according to the terms set forth

> in this Resolution and with the prior authorization of the President of the Sugar and Alcohol Institute, on the condition that their location does not allow them to compete for the acquisition of cane which can be used in sugar production.

Alcohol at this time played a secondary role in the cane industry, both for the directors of the IAA and for the producers, except in São Paulo. In fact, during this period, molasses which was used mainly as animal fodder in the United States and Europe, like sugar, commanded favorable prices on the international market.[28-29] Molasses was exported only from the Northeast[30] and only by the producers.[31] In the harvest of 1972/73, it brought a revenue of 21 million dollars for a volume of 730 metric tons at an average price of 30 dollars/m.t. (f.o.b.-stowed). In 1973, the price of molasses reached 75 dollars/m.t. Against this background, the President of the IAA predicted that "as there tends to be an outward drain on molasses, there will be no molasses for alcohol production, nor for the other necessities of the domestic market" (Tavares do Carmo, 1974a: 21).[32] The policy of the Institute was to forego no opportunity to export sugar and its by-products which, while advantageous for the cane sector, would also bring foreign exchange into the country. Supported by the Ministry

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[28-29] Molasses is a necessary by-product of sugar production and the raw material for the so-called residual alcohol.

[30] See Volume I, pp. 176-177.

[31] The IAA's role was limited to authorizing exports after a determination had been made that the raw material necessary for sufficient alcohol production to supply the domestic market was guaranteed (see Tavares do Carmo, 1974a: 20, 21 and Simões de Almeida, 1972: 70, 71).

of Mines and Energy, the IAA thought it inappropriate to let the decision to produce alcohol interfere with the exports of sugar and its by-products.[33]

In this context, the Minister of Industry and Trade's proposal to expand the production of anhydrous alcohol[34] for mixture with gasoline, though originating from outside the sugar sector, was accepted as a safety valve for a possible, but as it was believed, improbable,[35] crisis of overproduction of sugar. On this basis, the proposal was supported by the President of the IAA, Tavares de Carmo, on the occasion of the important Second and Third National Sugar Producers Meetings in Campos, Rio de Janeiro, in August 1974 and 1975 (cf. COPERFLU, 1974: 17; and Tavares de Carmo, 1976: 297), and similarly endorsed by the Director of the Export Division of the Institute (cf. COPERFLU, 1974: 84), as well as Evaldo Inojosa, the President of COPERFLU (cf. COPERFLU, 1974: 87, 133, 134 and COPERFLU, 1976: 288, 289).

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[32]For background information on Brazil's export of molasses and the international market for this commodity, see Simões de Almeida, 1972: 70-71; Tavares do Carmo, 1974a: 20-21; and especially Mont'Alegre, 1979.

[33]"You can't cover one saint with the shroud of another" (cf. GM, 6/17/74, "Resolução do IAA fixa novos preços na base já prevista pelo CIP").

[34]To properly mix with gasoline and for the proper operation of engines, anhydrous, or dehydrated, alcohol (99.5° G.L. at 20° C) is necessary. For a brief technical explanation of the difficulties in miscibility with gasoline as well as the problems presented in engine performance by the water contained in alcohol, see Volume I, footnote 20, pp. 55-56.

[35]See p. 228.

As alcohol production was viewed as contingent upon the unlikely event of a crisis in the sugar market, it was not surprising that the producers were indifferent as to its use. Thus, during the Second National Sugar Producers Meeting (August 1974), various possibilities for the non-carburant use of alcohol were, in fact, discussed, including industrial alcohol, especially in the chemical industry, and alcohol as an additive to gasoline replacing imported tetraethyl lead (or even the combination of the production of alcohol and cellulose from cane fiber). Another option was alcohol for export,[36] of which the President of COPERFLU spoke with enthusiasm:

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[36]The 70s began with a very limited outlook for the export of alcohol, which could not compete with synthetic alcohol produced from petroleum. Beginning with the harvest of 1968/69, São Paulo ceased to export alcohol, and only Pernambuco continued its production during the next three harvests (see Volume I, p. 177 and Simões de Almeida, 1972: 70, 71).

In 1973, however, a shortage of alcohol on the world market opened up new export opportunities for Brazil. This shortage was caused by many factors: (i) because (residual) alcohol production is linked to sugar production, its level slumped concomitantly with that of sugar; (ii) alcohol production was prohibited in Japan because of problems with pollution; (iii) various countries needed to consume all molasses obtained from sugar production for animal fodder; (iv) high oil prices rendered more competitive the price of alcohol from agricultural products with that manufactured synthetically; and (v) also because of high oil prices, the carburant use of alcohol was considered.

Responding to these opportunities, the IAA authorized for the harvest of 1973/74 the export of 85 million liters of alcohol (about 13% of total anhydrous and hydrated production) with Pernambuco and Rio de Janeiro in mind. Alcohol, like molasses, was exported directly by the producers, and, above all, from the regional cooperatives, without the intervention of the IAA (see Tavares do Carmo, 1974a: 21, and GM, 8/23/73, "Será ampliada este ano a exportação de álcool").

COPERFLU negotiated an especially advantageous contract with SOFECIA, a French firm, and the largest purchaser of alcohol in the

> Alcohol cannot be separated from sugar, nor sugar from alcohol. In fact, the possibility of the carburant mixture, whether in the form of an additive to improve the octane rating of gasoline, or in a more traditional form, as used during the war, of a carburant in itself, whichever way you think of it, points in only one direction: to allow Brazil to expand sugar production, and, by means of this mixture, by means of this production, to take its rightful place in the international sugar market (COPERFLU, 1974: 133-34).

Thus COPERFLU aligned itself with the IAA, favoring the installation of autonomous distilleries exclusively for the production of alcohol "in the case of Brazil wanting to use anhydrous alcohol as an additive to gasoline, to reduce oil imports".[37]

On this question, the rhetoric and position adopted by COPERSUCAR were quite distinct. Although alcohol for any use was an "extraordinary regulating valve for the whole industry",[38] the documents and pronoun-

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36 (cont.)
world. This contract provided for the export of 70 million liters of alcohol per year up to 1977, and of 20 million liters in 1978 and 1979. In order to meet this obligation, COPERFLU rented the Jacques Richet Central Distillery from the IAA, intending to produce 250,000 l/d through 1974 (tripling the normal production of the cooperative of around 90,000 l/d). Inojosa, the President of COPERFLU, expected to obtain 15 million dollars from alcohol exports (see Negócios em Exame, no. 36, November 1974, "A COPERFLU fatura com a crise do petróleo").

Despite COPERFLU expectations to the contrary, these contracts were unlikely to be renewed. Bearing in mind the proposal to return to the mixed carburant policy, the National Petroleum Council would regulate the addition of alcohol to gasoline. In fact, whereas total alchol exports reached 77.1 million liters at the harvest of 1973/74, their levels would vary erratically in the following harvests, only reaching and surpassing the 1973/74 total in the harvest of 1979/80 (see Table 26), for reasons to be seen.

[37] OG, 11/1/74, "Usineiro acha exagerado preço externo do açúcar."

cements of their representatives consistently emphasized the use of alcohol as a fuel, justified by the saving of foreign exchange and considerations of national security (the guarantee of an adequate supply of fuel, especially in the transport sector). As long as alcohol was considered a by-product of sugar, they argued, the minimum conditions for its establishment as an alternative energy source would not materialize. On this basis they criticized the policy of the IAA of making maximum use of residual molasses for sugar production, and favoring the export of lean molasses. The quantity of alcohol produced for the carburant mixture was then adapted to the volume of residual molasses available, or of surplus cane, and even then, only after industrial demand for alcohol had been satisfied.[39] Moreover, the proposal to use alcohol as fuel had been coherently advanced[40] by COPERSUCAR even before the pronouncement by Pratini de Morais.

This raises the question of why COPERSUCAR, unlike the other actors of the sugar industry, not only considered alcohol as an important product of cane, but also vigorously defended its use as a fuel. The explanation lies in the special circumstances of alcohol production

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[38]Speech by Diego Galhardo, the representative of COPERSUCAR, at the Second National Sugar Producers Meeting (August 1974). See D. Galhardo, "O Álcool e sua Importância Atual para a Economia Nacional" in COPERFLU, 1974: 112.

[39]See speech by Diego Galhardo referred to above.

[40]See, for example, the COPERSUCAR document, "Subsídios para uma política de mistura carburante", August, 1972, and the article by the President of COPERSUCAR, Jorge W. Atalla, published in O Estado de São Paulo in November of the same year (ESP, 11/5/72, "Álcool é pouco e irregular na gasolina").

in São Paulo. As Brazil's largest producing state of sugar and alcohol, Sao Paulo began the 70s with almost 50% of total national sugar production, and between 65 and 75% of total alcohol production.[40a] In that almost all alcohol produced in the country through phase one of the PNA came from molasses,[41] a by-product of sugar, São Paulo's share of total alcohol production should have been equal to that of sugar. São Paulo's more pronounced leadership in alcohol production is explained, on the one hand, by the state's greater industrial capacity than other states, and, on the other, by the export of molasses, the raw material for alcohol production, by the northeastern states (especially Pernambuco and Alagoas).

It has been seen[42] that as a result of the extremely unfavorable conditions for the mixed carburant policy during the 60s and early 70s, the producers and decision-makers linked to the sugar sector were forced to look for alternative uses for alcohol and the other by-products of sugar. Attempts were made to stimulate the supply of industrial alcohol, and, in general, producing states redirected their operations towards hydrated alcohol. Pernambuco, the second biggest alcohol producer after São Paulo, beginning with the harvest of 1968/69 (with one exception in the 70/71 harvest), allocated more than 90% of its total al-

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[40a] Based on data from the IAA.

[41] Until the harvest of 1977/78, all direct alcohol was produced in the Center-South region, and mostly in São Paulo. In the early 1970s, at least 96 percent of all alcohol produced in the country used molasses as its raw material. Beginning with the harvest of 1977/78, the share of direct alcohol began to increase. In the 1982/83 crop season, 40 percent of all crushed cane went to direct alcohol production (see Table 25).

[42] See Volume I, pp. 174-180.

cohol production to hydrous. This proportion reached 98.5% and 97.5% in the harvests of 1973/74 and 1974/75, respectively, when production was diverted towards anhydrous alcohol with the Gasohol Phase of the National Alcohol Program. Despite these developments in Pernambuco, São Paulo continued to be, by far, the biggest producer of hydrous alcohol in the country, responsible from the harvest of 1968/69 on (when Pernambuco began to shift direction in its alcohol production) for at least 40% of Brazil's total production of this type of alcohol. To appreciate the superiority of São Paulo, at the harvest of 1974/75, during which Proálcool was launched, production in São Paulo was more than double that of Pernambuco, which was equal to 91 million liters (see Table 29). Unable to depend on the export of molasses ,[43] São Paulo found itself, so to speak, drowning in alcohol. In spite of all the difficulties imposed by the CNP on the mixed alcohol-gasoline policy,[44] among them the price and quantity of alcohol to be mixed, São Paulo would continue to produce anhydrous alcohol mostly for carburant use. Thus, at the beginning of the 1970s, more than 93% of the total anhydrous alcohol produced from the harvests of 1971/72 and 1972/73, and an even greater percentage, 98 and 97.5 respectively in 1973/74 and 1974/75, equal to 300 and 200 million liters, were accounted for by São Paulo (see Table 29). The small percentage of alcohol in the mixture with gasoline (see Table 45) came almost exclusively from São Paulo. Yet, São Paulo had approximately 45% excess capacity in its distilleries, equal to 400 million liters (see Tables

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[43] See Volume I, p. 177.

[44] See Volume I, pp. 149-157 and 169-174.

32 and 33).

Consistent with the specific position which the alcohol industry occupied in São Paulo, COPERSUCAR defended the increase in alcohol production (principally for carburant uses) by:

i) making use of idle capacity in existing annexed distilleries;

ii) modernizing and expanding existing distilleries; and

iii) installing new distilleries annexed to the usinas which did not as yet have any.

The emphasis on the expansion of anhydrous alcohol production for mixture with gasoline is explained by the concentration of anhydrous alcohol distilleries in the state of São Paulo, a large number of which were operating at less than full capacity.

COPERSUCAR's position on the form of expanding alcohol production would be, during the first phase of the formulation of the National Alcohol Program, coherently and frequently defended by the President of the Cooperative, Jorge W. Atalla, and other spokesmen. The São Paulo sugar producers' lobby was strong and highly visible. Circumventing the IAA, the institutional channel of communication to upper level decision makers, COPERSUCAR made use of informal channels of access to these upper circles. It also took advantage of the public forum,[45] releasing technical studies,[46] and gaining widespread exposure

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[45]Such as the important National Sugar Producers Meetings, held annually in Campos, Rio de Janeiro.

[46]Among these are the afore mentioned study, "Subsídios para uma política de mistura carburante" (August 1972) and the "Potencial da

in the principal newspapers of the country, both as a result of the frequent declarations of its president and its paid announcements in these publications.

IAA Resolution no. 2081/74, which planned for the installation of autonomous distilleries, was immediately contested.[47] In a study entitled "O Potencial da Mistura Carburante na Solução da Crise de Combustíveis" ("The Potential of the Mixed Carburant in the Solution to the Fuel Crisis"), prepared by COPERSUCAR and the Producers Syndicate of the Alcohol Industry of the State of São Paulo and released in September 1974, the proposal to expand production via annexed distilleries and the use of existing idle capacity was repeated:

> The increase in production which would result from this would be at a much lower cost than that generated by installing new autonomous distilleries, which would render redundant the whole production structure and result in increased cost to the economy because of the double immobilization of factors of production for the same purpose (p. 1).

In order to understand the campaign conducted by COPERSUCAR, it is necessary to recall the way in which actors publicly identified with the government's official position on alcohol policy in order to enhance their own position, often based on entirely different considerations, over the policy preferences of other actors. In this case, COPERSUCAR was promoting its policy preference -- the production of alcohol for use as a carburant with the idle capacity of annexed distilleries -- over that of the IAA -- the production of alcohol in auto-

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46 (cont.)
Mistura Carburante na Solução da Crise de Combustiveis" (with the Producers Syndicate of the Alcohol Industry of the State of São Paulo, September 1974).

nomous distilleries located outside of the traditional sugar producing regions -- by attempting to demonstrate that its proposal to expand alcohol production, as well as being more economical, was the best solution for the goverment's concern over the balance of payments.

Proportion of alcohol in gasohol. In addition to the question of the way in which to expand alcohol production was that of the proportion of alcohol to be included in the carburant mixture. Several proportions, varying from 10 to 30%, were proposed by various actors. The basic considerations on the part of these actors were, first, the expansion of cane cultivation and distillery capacity to enable the different proportions of alcohol in the mixture, and secondly, the calculation of the maximum proportion of alcohol which could be used without adjustments to automobile engines. In the first phase of the gestation of Proálcool, the IAA[48] and COPERSUCAR[49] suggested a proportion of 10% to be achieved over a period of about two years. Consistent with their policy preferences, the IAA proposed the necessary expansion of distillery capacity be based on autonomous distilleries, and COPERSUCAR, on annexed distilleries. While both the IAA and COPERSUCAR

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[47] See, for example, the pronouncements of the COPERSUCAR representative at the Second National Sugar Producers Meeting in Campos, August 1974.

[48] See below detailed references on this issue (pp.

[49] In the above cited document prepared by COPERSUCAR in August 1972, "Subsídios para uma política de mistura carburante," a mixture with 15% alcohol was proposed. In the proposal by COPERSUCAR and the Producers Syndicate of the Alcohol Industry of the State of São Paulo, "O

were quite specific in their estimates of the volume of direct alcohol (IAA, 1,640 million liters; COPERSUCAR, 1,153 million liters), the quantity of cane to produce this volume (IAA, 23.4 million tons; COPERSUCAR, 17.5 million tons), and the area under cultivation (IAA, 387,200 hectares; COPERSUCAR, 350,000 hectares) necessary to make this 10% anhydrous-gasoline mixture viable, neither body calculated the required investment.[50] The initial proposal of 30% from the MIC was later revised down to between 15 and 25%.[51]

There were mainly two actors concerned with the use of the carburant mixture, specifically with its effects on car engines, the automobile industry and the Aerospace Technical Center (CTA), who was involved in the technical side of the question. The automobile industry was generally concerned that the mixture be the same throughout the country, and that a proportion of alcohol be adopted which would not

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49 (cont.)
Potencial da Mistura Carburante na Solução da Crise de Combustíveis", of September 1974, two alternative mixtures were considered: one of 10% and the other of 15% alcohol. Having calculated the expansion of the volume of direct alcohol, the amount of cane and the expansion of the area of cultivation to make the mixture feasible in either case for the years from 1976 to 1980, the study concluded:

> Given the discrepancy between the current levels of alcohol production and those necessary in the hypothesis of 10% of the mixture, a great effort must be made in order to reach this goal.
>
> The massive financial resources required, as well as the time it will take for the productive sector to adjust to the new levels demanded, suggests that the standardization of the mixture at a 10% level is more feasible in the short and medium run (Producers Syndicate of the Alcohol Industry of the State of São Paulo and COPERSUCAR, 1974: 9).

[50] See the above cited document by the Sindicato da Indústria de Fabricação de Álcool no Estado de São Paulo and COPERSUCAR document "Política do Álcool Carburante", presented by Tavares do Carmo

necessitate adjustments to the engine (up to 15%).[52] Studies by the CTA[53] showed, in fact, that alcohol mixed with gasoline in a proportion of up to 15% would not require engine adjustments. Over 15%, however, the carburetos would have to be modified, with progressive adaptations required as the proportion of alcohol mixed with gasoline increased. For proportions of over 30%, the compression ratio of the engine would need to be altered (Stumpf, 1976: 169).

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50 (cont.)
to President Geisel, mentioned below.

51 See footnote 48 above.

52 See, for example, ESP, 6/15/74, "Há pouco álcool para adicionar à gasolina," and JB, 7/23/75, "Indústria poderá fabricar o carro para usar nova mistura". In this latter article which appeared shortly after the promulgation of decree no. 75,966/75, the first attempt at a global alcohol policy, the producers of carburetors went on record that beyond 15% a complete recalibration of the carburetor would be necessary, but that all mechanic shops were prepared. Also, from the available studies, Volkswagen concluded that the best proportion of alcohol was between 14% and 16%, beyond which corrosion could occur to various parts of the vehicle, which would require the redesign of those parts. Only the President of the Automobile Industry Syndicate, Mário Garnero, dissented. He affirmed that the automobiles being manufactured could use gasoline mixed with up to 25% anhydrous alcohol.

53 The early research projects at the CTA on the use of fuel alcohol were conducted in the period from 1951-1952, when the country was experiencing a grave crisis resulting from a shortage of foreign exchange and, therefore, difficulties with oil imports. The Vargas Government and its Economic Advisory Staff anticipated, moreover, rapid growth in the domestic consumption of petroleum products, rising prices of crude oil and petroleum on the international market, and a possible disruption of this market due to the Korean War and the conflict between the government of Iran and the Anglo-Iranian Oil Company. Against this background, the mixed carburant policy was conceived of as a measure to alleviate the balance of payments problems and the fuel shortage crisis. However, the fears of the Vargas Economic Advisory Staff did not materialize (see Castro Santos, 1979: 20-22). Nevertheless, to confront

The CTA was extremely active in its campaign for the carburant use of alcohol. Its main spokesman, Urbano E. Stumpf, an engineer at the PMO/CTA, held innumerable conferences, took part in various symposia on alternative energy sources in the country during this period, and gave frequent statements to the press. At the symposium "Análise dos Êxitos Brasileiros em P & D" (Analysis of Brazilian Success Cases of R & D), sponsored by COPPE/UFRJ in December 1979, Stumpf said:

> Our initial efforts consisted of making the Brazilian people and the government itself aware of the technical and economic viability of the use of alcohol in internal combustion engines (...).
>
> The CTA recognizes the fact that the large-scale production of fuel alcohol depends, above all, on the demonstration of the viability, reliability and performance of engines run on alcohol.
>
> This was the banner raised by the CTA, which met with opposition from traditionalism and the individual interests at stake.

This allusion from Stumpf was to the difficulties encountered by the CTA project in developing an engine specifically designed for alcohol, looking ahead to the second phase of Proálcool with engines running exclusively on alcohol (see below).

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53 (cont.)
the expected fuel crisis (and the country's limited capacity to import), the Vargas Government formulated a policy based on achieving self-sufficiency in domestic oil production and refining in the near future. Thus, with the creation of PETROBRAS in 1954, fuel alcohol as a solution to petroleum shortages lost its appeal (for a detailed analysis of the missing elements required for the political survival of the carburant mixture in the fifties, see Volume I, pp. 146-150 and the Introduction to Volume II, pp. 189 to 193).

In this first phase of the gestation of the National Alcohol Program, both the actors whose interests lay in the production of alcohol and those in its consumption as fuel, would agree on a proposition of 10% or 15%. Not only was this proportion of alcohol suitable for existing car engines, but also it was technically and economically unlikely that the production of anhydrous alcohol could be expanded beyond that required to guarantee a 10% alcohol level in the mixture within the two year time limit. Merely to ensure the carburant mixture of 10% by the 1976/77 harvest would require that the production of anhydrous alcohol be almost 6 times greater than that projected for the 1974/75 harvest (270 million liters). During this phase, the National Petroleum Council, which considered the 10% alcohol-gasoline mixture untenable in the short run given the enormous effort necessary to expand the area under cultivation and the distillery capacity, adopted a posture of waiting.[54]

Despite the positions held by various actors, Geisel, in his important speech to the nation of October 9, 1975 officially announcing the National Alcohol Program, set the proportion of alcohol in the carburant mixture at 20% (and stipulated that alcohol would be substituted for imported raw material in the chemical industry). This speech manifested the Government's intention to embark on an alcohol policy of larger dimensions, which would require not only the substan-

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53 (cont.)
In 1974, after the first oil shock, the CTA, in collaboration with the National Petroleum Council, resumed research, in that year demonstrating the behavior of mixtures with differing proportions of anhydrous alcohol with gasoline.

tial increase of planted area and distillery capacity but also modifications to car engines. As a result, research at the CTA on the use of pure alcohol in Otto Cycle gasoline (and diesel) engines was intensified,[55] as were studies by the automobile manufacturers on the adaptations which Otto cycle engines would require to use the carburant mixture. These studies suggested that the addition of alcohol to gasoline should be gradual and uniform at each stage so as to introduce the alterations to the engines progressively, allowing time for the perfection of the technology and techniques of adapting these engines. The aim was the efficient functioning of these adapted engines at proportions of alcohol of above 25% of the mixture.[56]

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[54] GM, 6/17/75, "Resolução do IAA."

[55] In order to resolve the problem concerning the adoption of alcohol as a fuel, the Government endorsed two pacts: one between the STI and the CTA to research the use of alcohol in automobile engines made for gasoline, and another between the MME and the CTA to research the use of alcohol in diesel engines (see ESP, 10/19/75, "Álcool: indecisão custa US$ 1,5 milhão/dia".

Between 1975 and 1977, the CTA converted various types of car engines made for gasoline by Brazilian manufacturers to use exclusively alcohol.

The conclusion reached by the studies of the use of alcohol in diesel engines was that if the two fuels were used in mixture the engine would not function well due to the large difference in the point of ignition between alcohol (very high) and diesel (very low). Accordingly, the research turned to the development of a double feed system. (For details, see Stumpf, 1975: 168-69).

[56] cf. JB, 10/29/75, "Gasolina com álcool exigirá alterações nos motores atuais". It was proposed that this addition of alcohol to gasoline take place in three phases. In the first, conceived of as a short term measure, proportions of 15% alcohol would be utilized, for which engine modifications would not be necessary. In the second, this proportion would be increased to between 15 and 25%, at which point modifications to the carburetor and fuel pumps would be intro-

At the end of October, the Work Group (see below) responsible for elaborating the National Alcohol Program, decided on a goal for 1980 of 3 billion liters of alcohol to be mixed with gasoline in a proportion of between 10% and 15%. Nevertheless, decree no. 76,593 of November 14, 1975, which established the PNA, did not quantify a production goal for Proálcool, and, as a consequence, did not determine the proportion of alcohol in the carburant. The small quantity of anhydrous alcohol produced in the country at that time and the fact that research on the use of alcohol in gasoline engines was still in an early stage recommended a cautious approach for those responsible for the Program (Fassy, 1981: 5).

In the end, the proportion of anhydrous alcohol in the mixture was never fixed officially. It was to be settled annually by the Regulations of the National Petroleum Council, and would vary from region to region according to the volume of anhydrous production authorized by the IAA for each region at each harvest. The proportion of alcohol would increase each year during the first phase of Proálcool, reaching the 20% suggested by Geisel only in 1977 in some regions. While this proportion would be surpassed in the following years, it was not until January, 1983, that a uniform mixture of 20% was reached in all national territory.[57]

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56 (cont.)
duced. Finally, in a third phase, when the alcohol level would exceed 25%, engines and exhaust systems would be profoundly altered in relation to existing ones.

[57] Interview with Sergio Coelho, Assistant to the President, National Petroleum Council, on 3/3/83.

Alcohol raw material and the use of alcohol. Another question which would be raised during the formulation period of Proálcool concerned which raw material should be used in the production of alcohol, sugar cane or manioc. This will be analyzed below. Also, the question of the best use for alcohol, whether as a carburant or as a raw material for the chemical industry, was first raised. This latter question was to gain much importance during the initial period of the implementation phase of the PNA.

Price increase of sugar cane, sugar, and alcohol. Penetrating all these questions was the constant demand from the sugar producers and cane suppliers for an increase in the price of sugar cane, sugar, and alcohol. The producers generally stepped up pressure for increases after prices had been fixed, at what from their point of view were unsatisfactory levels, coinciding with the beginning of the annual crop which was in April for the Center-South region.

A major consequence of the price increase conceded in May 1974 for a ton of sugar cane (38.5% for the Center-South region and 35% for the North-Northeast region), and the resulting 30% increase in the price of a sack of sugar, was the decision to subsidize the consumer 25% of the retail price, which was financed from the IAA Special Export Fund. One year later, when the price of sugar was very low on the international market, the Fund was rather depleted. This fact considerably weakened the IAA as a political actor, at a time when it was disputing control over the PNA with other bureaucratic institutions.

The pressure to increase sugar prices was intensified when sugar prices were high on the international market. It should be recalled that the IAA exercised a monopoly over sugar exports, paying to producers prices based on their calculations of production costs for the sugar channeled to both the domestic and international markets. Whenever the international market was strong, producers pressed to break the IAA monopoly over sugar exports, frequently accusing the Government of "confiscating foreign trade" (confisco cambial). The euphoria phase of 1973-74 was no exception.[58]

The price of alcohol was quite a distinct matter. In fact, as already demonstrated, sugar and alcohol producers viewed the possibility of increasing anhydrous alcohol production for carburant use, above all, as a safety valve for the possible, although believed to be improbable, crises of excess sugar production. Because the production of anhydrous alcohol was not to divert raw material from sugar production, the producers demanded price parity between direct alcohol and sugar in order to stimulate investment in either autonomous[59] or annexed (COPERSUCAR)[60] distilleries. This question would become the object of attention of the Ministries involved in alcohol policy. Decree no. 75,996 of July 11, 1975 did establish price parity between

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[58] cf. RR, 10/28 - 11/3/74, "Açucarocratas".

[59] See ESP, 5/29/72, "CIP vai rever taxa de álcool"; RR, 6/3-9/74, "Esperando o CIP"; and JB, 10/30/74, "IAA aumentará preço de venda de cana-de-açúcar".

[60] In the above mentioned document prepared by COPERSUCAR and the Producers Syndicate of the Alcohol Industry of the State of São Paulo of September 1974, the average production cost per liter of direct alcohol in the distilleries annexed to the usinas associated with COPERSUCAR was calculated to be CR$ 1,463 at the harvest of 1974/75.

44 liters of anhydrous fuel alcohol and 60 kg of standard crystallized sugar, without distinguishing between direct or residual alcohol, or stipulating whether it was to be produced in autonomous or annexed distilleries. The producers would, however, continue to press for a more favorable sugar/alcohol price parity, as will be seen in Chapter 8.

6.3. Dispute over Control of the National Alcohol Program

In December 1973, with the new oil prices, the idea of a policy for using an alcohol-gasoline mixture was taken up once again in Brazil with the proposal from the Minister of Industry and Trade to expand the cultivation of sugar cane for the production of anhydrous alcohol. The reaction of those actors most directly linked to sugar interests revealed what was to become the principal question of the period: which form would the expansion of alcohol production take. Opposing positions on this issue would be defined from the beginning by the IAA and COPERSUCAR: while the IAA favored the expansion of alcohol production by means of autonomous distilleries in non-traditional sugar areas, COPERSUCAR advocated the utilization of idle capacity in existing distilleries annexed to the sugar usinas, as well as their expansion and modernization.[61]

In the Geisel administration (which assumed office in March 1974), the gestation period for the policy of carburant use of alcohol would be characterized by marked conflict among the bureaucratic agencies, involving principally the MIC, MME, IAA and PETROBRÁS, and, to a lesser extent, the CNP. Whereas the MME and PETROBRÁS acted independently, but generally along the same lines, the MIC and IAA, in spite of their administrative links, were often in opposite camps.[62] These conflicts were not very visible to the public eye during the first phase of the

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[61] See pp. 233-244.

[62] See footnote 23.

the gestation of the mixed carburant policy. The first public confrontation to occur was between the MIC and the IAA.

The First Movements:

The contribution of the private sector.[62a] Prompted by concern over the oil crisis and its adverse effects on the Brazilian economy, General Geisel, the coming President of Brazil, asked Shigeaki Ueki, the Minister-designate of Mines and Energy, to solicit private sector opinion on the subject. Ueki was acquainted with Lamartini Navarro Jr. and Luiz G. Bertelli, both of Ultragás (an enterprise manufacturing L.P.G.), who were to play prominent roles in the formulation and implementation of Proalcool.[62b] Associgás, the Association of Distribution Companies of Liquid Petroleum Gas, served as a forum for private sector discussion and study of the petroleum crisis. Zanini, the second most important manufacturer of equipment for sugar mills and alcohol distilleries, and a few usineiros, including Cícero J. Franco, who had experience in producing direct alcohol during the grave crisis of sugar overproduction in the mid-sixties, were called to join private sector efforts. In March 1974 the group released a document entitled "Fotossíntese como Fonte Energética" (Photosynthesis as an Energy Source), which proposed mixing alcohol with gasoline to reduce petroleum imports.

[62a] The information provided in this section is from interviews with Lamartini Navarro Jr., member of the National Energy Council (CNE) and owner of autonomous distilleries (São Paulo, 12/21/82), Luiz G. Bertelli, Director-Superintendent of SOPRAL (São Paulo, 12/20/82), Luiz L. Biagi, Vice-President of Zanini (São Paulo, 12/20/82), and Renato R. Barbosa, sugar and alcohol producer (São Paulo, 12/22/82). See also Menezes (1980) and Associgás (1974).

[62b] See below.

The document suggested two different programs for the production of the gasoline-alcohol mixture:

(i) expansion of alcohol production in the State of São Paulo, making use of the idle industrial capacity of the State's distilleries.

(ii) production of direct alcohol in autonomous distilleries.

It presented a detailed study of the agricultural and industrial investments needed to expand alcohol production in São Paulo, pointed out the importance of establishing price parity between sugar and alcohol in order to provide incentives for alcohol producers, and suggested a proportion of 25% alcohol in the mixture with gasoline.

It should be noted that the Associgás document combined the preferences of the IAA for autonomous distilleries and of COPERSUCAR for annexed distilleries with idle capacity in São Paulo. In May 1974, as noted, the IAA registered its position on the mixed carburant policy in Resolution no. 2081, which provoked strong reactions from COPERSUCAR.[62c] The Associgás document, which was forwarded formally to the President of the National Petroleum Council two months earlier, did not incur any noteworthy reactions from either the affected public or private actors. This document had the merit of being the first concrete proposal toward designing the National Alcohol Program, which was to be promulgated 20 months later.

[62c] See pp. 234-235 and 243-244.

The Ministry of Industry and Trade takes the lead. In early 1974, Geisel, now President of Brazil, asked the Minister for Mines and Energy, Shigeaki Ueki, and the Minister of Industry and Trade, Severo Gomes, to formulate a policy which would alleviate the adverse effects of the oil prices hikes on the economy. The two ministers prepared a document proposing a policy for a mixed carburant with 30% alcohol. Accepted by Geisel, the document was sent to the IAA for implementation. Tavares do Carmo, President of the IAA, was openly against the proportion of 30% alcohol, considering it technically and economically inviable. The IAA then formulated a competing document, "Política do Álcool Carburante" (Fuel Alcohol Policy) (July 1974), demonstrating the feasibility of a proportion of 10% to be obtained within a two year period, based on increasing the capacity of the autonomous distilleries. This document, together with a draft for a Decree-law to establish a comprehensive alcohol policy, was presented to Geisel by Tavares do Carmo at a meeting which was attended by Alysson Paulinelli, the Minister of Agriculture, as well as the Ministers of Industry and Trade and of Mines and Energy. Surprisingly, the IAA document won the immediate adherence of Ueki ("Better than I expected").[63]

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[63]Interview with Nicodemus de Andrade on 5/25/81.

The draft of the Decree-law proposed by the IAA called for the reestablishment of parity between the prices of sugar and alcohol destined for the carburant mixture (46 liters of direct anhydrous alcohol would equal a 60 kg sack of standard crystallized sugar) and protected the interests of sugar cane suppliers by stipulating a price differential for direct and residual alcohol produced in distilleries annexed to usinas. It did not give preference to establishing autonomous distilleries (as preferred by the IAA), but did assign to the Institute total control over the establishment and modernization of equipment of autonomous and annexed distilleries; the cultivation of cane should it be necessary; and utilizing the idle capacity of the annexed distilleries. It named the Bank of Brazil as the financial agent of the Program, but determined that all credit should be authorized by the IAA. It carried over the mechanism already in place to determine the purchase price of alcohol by the IAA from the producers and the invoicing to the distribution companies; the CNP would reimburse the IAA for the difference in price,[64] and a time limit was set for this reimbursement.[65] The draft decree also guaranteed that sugar cane would not be diverted away from sugar production towards anhydrous alcohol production. Finally, it stipulated that the norms for

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[64]Detailed analyses of the mechanisms for fixing the price and volume of anhydrous alcohol to be mixed, involving the IAA and the CNP, are provided in Volume I. See especially pp. 94-99 and 170-174.

[65]Here the IAA was trying to guarantee its reimbursement by the CNP, which was overdue, in order to be able to guarantee the alcohol producers a parity price with sugar, and avoid the problems raised by the CNP in the past (see Volume I, pp. 149-150).

the execution of the Decree-law be established by the Ministry of Finance, the Bank of Brazil, the National Petroleum Council, and the Sugar and Alcohol Institute. In other words, the draft of the Decree-law presented by the IAA strengthened its own hand in its contest to control alcohol policy, and guaranteed its policy preferences.

In October Severo Gomes presented another draft of a Decree for a mixed anhydrous alcohol-gasoline policy. It proposed a proportion of alcohol of between 10% and 25%, thereby backing down from its initial proposal of 30%. The MIC draft established price parity between sugar and alcohol which was more favorable to the producers (44 liters of anhydrous alcohol would equal a 60 kg sack of standard crystallized sugar), but did not differentiate between the prices of direct and residual alcohol. It accorded absolute priority to the expansion and establishment of annexed distilleries, authorizing the establishment or expansion of autonomous ones only in special cases. It broke with the traditional system for determining the price of anhydrous alcohol destined for carburant use involving the IAA and the CNP, recommending instead that the Council for Economic Development (CDE) supervise the plan for financing the sugar crop and alcohol and determine price parity between sugar and anhydrous fuel alcohol. The MIC draft decree also modified the traditional system of distributing anhydrous alcohol for mixture which involved the IAA, the gasoline distribution companies, and the CNP. The new draft made the CDE responsible for setting the quantity, the place, and the price at which IAA would sell anhydrous fuel alcohol to PETROBRÁS. The IAA was relegated to a secondary role, limited to monitoring the production and trade

of any type of alcohol intended for any use. In short, the MIC draft not only ran counter to the IAA preference for autonomous distilleries, but also would have resulted in a considerable weakening of the Institute's position in controlling alcohol policy, transferring to the CDE the authority which the IAA still held over the production and trade of anhydrous alcohol for use as a carburant.[66] It tried, moreover, to displace the traditional "partner" of the IAA on this subject, the CNP, in favor of PETROBRAS.

In November the IAA made known its appraisal of the MIC draft Decree in the memorandum SEAAI/GAB no. 457/74 of the director of the Special Anhydrous and Industrial Alcohol Service, Dr. Iedda Simões de Almeida, addressed to the President of the Institute. The Director of SEAAI praised the restructuring of alcohol production and trade, which would supply an important escape valve for the cane industry and allow the IAA to program adequately the Sugar Crop Plan. She stressed the importance of autonomous distilleries and IAA Resolution no. 2081/74 which awarded them priority. While she accepted the new responsibilities of the CDE, she also suggested a series of modifications in the draft Decree, especially to strengthen the IAA's role in alcohol policy. The most important of these were that IAA should fix the price of industrial alcohol; that once authorized by the MIC, new or recently expanded autonomous distilleries be guaranteed the same financing benefits as conceded to the annexed distilleries; that the monitoring function of the IAA over alcohol and molasses be detailed; and, that a guarantee be provided that outstanding CNP obligations to the IAA would be reimbursed by the date when the proposed decree would

enter into effect. The IAA thus tried, on the one hand, to consolidate its position (although a losing one) with respect to fuel alchol policy, and, on the other, to improve its extremely weakened standing in the MIC decree. However, the version of the draft proposed by the MIC which was promulgated in a Decree nine months later (Decree no. 75,966, July 11, 1975) would not incorporate any of the suggestions of the IAA.

At the same time, an MIC attempt to take over the leadership of the process of formulating the mixed carburant policy came to public attention. In July 1974 Severo Gomes met with the Ministers of Agriculture and Mines and Energy, and the President of the Institute of Sugar and Alcohol, at the Ministry of Industry and Trade. They decided to promote an expansion of the cane crop so as to enable an increase in anhydrous alcohol production for mixture with gasoline. The Ministers concluded that however high alcohol production might be, there would always be a domestic market. Furthermore, if there were to occur a fall in sugar exports, the cane which would have been used for this purpose could be redirected to produce anhydrous alcohol.[67]

One month earlier, General Araken de Oliveira, President of the CNP, had declared that in order to stimulte the alcohol industry enough to make a 10% alcohol-gasoline mixture viable, alcohol would have to be officially considered a fuel. This in turn would mean moving the cen-

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[66]The progressive weakening of the IAA over the preceding decades with respect to the sugar and alcohol policy should be recalled (see Volume I, pp. 180-184).

[67]cf. JB, 7/12/74, "Governo vai liberar cana para o álcool".

ter of decision-making for the production, distribution, and price of alcohol from the MIC/IAA to the MME/CNP.[68] In this light, the public pronouncement in the following month of the Ministers of Industry and Trade, Mines and Energy, and Agriculture, and the President of the Sugar and Alcohol Institute reaching minimum, if temporary, consensus, suggests an attempt to isolate the CNP and defeat its claim to greater control over the fuel alcohol policy.

The promulgation of Decree no. 75,966 on July 11, 1975, virtually unchanged from its MIC draft version of October 1974, but now signed by the Minister of Mines and Energy and of Agriculture as well as Severo Gomes, implies that the MIC consolidated its leadership over alcohol policy in this initial gestation phase of the National Alcohol Program. In the language proposed in this thesis, Decree no. 75,966 represented the climax of a "bargaining situation" in which the intensity of the "political vector force" of the MIC was greater than that of the other actors, allowing it to impose its direction on the "resultant" of this process, which was Decree no. 75,966.

President Geisel's visit to the Aerospace Technical Center (CTA). Between June and October 1975, the activity undertaken by President Geisel would be fundamental for the launching of the National Alcohol Program. As discussed above, the actions of a Brazilian president exercise a decisive influence on the outcome of a "bargaining situation." The preferences of the president take immediate precedence

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[68] cf. GM, 6/17/74, "Resolução do IAA fixará novos preços na base já prevista pelo CIP".

over those of all other actors. In symbolic language, the intensity of the "political vector force" representative of the actor "President of the Republic" is greater than that of any other actor. When he intervenes, the "resultant" of the forces at stake will frequently assume the "direction" of his policy preferences.

This being the case, great importance was attached to Geisel's visit to the Aerospace Technical Center in June signalling the President's awakening interest in the use of alcohol as a carburant. During his visit, Geisel "passed the door of the room where experiments were being conducted about the functioning of engines with alcohol. He became interested in the subject and stayed in there for two hours talking with the technicians."[69] According to the report of Dr. Urbano E. Stumpf, one of the engineers present on the occasion, the President "visited the Center for about 6 hours. The questions he asked me were far more critical than those of my interlocutors."[70]

Notwithstanding the fact that he was impressed by the information and projects under study, Geisel questioned the raw material used for alcohol production: given the excellent price of sugar on the international market, cane could not be diverted to alcohol production. The technical experts at the CTA pointed out various alternatives, including manioc, babassu, and other vegetables typical of the scrubland, and engaged in an exchange of ideas with the President about the advantages and difficulties of producing alcohol from manioc.[71] This was

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[69]See the statements by the Secretary for Industrial Technology during the Geisel Government, José Walter Bautista Vidal, at the round-table on new energy sources, sponsored by O Globo, and published on April 8, 1979 under the title "Israel Vargas defende civilização tropical para o Brasil baseada em recursos vegetais".

the first time that manioc was seriously considered as an alternative raw material for alcohol production.

According to Stumpf, the lively interest displayed by Geisel in the state of technology of alcohol-driven engines during his visit to the CTA would be decisive in launching a policy in favor of the carburant use of alcohol:

> I think that the information gained helped somehow. Two days later the President signed the decree giving parity /to the prices of sugar and alcohol/, which was the first step on behalf of alcohol.[72]

The decree cited was number 75,966, referred to above as the "resultant" in the inter-bureaucratic agency "bargaining situation", out of which the MIC seemed to emerge victorious. The importance of Geisel's action in the promulgation of this decree should not be underestimated, especially in light of the fact that the basic parameters for decision making were still unfavorable to the fuel alcohol policy. The international sugar market was seen to be very promising for Brazilian exports, and after the great leap between October 1973 and January 1974, oil prices remained relatively stable until 1975. The price of "Arabian Light" which in January 1974 was US$ 10.95 per barrel, rose

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[70]Report by Stumpf at the Third National Sugar Producers Meeting. See COPERFLU, 1975: 176.

[71]cf. ESP, 6/28/75, "CTA revela a Geisel pesquisa sobre alcool".

[72]Report by Stumpf at the Third National Sugar Producers Meeting. See COPERFLU, 1975: 176.

slightly to US$ 11.51 in June and then declined to US$ 10.83 and US$ 10.46 in October and November, respectively, where it remained until October 1975, when it returned to the price of US$ 11.51 per barrel (see Figure III and Table 9).[73]

The Industrial Technology Secretariat's (STI) alcohol program proposal: manioc as raw material. The idea of manioc as an alternative raw material for alcohol would gain credence from the STI study "O Etanol Como Combustível" (Ethanol as Fuel). This study, carried out over a period of 18 months between March 1974 and September 1975, relied on the technical experts at the Aerospace Technical Center for an analysis of the characteristics of ethanol as fuel and its performance in engines. A comprehensive program was proposed to consider the short and long run uses of ethyl alcohol as fuel. In the short term, suggested for further study was the progressive addition of ethanol to gasoline up to the technically recommended maximum and the simultaneous use of pure gasoline and diesel oil. In the long term, the use of pure ethanol, and of necessity the gradual changeover of all cars in the country, would be examined. In the introduction of pure alcohol as a carburant, both the adaptation of existing engines and the development of entirely new ones were suggested. The STI study recommended that manioc serve as the raw material for alcohol production in light of the strong performance of sugar, molasses, and in that year of residual alcohol itself, on the world market, and the fact that Brazilian manioc production was the

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[73] International Crude Oil and Product Prices, Beirut, Lebanon.

highest in the world. While productivity per hectare was low, manioc could be grown on land unsuitable for cane. The social implications of the use of manioc were "exceedingly important"; in allowing for the use of less fertile soil and in generating jobs, "progress will result from /cultivating/ the fuel which is abundant in the population centers of the interior" (p. 38).

The CTA, supported by the STI while directed by Bautista Vidal, took up the banner of the development of a special automobile engine for alcohol in the following years. The CTA and the STI became "allies" in the political game which ensued, adopting policy preferences reflecting a concern for the use and development of indigenous technology (for the production of ethyl alcohol derived from vegetables, especially manioc;[74] the adaptation of internal combustion engines to use alcohol as fuel; and even the development of a new engine) and for generating the financial resources required within the country. The stance of the two bodies can be summarized by one of the conditions deemed necessary for the successful use of ethyl alcohol as fuel contained in the Preface to the STI study about ethanol, signed by Bautista Vidal:

> /The/ existence of a society disposed to accept the challenge of a constant search for, and adoption of, autonomous solutions for its specific problems (pg. ii).

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[74] Whereas the technology for alcohol production from cane was well developed, and there were already firms capable of initiating production with 100% Brazilian machinery (STI, 1975: 24), the same cannot be said for manioc. At the time that the National Alcohol Program was established, all alcohol was produced from cane (although it had been produced from manioc in the past), and manioc was cultivated on a sub-

Speeding Up the Formulation of the National Alcohol Program:

The news of the next OPEC increase in oil prices would accelerate alcohol production in the shortest time possible. The preliminary criteria for a policy for the use of alcohol as a carburant and raw material for the chemical industry were discussed in a meeting at the Palácio do Planalto (the executive residence) held on the 13 of August of 1975 when the Ministers of Mines and Energy, Industry and Trade, Agriculture, and Planning met with the Chief of the Civil Cabinet, General Golbery do Couto e Silva. Because of the urgency attached to alcohol production, sugar cane was considered the most suitable raw material.[75] Four days later the Council for Economic Development (CDE) established a Work Group to outline the directives for an alcohol policy which

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74 (cont.)
sistence basis on small holdings. Therefore, it was necessary to develop distilleries to produce alcohol from manioc. The proposal for the first distillery, built by Petrobrás at Curvelo, Minas Gerais, was prepared by a small group from Belo Horizonte -- the "thorium group", who had been connected with the unsuccessful attempt to use thorium as a nuclear fuel and later moved to the INT/STI. The proposal was favorably appraised in economic and technical terms by the Industrial Development Institute (INDI) of Minas Gerais. The Curvelo project was to meet with considerable agricultural and industrial difficulties (see Chapter 7, pp. 340-341). According to the former "thorium group" at the INT/STI, however, it fulfilled the "political role of demonstrating that manioc produces alcohol, and the advantage of doing so entirely with Brazilian technology" (Symposium on the "Análise de Êxitos Brasileiros em P & D," sponsored by COPPE/UFRJ, December 3-5, 1979). At the same time, the firm SINOP managed to have its proposal to build a manioc distillery approved by the National Alcohol Commission, despite the norms of the National Institute of Industrial Propriety (INPI). The SINOP project was based on technology developed in the United States and Europe for alcohol production from cereals, and adapted by a German firm, NORDON. NORDON was the only firm in Brazil to specialize in manioc distilleries.

For a brief analysis of past experiments of producing alcohol from manioc, and the technology involved, see STI "O Etanol como

would govern its production and use as a carburant and raw material for the chemical and petrochemical industries. The aim was to replace petroleum as much as possible, and reduce domestic consumption of this commodity. Thus, increasing alcohol production had a "most urgently urgent" (urgência urgentissima) character, and this meeting recommended that not only sugar cane be used as raw material but also manioc and sweet potatoes. Comprised of representatives from the MIC, MME, MA and SEPLAN, the Work Group was to submit its recommendations directly to the Council for Economic Development for deliberation.[76]

In the discussions which followed within the Work Group, the question of which raw material was to be used to produce alcohol and every other important issue of this phase (whether priority should be accorded to annexed or autonomous distilleries; which proportion of alcohol to gasoline should be adopted for the carburant mixture; what price levels would stimulate producers and cane suppliers) was once again opened for debate, as if the slate had been wiped clean of all previous decisions, or "resultants" of the "bargaining situations".

Geisel's October speech directed at the problem of the balance of payments aggravated by the recent increase in oil prices by OPEC was delivered during the course of deliberations of the Work Group desig-

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74 (cont.)
Combustivel", pp. 33-35. For the technology of alcohol production from cane or amylaceous substances, see the same study by the STI and Avaliação Tecnológica do Álcool Etílico, 1978, by the National Research Council.

75 cf. ESP, 8/13/75, "Governo definará política do álcool".

76 See ESP, 8/18/75, "CDE articula os estudos para adicionar o álcool à gasolina".

nated by the CDE to formulate an alcohol policy. This speech formalized the idea of the National Alcohol Program, "approved by the Government", defined some questions and redefined others. The maximum proportion of alcohol in relation to gasoline was set at 20%; alcohol was to be used both as fuel and as raw material for the chemical industry; and financial stimuli for the additional planting of cane and the establishment of annexed and autonomous distilleries were to be provided, as were special programs to stimulate the production of alcohol from other sources, manioc and sweet potatoes.

Since Decree 75,966 of the 13th of July had clearly bolstered the production of alcohol from cane in annexed distilleries, it was to the satisfaction of the IAA that the question of annexed versus autonomous distilleries was reopened. Yet, while on the one hand the IAA-preferred autonomous distilleries were again under active consideration,[77] on the other, Geisel's speech called for the transfer of responsibility for the purchase of producers alcohol from the IAA to PETROBRÁS. The President endorsed the preference of the STI and INT for the use of amylaceous substances as raw material for alcohol, in addition to cane. It is noteworthy that the STI study, "O Etanol Como Combustível" (Ethanol as Fuel), which argued for the use of manioc as a raw

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[77]Although the MIC-IAA dispute over alcohol policy had been settled the previous year in favor of the former with the promulgation of Decree 75,966 favoring annexed distilleries, the IAA carried on with the implementation of its Resolution no. 2081 (5/13/75) which gave priority to autonomous ones. In September 1975 the Institute authorized the construction of 6 autonomous distilleries in non-sugar producing areas, so as not to affect sugar production (see ESP, 5/12/75, "Definida a fonte de recursos, surgem os projetos do álcool"). That is, the IAA did not accept defeat.

material, was completed in September and had recently made its way into the President's hands, where, reportedly, it was received with great interest. Thus, discussions within the Work Group would continue with the preferences of the President of the Republic as a point of reference.

The alcohol raw material issue. The question of which raw material would be used in alcohol production assumed importance at this stage. Developing behind the scenes of government was "a silent misunderstanding between those who support sugar cane and those who prefer manioc".[78] In favor of cane, of course, were the sugar producers and cane suppliers, as well as the IAA. The great champion of manioc was, as seen above, the STI, who enjoyed the backing of the CTA. The arguments for cane were its greater productivity, the potential use of its pulp in the energy supply of factories, excellent prospects for the mechanization of its production, a proven production techology for alcohol, and an already existing industrial complex (merely requiring expansion). The case for manioc was based on the benefits accruing from its use of less fertile soil, its cultivation on small holdings, and its more intensive use of the labor force, including the underemployed labor of the Northeast. The arguments against the adoption of manioc as a raw material for alcohol were the lack of agricultural experience with large manioc plantations and the need to develop industrial projects for alcohol production.

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[78] ESP, 9/19/75, "Em estudos um fundo do álcool".

These positions were brought before the Work Group, which was centrally concerned with the costs of production vis-a-vis the gains from sugar exports. Technical experts from the MIC reported on the conclusion of preliminary studies that cane alcohol would only be viable if sugar exports fell below 200 dollars per ton.[79] Some years later, Bautista Vidal, the Secretary of the STI during the Geisel administration, would testify about the consideration of manioc as raw material for alcohol:

> Launching a program of large dimensions, which could in the short run have depleted our main export /sugar/ would have been rash. So, the alternative of manioc arose...[80]

To settle all the issues before it would not be an easy task for the Group. Compounding the difficulties of choosing from among various alternatives based on their technical and economic merits were their political undertones originating in the competition among the bureaucratic agencies.

Defining the institutional framework. One of the objectives of the Work Group was to recommend to the CDE an institutional format for

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[79] See ESP, 9/19/75, "Em estudos, um fundo do álcool".

[80] Roundtable sponsored by O Globo on alternative energy sources, published under the title of "Israel Vargas defende civilização tropical para o Brasil baseada em recursos vegetais", on the 8th of April, 1979.

Also in the same year, Amaury dos Santos Fassy, adviser to the CDE and one of the authors of the Decree which established the National Alcohol Program, corroborated the statement by Bautista Vidal on manioc

the implementation of the National Alcohol Program. This meant, in reality, who was to control the Program. The dispute was principally among the MIC, the MME, the IAA and PETROBRÁS.

At the heart of the dispute was the control over resources. The IAA particularly would have received a great boost in its institutional strength and a way out of its present and anticipated grave financial problems. In fact, with the depletion of the resources of the Special Export Fund in the second half of 1975 as a result of the subsidy for the domestic price of sugar and the fall in its international price, the Institute feared it would lack resources even for the expansion of sugar production. The Alcohol Program's proposed resources, deriving from the difference in price paid by the IAA to the producer (in parity with sugar) and the price received from the sale of alcohol to the gasoline distributors (in parity with gasoline), under the control of the Institute would also ensure the expansion of sugar production. The MIC, on the other hand, proposed the creation of a special fund to finance alcohol production and subsidize its selling price when destined for carburant mixture or the chemical industry, which would be underwritten by a higher selling price for alcohol intended for other uses.[81]

On October 23 it was announced that the CNP and Petrobrás would

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80 (cont.)
as a raw material for alcohol production (see the interview published in the Jornal da Tarde on June 7, 1979, under the title "A solução é álcool. Mas porque essa decisão demorou tanto?"

[81] See ESP, 9/19/75, "Em estudos, um fundo do álcool".

administer and execute Proálcool "although some people prefer the IAA."[82] Five days later it was announced that the IAA would continue to execute the Program, though the question of which official body would be responsible for setting guidelines was to be decided at the meeting of the CDE on the following day.[83]

The disclosure of the PNA draft and its "test-balloon" role. The dispute for control over the PNA was inflamed when a copy of the draft of the decree establishing the National Alcohol Program fell into the hands of COPERSUCAR. COPERSUCAR leaked a copy on October 31 to the press. The publication of this draft corresponds, in the language suggested in this work, to an important "stop" in the formulation process of the National Alcohol Program. The draft itself symbolizes the "resultant" at that moment of the various "political forces" in confrontation.

The draft did not produce clear answers to the questions in debate (annexed versus autonomous distilleries, which percentage of alcohol to be used in the carburant mixture, the primary end use for alcohol - fuel or raw material for the chemical industry), instead generally accomodating all the proposed alternatives. To meet a goal of 3 billion liters of alcohol by 1980 for carburant, industrial, and commercial use, the draft proposed stimulating alcohol production from sugar cane or any other raw material (art. 2); expanding and modernizing

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[82] Cf. JB, 10/23/75, "CNP e Petrobrás executam o plano do álcool carburante".

[83] See ESP, 10/28/75, "Governo define diretrizes para o álcool carburante".

existing distilleries and installing both annexed and autonomous distilleries (art. 2); and setting the same parity prices between sugar and alcohol for carburant, industrial, or commercial use (44 liters of alcohol would equal 60 kg of standard crystallized sugar) (art. 7). This gave no advantage to fuel alcohol, and assured the supply to the chemical industry at a price not higher than 35% of the price for ethene fixed by the Government (art. 9, only paragraph).

The draft was quite clear in leaving the control of the PNA basically in the hands of the IAA. The Institute was to stimulate alcohol production and promote the modernization and expansion of the existing distilleries, as well as the installation of new ones (art. 2). Although a permanent Work Group was to be set up (composed of representatives of the IAA, the MME and MA, under the presidency of the General-Secretary of the MIC), to evalute projects for the modernization or installation of distilleries, interested parties were to direct plans for these projects to the IAA, which would "examine their viability, then forward them together with a definitive judgement to the Work Group" (art. 4). All alcohol distilleries using sugar cane or any other raw material were obliged to register with the IAA (art. 14). The PNA draft also granted the Institute a monopoly over the trade of all types of alcohol, intended for all uses, as well as of molasses, both on the domestic and foreign markets (arts. 6 and 12). The Financial Agent for the Program was to be, following tradition, the Bank of Brazil (art. 3). The Program's resources were to come from the difference between the price for alcohol paid by the IAA to producers and its selling price. The IAA was to sell fuel alcohol to PETROBRÁS at

a uniform price equal to the selling price of prime automobile gasoline (tipo A) at the distributors' tanks (art. 8). The eventual difference between the purchase and sale prices of all types of alcohol and molasses were to be covered by a portion of the tax on lubricants.[84]

Thus, the PNA draft would have strengthened considerably the IAA. This was surprising, not only because of the considerably weakened position with which the Institute began the 70s,[85] but also because of the way in which the first incidents of the gestation period of Pró-álcool developed.[86] The IAA was attempting not only to recuperate, but also to increase,[87] its control over alcohol policy.

The disclosure of the National Alcohol Program draft can be said to have played the role of a "test-balloon." Stated another way, although the Government bureaucracy was relatively permeable to the demands of the interest groups linked to the expansion of alcohol production, the PNA draft[88] was prepared essentially within the bureaucracy,

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[84]Another item of the Tax on lubricants and liquid and gaseous fuels (Imposto único sobre lubrificantes e combustíveis líquidos e gasosos) was created by Decree-Law no. 1420 of October 9, 1975, intended to "subsidize domestic energy sources, with the aim of reducing the country's economic dependence on foreign energy sources." This was to be administered by the National Petroleum Council" (art. 3).

[85]See Volume I, pp. 180-184.

[86]See pp. 255-266.

[87]Although the IAA controlled the distribution of alcohol of all types, at that time it exercised a monopoly over the trade of only anhydrous alcohol to be used as fuel.

[88]According to Lamartini Navarro Jr., an important private actor in this period, there were at least 4 different drafts of the decree to

with the purpose of smoothing out the differences among the government agencies directly involved in the formulation of the Alcohol Program. While it was not in their interest that the isolation of their policy arena be broken, once COPERSUCAR made public the PNA draft, ample consultations with interest groups could now take place. These interest groups voiced their demands to the press, directly to the Council for Economic Development (CDE),[89] or through informal mechanisms and personal contacts. The "consultation period" was to last some time; the decision-makers, incorporating some of their demands, would then produce the final draft for enactment by the President in the form of a Decree.

The use of this mechanism was in fact made explicit by a Senator's defence of the Alcohol Program in the Federal Senate. According to the Senator, the outline of the decree creating the National Alcohol Program was brought to the public's attention before being submitted to the CDE for approval in order to stimulate "the creative imagination of those people who want to cooperate in order to find a good solution".[90]

The publication of the PNA draft provoked an immediate reaction from interest groups linked to sugar and alcohol production. The disclosure of the draft by COPERSUCAR had, according to the President of

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88 (cont.)
create the National Alcohol Program (interview on 12/20/82, São Paulo, São Paulo). This is in itself an important indicator of the cleavages that existed inside the Government bureaucracy.

89 As for example, the drafts and proposals sent by COPERSUCAR and ABIQUIM.

the Cooperative, Jorge W. Atalla, the objective of protesting against:

> /The/ threat of consummation of state intervention in the sugar industry, by which the onus, sacrifices and risks of production fall on the shoulders of the producers, while the benefits and results of the trade of this production would accrue to the Government".[91]

COPERFLU and the Producers Syndicate of the Alcohol Industry of the State of São Paulo reacted in the same way to the IAA monopoly over all alcohol and molasses trade. Various editorials in the newspaper O Estado de São Paulo endorsed the protest from the producers and planters of the Center-South against the state control of the cane industry. All efforts were directed against article 6 of the draft:

> The Sugar and Alcohol Institute, within a time period of 30 days, will become the sole buyer and seller of molasses, anhydrous alcohol for carburant mixture and anhydrous and hydrated alcohol destined for industrial and commercial ends, produced in distilleries annexed to sugar mills or autonomous ones throughout the country.

The producers accepted the IAA monopoly over the trade of anhydrous alcohol for carburant use, which the Institute had enjoyed since its creation and maintained even with the progressive weakening of its decision-making power over alcohol policy (and that of sugar) from the 60s onwards. They did not, however, accept the extension of the mono-

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[90] Cf. OG, 11/6/75, "Produção e indicação para regiões pobres".

[91] Cf. JB, 11/1/75, "Projeto do álcool gera protestos no setor privado".

poly to industrial alcohol and molasses on the domestic or foreign markets. COPERSUCAR and the Producers Syndicate of the Alcohol Industry of the State of São Paulo proposed an alternative draft which omitted article 6 and replaced it with one that favored annexed distilleries, a longstanding preference of COPERSUCAR.[92-93]

The "state control" issue: bureaucratic agencies vs. interest groups. State intervention in the sugar industry was the major issue of this stage, involving especially COPERSUCAR and the MIC. The head of the Ministry of Industry and Trade clearly favored the presence of the State in the economy, a preference which he demonstrated consistently during his tenure in the Geisel Government. Accordingly, the MIC, defending state ownership and regulation, confronted COPERSUCAR, and developed a "bargaining situation" around this issue, which was to involve other actors as well. In spite of their differences, at this stage, the MIC acted in consonance with the IAA, given attempts to control the Program by the MME/PETROBRÁS (see below).

Four days after the protest against the IAA trade monopoly over all types of alcohol, and the recommendation by COPERSUCAR and the Producers Syndicate of the Alcohol Industry of the State of Sao Paulo to amend the PNA draft by omitting article 6, the Press Officer of the MIC released a statement explaining that the draft which had been leaked was without foundation. The draft expounding the new alcohol policy

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[92-93] See the text of the draft published in the Jornal do Brasil on 10/31/75 under the title "Os produtores sugerem mudanças".

sent to President Geisel, continued the MIC spokesman, did not stipulate an IAA monopoly over the purchase and sale of molasses and alcohol of all types. Rather, this monopoly was authorized only in the cases of anhydrous alcohol for carburant mixture and anhydrous and hydrous alcohol destined for the chemical industry. The IAA at that time already bought and sold anhydrous alcohol for carburant mixture; alcohol for the chemical industry would possibly come to be traded by the Institute. In other words, in a step backwards, the monopoly over all types of alcohol was foresaken, except for fuel alcohol, which was accepted by the producers, and alcohol for the chemical industry. The monopoly over this trade was justified by the need to guarantee raw material for the chemical industry. In support of this measure the MIC mobilized the Brazilian Association of Chemical Industries (ABIQUIM) (an umbrella organization for all the basic chemical industries) and the Syndicate of Industries of Chemical Products for Industrial Use. These entities sent a message endorsing the MIC proposal to Paulo V. Belotti, coordinator of the Work Group and General-Secretary of the Ministry of Industry and Trade.[94]

The reaction from COPERSUCAR was immediate. In a paid announcement taken out two days later in the O Estado de São Paulo signed by its President, Atalla, entitled "O Perigo da Estatização da Comercialização do Álcool" (The danger of state control over the alcohol trade), COPERSUCAR reiterated its opposition to the broadening of state control over the sugar-alcohol economy (including molasses). The cooperative's

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[94]Cf. OG, 11/4/75, "Ministério desmente o decreto divulgado".

resistance redoubled when a note was released by the MIC denying an intention to extend state control while in fact confirming it in authorizing, as an exception, a monopoly over the trade of alcohol to be used as a carburant and for the chemical industry. The COPERSUCAR statement read:

> That alcohol destined for the carburant mixture, for undeniably superior motives, will be - as it has always been - bought and sold by the Government is something which we have always respected. However, the measures referred to in the ministerial statement to be implemented by the National Alcohol Program prepare a whole scheme for more ample State intervention in the trade of anhydrous and hydrous alcohol intended for industrial use.[95]

On the same day that COPERSUCAR stepped up its protests against the extension of state control in the sugar and alcohol industry it once again restated its policy preferences. In a document entitled "Considerações Econômicas da COPERSUCAR sobre o Plano Nacional do Álcool" (COPERSUCAR Economic Considerations on the National Alcohol Program), published in several newspapers, the Cooperative affirmed that only by relying on annexed distilleries and on sugar cane as raw material for alcohol could the production goal of three billion liters of alcohol in 1980 be met. "At present, there is only one form of technology for alcohol production on a large scale: that which uses cane as the raw material."[96]

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[95] See ESP, 11/6/75, "O Perigo da Estatização da Comercialização do Álcool".

[96] See JT, 11/7/75, "Gasolina: petróleo + álcool (cana ou mandioca?). O Governo não vai aceitar pressões para decidir sobre o Programa Nacional do Álcool".

An immediate reaction to which raw material should be used for alcohol production was forthcoming from the CTA. In a strong pronouncement, Professor Urbano E. Stumpf used technical arguments in favor of manioc. However, the strong COPERSUCAR lobby incurred widespread irritation from the government bureaucracy over the issue of State control of the sugar industry. It was stated that the government would not be influenced by pressure groups in the elaboration of the National Alcohol Plan.[97] The Ministry of Mines and Energy criticized the opposition voiced by businessmen with sugar interests to the monopoly over the alcohol trade given that this proposal set forth by the government was an outgrowth of the incapacity of these same businessmen to take any initiative without government backing. Here, the government was granting the maximum support possible: to guarantee the purchase of all alcohol produced. The IAA, moreover, found it ironic that a cooperative which frequently had to be restrained from its expansionist tendencies would go on record opposing state control of the alcohol trade. It declared, with the support of the National Petroleum Council who based its arguments on national security considerations, that the monopoly over anhydrous fuel alcohol was irreversible.[98]

ABIQUIM and the Syndicate of Industries of Chemical Products for Industrial Use reiterated their support for the MIC intention to guarantee the supply of alcohol to the chemical industries declaring they

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[97] JT, 11/7/75, "Gasolina: petróleo + álcool (cana ou mandioca?)".

[98] Cf. ESP, 11/7/75, "O monopólio do álcool e irreversível".

did not see in this any special interest in state control.[99] The Federation of Agriculture of the State of São Paulo (FAESP), in a rather clear bargaining proposal, registered its support for state control in the sugar industry, as long as the cane suppliers were granted price incentives and credit.[100] That is to say, FAESP reasoned that the best way to win its demands for higher cane prices was to support the government's proposal for state control and bargain directly with it. In so doing, FAESP abandoned its traditional strategy of aligning with COPERSUCAR.

Bureaucratic agencies conflict over PNA control. While state control of the sugar industry was disputed between "public" and "private" actors, the competition over PNA control was intensified within the public sector. It is here suggested that the intense COPERSUCAR lobby against the monopoly of the alcohol trade precipitated this intra-bureaucratic wrangling. Although other bureaucratic agencies were involved, the COPERSUCAR lobby was directed principally against the IAA which was to exercise the monopoly over the alcohol trade. With the overturning of the draft legislation authorizing its control over the Program, the IAA was weakened in relation to other government bodies. Consequently, competition with PETROBRÁS was stirred up more than ever, centering on the question of control of the alcohol trade. Also, at the ministerial level, the Ministry of Industry and Trade, which suppor-

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[99] Cf. ESP, 11/7/75, "O monopólio do álcool e irreversível".

[100] Cf. ESP, 11/7/75, "O monopólio do álcool e irreversível".

ted the IAA, and the Ministry of Mines and Energy, which backed Petrobras, intensively disputed the control of a new energy source.

On the 5th of November a meeting of the CDE was held to define the National Alcohol Program. After three and a half hours, this meeting did not produce even a minimum consensus about various controversial issues. Another meeting was convoked three days later at the Granja do Riacho Fundo, the summer residence of the President of the Republic.

In the meantime, an alternative proposal was put forward by the Minister of Mines and Energy, Shigeaki Ueki, authorizing total control of the alcohol trade to PETROBRAS, as this institution was better able to buy all alcohol produced in the country, mix it with gasoline in the fixed proportion, and distribute it, all without creating new state institutional capacity. The MIC presented a counter-proposal, in which control of the fuel alcohol trade would remain with PETROBRAS, and the monopoly of the alcohol trade for the chemical industry with the IAA. The second part of the MIC proposal was endorsed by the majority of firms in the chemical sector and by ABIQUIM, and the first half received the support of the automobile industry. The car manufacturers believed that PETROBRAS was in the best position to guarantee the uniformity of the mixture, long the object of their concern.[101]

The meeting of the CDE, presided over by Geisel at his summer residence, was held on Saturday November 8 and lasted four and a half hours.

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[101]Cf. JT, 11/6/75, "O Plano do Álcool ficou para sábado"; ESP, 11/6/75, "CDE adia novamente definição sobre álcool"; JT, 11/7/75, "Gasolina: petróleo + álcool (cana ou mandioca?)".

Participating were the Ministers of Industry and Trade, Mines and Energy, Agriculture, Interior Affairs, Finance, and the Acting Minister of Planning. The MIC and MME were intransigent in their positions. Finally, Geisel accepted the suggestion of the Acting Minister of Planning and decided to create a permanent Interministerial Commission, the National Alcohol Commission (CNAl), to coordinate the Program. The CNAl was comprised of representatives from the Ministries of Finance, Agriculture, Industry and Trade, Mines and Energy, Interior Affairs, and Planning, and chaired by the General-Secretary of the MIC.[102]

The conflict among the second echelon of the bureaucracy was won by the CNP. It regained and even extended its previous control over the fuel alcohol policy to now include alcohol for the chemical industry. Petrobrás remained, as before, merely linked to distribution. The IAA emerged rather weakened (see below).

With respect to the monopoly over the alcohol trade, the Government opted to assign to the CNP the function of guaranteeing price parity between sugar and alcohol, destined both for mixture with gasoline and the chemical industry. The producers could, however, sell their goods freely, for whatever price they wished. The decision not to adopt state control over the alcohol trade was applauded by COPERSUCAR in a paid advertisement in the O Estado de São Paulo three days after the CDE meeting at the Granja do Riacho Fundo, entitled "Um grandioso

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[102]Cf. ESP, 11/8/75, "Geisel convoca Ministros para a decisão do álcool"; ESP, 11/9/75, "CNP garantirá compra e preço do álcool anidro"; Fassy, 1981, 3, 4 and JT, interview with Amaury dos Santos Fassy, assessor of the CDE, published on 6/7/79 under the title "A solução é o álcool. Mas por que essa decisão demorou tanto?"

compromisso com o Governo e o Pais" (A magnificent settlement between the Government and the Country). Public praise was also heard from producers of other regions, such as Pernambuco, through their Cooperative of Sugar and Alcohol Producers.[103] However, as one observer commented upon the "wisdom of Solomon" with which the Government resolved the question: the Government would not formally monopolize the purchase of alcohol, but the price it would pay would make it in effect a buyer with no competition.[104]

With the decree ready and reportedly already signed by Geisel, its promulgation was further delayed by a final attempt by the IAA to block its drastic institutional weakening. Based on the existing legislation, the Sugar and Alcohol Institute did not accept sharing its responsibilities with the National Alcohol Commission: it contended all facets of sugar and alcohol should remain under its control.[105] Despite IAA protests, however, Decree no. 76,593, which created the National Alcohol Program, was promulgated on the 14th of November, 1975, in a form unaltered from the text agreed upon at the meeting at the Granja do Riacho Fundo.

Indifferent to the arguments presented in the debates of the important issues which took place during the gestation period of the Program, Decree 76,593, like the draft that preceded it, accomodated equally

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[103]Cf. ESP, 11/13/75, "Disputa atrasa a divulgação do texto do álcool".

[104]See Veja, 11/19/75, "O plano, afinal".

[105]Cf. ESP, 11/13/75, "Disputa atrasa a divulgação do texto do álcool".

all the alternatives under discussion: the raw material for alcohol production would be sugar cane, manioc, or some other commodity (art. 2); the expansion and modernization of existing distilleries, and the installation of new annexed or autonomous distilleries, were equally written into the law; and price parity was guaranteed on the same basis (44 liters of alcohol per 60 kg. of standard crystallized sugar stowed mill or distillery) for all types. The Decree contained no reference to the proportion of alcohol in the mixture, and dropped an earlier reference to a production goal.

As noted, the control of the Program in the final decree differed substantially from the draft version. Article 6 of the PNA draft which had conferred upon the IAA the monopoly over the marketing of all types of alcohol for all uses was deleted. In Decree no. 76,593, the principal responsibility of the IAA was to process the proposals for financing the modernization, expansion, and installation of distilleries, and forward its technial appraisal of these proposals to the National Alcohol Commission for final approval (art. 4). Other responsibilities of the Institute were: to establish parity prices for alcohol for uses other than as a carburant or raw material for the chemical industry (art. 6); to fix the price of molasses and to export or authorize the export of molasses and alcohol of any type or grade (art. 10); to determine the technical specifications for molasses and alcohol of any type or from any source (art. 11); and to register all distilleries of alcohol of any type or from any source (art. 12).

To the National Alcohol Commission was transferred the authority to:

a) define the role to be played by those bodies directly or indirectly involved with the Program, with a view toward expanding alcohol production.

b) define the criteria for the location of new distilleries, taking into consideration:

i) the desire to reduce disparities in regional income;

ii) the availability of the production factors for the agricultural and industrial activities;

iii) transport costs;

iv) the need to expand the nearest production unit and not compete with it for raw materials.

c) establish annually a program for the various types of alcohol, specifying their use.

d) determine the suitability of the proposals for modernization, expansion, and installation of alcohol distilleries for fulfilling the objectives of the Program" (Single paragraph, art. 3).

Prior to the PNA, although in a disadvantageous position, the IAA shared control over the mixed carburant policy with the CNP. The Institute administered the production side -- buying alcohol from the producers and guaranteeing price parity for them wherever possible -- while the Council oversaw distribution -- determining, although "in common agreement" with the IAA, the selling price and the volume of alcohol to be mixed.[106] Decree 76,593 rescinded this responsibility of the IAA, conferring it all upon the CNP. In other words, this body, as well as guaranteeing price parity for alcohol for carburant use (and

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[106]See Volume I, pp. 94-99 and 170-174.

for the chemical industry) (art. 6) would also establish a program for the distribution of anhydrous alcohol among the oil distributors, who in turn would receive the commodity at a price set by the CNP (art. 7).

In the first Resolution of the National Alcohol Commission, passed on December 27, 1975, the Institute of Sugar and Alcohol was named as its Executive-Secretariat. The IAA was to follow up the Commission activities and provide all information necessary for the proper working of this body. As noted, the IAA also was to furnish the Commission with technical appraisals of the proposals for expansion of existing or construction of new distilleries of sugar cane alcohol. Thus, although with no power to formulate guidelines for the PNA, the IAA was nonetheless to occupy a definite place in alcohol policy implementation, assured by the technical knowledge of the sugar and alcohol industry it had accumulated during its four decades of existence. Neither the National Alcohol Commission (CNAl) nor its future replacement, the National Executive Alcohol Commission (CENAL), could dispense with it.[107]

Aspects concerning the financing of the Program, including the sources of funding and terms of credit, were to be defined by the National Monetary Council (art. 5). The initial terms of credit, later revised, were as follows:

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[107] Interviews with actors linked to alcohol production acknowledge this fact, which can be summarized in the following statement by a COPERSUCAR official: "CENAL without the IAA is nothing". (Interviews with Julio M. Borges, Technical Manager of COPERSUCAR, on 12/20/82, São Paulo; with Luiz L. Biagi, Vice-President of Zanini S.A. Equipamentos Pesados, on 12/20/82, São Paulo; with Lamartini Navarro Jr., an autonomous distillery alcohol producer, on 12/21/82, São Paulo; and with Celso A.O. Mendes, Economic Adviser, COPERFLU, on 4/12/83, Rio de Janeiro).

I) Annexed or autonomous distilleries:

Interest: 17% per year; a possible 15% per year for the North and Northeast.

Maximum Term: 12 years, with a grace period of 3 years.

II) Sugar cane and other raw materials:

Interest: 7% per year;

Maximum Term: 5 years, with a grace period of 2 years. (Art. 5, paragraph 2)

Taking into consideration that inflation rates were around 30% in 1974 and 1975 (see Table 5), one can appreciate the substantial credit subsidy which the Government granted to the National Alcohol Program in this initial phase.

Another important change in the final PNA Decree was in its exposition of motives, signed by the Ministers of Finance, Agriculture, Industry and Trade, Mines and Energy, Interior Affairs, and Planning, which added to the Program's economic objectives various social goals as well. According to the exposition of motives, the PNA was to contribute significantly to:

I) saving foreign exchange, which is one of its principal objectives, by means of replacing petroleum imports at present used by our highway fleet and as the raw material for the chemical industry;

II) reduction in regional income inequalities, given that the whole country - including the low-income regions - is able to produce the raw materials, especially manioc, in sufficient quantities;

III) reduction in individual income inequalities, by having its greatest impact on the agricultural sector, and, within agriculture, on crops that are highly labor intensive;

IV) growth of domestic income, by utilizing idle factors of production - principally the soil and the work force - considering that crop location could be oriented to wherever such factors were readily available.

V) expansion of the production of capital goods, by means of the growing placement of orders for equipment, with a high degree of national production destined for the expansion, modernization, and installation of distilleries.

The possibility of the PNA having redistributive effects on domestic income was a hope raised, and constantly enjoined by the critics of the Program.[108] However, as will be seen below, a serious attempt to fulfill the social objectives of the Program was never made.[108a]

Summing Up:

On formally closing the formulation phase of the National Alcohol Program with the promulgation of the Decree which created it, no. 76,593, on the 14th of November, 1975:

1. Some mechanisms to stimulate the producers had already been defined, such as price parity between sugar and alcohol, and highly subsidized credit.

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[108] See, for example, the various statements from José Gomes da Silva and the studies by Fernando Homem de Melo.

[108a] Although the STI and the Ministry of Agriculture were concerned with the distribution of income, and accordingly advocated the concentration of resources in poorer regions, the use of unconventional raw materials (especially manioc), and small distilleries, the Program was soon defined as an economic program, with economic objectives (See pp. 354-355).

2. No definition of the best proportion of alcohol in the mixture had been arrived upon, nor had a priority been given to any one type of distillery or raw material,[108b] but it was established that the expansion of alcohol production would aim principally at the mixture with gasoline and the substitution of the raw material for the chemical industry.

3. The sources of funding for the Program and a system for regulating its general financial aspects were still to be defined.

4. The institutional system set up to implement the Program had undergone a high degree of fragmentation of decision making power:

   -- the IAA, rather weakened, assumed a secondary role in the control of the policy for fuel alcohol and alcohol as raw material for the chemical industry, based on which the Program had been set up; the technical knowledge it had accumulated about sugar cane alcohol since its creation in 1933 was, however, to assure it a rather important position in the implementation of the Program.

   -- the CNP assumed control over the pricing and distribution of alcohol for fuel and as raw material for the chemical industry.

   -- decisions in the formulation of the Program were relegated to the National Alcohol Commission, a board made up of representatives of various Ministries;

   -- the National Monetary Council and the Central Bank held the power of decision over the financial aspects of the Program.

[108b] Those issues were to be decided in the years which followed (see Chapter 7).

If it can be said that the Economic Development Council was the locus of decision-making during the formulation phase of the PNA -- the arena for the inter-bureaucratic disputes and the point where the demands of the interest groups converged -- it is not possible to identify a decision-making center during the implementation phase of the Program. As noted, before the PNA, the decision-making for fuel alcohol policy was shared by two bodies: the IAA and the CNP. Although the real decision-making power resided with the CNP, the IAA acted as the representative of the interests of the producers and suppliers vis-a-vis the Council, and, except in rare occasions, they would channel their demands to the Institute. With the institutional system set up to implement the PNA, the producers and suppliers did not know to where they should direct their demands. The Association of Cane Suppliers of Pernambuco expressed this dilemma when declaring that the participation of the suppliers was not defined in the National Alcohol Program, and that no one knew to whom to go to ask for such a definition.[109] The usineiros from the state of Rio de Janeiro also lamented the removal of the IAA - "a body in which was concentrated all government experience about the sugar and alcohol sector" - from the principal decisions of the alcohol policy, fearing that this could lead to delays in the implementation of the Program.[110] Even the powerful COPERSUCAR, which having established direct access to the upper circles of decision

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[109]Cf. JB, 12/15/75, "Comissão do álcool faz 1ª reunião".

[110]See JB, 12/18/75, "Usineiros temem pelo afastamento do IAA".

making in the country dispensed with and often opposed the Institute, would voice some years later, through its President, Jorge W. Atalla, dissatisfaction with the lack of channels of communication and the lack of a clear decision-making center.

This lack of a decision-making center for the alcohol policy, and the ambiguity of the objectives of the PNA would be a cause of important delays in the implementation of phase one of the Program, the central theme of the following period.

CHAPTER 7:

The Implementation Process: Regulation and Ambiguity (November 1975 - December 1978)

The mixed alcohol-gasoline phase of the National Alcohol Program formally began with the promulgation of Decree no. 76,593 (11/14/75), which established the Program, and ended with the beginning of the gestation of the second phase (cars powered exclusively by alcohol). December 1978, when the Minister of Industry and Trade publicly called upon the automobile industry to cooperate with the government in implementing phase two of the PNA, is taken to be the analytical division between the two phases of the Program. Although the PNA's phase one production goal of 3 billion liters of alcohol in 1980, which would guarantee a proportion of 20% alcohol in the gasoline-alcohol mixture, was announced in 1977 and actually realized, it was not until January of 1983 that this proportion was reached uniformly in all national territory. Also some important problems and issues of phase one still remained unresolved.[1] Nonetheless, in the overlap between the closing of one phase and the beginning of the next, emphasis was placed on formulating the second phase of the Program.

This chapter will deal, in the first section, with changing circumstances in both the international oil and sugar markets. During the period under study, the oil market would pass through a relatively stable phase. The prevalent outlook among the Brazilian decision-makers

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[1] See chapter 8, pp. 381-437.

at the time was to adjust the economy to the effects of the higher, but relatively stable, oil prices. However, this process of adjustment did not encompass an accompanying adaptation of the country's energy supply, heavily dependent on oil imports, to the new prices of the product. The National Alcohol Program, created to substitute alcohol for a portion of the gasoline consumed, seemed then condemned, at best, to proceed at a slow pace, and, at worst, to come to a complete standstill. However, the 1980 alcohol production goal was met with no difficulty. The changing situation of the international sugar market was to provide the main stimulus to alcohol production during this period. In fact, the euphoria which had marked the climate in the sugar sector when prices were escalating rapidly on the international market from the end of 1973 until the end of 1974, and even two years later, when sugar policy-makers still believed that the market would stabilize at high price levels, then dissipated. The market conditions for sugar became very bleak, with very low prices and sugar stocks piling up at alarming levels. At that time alcohol production received a great boost, as this product served as a safety valve for the sugar industry.

The oil and sugar market situations would combine to influence the actors' motivations and preferences concerning the National Alcohol Program. Section two of this chapter will analyze the implementation of the PNA as shaped by the above-mentioned parameters of decision. It was a phase of regulation and ambiguity -- regulation of both general and unforeseen aspects of the Program which surfaced as it evolved, and ambiguity of various PNA objectives as defined by different actors, and even sheer opposition to the Program. This ambiguity can be attributed

to the counteracting influences on fuel policy exerted by the international oil and sugar market situations, as well as to the different positions occupied by the various bureaucratic agencies within the state apparatus. The fragmentation of the decision-making system for alcohol policy, a consequence of the intense inter-bureaucratic wrangling to control the PNA, was also an important characteristic of this period. These together greatly, though not entirely, explain the cause of delay in the implementation of the Program. This delay was the object of numerous complaints from private actors interested in the Alcohol Program (sugar and alcohol producers, sugar cane suppliers, distillery equipment manufacturers) throughout this period. The causes of Program delays and other important issues of this phase will also be analyzed in section two.

7.1. Parameters of Decision[2]

The three years which followed the creation of the National Alcohol Program coincided with a relatively stable period on the international oil market. For the first time since the Second World War the exponential growth of oil consumption was interrupted. This can be explained by the policy of economic recession adopted by many industrialized oil-importing countries in order to adjust to the macro-economic effects of the first oil shock, by the effects of the first efforts to find substitutes for petroleum products, and conservation measures. On the supply side, OPEC production would tally with the needs of the major oil consuming countries. Thus, "all the players appeared satisfied" (Choucri, 1982a: 30), although growing production from the North Sea and Alaskan fields (economical at about 12 or 13 dollars a barrel), as well as the Mexican fields, signalled an impending, short-term oil surplus on the world market. During this period the official selling price of "Arabian Light" (the posted price of which had almost quadrupled between October 1973 and January 1974) rose a modest 9.4%, from US$ 11.51 per barrel in October 1975 to US$ 12.70 in July 1977, and remained stable during 1978, as it had in 1976.[3]

Adjusting to the First Oil Shock: "The Worst is Over"

In Brazil, whereas domestic oil production declined as a result of the exhaustion of the wells of the Recôncavo Bahiano, total consumption of

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[2]Unless otherwise specified, this part of the work was written based on information from various articles in Negócios em Exame, Planejamento e Desenvolvimento, Indústria e Desenvolvimento, Visão, Brasil Açucareiro,

petroleum products underwent only a slight decrease in the rate of expansion, despite measures adopted to rationalize fuel consumption beginning in 1977,[4] and the policy of increasing gasoline prices implemented shortly after the first oil shock.[4a] To be sure, gasoline was the only petroleum product to undergo a significant reduction in its rate of growth during this period: almost nil in 1975 and 1976, and negative in 1977, after an average rate of growth of about 13% in the early

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2 (cont.)
La Industria Azucarera, Inazucar, Agricultura Hoje, Saccharum, Agroanalysis, and Petróleo e Petroquimica, published between 1976 and 1978.

[3]See Table 9.

[4]At the end of 1976, with frustrating results in the balance of trade (see text below), and the expectation of another increase in oil prices in January 1977, the Government decided on a series of measures to reduce the consumption of petroleum products in the country. After an almost semantic discussion about "rationing" or "rationalizing" the consumption of these products which divided the Ministers with jurisdiction over economic affairs and mobilized entrepreneurs in general but especially those with interests in the transport sector, it was decided to implement the "Program for the Rationalization of the Use of Fuels." Thus, in January, 1977, a series of measures within the purview of the CDE were passed in the form of decrees, decree-laws, and resolutions of the President of the Republic. The Executive Group for the Rationalization of the Use of Fuels (GERAC) was created in order to coordinate the implementation of the Program. The measures included: a substantial increase in the use of public transportation, at the same time trying to reduce the use of automobiles in city centers (by considerably reducing parking spaces); a reduction of 10% in the consumption of fuels by the Ministries; sanctions for unregulated truck and bus engines; closing gas stations at night, on weekends, and on holidays; introducing staggered work shifts in industry, commerce, banks and public offices; a 50% increase in the tolls for cars on weekends; and incentives to substitute coal or other fuels for fuel oil in sectors which used that product extensively.

The greatest repercussions were felt because of the so-called "simonetas" (after Simonsen, the Minister of Planning), which represented a levy on the consumers of 50% of the final selling price of automobile gasoline, diesel oil, and fuel oil, to be reimbursed after two years with no interest or adjustment for inflation. This measure provoked a unanimous protest from both consumers and businessmen, especially the automobile industry.

70's. It recovered somewhat in the following two years only to drop sharply with the second oil shock. The growth in consumption of diesel and fuel oil would, in this phase, continue at rates basically unchanged from those of the period prior to 1973, with the (subsidized) prices of these products being maintained practically constant in real terms. Given the relative inflexibility of the refining structure,[5] the reduction in crude imports would be slight and irregular between 1973 and 1977, even returning to pre-1972 levels between 1977 and 1979. It was only from 1979, after the second oil shock, that the decrease was really felt.[5a]

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4 (cont.)
The manufacturers, who through their principal spokesman, ANFAVEA President Mario Garnero, exerted the greatest pressure against this tax, can be credited with the scrapping of this measure (cf. "Vitória da ANFAVEA" RR, 3/14 to 20/77).

This was not, however, the only measure of the Program of Rationalization of the Use of Fuels not to be implemented. The substitution of coal and other fuels for fuel oil, for example, only began in 1979 with the memorandum of intent signed between the Ministry of Industry and Trade and the cement industry. In fact, only one measure was really put into effect: the closing of gas stations on weekends and holidays.

(See Geisel's speech at the ministerial meeting of the 13th of January 1977 proposing the Program for the Rationalization of the Use of Fuels. See also the statements of intent, drafts of decrees, decree-laws, and resolutions pertinent to this subject passed at various meetings of the CDE between the 13th and 19th of January, 1977, and in general the sources cited in footnote no. 2 and various articles in the Jornal do Brasil, O Estado de São Paulo, and Gazeta Mercantil between December 1976 and March 1977.)

[4a] See Table 17.

[5] Only in mid-1978, when more than 1 million cubic meters of gasoline were exported (equal to about 7% of total consumption for that year), was the question of the flexibility of Petrobras' refining structure given more attention. The National Petroleum Council, through its President Oziel de Almeida, reported that Petrobras would change the system of cracking petroleum in its refineries so as to produce less

The relative lack of concern with which the decision-makers viewed the modest decrease in the growth of consumption of petroleum products in the country at a time when national oil production was declining would reflect the above-mentioned relative stability of the international oil market. Furthermore, the hope of attaining self-sufficiency in oil was buoyed with the new discoveries in the Campos basin (Namorado and Badejo wells), and good off-shore prospects in Espírito Santo and Santos. To be sure, these expectations were scaled down from the exaggerated optimism unleashed by the discovery of the Garoupa well at the end of 1974.[6] In any event, the risk contracts[7] and the expanded exploration and development of petroleum[8]

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5 (cont.)
gasoline and more heavy products. (See "Maior oferta de álcool carburante leva Petrobrás a produzir menos gasolina", JB, 6/19/78). This change, taking place slowly over the years, would be consolidated with the "Bottom of the Barrel Program" (Programa Fundo de Barril) adopted in mid-1981 (see Tables 7, 8, and 10).

[5a] See Tables 11, 13, 16 and Figures IV, VI.

[6] See p. 220.

[7] Contrary to expectations, during the period in question few International Oil Companies entered into negotiations for risk contracts. The terms of the contracts were considered too severe by these companies as many areas offered for exploration were deemed to be areas of great risk, that is, with only remote possibilities for success. The decision to open tracts of Brazilian territory for exploration by foreign companies was, as already stated, rather controversial, with strong opposition surfacing from within Petrobrás itself. The pressure from these companies for more favorable contract terms would generate an internal debate within Petrobras. But, from 1977 on, these conditions would be made easier. Among the concessions granted to the Companies were: (1) the right to buy a part of the oil they discovered, that is, payment to these Companies would be made in oil and not in currency as initially proposed by Petrobrás; (2) the offer of a larger number of areas for risk contracts and the expansion of these areas; and (3) a reduction in the charge for geological information about the areas subject to negotiation. At the end of 1979, the President passed a proposal from the Minister of Mines and Energy to make the contracts

were to produce a significant increase in the volume of domestic crude oil in the not very distant future.[9]

Thus, it could be claimed that, at this stage, the problem created by the oil crisis appeared to the Brazilian rulers to be less that of adapting the structure of the country's energy supply to the high prices of crude oil than of absorbing the effects of the first oil shock. In fact, in spite of the frequent statements from the President and the Ministers of economic affairs that a decrease in the proportion of oil in primary energy consumption was needed, this change would occur only after the second oil shock (see Table 1). In other words, it appeared to the decision-makers that the "worst had passed", leaving the (difficult) task of adjusting the economy to what would be a new level in oil prices on the international market. This interpretation is supported by Geisel's statement at the end of 1977:

> The recent decision of the oil producing countries to freeze prices in the first half of 1978 gives us the calm of a truce. But we have to be aware that we live in a far more difficult world than that of five years ago.[10]

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7 (cont.)
with a risk clause more attractive. Despite opposition from within Petrobrás, it was decided to make all sedimentary basins available for exploration by private firms and allow these to take part in the production of oil if economically viable fields were discovered. (See Petrobrás Reports and various articles of Negócios em Exame, Planejamento e Desenvolvimento and Relatório Reservado for the period under study. See also Chapter 8, pp. 364-365).

[8]The investment in oil exploration and development, after a period of relative neglect from the late 60's to the early 70's when the price of a barrel of oil was about US$ 2.00, accelerated beginning in 1973. While investments were US$ 186.1 million in 1973, by 1978 they had more

The economic policy of the Geisel Administration had as its fundamental objectives the lowering of the rate of inflation and improving the balance of payments, profoundly upset by the sudden rise in oil prices in 1973/74. Although the Geisel Government could no longer achieve the 10% growth rates of 1968-1973, it remained committed to redressing these economic difficulties while maintaining reasonable rates of growth (around 5% or 6%).[11] The idea of controlling inflation without provoking recession -- a policy pursued by a great number of industrial, oil-importing countries, would divide the Geisel Government. Debate continued within the Figueiredo Government on this economic strategy.[11a] In the period in question, however, whereas it was possible to slow down the economy after 1977,[12] inflation, which in these years reached the 40% mark (see table 5), could not be brought under control.

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8 (cont.)
than quadripuled, rising to US$850.9 million. In that year, investment in exploration and development made up almost 50% of the total investments of Petrobrás (see Petrobrás Reports).

[9]The Balanço Energético Nacional (BEN) for 1977 forecast, for example, that petroleum production would almost triple between 1976 and 1981, with a reasonable chance of attaining self-sufficiency by 1986. In fact, growth in production between these years fell below 30% (9,702 thousand m^3 in 1976 and 12,384 thousand m^3 in 1981) (see BEN, 1977 and BEN, 1981).

[10]Speech by President Geisel at the end of 1977, reprinted in Planejamento e Desenvolvimento, no. 56, year 5 (January 1978): 4-5.

[11]The BEN for 1976 and 1977, however, took an 8% average annual growth of the GDP as the basis for the projection of the country's energy consumption, explicitly revealing the expectation that "after a short period of recuperation, the economy will once again expand at a high rate" (BEN, 1976: 11). Yet, already by 1978, the BEN was based on the lower average growth rate of 7%.

[11a]It was only in 1981 that the Figueiredo Government adopted a clear policy of curbing inflation at the cost of incurring an economic recession. In 1981, the GDP experienced a negative rate of growth (-1.9%). Inflation, however, could not be controlled, surpassing the 200% mark in 1982.

Efforts to ameliorate the balance of payments centered on reducing the deficit in the balance of trade by curbing imports (especially basic inputs and capital goods), and by stimulating exports. When 1976 closed with a larger deficit than expected in the balance of trade (US$ 2,255), the program to rationalize the consumption of liquid fuels, especially gasoline, was launched. This program, as has been seen, scored modest results in reducing crude oil imports. All in all, in 1977, the trade balance showed a slight surplus (US$ 95 million), an impressive result when compared with those of previous years. In 1978, however, a deficit once again appeared (US$ 1,024 million), which was caused by an inability to further reduce imports and a corresponding decrease in exports. The soy bean harvest had failed, and there occurred a substantial fall in coffee production due to adverse climatic conditions and pests. Nonetheless, this deficit compared favorably with those of 1974, 1975, and 1976.[13]

The recuperation of the balance of payments was remarkable. Showing positive results since 1976, in 1978 the figures were truly impressive: a surplus of US$ 4,262 million (see Table 4). The improvement in the payments position, however, was only possible at the cost of incurring further indebtedness (compare Tables 4 and 7). The high level of liquidity on the international money market resulting from both the slow recovery of the economies of the oil-importing

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[12]The rates of growth were 5.4% and 4.8% respectively for 1977 and 1978 (see Table 6).

[13]Exports were at satisfactory levels from the first years of the oil crisis, growing at an annual average of 18% between 1976 and 1981.

industrialized nations and the surplus on the current accounts (and the need to recycle that surplus) of the oil-exporting nations can explain the abundant resources available for lending. The great ease with which foreign capital was channeled to Brazil, however, was related to characteristics of the country's political system which made it creditworthy in the eyes of lenders.[14] The net debt in 1973 corresponded to US$ 6,156 million (FOB) and could be covered with the receipts of one year's exports. In 1977, the net debt rose to US$ 24,781 million (FOB) and reached US$ 31,616 million (FOB) in 1978, equivalent to, respectively, 2 and 2.5 years' export receipts.[15]

Against this background, the energy policy of the period was basically a response to the need for equilibrium in the balance of payments. Thus, the objectives of this policy, as defined in the Balanço Energético Nacional (National Energy Balance),[16] and basically coinciding with those set down by the Second National Development Plan, were:

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13 (cont.)
But, despite the great efforts to increase exports of manufactured goods, the revenue still derived basically from agricultural products (coffee, soy bean, and periodically sugar), thereby leaving the program vulnerable to a great dependence on climatic factors, pests, and so forth, not to mention the deterioration in the exchange rate during this period (see Table 8 and Figure V). Moreover, after maintaining the level of imports practically constant between 1975 and 1977, they grew at an average of 24% until 1980, declining slightly in 1981. Accordingly, a surplus in the balance of trade was achieved only in 1977 and 1981 (see Table 4).

[14]Freeman provides a very interesting analysis of these economic-political relations in Brazil which made it creditworthy. Among these were the Government's ability to contain the distributional pressures of an expanding economy in an authoritarian regime. He also foresees difficulties in this regard as the recent political opening (abertura) is consolidated. (See John Freeman, "The Politics of Indebted Economic Growth," MIT, Working Paper, October 1982.)

i) the substitution of imported (oil and high grade coal) with domestic energy sources, especially "renewable" ones, wherever technically and economically feasible, including:

- replacing petroleum products with alcohol, coal, and electricity (with subsidies for the substitutes); and

- replacing imported coal with domestic coal (adopting those steel-making methods most appropriate for Brazilian coal).

ii) the expansion of domestic sources of energy:

- increasing exploration by Petrobrás, especially on the Continental Shelf, and, also by foreign signatories of risk contracts;

- emphasizing the exploitation of potential, economical, hydraulic power; and

- utilizing uranium as an alternative source of energy and diversifying the use of Brazilian coal.

iii) the search for new energy sources:

- extending research on shale oil; and

- developing research on alternative sources of energy in general (small waterfalls, biomass, solar energy and aeolian) (see BEN, 1976, 1977, and 1978).

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[15]The ratio of net debts to exports (FOB), which was 99 in 1973, grew rapidly in the following years to 204 in 1977 and 250 in 1978. The figure of 200, which represents a need to use receipts from exports over 2 years to service the external debt, is considered by specialists on the subject to be the point beyond which the growth of interest on the debt and the payment of the principal end up creating a "snowball" effect, that is, a need to resort to ever larger loans merely to roll over the debt.

[16]Established by the MME Edict no. 574 of May 12, 1976, the Balanço Energético Nacional was to be reviewed each year. It contained both actual and projected consumption of the country's various sources of primary energy.

Neither the official documents of the energy policy, nor the various statements from the President and the Minister of Mines and Energy of the period, accorded any special emphasis to alcohol. This was even more true for other alternative sources. Alcohol was not expected, at least in the short run, to play a large part in the saving of foreign exchange. A statement from a Ministry of Planning official in 1976 serves to illustrate this:

> Considering the number of cars in circulation in the country at present, 1 billion liters per harvest/year would have to be produced in order to achieve a limited saving of foreign exchange of 250 million dollars. In any case, it is in the Government's interest to push ahead with the program to reduce its large deficits in the balance of trade, even if only in the long run.[17]

Given this general outlook, plus the relative stability of the international oil market (thereby reducing the urgency to find substitutes for imported energy), it is readily understandable that the period 1976-1978 was marked by ambiguity within the government as to the objectives of the Program, and even as to the expedience of implementing it. The period would also be characterized by constant complaints from those groups interested in getting the Program moving (sugar entrepreneurs and their cooperatives, and distillery equipment producers) about its delay.

All evidence suggests that the PNA, formulated at a moment of great concern about international oil prices, would move slowly. Yet,

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[17]"Por que o Programa está atrasado?", Visão, 7/12/76.

as early as 1977, it was announced that the goal established for the first phase of the Program had been achieved: alcohol production in 1980 would be sufficient to guarantee a 20% mixture of that commodity with gasoline, calculated to be about 3 billion liters.

A Weak Sugar Market Boosts Alcohol Production

Sugar, the other basic parameter for decisions concerning the alcohol policy, provides the answer to the puzzle of why alcohol production increased. In fact, as has been seen, by the end of 1975, although the price of sugar was sliding rapidly on the international market, heralding a severe crisis (see Table 19 and Figure II), the decision-makers responsible for sugar policy preferred to believe that this was a self-regulating readjustment of prices, which had reached an artificially high level the previous year.

In 1976, while the existence of a crisis was recognized and the more permanent causes of the reduction in sugar consumption were identified (such as the "invasion of substitutes"), hope was still held in the recovery of the world free market. Moreover, no reason was seen to restrict the expansion of sugar production in the country. The President of the Institute of Sugar and Alcohol (IAA) addressed the Fourth National Sugar Producers Meeting in Campos, Rio de Janeiro, in August 1976 as follows:

> At first glance it may seem that the international scene which has just been outlined is somewhat less promising than that which was shown in my earlier reports, and that the natural repercussions would be

> negative for any future plans for expanding our sugar industry. Our message, however, is far from being alarming. It is just a warning ... (Tavares do Carmo, 1976: 356).

Contributing to this optimism was Brazil's relatively comfortable situation in comparison with the other exporting countries in that: (1) exports represented only 1/3 of the country's production; (2) the domestic market was continually expanding; and (3) the National Alcohol Program afforded great flexibility to the sugar sector, enabling a reduction to be made in the amount of processed sugar, which would eventually be necessary.[18] The effective basis of the National Alcohol Program during this period was as an important, if not fundamental, escape valve for the sugar sector. Consequently, in 1977, in spite of the great accumulation of stocks at the end of the previous year, equivalent to 12.2% of total production (see Table 21), IAA decision makers did not consider limiting production at the 1977/78 harvest. They believed that a large production capacity would strengthen Brazil's position as one of the most important exporting countries of the world, increase its control over the international sugar market, and enhance its bargaining power in the 1977 negotiations for the new International Sugar Agreement. The estimate of 150 million sacks of sugar for the 1977/78 harvest ("a record production in domestic and international terms") was thus welcomed. That there may have been no market (domestic or foreign) for this production, that is, the possibility of another overproduction crisis, did not cause the same kind of concern, because the National Alcohol Program appeared to be a way of avoiding such crises (cf. Tavares do Carmo, 1977c: 32 and 33).[19]

In 1977, on request from the IAA, the Government authorized the production of 135 million sacks of sugar, of which the equivalent of 15 million sacks would be transformed into direct alcohol in Sao Paulo during the harvest of 1977/78.[20] This volume represented 6% of the total consumption of the world free market (cf. Tavares do Carmo, 1977c: 3) and in Brazil almost 100% of the increase in stocks in 1976, and 79% of that in 1977 (see Table 21).

On this occasion the National Alcohol Program received strong support from Tavares do Carmo:

> We need to realize that this Program is irrevocable and that on it we are pinning our highest hopes for a rational, Brazilian solution to the biggest problem for our economy in recent times, the energy problem, and furthermore, that this solution (...) will bring to the sugar industry the security and certainty of permanent growth, independent of the international scene and free from the threat of a limitation on production (Tavares do Carmo, 1977c: 34, 35).

However, as demand continued to be sluggist and the prices on the world free market extremely low (see Table 19 and Figure

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[18] See Tavares do Carmo, 1976 and 1977b.

[19] See also Watson, 1977. According to Watson, the head of the Export Division of the IAA, despite the bleak outlook on the international sugar market, the expansion of production should not have been interrupted (especially not that generated by increasing agricultural and industrial productivity). His reasoning was that the IAA could control the cane surplus either by directing it for sugar or alcohol production, depending upon conditions on the world sugar market and the demands for the mixture of alcohol and gasoline.

II), a limit on production would once again be applied. Authorized sugar production for the 1978/79 harvest was reduced by 15 million sacks from the previous harvest. From the 120 million authorized sacks of sugar, the cane equivalent of 35 million was to be transformed into direct alcohol[21] (almost double the stocks accumulated in 1977 and more than three times that of 1978). Although this was to take place in almost all the producing states, São Paulo was awarded 78.5% of direct alcohol production.

The imbalance between supply and demand on the world free market was aggravated by the difficulty of renewing the International Sugar Agreement. This renewal had been the objective of various conferences held during 1977 under the auspices of UNCTAD.[22] Finally, at the end of the year a decision was reached to renew the Agreement, to come into effect on January 1, 1978. However, it would still not be implemented that year, as the United States (responsible for 1/3 of world imports) and Japan (another large importer) blocked its ratification. In addition, the European Common Market not only did not subscribe to the ISA, but also adopted a policy of subsidizing the domestic production of its member countries. The result was that the level

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[20]The Crop Plan for 1977/78 estimated that 93 million sugar sacks out of the total 135 million authorized to be produced was to be directed to the domestic market and the remainder to exports. See pp. 337-338 of this chapter on the Government decision to bail out the sugar sector.

[21]Passed at a meeting of the CDE on 5/24/78 and confirmed by the Crop Plan of 1978/79 (Resolution no. 2, 5/31/78, of the IAA).

[22]Tavares do Carmo reports in detail the meetings which took place during 1977 to draw up a new International Sugar Agreement (1977b).

of world stocks continued to grow, while the harvest of 77/78 reached record levels (itself a result of investment stimulated by the high prices of 1972-1974),[23] leading to an unavoidable, extremely critical, situation on the world free market.

In this context, the National Alcohol Program would be the "salvação da lavoura" (the salvation of the crop) for the sugar sector. Therefore, pour cause, the sugar crisis would have great importance for the first phase of the PNA reaching its production goal, not only by stimulating the producers to invest in alcohol, but also by encouraging compliance with the decision to transform into alchol the equivalent of 50 million sacks of sugar during the harvests of 77/78 and 78/79. Whereas alcohol production for the harvest of 75/76 was 555.6 million liters, in the harvest of 1979/80 it was 3,396.4 million liters, thus surpassing the goal of 3 billion liters set for 1980.[24] The great leap (121.4%) came between the harvests of 76/77 (664 million liters) and 77/78 (1,470.4 million liters), when the IAA authorized the production of 612 million liters of direct alcohol,[25] a volume rather close to the total alcohol production of the previous harvest. The authorization of 1.4 billion liters of direct alcohol at the harvest of 1978/79 would also be of the same degree of magnitude as the effective production of the previous harvest (see Table 27).

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[23] See Mont'Alegre, 1976: 52 and 53.

[24] As was seen in chapter 6, the goal of 3 billion liters for 1980 did not appear in the decree creating the PNA. However, its unofficial existence was "legitimated", so to speak, by the statements of the authorities linked to the Program, such as Paulo V. Belloti, Secretary-General of the MIC until 1977.

The transformation into direct alcohol of the cane equivalent to the sugar discarded during the worst years of the sugar crisis, together with the great surplus capacity of the São Paulo distilleries (400 million liters at the harvest of 74/75, cf. Table 32) explain the rapid growth in alcohol production in the first phase of the PNA, with São Paulo taking the lead. It would not have been possible to transform the cane equivalent to the discarded sugar into alcohol had there not been sufficient industrial capacity. This capacity, which for historical reasons was concentrated in São Paulo,[26] was quickly utilized. In the period, says a specialist on this subject, "no cane was left standing" (não ficou cana em pé) in the state of São Paulo; the ground cane which was not destined for sugar was all used for the production of alcohol.[27]

The conjunction of these two factors -- the production limit on sugar as a result of the international sugar crisis and the existing large surplus capacity of the São Paulo distilleries -- as well as the expansion of the cane cultivated area[28] and of the capacity of the distilleries[29] financed by the PNA in its first years, all explain how the 1980 production goal of the National Alcohol Program was fulfilled.

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[25]The following formula was used: one 60 kg sack of sugar = 40.8 liters of direct alcohol (technical parity).

[26]See Volume I of this study, pp. 177 and 178. During this period, São Paulo produced 70% or more of all alchol in the country (see Table 29).

[27]Interview with Júlio Borges, Technical Manager of COPERSUCAR, on 2/10/83.

[28]The harvested area of sugar cane grew by 30%, from 2 to 2.6 million hectares between 1976 and 1980 (see Table 23). The harvested area of cane in São Paulo was, over the same period, even larger: 42% (720,000 hec-

7.2. "Alcohol is Doing Well in Spite of Pro-Alcool": Bailing out Sugar

Actors

During the implementation period of the gasohol phase, the following actors in the decision-making process gained importance in relation to the preceding period, the formulation phase:[30]

(i) the manufacturers of equipment for the sugar mills and alcohol distilleries, the most prominent of which were Dedini-Codistil and Zanini.[31] Together these two controlled about 80% of the market; Dedini alone held about 60%.[32]

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28 (cont.)
tares in 1976 to 1 million in 1980) (Data from IBGE/SEPLAN, Produção Agrícola Municipal).

[29]By 1978 alcohol production capacity had increased by 2,900 million liters/harvest in terms of approved projects from the 903 million liters/harvest at the beginning of the PNA (Source of data: CENAL).

[30]See chapter 6, p. 230.

[31]There are about 60 firms which produce equipment or parts for distilleries. The 5 largest are Dedini/Codistil, Zanini, Conger, Cosinor, and Flinor.

[32]In 1982, according to Szaya L. E. Seifert, the Marketing Manager for Dedini, the company controlled a 70 to 72% share of the market for equipment for the production of sugar and alcohol (interview on 12/22/82, Piracicaba, S.P.).

Both Dedini and Zanini grew out of repair and maintenance shops for the machinery of local usinas, the former in Piracicaba, and the latter in Sertãozinho, both in the state of São Paulo. Dedini began production of the first equipment for usinas in 1926; Zanini, in contrast a newer firm (established in 1950), began producing this type of equipment in 1971, when it was incorporated as Zanini S.A. Equipamentos Pesados.

On January 29, 1976, the Ministry of Industry and Trade invited representatives of the principal firms already working with distilleries, together with those willing to do so (a total of eight), to Brasilia in order to evaluate domestic capacity in the sector. This evaluation, as given in the report signed by Paulo Bellotti, the Secretary-General of MIC at that time, shows that Brazilian industry was perfectly able to provide the National Alcohol Program with distilleries, using its own know-how.[33] The equipment sector appeared enthusiastic, declaring on successive occasions during 1976 that it had the capacity to meet demand, though in the years to come there were recurrent complaints about the delay in releasing the resources for proposed distilleries already approved by the CNAL (see below). Thus the distillery equipment suppliers joined the other actors in the "bargaining situations" of the implementation process of the PNA.

(ii) the automobile industry was an important actor of this period, represented by spokesmen of the principal plants,[34] and their interest-group association, the

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32 (cont.)

Today, the Dedini Group is a holding company, and is comprised of 16 firms which showed a turnover of Cr$ 80 billion in 1982. Among the companies of this group is Codistil, set up in 1943 for the purpose of constructing alcohol distilleries. Dedini S.A. Metalurgica produces common parts in sugar mills and distilleries (equipment for receiving cane; preparing cane, and extracting the juice), while Codistil builds the distilleries themselves (for preparing and correcting the juice, fermenting the must, and distilling the beer). Dedini/Codistil have produced, since first being established, 450 distilleries, 300 of which have been set up since 1976 and the inauguration of the PNA.

The Zanini Group is nowadays made up of 24 independent firms. Until 1975 it only produced equipment for sugar mills, but with the creation of the National Alcohol Program, it entered into a consortium with Conger, a producer of distilleries. The Racional Engenharia S.A., which is a member of the group, is responsible for civil construction. The Zanini-Conger consortium broke up about seven years later, when the two parties could not come to an agreement about their association, proposed by Zanini. Today, Zanini, in consortium with other firms, such

National Association of Producers of Self-Powered Vehicles (ANFAVEA). Differing from the distillery equipment manufacturers, the automobile industry assumed an interested but cautious stance, apparently distrustful of the Program's viability, and especially of the Government's commitment to it. In 1978 it was the most conspicuous actor, given the approaching end of phase one of the PNA and its fundamental role in phase two, that of cars driven exclusively on alcohol.

Regulation

The implementation phase was characterized by the regulation of various aspects of the Program - especially establishing norms for authorizing credit for expanding existing or initiating new distilleries, as well as for increasing supplies of the raw material (above all in 1976 and 1977), and aspects related to the sales and distribution of alcohol (during 1977 and especially 1978).

In January 1976, the first steps were taken toward the implementation of the Program with the guidelines laid down by the National

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32 (cont.)
as Villares, produces all the equipment necessary for the functioning of a distillery.

Both Zanini and Dedini supply distilleries under the turn-key system.

(This note was written based on information obtained from interviews with Dedini personnel on 12/22/82, Piracicaba, and Zanini personnel on 12/20/82, São Paulo. See also "Um negócio camarada", Senhor, no. 77 (September 1982) and CNPq, Avaliação Tecnológica do Álcool Etílico (Brasília, CNPq, 1978).

[33]See "Indústria já pode atender plano de álcool"; ESP, 7/11/76.

[34]Volkswagen, General Motors, Volvo, Mercedes-Benz, Ford, and Fiat (which began operating in Brazil shortly after the PNA was set up).

Alcohol Commission (CNAL) for credit applications to the IAA, and the establishment of a Work Group[35] to divide the country into socio-economic and geographical zones with the aim of determining priority areas for installing the distilleries (CNAL Resolution no. 2/76).

In February, the National Monetary Council released Cr$ 1.2 million for the PNA. During the first phase of Proálcool, the Program's resources had come from specific allocations from the federal budget authorized each year, and the net income from the commercialization of the anhydrous alcohol mixed with gasoline (article 9 of decree no. 76,593/75). In March, the regulatory framework was extended when the CNAL set forth what type of buildings and equipment would be financed by PNA resources. The Commission also prohibited the transfer of approved projects to third persons (Resolution no. 5/76 complemented by no. 5/77).

In that same month, the Central Bank (Resolution no. 304/76) made public the regulations for the industrial operations of Proálcool, as passed by the National Monetary Council (CMN): resources for financing the installation, modernization, or expansion of alcohol distilleries (credid would not be extended for working capital), after the CNAL had determined that the project was consistent with the objectives of the PNA, would come from a portion of the proceeds from the sale of fuel alcohol, of provisions made by the CMN, and the returns and net revenue from already completed projects. These resources would be kept in a separate sub-account of the General Fund for Agriculture and

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[35]Comprised of representatives from the Ministries of Agriculture, Interior Affairs, and Planning, and state governments.

Industry (FUNAGRI) at the Central Bank, and would be disbursed by the authorized Financial Agents through refinancing operations. At first credit was to be made available for up to 100% of the industrial investment, at an interest rate of 15% for projects in the North and Northeast regions, and 17% for all other regions. From 1977 on, credit varied between a maximum of 90% and a minimum of 70% of industrial investment, according to the type of distillery, the raw material used, or the type of producer, in line with the priorities defined and redefined over the years.[36] The interest charged came to be based on a low fixed rate plus monetary correction of the principal, in turn based on percentages of the annual variation of the Obrigações Reajustáveis do Tesouro Nacional (ORTN), an index of Government bonds adjusted regularly to reflect inflation.[37] The repayment period was up to 12 years, initially with a three year grace period. The grace period later came to depend on the type of distillery financed.[38]

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[36] By 1982, credit was conceded for up to 70% of the fixed industrial investment for annexed distilleries, up to 80% for autonomous distilleries, and up to 90% for distilleries set up by cooperatives and/or associations of rural producers (cf. CENAL, "Informações Básicas para Empresários" (Brasília, June, 1982)).

[37] In 1982, the fixed interest rate was 5% per annum and the percentages of the annual variation of the ORTN's varied as follows: in the areas of SUDAM and SUDENE (the North and Northeast regions), 60% for annexed and 55% for autonomous distilleries; in other regions, up to 70% for annexed distilleries and 65% for autonomous ones. The sum of the fixed interest rate and the monetary correction could not exceed 55% (CENAL, ibid.).

[38] In 1982, the grace period for annexed distilleries was 3 years after receiving the credit, whereas for autonomous distilleries it was four years (see CENAL, ibid.).

In June, the Central Bank, through Circular no. 303, regulated rural credit for start-up expenses (fundação), operating costs (custeio), and the renewal (renovação) of the cane crop or other raw materials.[39] The expenses were to be defrayed from the allocations of the National Monetary Council to FUNAGRI, by authorized Financial Agents through refinancing operations. Credit for agricultural projects, initially 100% of the estimated cost, came to vary according to the type of producer.[40] The fixed interest rate of 7% per annum was altered at the end of 1976, after that fluctuating according to the region, the type of producer, and the type of agricultural activity.[41] The repayment term varied between 2 harvests and 12 years, depending on the activity

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[39]For sugar cane:

- start-up (fundação) or expanding the crop area entails the preliminary work (clearing the land, removing tree stumps, and so forth), planting (including preparing land, fertilizers, shoots, and so forth) and the subsequent treatment, up until the first harvest. Accordingly, tractors, fertilizers, and the like are required.

- renewal of the crop in areas previously cultivated by cane which have ended their productive cycles (first, second, and third harvests), encompasses all the necessary expenditure until the first harvest. It is necessary to remove the cane stumps, go over the land with a tractor, and so forth.

- operating costs cover expenses incurred with planting for the second and third harvests, including the treatment of the cane and partial replanting.

Whereas the start-up and renewal of a plantation are considered investment, the operating costs are considered annual working capital.

(CENAL, "Informações Básicas para Empresários" (Brasília, January, 1980) and interview with Roberto Antonio Pinto de Melo, at that time the Director of the Industrial Credit Department of the Bank of Brazil on 10/10/80, in Brasília).

in question (start-up, renewal, overhead, fixed or semi-fixed capital investment), and the type of crop (cane or manioc), with no substantive changes during this period. However, the types of agricultural activities financed by the PNA were restricted over time.[42-43]

The regulation of the sale and distribution of alcohol by the National Petroleum Council (CNP), as set forth by decree no. 76,593/75 (which created the PNA), proceeded without difficulty: a system of guaranteeing the supply of alcohol to the chemical industry was established (Resolution no. 3/78) and the organic products to be favored with subsidized alcohol were selected (Edict no. 53/76); the system of collecting the resources from the sale of fuel alcohol was revised (Resolution no. 2/76) and the price of anhydrous alcohol in the mixing centers was set (Resolution no. 2/78); quotas for anhydrous alcohol were determined for each state at each harvest, thus establishing the proportion of anhydrous alcohol in the mixture (various Directives). In 1978, however, when the problem of storage and outlets for alcohol became obvious, important changes in the distribution system took place, together with the necessary modifications in the legislation. This was to result in the exclusion of the IAA from this system (see below).

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[40] In 1982, credit was 100% for mini (as defined by a gross production value of up to 200 MVR - maior valor de referencia) and small (between 200 and 600 MVR) producers, as well as for cooperatives comprising at least 70% mini and small producers. For the medium producer (between 600 and 3,000 MVR), and cooperatives consisting of less than 70% mini and small producers, credit was for 70% of the approved budget. For the large producer (above 3,000 MVR), the credit limit was 50% of estimated costs (cf. CENAL, 1982).

[41] In 1982, the interest rate was 35% per annum for the SUDAM and SUDENE regions, and 45% for other regions (cf. CENAL, ibid.).

In sum, the regulation of the National Alcohol Program resembled a mosaic with the National Petroleum Council (CNP) controlling the sale and distribution of alcohol, the National Alcohol Commission (CNAL) administering the technical and economic aspects of production, and the National Monetary Council and the Central Bank in charge of the Program's finances. This mosaic's individual pieces did not form a consistently harmonious whole. Rather, discord would result from the decision-making system and institutional framework which would come to prevail.

Fragmentation of the Decision-Making Structure

As noted earlier, decree no. 76,593/75 which created the PNA was promulgated after a prolonged period of intense conflict between the bureaucratic agencies for control over the Program. This decree, rather than resolve the many questions posed during the Program's formulation (annexed vs autonomous distilleries, sugar cane vs manioc, proportion of alcohol in the mixture) involving both interest groups and bureaucratic agencies, resolved only intra-bureaucratic disputes. The "bargaining situation" at this point in time, as symbolized by decree no. 76,593/75, reflected the substantially weakened position

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42-43 Beginning in 1980, only activities considered to be investment (start-up and renewal) continued to be financed by Proálcool. Any cost considered to be working capital was financed by the National Rural Credit System. In 1982, only start-up operations were still financed by the PNA. For sugar cane, the time limit remained for up to 3 harvests.

of the IAA and Petrobrás. Petrobrás was excluded from direct control of the Program, and the CNP regained and strengthened its position in the command of the mixed carburant policy. At the ministerial level, the disputes were resolved by creating an institutional format without a clearly defined decision-making center, with policy decisions delegated to the National Alcohol Commission (CNAl), made up of the second and third echelons of the Ministries and presided over by the representative of the Ministry of Industry and Trade (MIC). In practice, of the Ministries that made up the CNAl, no single one assumed a leadership role in the implementation of Proálcool (despite the presidency of this body being awarded to the Secretary-General of the MIC): the dispute between the Ministry of Industry and Trade and the Ministry of Mines and Energy went on. At the same time, the National Monetary Council (in policy formulation) and the Central Bank (in implementation) exercised absolute control over the financial aspects of the Program. At the macro level, the Economic Development Council (CDE) was authorized responsibility for decisions concerning the overall energy policy for alcohol. Furthermore, when the various bureaucratic bodies involved in a determined aspect of this policy could not reach a minimum consensus, the CDE, through its President, the President of the Republic, made the necessary decision. Thus the Council acted as the "arbiter of the last instance" of alcohol policy during the first phase of the PNA.[44]

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[44] A good example was the decision to release the 15 million sacks of sugar for direct alcohol production at the harvest of 77/78 in order

This extreme fragmentation of decision-making authority would be an important cause of delay in the implementation of the PNA gasohol phase.

Delay in the Implementation of the PNA

Despite the announcement of the 1980 alcohol production goal as early as late 1977 (due, to a great extent, to the sugar crisis), complaints from the groups interested in getting the Program off the ground about the slowness of its implementation were pervasive during this period. This would be the overriding problem of this phase.

Ambiguity of PNA objectives. The fragmentation of Proálcool's decision-making system would be exacerbated by the ambiguity of the Program's objectives as held by different segments of the government bureaucracy.[44a] This ambiguity, and even opposition, towards the Program was a distinct characteristic of the implementation period of the first phase of the PNA, surfacing after the relative stability of the international oil market had reduced the urgency to substitute imported energy. The impetus from the weak world sugar market was insufficient to mobilize all segments of the government bureaucracy in the same direction. As a result, the conflict interests and differences among these bureaucratic agencies stood out. They resulted from:

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44 (cont.)
to bail out the sugar sector in crisis. As it was impossible for the IAA and the Ministries of Industry and Trade and Mines and Energy to agree on a crop plan, Geisel had to make the decision (cf. "O indefinido Plano Nacional de Álcool", ESP, 6/24/77). (See pp. 337-338 of this chapter).

[44a] For the objectives of Proálcool as defined by the political process and the causes of their ambiguity, see the Conclusions, pp. 526-532.

(i) the roles these agencies played, in many instances, as brokers of specific interest groups concerned with alcohol policy (the typical case is the Institute of Sugar and Alcohol, who acted for cane suppliers and sugar and alcohol producers, especially from the Northeast) and as decision-making arenas to which different interest groups would channel their demands (such as the Ministry of Industry and Trade (MIC), the Ministry of Mines and Energy (MME), and the National Petroleum Council (CNP)).

(ii) the self-interest these agencies tended to develop. With or without clearly defined jurisdictions within the bureaucratic apparatus, they aimed to strengthen their institutional positions by attempting to broaden or clarify these jurisdictions. This power game was especially evident during the implementation of the gasohol phase when, as noted, no center of decision-making was ever defined de facto. The dispute between the MIC and the MME to gain control of the Program was, as seen, readily apparent throughout this period.[44b]

In other words, the fragmentation of the decision-making structure of the alcohol policy and the ambiguity of the objectives of the National Alcohol Program mutually reinforced one another during the implementation of the gasohol phase. Together they are certainly responsible, to a great extent, for the delay in the implementation of this phase of the PNA.

The Slow Processing of Proposals for Distilleries. As early as July 1976, sugar and alcohol producers and distillery equipment suppliers complained about delays in the approval of proposed distilleries by the

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[44b]For a detailed analysis of the role the bureaucratic agencies played in alcohol policy-making, see the section "The Decision-making Structure of the Alcohol Policy" in the Conclusions, pp. 498-524.

National Alcohol Commission (CNAl), approval required for subsidized credit from Proálcool.

The complexity of the processing of proposals in itself was certainly a cause of the long time this process took. This complexity in turn can be ascribed to the above-mentioned extreme fragmentation of the decision-making structure for alcohol policy. Briefly, this process began with the interested party first submitting the proposal to the CNAl, on a standard form. This body assessed its siting, its conformity to the objectives of the PNA, and its technical merit. The IAA was called upon[45] to perform the technical evaluations for the National Alcohol Commission. Once the project received the approval of the CNAl, the interested party had 90 days in which to present the definitive project to the Financial Agent, usually the Bank of Brazil.[46] This body evaluated the project's banking and economic-financial aspects with the aim of gauging the applicant's ability to repay the investment loan. In practice, the applicant would have to formulate a second project for appraisal by the Financial Agent in accordance with the conditions it stipulated, as it bore all operational risks (as defined by the Central Bank Resolution no. 364/76). Once the

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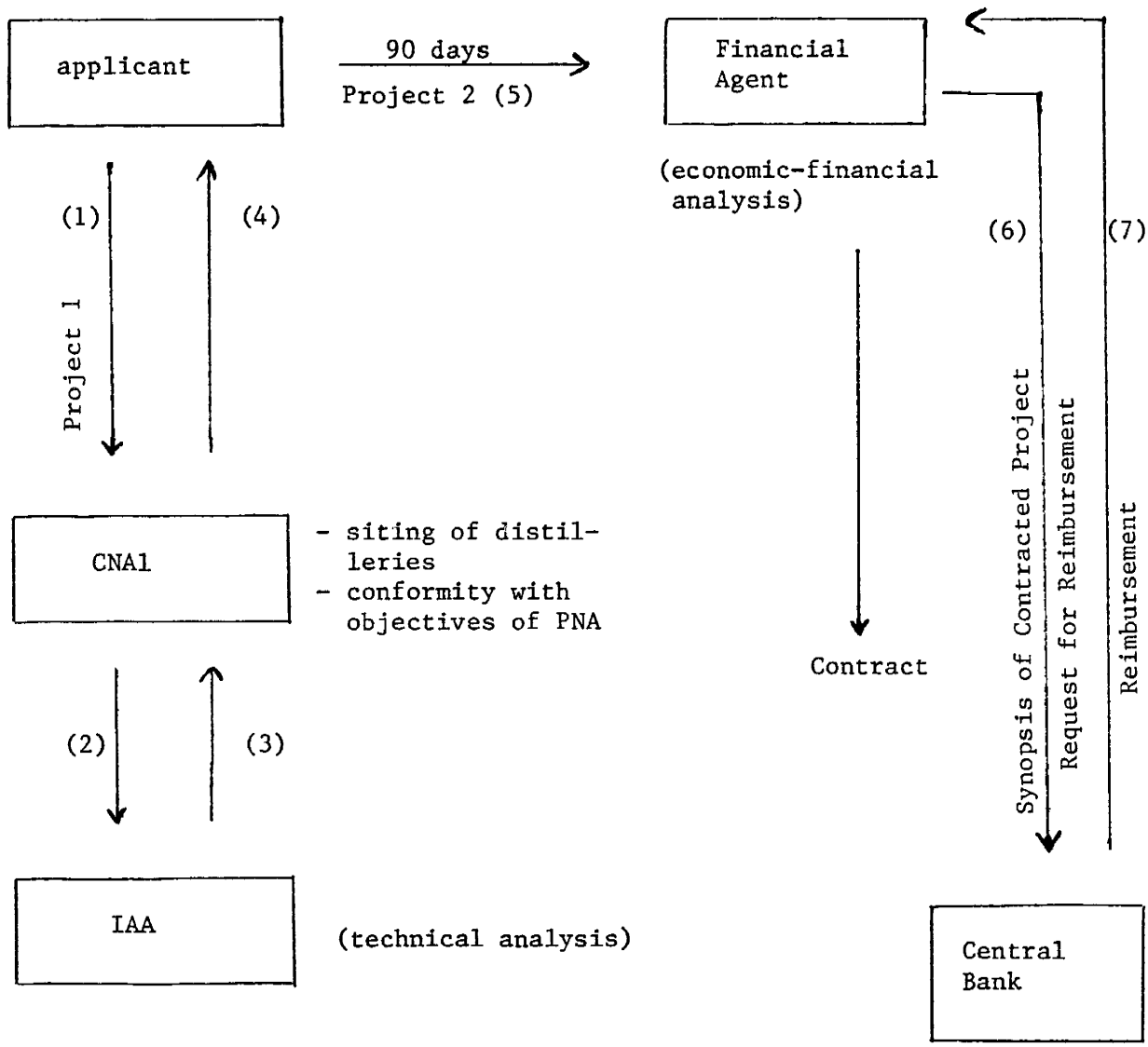
[45]The IAA was responsible for analyzing projects which used sugar cane as the raw material. During the first phase of the PNA, only 4 projects using other raw materials (2, manioc; 1, babassu; and 1, aguardente) were approved by the CNAl; in these cases the Commissions of other technical bodies, such as the STI, were responsible for project evaluations (see Table 40).

[46]The Bank of Brazil was the Financial Agent for 63.5% of the 170 projects approved by the CNAl between 1975 and 1978 (see Table 40).

Financial Agent had approved the project, a contract was drawn up with a local Financial Agent. This Financial Agent would then be reimbursed by the Central Bank after presenting a synopsis of the contracted project, subject to the Bank's approval. Thus, in practice, the Central Bank had the final word.

Figure 3: The Project Analysis Process

(Until 1979)



Thus, three principal bodies were involved in the process of approving a proposed project. Their criteria for evaluation and their general outlook towards the Program conformed to their divergent and even conflicting "interests". As Franken suggests: the CNAL, because of its very raison d'être and presidential orders,[47] had an interest in approving a larger number of projects, whereas the Central Bank, given its concern with inflation, was rigorous in its appraisals, attempting instead to release resources little by little. The Bank of Brazil, because it bore all operational risks and depended on Central Bank approval for reimbursement, also was very rigorous in its analysis of the proposed projects.[48]

Apart from the complexity of the processing of proposals for distilleries, a second major cause of the lengthiness of this process was the delay of the Financial Agent in releasing credit. Complaints about the delay in disbursing funds centered on the collateral the Bank of Brazil demanded from the applicant as a prerequisite for releasing the money. The impasse was a result of the debt owed by the sugar/alcohol sector to the IAA, incurred during the modernization program promoted by the Institute in the early 1970s.[49] Consequently, the

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[47] On the basis of its very reason for being, the CNAL should have been expected to approve the maximum number of projects. However, it cannot be claimed that this was always true. The ambiguity of objectives of the PNA (and even opposition to its implementation) from within the government bureaucracy, which was strong during this period, was carried over into the CNAl, which was composed of representatives of various segments of this bureaucracy (see below in the text).

[48] See "Aspectos Institucionais do PNA", chapter II, CNPq, Avaliação Tecnológica do Álcool Etílico (Brasilia: CNPq, 1978), prepared by Tjerk G. Franken.

usina equipment was mortgaged to the IAA as collateral for credit authorized from the Special Export Fund. However, the Bank of Brazil was unwilling to become a second creditor, claiming that its risks would be far greater than those of the Institute.

Producers who had already planted cane to supply the new or expanded distilleries complained of their losses. The goal for 1980 (3 billion liters of alcohol), they warned, was in jeopardy, as one harvest would be wasted and an industrial project would take about 2 years to become fully operational. The equipment manufacturers, especially the Dedini Group, also complained of losses, as Codistil, in order to meet anticipated demand, had increased production. The result was that at the end of 1976, its stock yard was full of complete sets of distilleries awaiting the release of funds by the Bank of Brazil.[50]

In October 1976, responsive to the complaints of the businessmen, an irritated President Geisel called a meeting of the CDE to ask for explanations for the delay in contracting projects for distilleries, and to demand solutions. The meeting was attended by 6 Ministers of economic affairs, and, specially invited, the President of the Bank of Brazil. The Brazilian President, as has been seen, holds the power to

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[49]See Volume I, pp. 165-169.

[50]See "Banco do Brasil admite paralisação de projetos", JB, 8/9/76; "Ministério acusa BB pelo atraso do Plano do Álcool", JB, 8/21/76; "Surpresa: há falta de cana e de estatísticas", RR 515, 8/16 to 8/22/76; "Técnicos duvídam da implantação do Plano Nacional do Álcool, JB, 9/30/76; "Destilarias sem recursos", RR 521, 9/27 to 10/13/76; "Governo aprova mais três financiamentos a destilarias de álcool", JB, 10/12/76; "Nos pátios, as destilarias esperam pelos financiamentos", OG, no date; and "O álcool, uma gasolina tropical", Isto é, February, 1977.

intervene in a "bargaining situation" at any moment, and in so doing momentarily interrupts the relations of all other actors, who now redirect their attention toward the President. Geisel's intervention followed upon a "round of pushing" in which the MIC had faulted for the delay in the Program both the Central Bank (for slowness in defining the terms for conceding credit for distilleries) and the Bank of Brazil (for demands for collateral). The Bank of Brazil, supported by the Minister of Planning, justified these stipulations on the grounds that the bank ran all the financial risk; both laid a large part of the blame on the businessmen who took far longer than the 90 day limit after receiving initial approval by the CNAl to submit the final project to the Bank of Brazil for lack of technical knowledge[51] and because they wanted to do so without offering collateral.[52] All in all, the demand for collateral was considered the gordian knot of the process. One suggested solution was that the Bank of Brazil not only accept the equipment that was already mortgaged (referred to as the "second mortgage"), but also other property not directly connected with usinas.

Despite direct intervention from Geisel, the complaints from the entrepreneurs (both usineiros from the Northeast and São Paulo and the

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[51]After the institutional restructuring of the Program in 1979, CENAL, the National Executive Commission for alcohol, recommended to interested parties that they should use consulting firms to formulate the project proposals.

[52]See "CDE debate siderurgia e álcool mas a conclusão continua sigilosa", JB, 10/28/76; "Dinheiro existe, mas não será liberado", RR 525, 10/25 to 10/31/76; "Como conter as dificuldades?" Veja, 11/3/76; "Dúvidas

representatives of the equipment industry - Zanini, Dedini, Conger) about the delay in releasing funds persisted into the following year. The demand for collateral from the Financial Agents continued to be the principal target of these protests. In January 1977, at a symposium sponsored by the Association of Development Banks, the Financial Agents were supported by the Director of the Rural Credit Department of the Central Bank for the care taken in project evaluation, in light of the risk involved. In March, the Bank of Brazil once again publicly blamed the Central Bank and the entrepreneurs for the delay in processing project proposals. Finally, in April, performing its role as decision-maker and arbiter in the last instance, the Economic Development Council (CDE), whose president was Geisel, ruled that the Bank of Brazil was to accept the "second mortgage" as collateral. The decision was immediately praised by the sugar and alcohol entrepreneurs.[53]

At the same time, the National Council of Alcohol was instructed to devise a single, simpler form for submitting projects both to the CNAl and the financial agent. This meant that the applicant would now submit only one project proposal rather than the two which had been required until that time.[54] The proposal of a "single form" to speed up approval of projects would often be reiterated by the authorities at the Ministry of Industry and Trade over the following years. However,

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52 (cont.)
de fim de ano", RR 533, 12/20 to 12/26/76; and "Plano do álcool - um ano depois, poucos resultados", Visão, 11/22/76.

[53]See "Indústria quer financiamento rápido para usinas de álcool", JB, 1/16/77; "Proálcool atrasado na Bahia e Sergipe", OG, 1/24/77; "Programa do álcool atrasa três anos", JB, 4/24/77; "Programa do álcool terá todo recurso necessário", ESP, 1/28/77; "Programa ainda espera

it would only be implemented in July 1979 when, prompted by the second oil shock, the institutional framework of Proálcool was reorganized.[55] All in all, the processing of the distillery projects during these years usually took between seven and twelve months, from the time they were submitted to the National Alcohol Commission (CNAl) to the final contract with the Financial Agent.[56]

Credit Value Adjustments. An important consequence of the delay in releasing credit for projects approved by the CNAl was the discrepancy between the estimated price of distillery equipment budgeted in the proposals and the price actually charged by the equipment manufacturers after the credit was finally released. The magnitude of the problem can be appreciated by considering that the projects normally took from seven to twelve months from the time they were presented to the CNAl and the resources were disbursed by the Financial Agent, at a time when inflation was in the 40% range (see Table 5). In effect, this problem represented yet another facet of the National Alcohol Program in need of regulation. The sugar and alcohol producers protested and pressured decision-makers, suggesting that unless an adjustment was made to the prices cited on the project proposals submitted to the CNAl,

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53 (cont.)
definições," ESP, 3/13/77; "Banco do Brasil facilita financiamento do Proálcool," JB, 4/28/77; "CNA aprova 14 novos projetos de destilarias," ESP, 4/29/77.

[54]See Figure 3, p. 325.

[55]See "CNAl aprova 14 novos projetos de destilarias," ESP, 4/29/77; "Velloso: Proálcool vai ter Cr$ 10 bilhões até 1978", OG, 9/16/77; "Para

Proálcool could become inviable, and small and medium-sized firms excluded from the Program altogether. The equipment suppliers claimed that they could not sign contracts to deliver equipment at a fixed price. A proposal was put forward that the project funds be tied to ORTN's,[57] thus automatically adjusting their value to inflation.[58] The Government resisted this suggestion. In November, 1977, in a meeting of the High Council for Agriculture of the state of São Paulo, with the Presidents of Copersucar and Coperflu in attendance, the Minister of Industry and Trade declared that the Government did not intend to concede adjustments in the credit value of already approved projects. He was vigorously attacked by the representatives of the producers. Speaking for the producers, Lamartini Navarro Jr. (whose

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55 (cont.)
Lycio de Faria, as metas são só indicativas," CM, 10/12/77; "O dinheiro (lento) do BB", GM, 10/12/77; "Destilarias esperam há 3 meses exame da Comissão do Álcool," JB, 1/24/78; "Álcool: caem seis projetos já aprovados," ESP, 3/2/78.

[56]The time taken between the approval of the project proposal by the CNAl and the submission of the final project to the Financial Agent often exceeded the 90 day limit. The Financial Agent, in turn, normally took longer than 6 months to evaluate the economic and financial soundness of the projects. In fact, the modal value of the processing time for the projects by the Bank of Brazil, easily the principal Financial Agent of Proálcool, in 1975, 1976, 1977, and 1978 was 100 days. The modal value of the time a project took from its presentation to CNAl and its contract with the Financial Agent was, for these same years, approximately 250 days.

(Interview with Roberto A.P. de Melo Carvalho, Director of the Industrial Credit Department of the Bank of Brazil, on 10/10/80, Brasília).

[57]See "Usineiros pedem financiamento de 100% do Proálcool," JB, 2/11/77; "Bons negócios para quem produz usinas," GM, 10/12/77; "Programa ainda espera definições," ESP, 3/13/77.

[58]See this chapter, p. 317.

proposal for the first autonomous distillery in the country, the Alcídia Distillery S.A., was approved at the first meeting of the CNA1 in December 1975), argued the point that to ignore inflation was to put obstacles in the path of the PNA. The first adjustment was authorized in 1977 to the Alcídia project.[59] However, these adjustments, which were passed at pre-fixed ORTNs at a level well below that of inflation, did not satisfy the producers, who were still paying for equipment at prices that accompanied inflation. Their customers' difficulties were not in the interest of the suppliers, and both complained of financial loss. The question was settled satisfactorily only in 1980 when, at a meeting in Brasília sponsored by the MIC and attended by representatives of producers, equipment manufacturers, and consulting firms, it was decided to adjust the credit value conceded to the distillery projects at the full ORTNs.[60]

Anti-inflation policy. Another important cause for the delay in the implementation of the PNA was, without doubt, the anti-inflation policy of the Government, which was incompatible with a steady allocation of resources for the Program. Even when they had been authorized, the producers charged that these resources would be released slowly,[61] a claim corroborated by the government bureaucracy itself.[62]

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[59] Interview with Lamartini Navarro Jr. on 12/21/82, São Paulo.

[60] Interviews with Luiz Lacerda Biagi, Vice-President of Zanini Equipamentos Pesados S.A., on 12/20/82, São Paulo, and with Waldyr Gianetti, Vice-President of Dedini Metalúrgica, on 12/22/82, Piracicaba.

[61] Prominent among the producers were Jorge W. Atalla, President of Copersucar, and Evaldo Inojosa, President of Coperflu (cf. "Inojosa:

Price of alcohol paid to producers. The price of alcohol, the fundamental incentive for the producer to participate in the Program, was yet another important cause for delay in the implementation of the PNA. Considered insufficient even to compensate for production costs, the producers had two basic demands in relation to the price of alcohol: first, that the relation of parity between sugar and alcohol (fixed at 44 liters per 60 kg of sugar by decree no. 75,966/75) be altered, and second, that the Imposto sobre Circulação de Mercadorias (ICM) (a kind of sales tax) which, in the North-Northeast region was levied on sugar cane, thereby increasing the cost of alcohol production, be eliminated. Lycio de Faria, the Secretary-General of the MIC and President of the CNAl, acknowledged that the price of alcohol was one of the most difficult problems confronting the PNA, potentially causing the Program to miscarry.[63] The question of the ICM would be partially resolved by CNAL Resolution no. 1 (2/2/77) which stipulated that the portion of the ICM applied to the raw material for fuel alcohol production beginning with the harvest of 77/78 would be included in the value of the sugar/alcohol parity price. The sugar/alcohol parity price relation itself was modified in June 1978, from 44 liters of alcohol per 60 kg sack of standard crystallized sugar to 42 liters per sack (MIC Directive no. 138/78). Nevertheless, the producers were still not content.

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61 (cont.)
política inadequada prejudica Proálcool," OG, 11/11/76 and "Programa do álcool atrasa três anos," JB, 4/24/77).

[62] See statements from the representatives of the National Alcohol Commission (CNAl), the National Monetary Council (CMN), and Petrobras (cf. "Técnicos duvidam da implantação do Plano Nacional do Álcool," JB, 9/30/76;

Copersucar, for instance, demanded economic parity -- that is, parity based on the production costs of each commodity (which Copersucar calculated to be about 37.5 liters of alcohol per 60 kg sack of sugar) -- and not technical parity[64] (calculated by 1983 at 40.8 liters of alcohol per 60 kg sack of sugar).[65]

The Issue of the Use of Alcohol

Concurrent with the delay in implementing the Program, at the beginning of the mixed carburant phase, was the question of the best use for the alcohol produced. At the Fourth National Meeting of Sugar Producers, held in Campos, Rio de Janeiro in August, 1976, the Minister of Mines and Energy, Shigeaki Uēki, announced that alcohol would be accorded priority as a basic input into the chemical industry (replacing naphtha in ethylene production). The Minister based this decision on calculations of economic viability:

> Alcohol is at an obvious competitive disadvantage when compared with petroleum in the production of fuel, and at a very clear advantage in the production of ethylene.[66]

This statement was received with great surprise, for, until that time, it was believed that the priority use for alcohol was as a fuel for

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62 (cont.)
"Motores à moda brasileira," Veja, 10/27/76; "Na dependência do açúcar," RR 556, 5/30 to 6/5/77; and "Proálcool tem problemas," FSP, 6/11/78).

[63]See "Velloso: Proálcool vai ter Cr$ 10 bilhões até 1978", OG, 9/16/77.

[64]See "Álcool dimensionou o plantio da cana," JC, 11/26/78.

internal combustion engines. The bureaucratic agencies split over this issue, with the Ministry of Industry and Trade (MIC) and the Industrial Technology Secretariat (STI) openly favoring the carburant use of alcohol to save foreign exchange (even at a higher cost of production). They also emphasized the great importance of alcohol as a fuel derived from renewable sources, produced totally within the country, with Brazilian equipment and raw material. The Ministry of Planning adopted an intermediary position, supporting, in the short run, a priority use for alcohol in ethylene production while the Petrochemical Pole in Bahia was in its final stages and the third pole in Rio Grande do Sul was being set up. However, once these two poles had satisfied the demand for ethylene (in about two years), the National Alcohol Program should then be directed towards the replacement of gasoline. Uēki was supported by Bellotti, the Secretary-General of the MIC and President of the CNAl, revealing a division within the Ministry of Industry and Trade itself. The salience of the question of the best use for alcohol would continue through mid-1977, with Uēki and Belotti repeatedly proclaiming a Government decision to assign priority to alcohol production for the chemical industry, a decision which, however, was never implemented. Copersucar backed the strong Ministry of Mines and Energy (MME) lobby, whereas the representatives of the chemical industry were divided: some disputed Uēki's case for the relative economic advantage of ethylene

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[65] Interview with Julio Maria Borges, Technical Manager of Copersucar, on 2/10/83.

[66] See "Álcool será usado na produção de etileno e não de carburante," JB, 8/10/76.

from alcohol vis-à-vis petrochemical ethylene, while others feared an inadequate supply of alcohol in relation to future ethylene demand.[67]

The emergence of this question, revealing the divergence within the Government over the objectives of Proálcool, was made possible by the slackening of the international oil market in this period and the consequent loss of urgency to substitute imported energy supplies. The issue would be settled only after April 1977, when the Government took an important step to bolster the sugar sector. At that point in time, sparked off by the sugar crisis, the other basic parameter of the alcohol policy, there occurred a complete modification of the "bargaining situation" of the alcohol policy.

Bailing Out Sugar and Defining Some Issues

After the 1973-74 period of very high prices on the international sugar market, the sugar sector in Brazil was accumulating stocks to what was becoming by 1977 dangerously high levels. Investments in sugar production made during the high price years were now coming to fruition, at the same time that international demand was contracting substantially and sugar prices falling to very low levels on the world market.

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[67] See "A fala de Uêki reabre polêmica do uso do álcool," ESP, 8/11/76; "Severo afasta empresa estrangeira do Salão," RR 518, 9/5 to 9/11/76; "Álcool: preferência à indústria química," ESP, 8/21/76; "Governo aprova mais três financiamentos a destilarias de álcool," JB, 10/12/76; "O álcool, para reduzir o consumo de petróleo na indústria," JT, 10/21/76; "O que falta mesmo é dinheiro para o álcool," JT, 11/10/76; and "O eteno obtido do álcool sai mais caro," JT, 11/15/76.

In order to rescue the sugar industry, the Government determined that the cane equivalent to 15 million 60 kg sacks of sugar at the harvest of 1977/78 and 35 million 60 kg sacks at the following harvest be transformed into direct alcohol. In addition, other incentives for alcohol production were announced. One was a credit on warrantagem (a credit for marketing costs, especially storage for an entire year, given that the sugar cane harvest lasts only 6 months) for up to 80% of the value of the alcohol produced, a value higher than the 60% allowed for sugar. Another measure adopted to alleviate the crisis in the sugar industry was a subsidy to make the price of alcohol uniform throughout the country with a view to making its production viable in the autonomous distilleries, especially in the Northeast.[68] On the same occasion, the then Ministry of Industry and Trade, Calmon de Sá,[69] announced that there would be no lack of financial resources for Proálcool: the sum of 10 billion cruzeiros was cited in the text of the Exposition of Motives submitted by the Ministers of economic affairs to the Economic Development Council (EM/MIC no. 30/77).

The EM/MIC no. 30/77, which stipulated the transformation of the sugar cane equivalent to 15 million 60 kg sacks of sugar into direct alcohol at the 1977/78 harvest, as well as the other above-mentioned incentives, represented an important Government decision to bail out

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[68] See "Geisel reduz exportação de açúcar para produzir álcool," JB, 5/6/77; "Ministros mostram situação do Programa," OG, 5/6/77; and "CNA enquadra mais 14 projetos no Proálcool," JB, 5/10/77.

[69] Severo Gomes resigned as Minister of Industry and Trade in February, 1977. He was replaced by the President of the Bank of Brazil, Angelo Calmon de Sá.

the sugar sector. Signed by the Ministers of Industry and Trade, Mines and Energy, Finance, Agriculture, Interior Affairs, and Planning, it was approved by President Geisel in a meeting of the Economic Development Council (CDE) on May 4, 1977, and regulated by the Crop Plan for 1977/78, passed in Resolution no. 01 of the Institute of Sugar and Alcohol (IAA). The number of bodies involved and the high levels of decision-making that had to be called upon to enact these measures give a good idea of the cleavages within the bureaucracy on the issue of whether the government should have moved to rescue the sugar industry. In fact, the IAA could not reach an agreement with the Ministry of Industry and Trade (MIC) and the Minister of Mines and Energy (MME) on the Crop Plan for 1977/78,[70] forcing Geisel, through the Economic Development Council, to intervene and make the decision.

The EM/MIC no. 30/77 represented, therefore, to use the terminology proposed in this work, an important "stop" in the implementation process of the National Alcohol Program. Like decree no. 76,593/75 which established the PNA and represented the preceding important "stop" in the decision-making process of the Program, the EM/MIC no. 30/77 resolved the inter-bureaucratic conflicts. This time, however, it defined some questions previously left open which had arisen during the formulation phase of Proálcool. On the first important question, the best use for alcohol, the MME came out the loser. The Exposition of Motives, signed by the Minister of Mines and Energy himself, as well as by other Ministers, stated:

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[70]Cf. "O indefinido Plano Nacional do Álcool," ESP, 6/24/77.

> The principal use foreseen for alcohol will be as a fuel to be mixed with gasoline, which will provide a substitute for imported petroleum.

As the loser, Uēki made a point of publicizing his position before the President of the Republic. One month after the decision, the Minister of Mines and Energy declared that it was "utopian" to think that the solution to the Brazilian energy problem lay in the production of alcohol for mixture with gasoline, for this would only substitute a portion of oil imports. The best use for alcohol, reaffirmed the Minister, was as raw material for the chemical industry.[71]

As for the question of annexed vs. autonomous distilleries, the previous legislation which had awarded priority to annexed distilleries (decree no. 75,966 of July 11, 1975) was reversed: the Exposition of Motives stated that since alcohol should become an important source of fuel, its production should not be strictly dependent on sugar production. Therefore, the autonomous distilleries should progressively play an ever larger part in alcohol production. In accordance with the new legislation, the PNA would no longer finance the expansion or installation of annexed distilleries with more than 20% of the milling capacity of the sugar mill.[72] Experts judged that the Government had calculated correctly the idle capacity of the country's annexed distilleries, and forced them to use this capacity at the same time that it guaranteed an increase in alcohol and sugar production for the domestic market.[73]

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[71]The Minister of Mines and Energy advanced this opinion at a meeting of the President and entrepreneurs interested in investing in the PNA (cf. JB, 6/8/77, no title).

Priority for the autonomous distilleries immediately met with the opposition of Copersucar, which, for reasons already given, always advocated annexed distilleries. Jorge W. Atalla, the President of Copersucar, made his protest public three months after the CDE decision, in the important forum of the annual National Sugar Producers Meetings held in Campos, Rio de Janeiro. Evaldo Inojosa, President of Coperflu, on the other hand, defended the CDE measure vigorously, believing that with the "exception of São Paulo", this measure benefits all sugar producing regions.[74]

Another question settled by the Government's move to help the sugar sector (although not by EM no. 30/77) was that of the raw material for sugar production. It should be recalled that during the gestation phase of the PNA, the use of manioc was strongly favored by the high price which sugar commanded on the international market, leading to this commodity becoming the principal export of the country at a time when the balance of trade showed a huge deficit. With the sugar crisis that followed and the decision to transform into direct alcohol a portion of the cane originally destined for sugar, sugar cane was given priority over manioc a fortiori. Nonetheless, Petrobrás continued to develop the project for the first manioc distillery, which

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[72]Later, this limit would be increased to 30%.

[73]Interview with Aloísio Nunes de Almeida, economic adviser to the Board of Directors of Copersucar, on 12/20/82, São Paulo.

[74]See "Atalla critica Governo por limitar destilarias de álcool," JB, 8/17/77; "No encontro do açúcar, maior destaque para o álcool," GM, 8/22/77.

was inaugurated at Curvelo in the state of Minas Gerais in May 1976, with an anticipated production of 60,000 1/day. The industrial technology for this project was developed by the National Institute of Technology (INT), Ministry of Industry and Trade.[75] The construction of manioc distilleries in other areas (Bahia, Goiás) was considered. However, the distillery at Curvelo encountered great difficulties[76] and never operated at full capacity. Another important distillery for alcohol from manioc was built in this period by SINOP, using technology supplied by NORDOM, a German firm. Its planned capacity was 150,000 1/day. Until 1978, these two were the only projects for manioc distilleries to be approved by the CNAl. As of November 1982, of a total of 383 approved projects for distilleries (including one using basassu, one sorghum, and three aguardente as the raw material), only 11 were for alcohol made from manioc.

The issue of manioc as the most appropriate raw material for the National Alcohol Program surfaced amidst rising hopes of implementing stated PNA objectives of reducing regional and individual income disparities,[77-78] and closed as a result of the changing situation in the international sugar market, with few voices being raised in support of manioc in the years that followed.[79] By 1979, during the Seventh

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[75] See footnote no. 74, chapter 6.

[76] The difficulties were both agricultural (problems with the production of the raw material on a large scale and the consequent shortage of raw material), and industrial (problems of adapting the technology from the laboratory to an industrial scale) in nature.

[77-78] See chapter 6, pp. 270-271.

National Sugar Producers Meeting in Campos, Rio de Janeiro, the Minister of Industry and Trade, Camilo Penna, made very clear the preference for sugar cane as the basic raw material for alcohol production. Penna stated that the target of 10.7 billion liters of alcohol set for 1985 as a consequence of the second oil shock (see chapter 8) was to be met with sugar cane alcohol, for,

> At this time, /sugar cane/ is the only source really well-known, tested, proven, and measured for alcohol production.[80]

While the question of the raw material appeared to have been defined in 1977 with the move of the Government to rescue the sugar industry, the same cannot be said of the issue of the type of distillery nor that of the best use for the alcohol produced. Thus, still in 1978, the Society of Sugar and Alcohol Producers (SOPRAL),[81] Zanini, and Petrobrás advocated the use of alcohol as a substitute for petroleum products in general, including as inputs for petrochemicals,[82] while representatives of the chemical industry expressed ambivalence about this proposal.[83] At present, the use of alcohol as raw material for the chemical industry is definitely subordinated to its use as fuel. In 1983, only .6% of total alcohol consumption was directed to the chemical industry.

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[79] Among them were the Industrial Technology Secretariat (STI/MIC) and SINOP, whose attempt to extract alcohol from manioc had apparently yielded no positive results.

[80] Speech by Camilo Penna at the Seventh National Sugar Producers Meeting, reproduced in COPERFLU, 1979: 15-21.

[81] See chapter 8, p. 379 and footnote 19.

During the same year, the advocates of autonomous distilleries, arguing for a regional redistribution of income,[84] protested the advantageous credit position given to the annexed distilleries by the CNAl. The Minister of Industry and Trade, Calmon de Sá, supported by Uéki, considered the annexed distilleries to be the only possible choice in economic terms, given the rapid expansion in alcohol production needed to make its use as a substitute for imported fuel realistic. The reasoning behind their position was that at a time of crisis in the sugar sector, the idle capacity of the usinas would be utilized at the same time that surplus cane would be used to produce alcohol. The rapid increase in alcohol production required, moreover, the expansion of the capacity of the distilleries annexed to the sugar mills, which would take advantage also of the already existing infrastructure and experience in the sector.[85] Autonomous distilleries, apart from not helping the sugar sector, would require twice the time

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[82]See "São Paulo produz este ano 65% da safra de álcool," OG, 6/25/78; "Empresário afirma ...," JB, 8/8/78; and "Governo diz ...," JB, 11/12/78.

[83]The Director of Rhodia, for example, considered that the substitution of alcohol for petrochemical naphtha would only make economic sense when oil cost US$ 23 per barrel (cf. "Uéki: Exportar álcool, para importar gasolina," GM, 12/13/78.

[84]See, for example, the statements of businessmen from Paraná and the objections from the Ministry of Agriculture (cf. "São Paulo produz este ano 65% da safra de álcool," OG, 6/25/78 and "Minidestilarias para o Proálcool," OG, 11/9/78).

[85]See "Minidestilarias para o Proálcool," OG, 11/9/78; and "Alagoas terá os primeiros postos," JB, 12/9/78.

and investment. Their claims are supported by the empirical record: the growth in alcohol production during the first phase of the PNA was due basically to the expansion and installation of distilleries annexed to already existing sugar mills (see Table 40).

The Delay in the Implementation of the PNA Continues

Despite the great boost given to alcohol production by the Government's decision to bail out the sugar sector, complaints were still voiced in 1978 about the slow pace of implementing the Program.

In that year, 3 principal causes account for the delay in the PNA:

(i) the persistent slowness in processing project proposals for distilleries.

(ii) the opposition to the Program from Petrobrás.

(iii) the lack of an infrastructure for storing and distributing alcohol.

The slow pace at which the CNAl approved project proposals during late 1977 and the first semester of 1978 is evidenced by the long intervals between commission meetings, in violation of the law stipulating they should be held at least once a month (see Table 37). Two basic reasons account for this: the delays in releasing resources for the Program as a result of the Government's anti-inflation policy, which was even acknowledged within official circles,[86] and the actions taken

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[86] See "Proálcool tem problemas," FSP, 6/11/78.

by Calmon de Sá, the Minister of Industry and Trade, whose portfolio included control over the Presidency of the CNAl.

São Paulo producers complained of CNAl delays in performing the technical appraisals of the distillery projects, as well as the timing of its meetings. Curiously enough, it was the technicians working in the National Alcohol Program who, in May, leveled the most serious accusations against Calmon de Sá. Since he had taken over the Ministry in February 1977, they charged, Calmon de Sá had been concentrating the decision-making power of the CNAl in order to undermine it (for example, only two meetings were held between November 1977 and June 1978, both in February of 1978). The criticism about the Minister of Industry and Trade forced Geisel, once again, to assume the role of the key actor in the alcohol policy decision-making process, imposing upon the "resultant" of this game of pressures and cross-pressures the direction of his preferences.[87] The process of project proposal approval by the CNAl was then speeded up; two meetings were held in June and 4 more by the end of the year. In all of 1978, projects with a total capacity of 1828.5 million liters per harvest were approved, as compared with 1071.1 in 1977 (see Table 40).[88]

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[87] On this subject, Antonio Licio, Secretary-general of the Ministry of Agriculture and an advocate of the Program and its social objectives appropriately commented: the speed at which the Program is implemented depends, fundamentally, on a political decision (cf. "O Proálcool pode ser desacelerado," ESP, 7/23/78).

[88] See "São Paulo produz este ano 65% da safra de álcool," OG, 6/25/78; "Ângelo Sá impôs redução de velocidade," RR 604, 5/15 to 5/28/78; "Lycio de Faria acha que Petrobrás perde com plano de álcool," JB, 6/28/78; "Proálcool tem mais 21 projetos," JB, 7/14/78; "Deslanchou sob pressão da crítica e de Geisel," RR 611, 7/3 to 7/9/78.

Opposition from Petrobrás to the National Alcohol Program surfaced in 1978. The statements from Paulo Vieira Belloti, the enterprise's Sales Director at the time, are particularly revealing. During the Sixth National Sugar Producers Meeting in Campos, Rio de Janeiro (August 1978), Belloti questioned the economic viability of the PNA, declaring that as Petrobrás had not been included in the Program, it should bear no responsibility for it, though it was willing to collaborate if officially ordered to do so. At the Meeting, this declaration followed criticism of Petrobrás' refusal to use its tankers to transport surplus alcohol from the Northeast to the South, something which showed up the lack of infrastructure for the distribution and storage of the commodity (see below). Having lost the battle for formal control over the Program,[89] and suffering frustration over the disappointing results from the Curvelo manioc distillery (an experiment which might have afforded an opportunity for Petrobrás to enter into the production of a liquid fuel it did not control), the distant and even hostile position of Petrobrás would not be maintained for long. In the following years, the enterprise would make other, though unsuccessful, attempts to participate in alcohol production. It would, however, succeed in taking a firm hold of the storage and distribution system.[90] As Petrobrás had exercised total control over liquid fuels in the country prior to this point, the development of a domestic fuel without its participation would put at risk its very institutional identity.

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[89]See chapter 6.

[90]See chapter 8, pp. 395-411.

The need to create an infrastructure for the distribution and storage of alcohol was the overriding question of 1978. This was unanimously considered to be the major stumbling block for the National Alcohol Program at the end of its first phase, as the production goal would easily be reached by 1980, and the technical problems associated with the use of 20% alcohol in mixture with gasoline had been solved.[91] The Minister of Industry and Trade, the MIC's Secretary-General, who was also the President of the CNAl, voiced their concern over this issue. Usineiros declared they foresaw no problems with production, but demanded guaranteed outlets for the alcohol they produced. The automobile industry claimed it could not guarantee the efficient operation of the engines unless a nationally uniform mixture was established, for which in turn an efficient system of storage and distribution was sorely needed.[92]

The inadequacy of the existing infrastructure to accomodate the alcohol produced was manifested at the beginning of the year when in Alagoas and Pernambuco there occurred a grave alcohol surplus. The situation was especially acute in Pernambuco where anhydrous alcohol production, stimulated by the PNA, increased 144% between the harvests of 1974/75 and 1976/77. Pernambuco now found itself with approximately 65% of the 35.4 million liters of anhydrous alcohol produced in this last harvest with no outlet, with no prospective market, and with no storage facilities.[93]

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[91]This refers especially to the progressive adaptation of the carburetor to accomodate mixtures with more than 15% alcohol.

[92]See "CNP diz que ausência de programação de usina torna difícil distribuir álcool," JB, 4/22/78; "Belotti: preço da gasolina inviabiliza

This alarm over a problem which could impede the successful implementation of the first phase of the PNA led to a "round of pushing" amongst government bodies whose jurisdictions extended to alcohol policy. Both the CNP and the IAA declared that it was not their responsibility to provide storage for the usineiros who received credit from the PNA for this very purpose. The IAA was legally responsible only for collecting the alcohol from the usinas, controlling its quality, paying for it, and sending it to the distributors in quantities they could absorb. The President of the CNP, Oziel de Almeida, stated that the problem was the lack not of an outlet for alcohol, which was guaranteed by the Council, but of a network of storage tanks next to the distilleries, and a better estimate of the production of the usinas. Lycio de Faria, the Secretary-General of the MIC and the President of the CNAl, blamed the usineiros for not making their plans known beforehand. Oziel de Almeida countered that the weight of the responsibility lay with the IAA.[94]

In any case, it became clear, as recognized by the President of the CNP, that neither the CNP nor the IAA could assume the responsi-

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92 (cont.)
Proálcool," OG, 8/23/78; "Energia e Desenvolvimento Regional," FSP, 10/23/78; "Mistura de álcool na gasolina pode ir a 25%," OG, 11/3/78; "Ganha regulamentação no dia da eleição," RR, 11/20 to 11/26/78.

93 See "Para produtor, álcool pode substituir em até 100% o petróleo," OG, 1/9/78; "Pernambuco não tem mercado nem armazém para álcool anidro," JB, 3/24/78.

94 See "Pernambuco não tem mercado nem armazém para álcool anidro," JB, 3/24/78; "CNP diz que não cuida de tancagem," JB, 3/29/78; "CNP diz que ausência de programação de usina torna difícil distribuir álcool," JB, 4/22/78; "Presidente do CNP garante escoamento e consumo total do álcool da próxima safra," JB, 5/29/78.

bility for the distribution and sale of alcohol at the next harvest given the large increase in the scale of production. The search for a solution once again brought to the surface the deep divisions within the Government bureaucracy. Control over the alcohol distribution system was disputed by the Distributing Companies of Petroleum Products, supported by the Ministry of Industry and Trade (MIC), on the one hand, and Petrobrás, supported by the Ministry of Mines and Energy (MME), on the other. Finally, in November, the CNP adopted Resolution no. 18/78 which conferred upon the Distributors the responsibility for acquiring fuel alcohol directly from the usinas, in a quantity pre-set in the monthly quotas determined by the CNP, and to transport it to the mixing centers. Thus, the IAA lost yet another of its activities related to alcohol policy.[95] Petrobrás would act only through its Distribution Subsidiary. However, the dispute for control over the distribution system did not end here; the CNP Resolution was only a "stop" in the round of pressures and cross-pressures exerted over this issue. It would unfold further in the years ahead.[96]

Summing Up

The implementation period of the first phase of the National Alcohol Program was essentially a period of regulation, characterized by on the one hand the establishment of the first set of norms gov-

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[95] See Volume I, pp. 180-184.

[96] See chapter 8.

ning the more general aspects of the Program, such as the terms of financing projects to expand raw material production and the expansion or installation of alcohol distilleries, and, on the other, the regulation of unforeseen aspects which cropped up once the Program was functioning, such as the collateral demanded by the Financial Agent, the simplification of the process of analyzing proposals for distilleries, and the adjustment to the inflation rate of the value of authorized credit. Some of these aspects were addressed in Decree no. 80,762 of November 18, 1977, which consolidated the provisions of the National Alcohol Program. However, many others would not be resolved in the first phase of the Program. Rather, the constant interaction between the dynamics of the power game and the revisions of the norms and legislation of the alcohol policy would continue in the following years.

It has also been seen that the complaints about the delay in the Program persisted throughout this entire period, even after it was evident, in late 1977, that the alcohol production goal would be met. This success was explained principally by the stimulus of a very weak international sugar market during this period, coinciding with substantial idle capacity in the São Paulo distilleries, and, to a lesser extent, by the expansion of both the area planted with cane and the capacity of the annexed distilleries. However, both the rapidity with which the idle capacity of the São Paulo distilleries was put to use, and the investments made for expanding productive capacity,[97] can be

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[97]The producers of São Paulo, for instance, reportedly assumed the costs of the projects to expand the capacity of the annexed distilleries

ascribed to the sugar crisis. High inventories attracted sugar producers into the game, leading them to actively pressure for better incentives (favorable alcohol prices and credit terms) and the quicker release of investment capital for building distilleries.

Various causes were cited for the delay in implementing the Program. In the first years of the mixed carburant phase the priority concern was to speed up the expansion of alcohol production to meet the target of 3 billion liters in 1980, making the 20% alcohol-gasoline mixture possible. The principal factors restraining the expansion of alcohol production were: (i) the complexity of the process of analyzing proposed distillery projects -- a result of the extreme fragmentation of the decision-making for alcohol policy -- which brought about several negative concomitants of a lengthy processing period (delays in the start-up of distillery production, financial losses for the usineiros and equipment producers, and an erosion of the value of credit once finally released by a soaring inflation); (ii) the Government's anti-inflation policy, which entailed holding back resources already allocated to Proálcool; and (iii) a price for alcohol paid to the producers which they considered insufficient. Despite the slow pace of the Program's implementation, however, the production goal was met in terms of approved projects. Yet, at the end of this period, it became apparent that the system for distributing and storing alcohol had been overlooked. While the capacity to produce anhydrous alcohol for mixture in an ever increas-

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97 (cont.)
without waiting for the release of funds by the Financial Agent, which, as has been seen, was painstakingly slow.

ing proportion with gasoline was being developed, no accompanying means were devised to deliver alcohol for the preparation of gasohol on a rational basis.

No cause for the delay in the implementation of the PNA was more important than the ambiguity of its objectives and even the opposition it met with from some segments of the Government bureaucracy involved with the alcohol policy. This ambiguity led to bureaucratic obstacles which touched upon and exacerbated all other causes of delay. At the end of this period, 3 basic positions on the PNA, or the use of alcohol as a fuel, can be seen:

> (i) Taking into account the costs and economic viability of the Program, the Ministry of Mines and Energy (through the Minister, Shigeaki Uēki) and Petrobrās (through its Sales Director, Paulo V. Belloti) opposed the use of alcohol as fuel. This position was supported by studies of the economic viability of the PNA by the Getúlio Vargas Foundation and the World Bank, brought to public attention at the beginning of 1978. Both considered the Program economically inviable. The World Bank Report, for example, concluded that the cost of a liter of alcohol in the distillery was Cr$ 3.40, about twice that of gasoline or diesel. Alcohol could compete with these two products only if world oil prices rose substantially. Accordingly, Uēki and Belloti felt it made more sense to substitute oil for oil, that is, to give priority to oil exploration and production within Brazil (increasing Petrobrās' activity and the number of risk contracts). As Uēki's proposal to use alcohol primarily as raw material for the chemical industry had been "defeated" by the Government's move to rescue the sugar industry in 1977, he considered the next best alternative to take advantage of foreign trading opportunities, for example, to export alcohol (or sugar if the price were high) and import gasoline.

Belloti, diverging slightly from Uēki, defended the development of alternative sources of energy concurrent with exploring for oil on the grounds that the prices on the international market would not always favor such an import-export strategy.

(ii) The Ministry of Industry and Trade (mainly through the Secretary-General and President of the CNAl, Lycio de Faria,[98] and the Ministry of Agriculture (through its Secretary-General, Antonio Licio) defended the PNA as a means to achieve independence in energy supplies. Furthermore, they argued, whatever the comparable price of alcohol might be, oil was purchased in dollars at a time when the country's fundamental goal was to produce a surplus in the balance of trade. Other defenders of the Program pointed out that as agricultural productivity improved and the technology of alcohol production was perfected,[99] the price of alcohol would drop in comparison with that of gasoline.

(iii) Mario Henrique Simonsen, the Minister of Planning, adopted an intermediate stand, namely, that the National Alcohol Program represented an important safeguard against other oil crisis which could occur. According to the Minister:

> "We plan to stop at a mixture of 20% after 1980, but we shall have developed the infrastructure and technology to expand further in the next decade should there be a crisis."100

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[98] Despite the criticism aimed at Calmon de Sá in early 1978 for CNAl slowness in processing proposals for projects, his public statements always supported Proálcool.

[99] See, for example, the statements by Melvin Calvin, Nobel Prize-winner for chemistry, and Candido Toledo of the Syndicate for the Sugar and Alcohol Industry of Alagoas, at the Sixth National Sugar Producers Meeting, August, 1978. ("Belotti: preço da gasolina inviabiliza Proálcool," OG, 8/23/78.)

A fourth position was staked out by the Ministry of Agriculture, whose priority concern focused on the social objectives of the PNA. At the end of 1976 a document was forwarded to the Economic Development Council (CDE) accusing the Program of neglecting its social objectives, in that resources were being concentrated in the more prosperous regions of the country. The MAG was strongly supported by José Bautista Vidal, the Secretary heading the Industrial Technology Secretariat (STI/MIC). This current of thought in the government bureaucracy defended the application of resources to the poorer regions, the use of unconventional raw materials, and small distilleries. The other current, of which the MIC and MME formed a part, considered that the quickest and cheapest way to expand alcohol production rapidly was to give priority to annexed distilleries, sugar cane, and the Center-South region, in order to take advantage of the already existing agricultural and industrial infrastructure and the region's other advantages (more resources, greater industrial capacity for alcohol production, and closer proximity to consumer markets). In response to criticism from the MAG, the Secretary-General of the MIC asserted that the National Alcohol Program was, above all else, an economic program.[101] To integrate the small holders and small cooperatives,

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[100]See Norman Gall, "O que o Álcool pode (e não pode) fazer pelo Brasil," JB, 9/24/78. For a view of the ambiguity displayed by the government bureaucracy toward the objectives of the PNA, see Altino Tavares, "Álcool mas sem exageros," BANAS, 12/11/78, as well as "Demanda reprimida aumentou as vendas," RR 623, 9/25 to 10/10/78; "Esperanças no Proálcool," GM, 12/13/78; "Uéki: Exportar álcool, para importar gasolina," GM, 12/13/78; "Uéki afirma que Brasil já está exportando álcool," OG, 12/16/78; "Belotti defende um preço subsidiado para o álcool," ESP, 12/14/78; and "Programa nuclear e política energética," JT, 11/14/78.

the MIC proposed the installation of mini-usinas (5,000 to 10,000 liters/day, using technology developed by the STI) in non-sugar producing regions, and the setting up of a special financial scheme. In effect, this proposal amounted to a separate program, intended to not interfere with the economic objective of the PNA.[102]

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Taking all these difficulties into consideration, the fulfillment of the goal set for alcohol production in phase one of the PNA (3 billion liters in 1980) substantiates the phrase that was to become famous expressed by the usineiros in December 1978 at the Conference panel "O Proálcool e a Indústria Automobilística" (Proálcool and the Automobile Industry), sponsored by ANFAVEA: "Alcohol is doing well in spite of Proálcool."

Attaining a uniform mixture of 20% alcohol - 80% gasoline in all national territory, however, would be blocked by the inadequacy of existing alcohol storage facilities and distribution networks. São Paulo, already by the end of phase one, did develop an efficient system for alcohol storage and distribution. This system counted with the essential cooperation of Petrobrás[103] and enabled meeting the 20% alcohol target for the gasohol mixture within state borders.

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[101] See "O Proálcool pode ser desacelerado," ESP, 7/23/78; "Projetos do proálcool darão cerca de 5 milhões de litros," JB, 12/13/78; "O futuro do Proálcool divide os Ministérios," FSP, 12/23/78; and "Minidestilarias para o Proálcool," OG, 11/9/78.

[102] See "Minidestilarais para o Proálcool," OG, 11/9/78; and "Projetos do Proálcool darão cerca de 5 milhões de litros," JB, 12/13/78.

[103] See chapter 8, pp. 395-411.

The second phase of Proálcool, that of alcohol-fueled cars, began with a great number of problems inherited from phase one, and faced the major difficulty of getting the automobile industry engaged in the Program.

Both the Aerospace Technological Center (CTA) and the automobile industry conducted research to develop an internal combustion engine propelled by alcohol. By 1978 there were already various state enterprises (TELESP, COPEL, TELEBRASILIA, and so forth) using a total of between 500 and 700 cars with engines adapted for the exclusive use of alcohol.[104] In November of the same year, at a meeting with the STI, the automobile manufacturers decided to form a pool with the objective of producing an experimental fleet of vehicles using alcohol.[105] However, when requested by the MIC to enter the second phase of the PNA, the automobile industry, both individually and through their interest group, ANFAVEA, repeated throughout 1978 their declaration that they would be ready technically in 2 or 3 years provided the Government guarantee it would remain firmly committed to the Program, and if an infrastructure for the distribution of hydrated alcohol was created.[106]

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[104] See "500 veículos andam apenas com álcool," JB, 5/29/78.

[105] See "Fábricas produzirão frota de teste," ESP, 11/18/78.

[106] See "Mistura de álcool na gasolina pode ir a 25%," OG, 11/3/78; "Industria só começa a produzir em 1980," RR 632, 11/27 to 12/3/78; "Futuro pagará bem caro pelo atraso do Proálcool," FSP, 8/24/78; "A Era do Álcool já está aí. Mas seus automóveis só daqui a dois anos," JB, 9/5/78; and "Belotti defende um preço subsidiado para o álcool," ESP, 12/23/78.

At the end of the year, at the panel discussion sponsored by ANFAVEA mentioned above, the Minister of Industry and Trade publicly called upon the automobile industry to cooperate with the Government in the implementation of the second phase of the Program.[107] As the full use of anhydrous alcohol was predicted within a few years, the continued expansion of alcohol production would depend basically upon the commitment of the automobile industry. But, in the view of the automobile manufacturers, it would depend equally upon the commitment of the Government.

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[107]See "Esperanças no Proálcool," GM, 12/13/78.

PART VI

THE DECISION-MAKING PROCESS OF THE NATIONAL ALCOHOL PROGRAM: THE PHASE OF PURE ALCOHOL-FUELED CARS (1979-1982)

CHAPTER 8

Launching the Phase of Alcohol-Fueled Cars: The Second Oil Shock

With the Iranian Revolution at the end of 1978 and what has been called the second oil shock during the first half of 1979, the Brazilian government initiated the second phase of the National Alcohol Program. The decision to proceed with the Program's second phase was prompted by not only the turmoil in the international oil market, but also by the expectation of completing, in the near future, the first phase of the Program, whose goal was the production of the 20% anhydrous alcohol-80% gasoline mixture. By the end of 1978, the capacity to absorb the production of anhydrous alcohol was nearing exhaustion. Any further expansion of alcohol production would depend on the success of hydrated alcohol-propelled cars.

The transition from phase one to phase two of the National Alcohol Program coincided with the end of the Geisel administration and the beginning of the presidential term of João Figueiredo. Although the first steps toward the formulation of phase two were taken in 1978, it was the Figueiredo government which was primarily responsible for its implementation and promotion.

This chapter will deal with the macro-parameters -- oil, sugar, energy, and economic policies -- which would orient decisions concerning the National Alcohol Program (section one), and the challenges encountered in lauching phase two of the Program (section two).

8.1. Parameters of Decision[1]

Reacting to the Second Oil Shock:

The relative stability of the international oil market during the preceding three years had, in fact, been deceptive. Political strains among Arab members of OPEC were severe and pervasive. Their political differences spilled over into the economic arena: Saudi Arabia, Iran, and Iraq disputed the control of the oil market, disagreeing over price increases and production levels. In the Middle East at this time all countries began "to acquire arms on a very large scale, beyond any previous level, for every cause and from every supplier" (Choucri, 1982a: 30).

The Iranian Revolution erupted in November, 1978. When the Shah was finally forced to leave the country, one of the first measures taken by the new government was to cut oil production by 2.7 million barrels/day. Although this reduction did not represent a significant proportion of total OPEC production, it triggered swift and wide-ranging reactions. The Majors, fearing a spread of the Iranian Revolution, began to build up stocks and cancel sales contracts. Some countries increased production to full capacity, others restricted production, but all intended to take maximum advantage of the high price of the commodity (cf. Choucri,

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[1]This section is based on information gathered from Petrobrás Reports 1979-1981 and various issues of the Petroleum Economist, Brasil Açucareiro, Saccharum, Inazucar, La Indústria Azucarera, Boletim Informativo da Administração Geral do Açúcar e do Álcool, Agroanalysis, Visão, Negócios em Exame, and Relatório Reservado for the years from 1979 to 1982. It also draws heavily upon Choucri, 1982a.

1982a: 30,32). Prices doubled on the spot market in eight months and the official price rose several times during 1979. By the end of that year the price of "Arabian Light" had reached US$36.28 per barrel on the Rotterdam spot market and the official price had been fixed by OPEC at US$24.00, as compared with US$12.85 and US$12.70, respectively, in October 1978.[2]

In Brazil, the second oil shock came at a time when 41.6% of the nation's energy supply was derived from oil, only slightly less than at the time of the first oil shock (42.8% in 1973). Furthermore, oil consumption continued to increase rapidly and domestic production was only just beginning to recover after a decline in previous years due to the depletion of the Recôncavo Bahiano wells. This drop in production had not yet been compensated by increases in the Campos basin (see Table 11 and Figure IV). At this juncture, the country imported about 1 million barrels/day of oil, which, setting aside variations in inventory levels, corresponded to approximately 85% of Brazil's total oil requirement.[3] The interruption in Iranian oil exports in December 1978 meant for Brazil a loss of about 40% of its total imports of crude. As a result, some emergency measures were taken: new suppliers were found (Venezuela and especially Iraq), Petrobrás deliveries of fuel oil were reduced by 10% and of diesel oil by 5%, and fuels were subject to another price hike.[4]

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[2] International Crude Oil and Product Prices (Beirut, Lebanon) and Petroleum Intelligence Weekly. See also Figure III.

[3] See Minister of Mines and Energy, Balanço Energético Nacional, 1982.

[4] See Brazil: Caught in Supply/Demand Squeeze", Petroleum Economist, Vol. XLVI (April 1979), No. 4.

Although the increases in the price of oil were substantially greater (and at more frequent intervals) during the first oil shock - when the price of crude practically quadrupled between October 1973 and January 1974 - than during the second - when they doubled during 1979 and rose another 23% in the following year - the repercussions of the second oil shock in the economies of the oil importing countries were more profound, for now the initial price level was four times higher (US$ 12.7 for Arabian Light in December 1978) than the October 1973 level (US$ 3.00 for Arabian Light). Between 1978 and 1979, Brazil's import bill increased by 32%, due mostly to oil, and, in spite of a remarkable growth in exports (about 20%) the balance of payments deficit almost tripled. Despite a sustained influx of foreign loans, in 1979 the balance of payments showed a deficit of US$ 3.2 million, in marked contrast to a surplus of US$ 4.3 million in 1978. The net external debt rose 24%, from US$ 19.4 billion in 1978 to US$ 24.8 billion in 1979. Inflation, which in 1978 had already passed the 40% mark, skyrocketed to 77% in 1979 (see Tables 4, 5, and 7).

When OPEC imposed a new round of price increases (US$ 18/barrel for "Arabian Light") in June of 1979, representing the third of the year, and yet further increases were anticipated, President Figueiredo, in a historic speech to the nation, declared the country to be in a state of "wartime economy":

> Because of the /adverse/ effects on the balance of payments, the energy question, together with combatting inflation, the scourge of wage earners and destroyer of social harmony, assume maximum priority in my administration, as well as the development of agriculture, indispensible for an improvement in the level of nutrition of the people, and the creation of a surplus for export.[5]

In order to coordinate energy policy, the National Energy Commission was formed with the aim of "establishing directives for rationalizing energy consumption, increasing domestic oil production, and substituting other energy sources for oil." The Commission was chaired by the Vice-President, and the Minister of Mines and Energy served as Executive Secretary. Other members included the Ministers of Finance, Agriculture, Transport, Industry and Trade, Planning, and Social Communication; the head of the Military Cabinet, and the Secretary-General of the National Security Council; the Presidents of the CNP, Petrobrás, and Eletrobrás; and three citizens of "unblemished reputation and well-known for their knowledge of the energy field." Conspicuously absent from this list was the President of Nuclebrás. The proposed energy policy and its priorities can be summarized as follows:

1. The country does not and will not depend on oil for the generation of electricity; hydraulic potential will be fully exploited for many years, and when that runs out, it will be replaced with nuclear energy.

2. The country's great dependence is on liquid fuels:

   2.1. The best substitute for imported oil is domestically-produced oil.

   The top priority for oil policy is, therefore, to substantially increase production, whether by stepping up research and exploration, or by extending the areas opened for risk contracts.

   2.2. Substitutes for petroleum products must be found.

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[5]The text of Figueiredo's speech was published in the Jornal do Brasil of July 5, 1979, under the title "Figueiredo diz que petróleo impõe economia de guerra" ("Figueiredo says that oil imposes a wartime economy").

- an alternative solution should be sought which offers the best return on investment; petroleum is still in fact the cheapest fuel, but the tendency for prices to rise and the need to reduce the country's dependence on imported energy sources are cause for replacing it.

- the substitution of alcohol (the production goal for alcohol will be increased to 10.7 billion liters for 1985) for gasoline and of coal for fuel oil (in industries with extensive use of this fuel) and also for naphtha on a large scale and at an acceptable cost shall be evaluated immediately. The feasibility of replacing diesel oil is still technically and economically uncertain (see below). However, the refining structure of Petrobrás will be adjusted in the medium run to increase the production of diesel.

3. Energy conservation measures in general, especially of imported fuels.

Both the Third National Development Plan, published in September 1980 and the Ministry of Mines and Energy's Brazilian Energy Model of 1979 and 1981 conformed in essence to the energy policy proposed by Figueiredo and approved by the CDE. A distinctive feature of this policy, in contrast to the energy policy formulated in response to the first oil shock, was the objective of effecting a general substitution of all petroleum products. Thus, the National Alcohol Program was given a big boost. Fuel oil began to be replaced in various sectors of industry (especially cement and steel works), mostly by coal, but also by wood and charcoal. Finding an alternative to diesel was more problematic; a policy for the substitution of this product has never really been accomplished (see below).

In fulfillment of the energy program, there followed a massive effort to increase oil production. Petrobrás doubled its exploration activities and increasingly authorized risk contracts. By the end of 1981,

it had invited six rounds of international bidding. From 1979 on, domestic companies, private and state owned, were also allowed to bid.[6] In all, 102 risk contracts have been signed since 1976, when they were first allowed. The conditions of these contracts were made more attractive following the lack of response to the 1979 rounds. Especially important was Figueiredo's decision at the end of the year to open up for risk contracts all sedimentary areas not being explored by Petrobrás. The international oil companies could also participate in oil development and production if commercial fields were discovered. In 1981, the Smith Fool Co. (United States) considered Brazil to be the fifth most active country in drilling wells, covering approximately 800,000 meters in 1980 and more than one million in 1981. However, of the 82 wells in operation by the end of that year, only three did not belong to Petrobrás. Moreover, of the 55 drilling sites under risk contract, only one had showed positive results.[7] Despite disappointing results, more and progressively larger sedimentary tracts were offered for exploration under risk contract in the anticipation that some would eventually produce significant discoveries of oil.

From 1980 on, crude production expanded continuously, each year setting new records with the ever-increasing returns on the wells in the continental shelf of Campos, and the partial recuperation of the land wells of the Recôncavo Bahiano. Production rose from 160,000 b/day in

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[6] Risk contracts were signed with several international firms, among them EXXON, British Petroleum, Elf Aquitaine, and Shell. The CESP/IPT consortium was the most prominent of the domestic firms (see Chapter 7, footnote 7).

1978, to 214,000 b/day in 1981, with the expectation that levels of 500,000 b/day could be reached by 1985.[8] Furthermore, proven reserves in 1981 amounted to 1.44 billion barrels, as opposed to 1.34 billion the previous year.

A consumption limit of 1 million barrels per day was established for 1985; any energy needs beyond this were to be satisfied by alternative sources. Consumer price increases were used as an important policy tool to discourage consumption of petroleum products. From 1979, the number of price increases per annum rose, although the price of gasoline in real terms did not increase by more than 1.2% between 1979 and 1980, and actually fell by 11.8% between 1981 and September of 1982. Consumption declined about 22.1% between 1979 and 1982. The price of diesel oil in real terms decreased by 27.5% between 1979 and 1980, while consumption increased at approximately the same rate as during the pre-1979 period. In the next two years, this tendency would show signs of reversal, with prices rising more than 30%. In all, consumption of diesel oil grew 6% between 1979 and 1982. The policy of increasing prices would, however, be applied more coherently to fuel oil. Both the prices of high/low-pour point oils and of low sulphur content oil increased by 136% between 1979 and September of 1982. Total consumption of these oils dropped by about 30.9% between 1979 and 1982 (see Tables 13 and 17, and Figure VI).

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[7]The discovery was made by the Pecten/Chevron/Union Group on the southern coast of Bahia of a 1,000 b/d well (31st). The group is currently developing a drilling program to test whether the field is of economic value (see Frank E. Niering, Jr., "Brazil: steady rise in oil production", Petroleum Economist, vol. XLIX, no. 4 (April 1982)).

The exponential growth in crude oil consumption of the late 1960s and 1970s levelled off in 1980 and thereafter declined. From a peak of 1.1 million barrels/day in 1979, it had by 1982 fallen to a little more than 1 million (see Table 11 and Figure IV).

As a result of the combined growth in domestic oil production and the decrease in consumption, oil imports dropped from approximately 1 million barrels/day in 1979 to around 800,000 barrels/day in 1982. A target of 750,000 barrels/day was set for 1985. The reduction of consumption, however, was less the outcome of an effective oil substitution policy than a consequence of a severe economic recession (with a -1.9% rate of GDP growth in 1981) and the policy of price increases. First, unlike gasoline and fuel oil, an alternative to diesel was never agreed upon. Decision-makers were divided between advocates of vegetable oils and alcohol with additive, and a final decision was always postponed. Any need to hasten a resolution of the issue was alleviated by the success of adapting the Petrobrás refineries and the "Bottom of the Barrel Program" (Programa Fundo de Barril)[9] - which together were

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[8]According to the Petroleum Economist (vol. XLIX, no. 7, July 1982, p. 303) the target of 500,000 b/d in 1985 can be met only with new discoveries. The capacity of the existing fields is 465,000 b/d, but these would dry up in 10 years. In fact, the target was met in mid-1984.

[9]The CNP decision no. 13 (July 31, 1979) lowered the flash point (indicator of the proportion of light products) of diesel oil. Resolution no. 7 (January 22, 1980) subsequently abolished the specification of the flash point for diesel, except for marine engines. These Resolutions made it possible to add naphta and surplus gasoline (generated by the drop in consumption and its substitution with alcohol) to diesel. In addition, Petrobrás, as part of the "Bottom of the Barrel Program" extracted more light products from fuel oil during the refining process, and added them to diesel as well. In this way, the volume of diesel produced was increased, and relatively inexpensive fuel oil was imported

responsible for a higher allocation of refined oil to diesel - and a sales policy which promoted the export of the more expensive light products and the import of the cheaper, heavy ones.[10] Thus, interest waned in replacing diesel oil, and solutions for technical and economic problems were sought merely as an "insurance policy".[11] Secondly, the programs for the substitution of petroleum products slowed down principally for two reasons: (1) the critical situ-

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9 (cont.)
to satisfy demand. Table 16 demonstrates the changes in the refining structure of Petrobrás to the advantage of medium products. It should be noted that whereas the percentage of refined gasoline fell noticeably between 1975 and 1980, after which time it rose again, the proportion of fuel oil remained more or less constant until 1979, when it decreased significantly. In contrast, the proportion of refined diesel increased steadily, from 27.8% of total refined products in 1975 (as compared to gasoline's 31.2% and fuel oil's 31.5%) to 37.6% by October 1982 (when gasoline dropped to 26.5% and fuel oil to 25.8%).

(Interview with Antonio Heraldo Camara Porto, the Assistant Superintendent of Petroleum of the Sales Department, Petrobrás, on 10/27/82, Rio de Janeiro. Additional information was provided by Marcelo Madeira, Department of Energy, FINEP/SEPLAN).

[10]Note the single great leap in gasoline exports in 1978, a consequence of the oil product substitution policy in effect from 1975 to 1978. The second great jump, which occurred in 1980 and was sustained during 1981, is attributable to the "Bottom of the Barrel Program". The value of exports during 1980, 1.5 million cubic meters, and 1981 (to September), 1.2 million cubic meters, was US$ 384 million and $US 273 million, respectively (see Tables 14 and 15).

[11]Vegetable oils as substitutes for diesel have been studied by the STI and the Military Institute of Engineering, as well as by the self-driven vehicle manufacturers, especially Volkswagen. According to technicians of that firm, the use of vegetable oils in diesel engines has been technically solved. First, because vegetable oils are not such an "aggressive" fuel as alcohol, they do not cause the same serious problem of corrosion. Secondly, each type of oil forming a fuel with different characteristics can be corrected by a standardization process. Thus it is entirely possible to substitute these for diesel without any perceptible difference to the consumer. However, it should be noted that acrolein is produced by the burning of fuel oil, and that when discharged from exhaust pipes, results in an irritating effect similar to that of tear gas.

ation of the economy, which caused consumption to decline and, as a consequence, the program's production goals to be revised,[12] as well as a restriction of public expenditure;[12a] and (2) changes in the world price of oil, which after the sharp rise in 1979 and the less severe increases of 1980, stabilized and even declined in 1981 in real terms (see Figure III).

The Test of Adjusting to the Second Oil Shock

According to Choucri (1982a: 32, 34), the manoeuvres on the part of various producing countries to increase further the price of oil after the 1979 shock triggered an intra-OPEC fight to regain control over the market. Whereas Saudi Arabia attempted to achieve a uniform price, other producers continued to press for additional premiums. OPEC lost control of the market at the same time that the power of the Majors to act as brokers between producers and consumers weakened.

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11 (cont.)
Research has been conducted on alternative methods for diesel substitution by other auto manufacturers: double injection (alcohol and diesel) in the engine, by Volvo and MWM; alcohol with additive, by Mercedes Benz (which also did research on vegetable fuels) and, to a lesser extent, Scania.

According to Eduardo Celestino Rodriguez, Coordinator of the Special Group of the CNE (the Group responsible for elaborating the policy for non-conventional fuels), there is no immediate economic need to replace diesel oil, given the success of the change in the refining structure of Petrobrãs together with its sales policy for petroleum products (see above). Replacing diesel oil with vegetable oils would, moreover, present additional problems. Large quantities of glycerol would be produced by the transesterification of the vegetable oils (about 30% of the volume of the processed oil), for which there would be no market. Further, this chemical process itself would require a substantial volume of alcohol (about 30% of the volume of the processed oil).

(Interviews with Georg Pischinger and Rolf W. Sickmann, respectively the Manager of the Research Division and the Manager of the New Technology and Energy Techniques Department of Volkswagen, on 12/14/82, São Paulo. Supplemented by information from Marcelo Madeira, Department of Energy, FINEP/SEPLAN.)

Overall demand for oil dropped quickly and significantly. The primary explanation for this drop in demand was the world economic recession, but other factors such as the success of energy conservation measures in consumer countries, the fruition of investments in alternative sources, the increase in oil production from outside OPEC (Mexico and the North Sea, for example), and the use of stocks on the part of the Majors, also contributed. In 1981 prices began to level off, stabilizing at US$ 34/barrel at the end of this year, and remaining constant throughout the following year. It therefore became clear that consumers could manipulate demand. The hegemony of OPEC over the international oil market appeared to have weakened considerably. Accordingly, consuming countries resumed the posture that predominated in the period immediately preceding the second oil shock: the worst was over, and what remained was the necessity for the economies of these countries to absorb the effects of the second oil shock.

Readjusting its economy has been an arduous task for Brazil, for as noted above, the effects produced by the second oil shock were far more dramatic than those following from the first oil shock.[13] While high rates of inflation and Balance of Payments problems did not originate with the oil shocks, they were exacerbated by them. In 1980

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[12] In 1981 government authorities acknowledged that the target for alcohol production for 1985 of 10.7 billion liters would not be met.

[12a] To be sure, while the PNA suffered from a lack of federal resources as early as 1981, the cut in public expenditure on other alternative energy programs was noticeable only in 1983.

[13] For an analysis of the energy policy formulated in response to the first and second oil shocks, and the implications of oil price increases for government economic policy, see Castro, 1982.

inflation passed the 100% mark, in 1981 dropped slightly to 95.2% (see Table 5), and in 1982 rose again by a small margin. In 1979, the balance of trade registered a deficit of 2.8 billion dollars. In 1981, however, was achieved a surplus of 1.2 billion dollars, and in 1982, a more modest surplus of 780 million (see Table 4). This recuperation was remarkable, especially when it is taken into account that Brazil is a developing, oil-importing country which suffered a severe deterioration of its exchange rate after the second oil shock (see Table 8 and Figure V). These results in the trade balance can be ascribed to successful efforts to increase exports and to cut back on the volume of imported oil. If, as the new situation in the international market suggests, expenditures on oil do not increase in the next few years, and if exports maintain current growth rates, the major problem Brazil must face will be to pay its ever increasing debt service (interest plus amortization of foreign loans), which each year makes a positive balance of payments more difficult to achieve. The increasing recourse to foreign loans to absorb the effects of the second oil shock while maintaining high growth rates - the policy pursued by the government until very recently - more than doubled the debt service between 1978 and 1982 (from 8.1 to 19.5 billion dollars). The gross debt increased from 43.5 to 69.6 billion dollars over the same period, soaring to 81.3 billion dollars in 1983. The net debt rose in similarly alarming proportions, for as the gross debt escalated, foreign exchange rates were kept at fairly constant levels (see Table 7).

The attempt to control inflation and the need to score large surpluses in the balance of trade to finance the debt service, which in turn required the imposition of controls on imports and subsidies for

exports, led the government to adopt a policy of rigid restraint on public expenditure. This policy has slowed down alternative energy programs for replacing oil products, given that concern over the country's energy vulnerability has waned during recent years with the stabilization and even decline in real terms of world market oil prices. In 1982, with a significant decrease in the number of projects approved by the National Alcohol Executive Commmission (CENAL) (see Table 38), the only funds allocated to Proálcool came from the World Bank.

Sugar: No Longer the Primary Product of the Sugar Cane Agro-industry

Sugar, the other basic parameter of decision of Proálcool, would not play as crucial a role in bringing about the increase in alcohol production during this period as it did during the implementation of the gasohol phase. This is true despite the fact that after a brief period of favorable prices from mid-1979 to the end of 1980, the price of sugar on the world free market declined continuously until mid-1981, when it has fallen to the same low level as during 1977 and 1978 (see Table 19 and Figure II). However, while consistently low sugar prices in recent years did not catalyze alcohol production for reasons to be seen below, they did play a decisive role in interrupting the "discrediting phase" of the Program, when consumers turned their backs on the alcohol car (see Chapter 9).

Beginning in mid-1979, sugar prices began to recover from a 3 year slump on the international market (with levels as low as from 7 to 8 cents per pound) (see Table 19 and Figure II). According to experts,

the new situation was more imaginery than real in that at no time was there a shortage on the commodity market. Among the factors which combined to destabilize the sugar futures market and force up prices were: consumption outstripping production in two successive harvests, 1979/80 and 1980/81; harvest failure in the USSR, an important importer of sugar, which strained demand more than usual; the attack by rust of Cuban plantations (Cuba was one of the world's largest exporting countries); and the metamorphosis of some major exporting countries (Mexico, India, and Thailand) into importing countries. In light of these circumstances, the price of sugar reached 40.5 cents per pound in October 1980. However, the ratification of the International Sugar Agreement by the United States, finally realized in November 1979, allowed the ISA's defense mechanisms to be put into action (such as the relaxation of export quotas, restrictions on imports by non-members, and, above all, the releasing of special stocks), thus minimizing the possibility of a shortage. This, combined with the reduction in sugar consumption in the industrialized countries and the increased use of natural sugar substitutes (especially corn syrup)[14] which, according to experts, represented a structural change on the world free market, contributed to the reversal of the price tendency on this market. Rounding out the equation were conjunctural factors, such as the recuperation of the crop in countries where the harvest had failed because of poor climate or pests, and the high output of the sugar beet harvest of the European Economic Community. Prices began to fall in November 1980 and, by mid-1982 had slumpted to the low level of the years prior to the 1979/

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[14] See chapter 6, p. 227 and footnote no. 21.

80 peak. The persistence of low prices in the world sugar market through 1983 is generally attributed to the United States' sugar protectionist policy and to the European Economic Community's policy of subsidizing the sugar costs of its members while refusing to adhere to the International Sugar Agreement, thus undermining ISA defense tools. Other frequently cited causes are the world recession and high interest rates in the international financial market.

While sugar prices began to climb in the middle of 1979, in Brazil the market was perceived as strong only in the Crop Plan for 1980/81. Prior to this, the sugar market was likened to a recuperating patient whose cure had yet to be defined. On the other hand, by the time the Crop Plan for 1981/82 had been defined, the upward tendency of sugar prices had already been reversed. During the ephemeral high price period, an attempt was made to export the maximum volume possible of sugar, with a view toward improving the country's trade balance - a major objective of national economic policy as seen above. In fact, while sugar production increased by 18% during the 1979-1981 period, beginning from a level of 7 million metric tons in 1979, exports grew by approximately 37% in the same period, reaching about 2.7 million metric tons in 1981. The value of exports in these years were approximately US$ 1.3 billion in 1980 and US$ 1 billion in 1981. In 1982, in contrast, while the volume of sugar exports was slightly higher than 1980 and 1981 levels (around 4%), the value of those exports was down almost 60% (US$ 594 million) (see Tables 20 and 21).

The peak period for sugar prices on the world market coincided, however, with the second oil shock. The production as well as exports of

sugar suffered the effects of the oil price hikes. Authorized production levels for the 1980/81 harvest fell short of the country's capacity.[15] Also, beginning in 1979, the expansion of sugar cane harvested area was directed mostly to alcohol. Ground cane previously directed to the manufacture of sugar was also diverted to alcohol production. The stabilization of sugar production levels resulting from alcohol production was a fact acknowledged by sugar experts.[16-17]

When the Iran-Iraq War broke out in September 1980, the Iraqi oil supply to Brazil represented nearly 50% of the country's daily import volume of 900,000 barrels.[18] Not surprisingly, the Iraqi cutoff led the country to the verge of panic. Raw sugar exports from the Center-South region were cancelled, and new sugar sales contracts were temporarily suspended. Consumers rushed to buy alcohol cars. The demand was so strong as to double alcohol car production in four months and to spur the automobile industry to finally engage in the Alcohol Program (see Chapter 9). In December 1980, 75% of the 42,700 cars sold were powered by alcohol, evidence of the reinforcing effect which the Iran-Iraq War had on the push toward alcohol.

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[15] According to Mont'Alegre, the country was capable of producing 11 million tons of sugar at the harvest of 80/81. However, the IAA authorized only 7.8 million tons (cf. Mont'Alegre, 1981).

[16-17] "Agricultura: Perspectiva no Mercado Internacional", Agroanalysis, Vol. 4, no. 6 (June 1980): 2-14; and Mont'Alegre, 1981.

[18] Niering Jr., 1980.

When sugar prices began their decline in 1981, the National Alcohol Program was sufficiently structured to serve as a safety valve for the sugar sector. Stated another way, mechanisms to increase alcohol production were already in operation. Thus, no substantial increase in sugar production followed the period of high prices, nor did stocks pile up as had happened during the mid-1960s and the 1976-78 period (see Table 21 and Figure 1).

Alcohol became at least as, if not more, important than sugar for the cane sector. A good indicator of its rising significance is the fact that statements issued by the Ministry of Industry and Trade and the Institute of Sugar and Alcohol at the important National Sugar Producers Meetings, held each year in Campos, Rio de Janeiro, at the initiative of COPERFLU, dealt almost exclusively with the National Alcohol Program. Similarly, expert analyses of the domestic sugar market began to include problems of alcohol and Proálcool. In the same way, estimates of production and consumption on the world free market came to include the possibility of substituting alcohol for oil, especially in Brazil. The growing importance of alcohol in the sugar cane agroindustry can be measured concretely by the proportion of total ground cane that is direct to alcohol production as compared to sugar production. The proportion channeled to alcohol, practically nonexistence before the National Alcohol Program, increased rapidly in the following years, now corresponding to 40% (see Table 25). Moreover, it is expected that this proportion will be greater than that directed to sugar in the next or the following harvest.

In sum, during the period when sugar prices peaked on the world

market, sugar would "naturally" work against alcohol. However, the pull toward sugar was counterbalanced by the second oil shock and the Iran-Iraq War. From 1981 on, oil prices stabilized and even declined in real terms at the same time that the downward tendency of sugar prices on the world free market manifested itself. This conjuncture was similar to that of the 1977-78 period, when sugar successfully pressed for increasing alcohol production and in large part was responsible for alcohol meeting its 1980 production goal. This time, however, the economic difficulties worked against the PNA, slowing its progress by mandating cuts in public expenditure. Also hindering the success of the Alcohol Program was the accumulation of hydrated alcohol stocks resulting from the abrupt shift from its "euphoria" to "discrediting" phase (see Chapter 9), which made more difficult the task of planning the national alcohol supply. But even if it is clear that the alcohol production goal for 1985, 10.7 billion liters, will not be met, the Program is sufficiently structured to prevent an overproduction crisis of sugar. The volume of anhydrous alcohol is today considered the principal policy tool for that purpose. An idea of the flexibility between sugar and alcohol production can be gleaned from the variation of the proportion of anhydrous alcohol mixed with gasoline over time (see Table 45 and Figure IX), which reveals the liberation or absorption of the raw material as needed according to the price of sugar on the world market, and the capacity of the domestic market to absorb hydrated alcohol. Moreover, if sugar was ineffectual in boosting alcohol production for reasons cited above, it certainly has been very important in keeping the Program alive. The

major sugar and alcohol producers, for instance, initiated important actions in 1981 to break the "discrediting phase" of the PNA, as will be seen in Chapter 9. Moreover, as low sugar prices are prolonged on the world market, they will place increasing pressure on the Program to expand its scope to include loading vehicles in addition to passenger cars.

8.2. Actors, Problems, and Issues of Phase Two of Proálcool

Actors

In the second phase of Proálcool emerged several actors directly and indirectly linked to the production and distribution of alcohol vehicles. The most prominent were automobile manufacturers, acting individually or collectively through their interest group, the ANFAVEA, and an array of interest groups: SINDIPEÇAS, respresenting the auto-parts and vehicle components suppliers; ABRAVE (Associação Brasileira dos Distribuidores de Veículos), the car dealers' group; CONAREM (Commisão Nacional de Retíficas de Motores) and its counterpart in São Paulo, APAREM (Associação Paulista de Refíficas de Motores, the association of car repair shops; and the NTC (Associação Nacional das Empresas de Transportes de Carga), representing the loading vehicle firms.

An important new sugar and alcohol producers association also emerged during this period, SOPRAL (Sociedade de Produtores de Açucar e de Álcool). SOPRAL was formed in May 1975 by dissident producers who diverged from the COPERSUCAR leadership with respect to sugar and alcohol policy during the administration of Jorge W. Atalla. SOPRAL's explicit political aim was to defend and represent the interests of the sugar and alcohol sector before government bodies. After Atalla left COPERSUCAR, SOPRAL became the most important political representative of the industry, comprising the great majority of the autonomous distilleries of the Center-South region. It had been especially active in the issue of using alcohol as a fuel in light cargo

vehicles (see below).[19] Another association of alcohol producers, ANAPA (Associação Nacional dos Produtores de Álcool), headquartered in Rio, had recently been created (in 1980) with the same objective as SOPRAL, namely, to represent politically its members before government bodies. Although the "N" in ANAPA suggests its scope was national, this Association reportedly meant to attract, bring together, and speak for, in the Center-South, the interests of the autonomous distilleries from the North-Northeast region;[20] its president was the second major alcohol producer of the North-Northeast.

Petrobrás, an important actor since the beginning of the National Alcohol Program, would play an especially significant role in phase two of the Program. At the same time that it disputed control over the alcohol storage and distribution systems with private distribution com-

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[19]SOPRAL was created to represent an alternative political viewpoint to the interest representation of the sugar and alcohol sector in São Paulo, as well as to assist its members in various ways. It was initially comprised of 9 sugar and alcohol usinas. By 1982, SOPRAL had grown to encompass 11 sugar mills and 61 autonomous distilleries widely dispersed throughout the states of São Paulo, Paraná, Mato Grosso do Sul, Mato Grosso, Goiás, Minas Gerais, and Espírito Santo. Its members today control 35% of total domestic sugar and alcohol production, 10% less than that of COPERSUCAR, the largest cooperative of sugar and alcohol producers in the country. As a rule, new autonomous distilleries are joining SOPRAL; the Directors of this Association anticipate it will control the majority of alcohol production by the 1985/86 crop (an autonomous distillery takes 4 to 5 years to start operating). SOPRAL is also promoting an annual National Meeting of Autonomous Distilleries. These meetings, rivaling the annual National Meeting of Sugar Producers organized by COPERFLU, will become an important forum of debate on alcohol policy. (Most of the data and information are from an interview with Luiz Gonzaga Bertelli, Director-Superintendent of SOPRAL, on 12/20/82, São Paulo).

[20]Interview with Luiz Gonzaga Bertelli, Director-Superintendent of SOPRAL, 12/20/82, São Paulo.

panies, it made decisive moves toward participating in the production of alcohol. With the growing importance of the new liquid fuel, its own institutional identity was threatened. Accordingly, during the second phase of Proálcool, Petrobrás attempted to define a role for itself in the Program.

Problems and Issues

As the second oil shock was played out -- that is to say, as the successive increases in petroleum prices determined by OPEC took effect during 1979 -- the preparations for implementing the second phase of the Alcohol Program were accelerated. The government announced a series of measures to speed up the Program under the direction of the Ministry of Industry and Trade.[21] Finally, in June, during a meeting of the Council for Economic Development (CDE), chaired by the President of Brazil, it was decided formally to accelerated the National Alcohol Program. A new alcohol production goal was set: 10.7 billion liters, equivalent to 170,000 b/d of petroleum, were to be achieved by 1985. This target encompassed anhydrous alcohol to be mixed with gasoline (3.1 billion liters); hydrous alcohol to fuel the new, soon-to-be manufactured pure alcohol-powered cars (6.1 billion liters); and alcohol to be used as a raw material by the chemical industry among others (1.5 billion liters). This goal for fuel alcohol was intended to absorb

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[21] See ESP, 4/3/79, "Uma missão dificil para o Ministro Camilo Penna; OG, 4/3/79, "Monopólio pode prejudicar Proálcool, diz empresário; OG, 4/11/79, "Álcool em algumas áreas já atinge 20%"; and JB, 6/3/79, "Garrafão do álcool irá ao CDE na quarta-feira".

the estimated growth of gasoline consumption, equivalent to 36% of the total projected gasoline consumption.[22] The CDE also agreed to invest 5 billion dollars in the Program during the Figueiredo government, although no consensus was reached by the Council's Ministers on how to raise the necessary financing (see below). Important institutional changes considered necessary to the successful implementation of phase two of the Alcohol Program were also decided upon (see below). Finally, in this same CDE meeting, in a defeat for the Minister of Mines and Energy, PNA control was handed to the Ministry of Industry and Trade.

The acceleration of the National Alcohol Program and its new production goal were to be reaffirmed just one month later, in the "wartime economy speech" delivered by Figueiredo following the third price hike in oil announced by OPEC in 1979.[23]

To boost the National Alcohol Program, solutions had to be found for a number of "problems"(and a few issues), some of them inherited from phase one:

1. "operational" problems: the long, drawn-out process for approving proposed distillery projects; monetary correction of credit conceded to distilleries; distribution and storage of alcohol;

2. the price of alcohol paid to producers considered insufficient by them to compensate for production costs;

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[22]See Minister of Mines and Energy, Modelo Energético Brasileiro, May, 1981.

23, See p. 362.

3. resources to finance the expansion of sugar cane crops and industrial capacity for alcohol production;

4. an adequate institutional framework; and

5. the development of the technology for internal combustion engines (Otto cycle engines) propelled by hydrous alcohol.

A brief analysis of these problems and the ways in which they were and were not solved follows.

Institutional Framework and Decision-Making Structure

To speed up the second phase of the PNA, the government revamped the institutional framework and decision-making structure of the Program. The decision-making structure of Proálcool was extremely fragmented. The principal private actors perceived this to be a major impediment to the proper implementation of the Program insofar as this led to contradictory statements and actions on the part of the different bureaucratic agencies involved in the Program, and they could not identify a center of decision-making to which they could direct their demands.[24] Efforts to centralize decision-making intensified in 1978 and in the first half of 1979 for not only the PNA but also for energy policy as a whole.[25]

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[24]The usineiros were especially vocal with respect to the lack of a center of decision-making for alcohol policy. See, for instance, JB, 8/24/78, "Economista afirma ..." and the records of the Sixth National Meeting of Sugar Producers, published in COPERFLU, Açúcar e Álcool: Centro Dinâmico da Economia Brasileira (Rio de Janeiro: APEC, 1978).

[25]These efforts to centralize decision-making for the alcohol and energy policies were frequently reinforced by bureaucratic agencies, such as the National Petroleum Council and Petrobrás. See on this subject RR, 5/29 to 6/4/78, "Em gestação ..."; FSP, 8/23/78, "Um Conselho...";

As part of the government's energy policy formulated in reaction to the second oil shock, the National Commission of Energy (CNE) was created in July 1979.[26] The CNE did not become the real decision-making center for energy policy, however; rather, the Minister of Planning (SEPLAN), in firm control of capital resources, exercised the decisive leverage over energy matters. In 1980, when the decision-making process for energy policy was still being working out and the role of the CNE was yet to be well-defined,[27] it was already clear that the authority of the Ministry of Mines and Energy (responsible for energy policy during the Geisel administration prior to the creation of the CNE) was declining, something it would continue to do during the following year, while that of SEPLAN was on the ascent. In December 1981, the SEPLAN Energy Commission (CSE) was created to administer and allocate the resources of the Energy Mobilization Program (PME)[28] "in conjunc-

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25 (cont.)
JB, 8/24/78, "Economista afirma ..."; JB, 10/19/78, "Atalla quer ..."; JT, 12/8/78, "Em estudos ..."; ESP, 1/14/79, "O prómixo governo diante das questões energéticas"; and ESP, 1/24/79, "Proálcool precisa ser reformulado, segundo o CNPq".

[26]See p. 363.

[27]See, for instance, FSP, 1/6/80, "Divergências sobre o álcool"; ESP, 1/9/80, "CNE prepara redefinição da política energética"; ESP, 1/10/80, "O trabalho da CNE e a política energética"; FSP, 3/23/80, "Sem direção"; and JB, 6/29/80, "Plano do carvão continua atrasado".

[28]The Energy Mobilization Program (PME) was created in 1979, during the second oil shock, to promote the energy programs developed by the National Energy Commission, especially those concerned with alternative sources of energy. The Energy Mobilization Fund (FME) was created to provide resources to the PME. The resources derived at first from the Imposto Único sobre Lubrificantes e Combustíveis Líquidos e Gasosos, that is to say, from road taxes on automobile owners and users. Today PME resources derive from monetary and fiscal budgets. With the creation of the SEPLAN Energy Commission (CSE), the distinction

tion with the CNE" (E.M. no. 631/12-17-1981); the Ministers on the CNE in signing the legal document creating the CSE gave their tacit approval to the measure. The de jure and de facto decision-making powers related to energy matters were then concentrated in SEPLAN, through its Energy Commission (CSE).[29] The CNE, although rather weakened in its policy-making role, still functioned as a bargaining arena for some policy issues, such as diesel oil substitution (see below) and alcohol pricing. Thus, the interest groups involved channeled their demands to the CNE, either directly or through the intermediation of the various Ministries serving on the Commission. It was during CNE meetings that the Ministries on opposite sides of an issue worked out their differences,

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28 (cont.)
between the FME and the PME became blurred, and from this point on, the PME was the basic reference for the area of energy resources. (Interview with a SEPLAN official.)

[29]The SEPLAN Energy Commission was headed by a President, also coordinator of the National Energy Commission Special Group on Energy Alternatives; an Executive Secretary, a SEPLAN official; and three other persons subordinate to the latter who were seldom called upon. The decision-making power, in fact, rested with the Executive Secretary and the Minister of Planning, Delfim Netto. This conclusion is supported by the following description of the SEPLAN Energy Commission's procedures:

> The Ministries present their energy programs to the Ministry of Planning (SEPLAN) Energy Commission. The projects are technically analyzed by officials from both the Ministry that presented the proposal and from SEPLAN. The Executive Secretary of the Commission may call upon persons and organs to furnish additional information as needed. The final decision concerning the resource allocation is made by the Executive Secretary of the Commission together with the Minister of Planning. Although based on technical analysis, the decisions are largely politically motivated and competition between the Ministries is rather stiff. (Interview with a SEPLAN official.)

with the Vice-President of the Republic (President of CNE) serving as an arbiter. If agreement was not reached and the matter under discussion was urgent, the President of the Republic stepped in to perform his "traditional" role of arbiter of the last instance for disputes within the government bureaucracy. Those CNE meetings, however, became more and more infrequent (in 1983 only one such meeting was held) as decision-making power became increasingly concentrated in the SEPLAN Energy Commission.

In alcohol policy, the Minister of Trade and Industry, sensitive to the demands of the interest groups, took the lead within the State bureaucracy in revamping the PNA's decision-making structure. As the second oil shock played out its course and the importance of alcohol as a fuel was increasingly recognized, this reform was seen as an important step toward the acceleration of phase two of the Alcohol Program. However, it was caught in the middle of a renewed dispute between the Ministry of Industry and Trade (MIC) and the Ministry of Mines and Energy (MME) over control of the PNA. One should recall that although the MIC had won formal control of Proálcool, in practice, the MIC/MME dispute continued throughout phase one of the Program. With the advent of the new Figueiredo government and its new incumbents, João Camilo Penna (MIC) and Cesar Cals (MME), the dispute over the PNA was resumed. During the first six months of the Figueiredo administration in 1979, the conflict over the jurisdiction of the two Ministries was made public in a series of statements made by Penna and Cals appearing in the press.[30] The President of the Republic was called upon in

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[30]Cf. ESP, 3/3/79, "Proálcool passará para Minas e Energia"; ESP, 3/6/79, "Penna e CNA estranham fala de Cals"; ESP, 3/7/79, "Proálcool: secretaria executiva"; JT, 3/16/79, "A tática para o problema energético: o bom senso"; ESP, 3/21/79, "Cals anuncia a criação de novo modelo

his role of arbiter of the last instance of intra-governmental disputes[31] to settle the conflict; he reaffirmed MIC control over the Alcohol Program.

Thus, during the above-mentioned CDE meeting on June 6th, Figueiredo decided to separate the formulation and execution of the alcohol policy, and replaced the National Alcohol Commission (CNAl) -- which had performed both functions -- with the National Alcohol Council (CNAL) and the National Alcohol Executive Commission (CENAL) (decree no. 83,700, 7/5/79).[32] Like the National Alcohol Commission, the National Alcohol Council would be in charge of formulating the directives for the National Alcohol Program. Unlike its counterpart in phase one of Proálcool, its members were top-level officials of the Ministries, that is, their Secretary-Generals,[33] and it was chaired by a Minister, that of Industry and Trade. Its status was upgraded to speed up the decision-making process as decisions reached by its predecessor, the National Alcohol Commission, on which the Ministry representratives had come from the second and third bureaucratic echelons, were not necessarily endorsed by higher ranking officials. Moreover, it was expected

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30(cont.)
energético"; ESP, 4/3/79, "Uma missão difícil para o Ministro Camilo Penna"; and OG, 4/3/79, "Monopólio pode prejudicar Proálcool, diz empresário".

[31]Cf. ESP, 4/3/79, "Uma missão difícil para o Ministro Camilo Penna"; and ESP, 5/13/79, "As diretrizes para o setor energético".

[32]See also Resolution CNAl no. 1/79 for the procedures and operating norms of CNAl and CENAL.

[33]Besides the Ministries of Industry and Trade, Planning, Finance, Agricuture, Mines and Energy, and Interior Affairs, already represented on the National Alcohol Commission, the National Alcohol Council would also include representatives of the Ministries of Transportation and of Labor, the Vice-Chief for Technological Affairs of the Supreme Command of the Armed Forces, and representatives of the National Confederations of Agriculture, Commerce, and Industry.

that because the National Alcohol Council was to be chaired by the Ministry of Industry and Trade himself, this would bring Proálcool under a single command.[34] Moreover, the new body to execute alcohol policy, the CENAL, which was to give technical and administrative support to the Council, was to be under the jurisdiction of the MIC; the Executive Commission presidency was given to the Secretary-General of this Ministry, who also served as the Executive Secretary to the Council. The members of CENAL were the President of the National Petroleum Council (CNP), the President of the Sugar and Alcohol Institute (IAA), the Secretary of the Industrial Technology Secretariat (STI), and the Executive Secretary of the Industrial Development Council (CDI); the final three bodies were all under MIC jurisdiction.

It was the responsibility of CENAL to process the proposals to modernize, expand, or install new distilleries. The IAA was accorded an important participatory role in this process. Regardless of the extent to which it had been stripped of its authority over alcohol policy, the Institute was widely accepted as a fundamental presence in the institutional framework of Proálcool for its solid knowledge of the sugar and alcohol sector, gained during five decades of existence.[35] This institutional arrangement was expected to speed up the process of analyzing distillery projects, which, as seen above, was a major cause of delay in the implementation of the PNA. In fact, as shown below, the very first act of CENAL was aimed at rationalizing the approval process for industrial projects.

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[34]See JT, 6/8/79, "O Programa do Álcool entra em nova fase"; and ESP, 6/8/79, "As verdadeiras dimensões do novo programa do álcool".

All in all the National Alcohol Program did fall under the MIC command either by the Minister Camilo Penna's presence and actions or through CENAL and its President and MIC's Secretary-General, Marcos José Marques. CENAL, in practice, became the important organ for the Alcohol Program, while the National Alcohol Council (CNAL) occupied a secondary position.[36] Yet, its enhanced authority was restricted to the production aspects of the Program, with its main function being to balance the demand and supply of alcohol. Distribution remained the concern of the CNP, although Petrobrás did increase its presence by heightening its control over the storage and distribution system of alcohol. As of 1982, decisions on financial matters were concentrated in the SEPLAN Energy Commission (CSE). Alcohol policy, therefore, was given more than one center of decision-making.

The complaints about the lack of a center of decision-making for alcohol policy persisted during 1979 even after the creation of the National Alcohol Council and CENAL.[37] But they dissipated in the following years. Today no major complaint on the structure of decision-

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[35] See Chapter 6, p.288 and footnote no. 107.

[36] Interviews with Julio M. Borges, Technical Manager of COPERSUCAR (12/20/82, São Paulo, SP); Waldyr Giannetti, Vice-President of Dedini and President of ABDIB (12/22/82, Piracicaba, SP); Luiz G. Bertelli, Director-Superintendent of SOPRAL (12/20/82, São Paulo, SP); Renato R. Barbosa, an important usineiro and alcohol producer (12/21/82, São Paulo, SP); and Celson A. de Oliveira Mendes, Economic Adviser to COPERFLU (4/12/83, Rio de Janeiro, RJ).

[37] See ESP, 8/12/79, "Excesso de órgãos atrasa Proálcool, dizem técnicos"; JB, 9/4/79, "Falta de tanques pode afetar safra de álcool"; ESP, 10/21/79, "Mário Garnero pretende dinamizar o Proálcool"; and JT, 11/5/79, "Produtor começa a duvidar que Proálcool atinja sua meta".

making of the National Alcohol Program is voiced in public. And, at least from the point of view of the major actors,[38] the Program's institutional framework and decision-making process function fairly well.

Proposed Distillery Project Processing

The lengthy approval process for proposed distillery projects was greatly simplified by streamlining the bureaucratic procedures to analyze projects. Earlier, in 1977, the question of "securities" required by the Bank of Brazil to release credit was satisfactorily resolved.[39] Then, in mid-1979, as part of the important changes in the institutional framework of the PNA discussed above, a major improvement in the bureaucratic processing of the industrial projects took place. In the first Act of the newly-created CENAL (7/18/79),

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[38]All the actors interviewed recognized the extreme fragmentation of the decision-making structure of the PNA. Some (Julio M. Borges and Aloísio N. de Almeida, Technical Manager and Assistant to the Director, respectively, of COPERSUCAR, 12/20/82, São Paulo, SP; and Waldyr Giannetti, Vice-President of Dedini and President of ABDIB, 12/22/82, Piracicaba, SP) expressed the view that this fragmentation ensured that the decision-making structure of Proálcool worked well because it enabled greater flexibility in the structure and avoided an overlapping of functions and jurisdictions of the bureaucratic agencies involved. Others (Luiz G. Bertelli, Director-Superintendent of SOPRAL, 12/20/82, São Paulo, SP; Lamartini Navarro Jr., member of the National Energy Commission (CNE), owner of CONSPEL (a consulting firm which aided the design of distillery projects) and an important autonomous distillery owner, 12/21/82, São Paulo, SP; and Celson A. de Oliveira Mendes, Economic Adviser to COPERFLU, 4/12/83, Rio de Janeiro, RJ) believed that greater centralization of decision-making was desirable. However, all clearly knew where to lobby and attempt to influence decisions: directly to the body in charge of the specific aspect of the alcohol policy at stake.

See the Conclusions (pp.498-524) for a more detailed account of the decision-making process of the PNA and the mechanisms of interest representation.

[39]See Chapter 7, pp. 323-330.

new and simpler procedures for the analysis of distillery projects were established, among them a "single form" (roteiro unico) for submitting projects to CENAL. CENAL would then simultaneously send a copy of the form to the agency in charge of the technical analysis (the IAA if the raw material was sugar cane; the STI or EMBRATER for other raw materials) and another copy to the Financial Agent in charge of the fiscal analysis. A 60 day limit was set for the technical analysis performed by the IAA (or the STI or EMBRATER), while CENAL urged the Financial Agent to complete the financial analysis in a comparable time period. Once completed, the technical analysis would be sent back to CENAL for final approval; CENAL would then communicate its decision to the Financial Agent. The Financial Agent would proceed to contract credit with the applicant if the result of the project's financial analysis was positive. The procedures for Financial Agent reimbursement by the Central Bank remained the same, and for this reason have been omitted from the chart on the following page.

The Ministry of Industry and Trade pressured the Financial Agents to speed up the analysis of the financial aspects of the distillery projects.[40] The successful effort in accomplishing this by the Bank of Brazil -- by far the most important Financial Agent of the Alcohol Program[41] -- is exemplary.[42] The average time from the point the Bank

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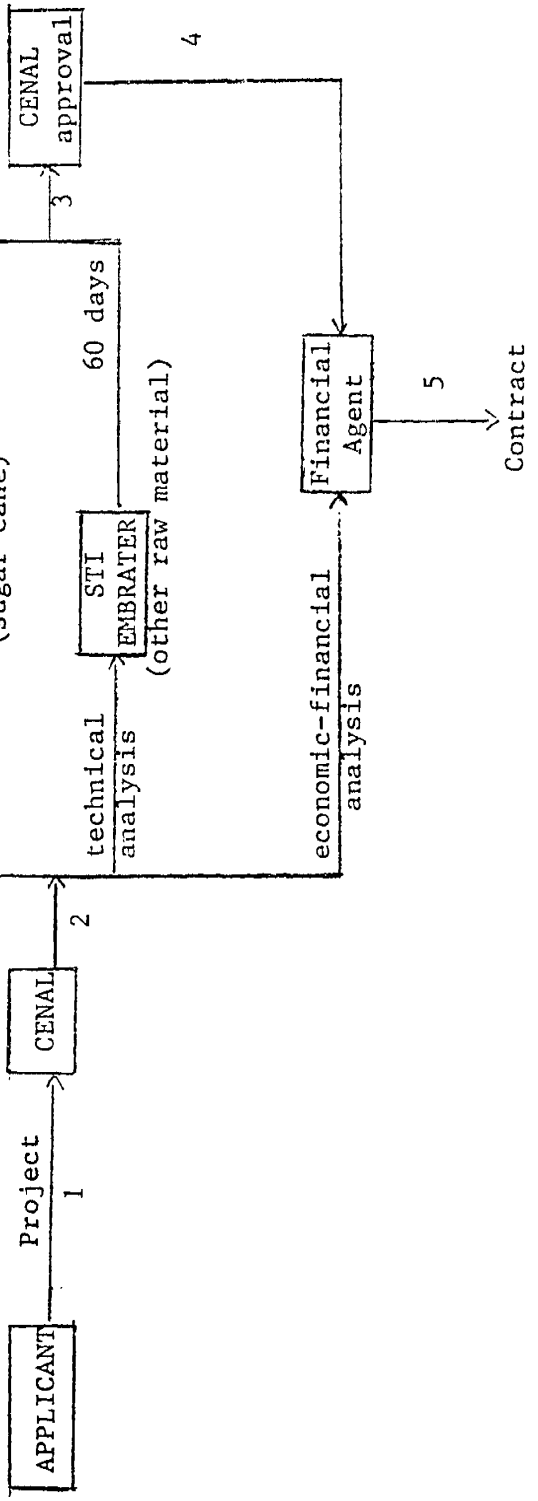
[40]Cf. JB, 6/13/79, "MIC estimula fabricação de equipamentos para destilaria".

[41]See Table 40.

[42]In an interview with Roberto A. P. de Melo Carvalho, Director of the Industrial Credit Department of the Bank of Brazil, he made clear

Figure 4: The Project Analysis Process

(1979 - present)



received a project to the finalization of a contract with the applicant was reduced from approximately 190 days in 1975, 1976, 1977 and 1978 to 97 days in 1979, and roughly the same in 1980.[43]

During 1980, other, minor simplifications in the processing of industrial projects by CENAL and the Financial Agent were still being worked out,[44] but complaints from interest groups on this matter had largely disappeared, indicating the success of the new procedures.[45] Not only were no major complaints in the most important newspapers and periodicals voiced, but also important actors interviewed acknowledged that industrial projects were being processed in good time.[46] Moreover, they praised the coordination between the analyses of the industrial and agricultural projects related to the expansion or installation of a distillery.

After 1980 a delay resurfaced in releasing resources on the part of the Financial Agent. However, this delay was caused by the aggra-

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42 (cont.)
that he took the speeding up of the Bank's processing of industrial project proposals as a challenge, and was proud to show the impressive results (Interview on 10/10/80, Brasília).

[43]Interview with Roberto A.P. de Melo Carvalho, 10/10/80, Brasília.

[44]Cf. ESP, 1/31/80, "Multinacionais poderão participar do Proálcool; and DCI, 1/31/80, "Bancos poderão financiar Proálcool".

[45]Sapolsky (1972) considers the absence of complaints as a proxy for an indicator of success of a government program. For a summary of his argument see Conclusions, pp. 487-488.

[46]Interview with Aloísio Nunes de Almeida and Julio Maria Borges, Assistant to the Director and Technical Manager, respectively, of COPERSUCAR (12/20/82, São Paulo) and Lamartini Navarro, Jr., member of CNE, owner of CONSPEL (a consulting firm to distilleries) and an important autonomous distillery owner (12/21/82, São Paulo).

vation of the economic crisis the country was experiencing at that time.[47] Proálcool suffered from a lack of resources due to the tightening of public expenditure. In 1982, the only industrial projects which were contracted for credit by CENAL were co-operatives and small producers,[48] who received IBRD financing. Larger industrial projects required one year to be approved and the applicants had available only their own resources. It must be pointed out, however, that the delay in approving larger industrial projects can also be ascribed to the government's concern over the equilibrium between the supply of and demand for alcohol production.

Data from the Bank of Brazil demonstrate recent tendencies in the financing of industrial projects:

Year	No. of Projects Analyzed	Mean Value of Processing Time (in days)	Credit Value (in current million cruzeiros)
1980	95	103.65	28,672
1981	88	117.75	42,970
1982	63	137.64	15,020

Monetary Correction

Another "operational" problem, the adjustment in the credit value conceded by the Financial Agents according to inflation rates, was "inherited" from phase one of the PNA. This problem, a major consequence

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[47] See Chapter 8, section 8.1.

[48] This is one of the criteria to be met by projects funded by the IBRD.

of the delays in the processing of distillery projects, was felt heavily in the prices of distillery equipment which were estimated at one value in the project sent to CNAl and would be much higher when the Financial Agent finally contracted credit with the applicant. After years of pressure and bargaining involving the alcohol producers, the distillery equipment suppliers, and the government, a satisfactory solution was reach in 1980, when the credit value conceded to the applicant was adjusted according to the inflation rate.[49] However, there are rumors that the situation may change again, with adjustment falling below the inflation rate.[50]

The Alcohol Storage and Distribution System (and the Role of Petrobrás in the National Alcohol Program)

The third "operational" problem, the storage and distribution system for alcohol, was of fundamental importance. While identified as a neglected yet serious problem for the successful implementation of phase one of the Program, the construction of an adequate storage and distribution system was essential to phase two. In phase one, the Gasohol Phase, no difficulties were foreseen in meeting the production goal (3 billion liters of alcohol in 1980). However, producers demanded guaranteed outlets for alcohol and the automobile industry required a uniform mixture of (anhydrous) alcohol with gasoline so as to

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[49]See Chapter 7, pp. 330-332 for a more detailed account of this problem and its solution.

[50]Interview with Luiz L. Biagi, Vice-President of Zanini Equipamentos Pesados, on 12/20/82, São Paulo.

ensure the efficient operation of the engines. In phase two, the pure alcohol driven car phase, a major demand of the automobile industry hesitant (see below) to produce vehicles running on pure (hydrous) alcohol was for an assurance that this fuel would be distributed properly. The implementation of phase one and phase two of the Alcohol Program thus overlapped in the need for building an alcohol storage and distribution system for both anhydrous and hydrous alcohol.

As seen in Chapter 7, it was the responsbility of the Institute of Sugar and Alcohol (IAA) to collect the anhydrous alcohol from the usinas, pay for it, and provide for its transportation to the mixing centers. The companies distributing oil products would then distribute the mixed product, the gasohol, to nearby retail outlets. But as the first phase of Proálcool progressed, and the volume of anhydrous alcohol production increased and alcohol had to be delivered to mixing centers located at farther distances, the inadequacy of the storage and distribution system became more and more evident. In 1978, when Alagoas and Pernambuco were "drowning" in alcohol for lack of an outlet to consumer centers, the inadequacy of this system assumed crisis proportions. It was manifestly clear that the IAA could not fulfill its responsibility.

To accomodate the new scale of gasohol production[51] and its distribution to the entire national territory, as well as the distribution of hydrous alcohol for the new alcohol-fueled cars to come into production in the near future, a network of storage tanks and collecting

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[51] In 1976 the proportion of alcohol mixed with gasoline was 1.1%. In 1977, this proportion was more than four time larger (4.6%) and, in 1978, the crisis year for the storage and distribution system, anhydrous

centers had to be built. In addition, a transport system (ducts, railroads, highways, coastal trade) had to be provided to transfer alcohol from the production units to the collecting centers and from there to the distant mixing centers.[52]

As mentioned earlier, Petrobrás and the private distribution companies (the great majority of which were multinational corporations) hotly disputed control of the expanding alcohol storage and distribution system. On the ministerial level, the issue once again divided the Ministry of Industry and Trade (MIC) and the Ministry of Mines and Energy (MME), who supported Petrobrás' claim. Phase one of the National Alcohol Program ended with National Petroleum Council (CNP) Resolution no. 18/78, which determined that it was the Distribution Companies' responsibility to purchase alcohol directly from the usinas and transport it to the mixing centers. Included among the companies was Petrobrás' own Distribution Company, Petrobrás Distribuidora, which

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51 (cont.)
alcohol represented 10% of the carburant mixture. The volume of anhydrous alcohol mixed with gasoline increased from 172 million liters in 1976 to 1.5 billion liters in 1978. It was anticipated that this volume would continue to increase in the following years, as in fact it did until 1981, when a substantial share of alcohol production was diverted to hydrous alcohol to fuel the new cars. After that the proportion of anhydrous to total alcohol production relative to that of hydrous alcohol increased again for reasons to be seen in Chapter 9 (see Table 26, Table 45, and Figure IX).

[52]A mixing center is located in the Distribution Company's zone, and serves the purpose of mixing anhydrous alcohol with gasoline, receiving hydrous alcohol, and delivering both to nearby service stations.

A collecting center stores large volumes of alcohol and is located in areas where alcohol production exceeds demand, so as to facilitate and reduce the costs of transporting the fuel to areas where consumption exceeds production.

was to be treated on a par with the private companies. In the terminology proposed in this thesis,[53] this CNP Resolution was nothing but a "stop" in the "bargaining situation" concerning this issue. The dispute between Petrobrás and the private Distribution Companies continued during the following years into phase two of the PNA and the Figueiredo administration. Headed by new incumbents, the MIC (Penna) and the MME (Cals) both opposed Petrobrás' aim to control the alcohol storage and distribution system.

At the beginning of phase two, Petrobrás' ambitions for its participation in the PNA went beyond the distribution system for alcohol. As may be recalled, at the very outset of the National Alcohol Program, Petrobrás had fought and lost the battle to control the Program as a whole.[54] Its attempt to participate in production through manioc-alcohol also failed.[55] After a brief period in which the state enterprise openly opposed the PNA,[56] it again took action to increase its control over the Program and pressed simultaneously to take part both in the production and distribution of alcohol. Its most important actions toward this end took place in 1979 and 1980. They provoked strong (positive and negative) reactions from the Government bureaucracy and the affected interest groups. In the first of these actions in May 1979, Petrobrás proposed the creation of a new subsidiary, Alcoolbrás.

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[53] See Introduction to Volume II, pp. 204-206.

[54] See Chapter 6.

[55] See Chapter 7, pp. 340-341.

[56] See Chapter 7, p. 346.

Alcoolbrás was to be the organ in charge of formulating and executing alcohol policy, providing a powerful infrastructure which would include sugar cane and manioc crops, alcohol distillation, and alcohol distribution. In short, Alcoolbrás would command complete control over the new fuel.

During this same month, Petrobrás presented the President of the Republic with a study (and an attached bill) of the implementation of phase two of the Alcohol Program, which contained suggestions for various aspects of this phase, such as consumer incentives to use alcohol powered cars, directives for converting engines from gasoline to alcohol, and the production of new alcohol automobiles. With respect to alcohol distribution, Petrobrás pointed out the advantages of its participation in the construction of an adequate alcohol storage and transportation system "to ensure an efficient and economical supply of the fuel." Article 7 of the attached bill stated that, under CNP supervision, Petrobrás was to build complementary usina storage tanks and to transfer alcohol from these tanks to the supply bases of the private Distribution Companies near the consumer centers.[57] This "strategic" control over the initial point of the distribution system would, of course, place Petrobrás in a very favorable position to gain control over the entire system.

Reactions against what was seen as an intention on the part of Petrobrás to monopolize the production and distribution of alcohol came swiftly. Representatives of the private Distribution Companies com-

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[57]Cf. ESP, 5/19/79, "Petrobrás quer incentivo fiscal para álcool".

plained of the difficulties they were encountering in installing alcohol pumps, while Petrobrás had already installed pumps in five different states. They also denounced the state enterprise campaign based on the slogan "Alcohol is ours",[58] a clear reference to the most well-known slogan of Brazilian nationalism, "Petroleum is ours", the symbol of the creation of Petrobrás and its monopoly over petroleum in the early 1950s.[59] ANFAVEA, the interest group association for the automobile industry, was very vocal on this occasion, joining the protest of the so-called "liberal" press[60] to ensure that the PNA remained in the private sector.[61] The alcohol producers, however, were divided over the Petrobrás proposals: all, to be sure, opposed Alcoolbrás, but major producers supported the idea of selling their production to Petrobrás, which would then distribute it to the private Distribution Companies.[62] In exchange, Petrobrás would offer the al-

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[58]See ESP, 5/13/79, "Nova subsidiária: Alcoolbrás".

[59]On the creation of Petrobrás see Gabriel Cohn, Petróleo e Nacionalismo. São Paulo: Difusão Européia do Livro, 1968; John Wirth, The Politics of Brazilian Development: 1930-1954. Stanford, California: Stanford University Press, 1970; Mario Victor, A Batalha do Petróleo Brasileiro. Rio de Janeiro: Editora Civilização Brasileira, 1970; and Peter Seaborn Smith, Oil and Politics in Modern Brazil. Toronto: The Macmillan Company of Canada, Ltd, 1976.

[60]The term "liberal" here implies a pro-private sector leadership of the economy as opposed to state control, an issue whose roots date back to the 1930s and which is related to the manner in which the industrialization process of the country should be conducted.

[61]O Estado de São Paulo manifested itself in ESP, 5/16/79, "Alcoolbrás, mas sem controle da Petrobrás"; ESP, 5/22/79, "A Petrobrás pretende controlar também o álcool"; ESP, 7/6/79, "É da ação empresarial que precisamos agora"; ESP, 7/7/79, "Álcool, oportunidade para o setor privado". The Jornal da Tarde protested in JT, 5/15/79, "O monopólio do álcool nas

cohol producers a long term guarantee for the purchase of their alcohol, which in turn would serve as collateral for much needed bank loans.

The Government responded to the protests and demands surrounding Petrobrás' attempts to control the new fuel through a series of statements issued from both the Minister of Industry and Trade and the Minister of Mines and Energy. In general they promised: (i) alcohol production would remain in private hands and (ii) the alcohol distribution system would not be controlled by Petrobrás, but rather would be the joint responsibility of the state enterprise and the private Distribution Companies, under the supervision of the CNP.[63]

In June, Petrobrás retreated on the subject of its participation in production, but stepped up its campaign to control alcohol distribution, given that, as its Finance Director, Paulo V. Belotti, put it, "no private enterprise was able to distribute, store, and transport alcohol."[64] In contrast, Petrobrás already had at its disposal its own infrastructure for the storage and distribution of oil products, which it offered to make available for the flow of alcohol.[65]

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61 (cont.)
mãos da Petrobrás?". The ANFAVEA publicly reated in JB, 5/16/79, "Garnero descrê da Álcoolbrás"; and ESP, 5/23/79, "Governo desiste da Álcoolbrás e só vai distribuir".

[62]At this point, COPERSUCAR and COPERFLU favored a Petrobrás oligopsony over alcohol production (cf. JB, 6/14/79, "Fazenda é contra monopólio"). Among its opponents was Lamartini Navarro Jr., an important autonomous distillery producer, who was against any kind of Petrobrás participation in Proálcool (see JB, 6/6/79, "Cals afirma que Petrobrás não terá monopólio no programa de álcool"; and JB, 6/15/79, "Produtor de álcool não quer entregar tudo à Petrobrás".

[63]See, for example, JB, 5/6/79, "Distribuidor privado pode vender álcool"; JB, 6/7/79, "Proálcool precisará de 5 bilhões de dólares até 1985"; and GM, 6/7/79, "As reformulações do CDE para a política do álcool".

A few months later, Petrobrás made another move toward its participation in alcohol production, one which became intertwined with the very important issue of admitting foreign capital into the National Alcohol Program (see below), that surfaced during 1980 as a consequence of the severe lack of resources from which the Program suffered. Thus, in March 1980, the President of Petrobrás, Shigeaki Ueki (the previous Minister of Mines and Energy) proposed a "tripod model" to boost alcohol production. Production projects would pull together private domestic, state (Petrobrás), and foreign capital. Petrobrás' participation would include the purchase of all alcohol production directly from the producers and participation in distillery projects.[66]

Once again the interest groups involved in the National Alcohol Program were divided over Petrobrás' participation in alcohol production. A significant number of entrepreneurs supported the Petrobrás proposal for a "tripod model", welcoming the new financial resources, but insisting that the control over production projects rest with the domestic private partner.[67] Among the opponents was Zanini, one of the

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[64]Cf. JB, 6/4/79, "Belotti acha que só Petrobrás pode distribuir álcool".

[65]Petrobrás prepared a careful study of the technical possibility of using the same system of ducts (in São Paulo) for the flow of both alcohol and oil products, to good advantage. The volume, characteristics of, and distance the fuel traveled was a novelty even in international terms. In June 1977 the duct system in São Paulo was successfully used to distribute alcohol to the mixing centers. (See "Bombeamento de álcool tem processo inédito", JC, 12/4/78.)

[66]Cf. GM, 3/18/80, "A Petrobrás vai investir no Proálcool"; and GM, 3/19/80, "Reiterada a sugestão".

two most important distillery equipment suppliers, whose Vice-President, Luis L. Biagi, believed that Petrobrás should participate only in alcohol distribution.[68]

On the ministerial level, Cesar Cals, the Minister of Mines and Energy, maintained his position that Petrobrás should have a role only in alcohol distribution ("Its function is to find petroleum").[69] On the other hand, Camilo Penna, the Minister of Industry and Trade, while not have articulated clearly his own position, seemed to sympathize with the idea of the "tripod model".[70] The idea, however, never came to fruition, and in mid-1980, Ueki declared in a speech to the Superior War College that Petrobrás would relinquish its participation in the agricultural but not in the industrial facet of alcohol production.[71]

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[67]Among the entrepreneurs who supported Petrobrás' participation in alcohol production were those from the states of Paraná and Minas Gerais. With the support of the National Bank of Economic Development (BNDE), COPERFLU proposed a "two-partner model", in which there would be a direct association between a domestic group and Petrobrás, with Petrobrás as a minority shareholder. (Cf. GM, 3/19/80, "Reiterada a sugestão", by Mateus Kacowicz; GM, 3/20/80, "Grupo mineiro oferece sociedade à Petrobrás"; and GM, 3/21/80, "COPERFLU aprova recursos da Petrobrás no álcool", by Mateus Kacowicz.)

[68]See OG, 3/21/80, "Para Setúbal, Petrobrás não deve produzir álcool". Other important actors who also opposed Petrobrás were the Secretary of Industry and Trade, Science and Technology of the state of São Paulo, the President of the Brazilian Exporters Association, and the President of the Agricultural Federation of the state of Pernambuco (cf. GM, 3/21/80, "Plano triplica o Proálcool", by Luiz A. Turíbio; and the above cited article).

[69]Cf. GM, 3/19/80, "Cals veta o plano tripartite"; OG, 3/19/80, "Cals: Petrobrás fica fora do Proálcool"; and JCm 3/20/80, "Cals diz que Petrobrás não entra no Proálcool".

[70]See JC, 3/19/80, "Admitida estatal no álcool"; DCI, 3/19/80, "Meta do álcool até 88 é de 14 bilhões de litros"; JB, 3/19/80, "Camilo admite

All in all, Petrobrás has not up until this time taken part in alcohol production (except for its own manioc-alcohol project in Curvelo, Minas Gerais). There has been little movement in this direction in the past three years, and it is entirely possible that the state enterprise has given up, at least for the time being, a role in alcohol production.[72] In contrast, Petrobrás has been quite successful in controlling the alcohol distribution system. Control over this system implies control over: (i) the initial point of the system, that is, the alcohol outflow from the production units; (ii) the collecting centers; (iii) the mixing centers or the distribution bases; and (iv) the transportation system that links the production units, the collecting centers, and the mixing centers. Petrobrás does not own mixing centers, and seems unconcerned that it does not. All mixing centers are the property of the Distribution Companies, which include Petrobrás Distribuidora. Petrobrás own distribution company receives the same legal treatment as any private Distribution Company, and operates fairly independently of Petrobrás itself.

The National Alcohol Council passed important legislation on March 13, 1980 governing the storage, stocks, and transportation of

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70 (cont.)
que Petrobrás entre na produção de álcool"; and JC, 3/20/80, "Cals diz que Petrobrás não entra no Proálcool".

71 ESP, 6/12/80, "Proálcool, uma questão da ESG para o Petrobrás".

72 This is a difficult point to assess. Interviews with Petrobrás officials yield limited insight, given that, on this point, they adhere to the enterprise's official rhetoric.

hydrous carburant ethanol. CNAL Resolution no. 6/80 established that hydrous carburant alcohol would share the same transport system as that used for oil products. The means of transportation were to be employed in the following order of priority: first, ducts; second, coastal trade; third, railroads; and fourth, highways. Highways, moreover, were not to be used for distances longer than 300 kilometers. If one considers that private Distribution Companies had available only their own trucks and that in contrast Petrobrás already had an extensive transportation system for oil products (which included ducts, tankers, and trucks), it is readily apparent that the state enterprise enjoyed a great advantage over private companies in the middle- and long-distance transportation of alcohol.

CNAL Resolution no. 6/80 also delineated a storage system for hydrous carburant alcohol, which was to be comprised of four subsystems:

(i) producers' tanks (producers' property; located in the production units with a capacity to store up to 3 months of alcohol production);

(ii) operational tanks (property of the Distribution Companies, located in the distribution bases or mixing centers with a storage capacity of 15 days of alcohol consumption in their zones);

(iii) collecting tanks (located in the collecting centers with capacity to store large volumes of alcohol; to be the property of either Petrobrás or the Distribution Companies); and

(iv) security tanks (located in areas to be defined, with a storage capacity which would, when added to 50% of the collecting tanks capacity, supply 60 days of

alcohol consumption in their surrounding areas; the security stock from the collecting tanks was the property of Petrobrás).

It is evident that, setting aside the security stocks (to be used only in criticial situations), whoever gained control of the collecting tanks would have the control of the storage system. In September of 1980 CENAL approved, as consistent with the objectives of the National Alcohol Program, a nationwide system of collecting and security tanks for hydrous carburant alcohol belonging to Petrobrás, which represented 325,000 cubic meters and an investment of 1.5 billion cruzeiros (CENAL Act no. 254/80). Approved by the CNP, this expansion of Petrobrás' storage capacity - which when added to the already existing 500,000 cubic meters totalled more than 800,000 cubic meters - incurred the protest of the private Distribution Companies. In a letter to the Minister of Mines and Energy, Cesar Cals, they demanded that the Government define more clearly the system for alcohol distribution and speed up the process for approving their projects to build collecting centers and distribution bases.[73] Once again Cals reassured the private Distribution Companies that Petrobrás was to play a complementary role in the alcohol distribution system. Petrobrás stepped in, the Minister said, only because the private companies had appeared uninterested in starting up their own distribution projects.[74] Other segments of the Government bureaucracy, however, believed that the state

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[73]See JC, 11/3/80, "Distribuidoras querem a Petrobrás fora do Proálcool".

[74]See, for instance, JC, 11/3/80, "Petrobrás e multis entram no carvão?"; and JB, 11/5/80, "Prioridade no álcool será para as empresas privadas".

enterprise should have a strong presence in that system.[75]

Reportedly Petrobrás, backed up by the CNP, has plans to build an extensive network of collecting and security tanks for both hydrous and anhydrous alcohol by 1985. When added to the 1980 existing storage capacity (around 500,000 cubic meters), this would guarantee a storage system for distribution and security purposes,[76] corresponding to almost 25% of the alcohol production goal for that year,[77] 10.7 billion liters. If Petrobrás will implement this plan successfully remains to be seen. It will, for certain, encounter the strong opposition of the private Distribution Companies, which can count on the support of major newspapers, the representatives of the so-called "liberal" press. The Government bureaucracy and the interest groups concerned with alcohol policy will divide along the same lines as they have in the past. At present, the alcohol storage capacity of Petrobrás is estimated at 1.3 million cubic meters, corresponding to 23.5% of the total storage capacity of the country (including security, collecting, and producers' tanks). The Distribution Companies are unable to store more than 200,000 cubic meters of alcohol.[78] Therefore, Petrobrás has substantial control over the alcohol storage system, especially over the collecting tanks.

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[75]CENAL and the Ministry of Planning expressed this view in GM, 11/7/80, "Multinacionais não podem ter financiamentos". An example of National Petroleum Council support for an important presence of Petrobrás in the alcohol storage and distribution system appears in RR, 11/17-23/80, "Oziel critica 'multis'".

[76]See GM, 11/3/80, "Os planos da Petrobrás".

[77]The goal of 10.7 billion liters of alcohol to be produced in 1985 was later postponed to 1987.

The initial point of the distribution system, the collecting of alcohol from the production units, as noted, has been a matter of serious concern for Petrobrás. In October 1980, the National Petroleum Council passed important legislation regulating the roles of Petrobrás and the Distribution Companies in this area. It should be recalled that a previous CNP Resolution (no. 18/78) had determined that alcohol should be collected directly by the Distribution Companies from the production units, according to quotas to be established by the CNP each month. The Distribution Companies, including the Petrobrás Distribuidora, would then transport the fuel from these units to the mixing centers. The new CNP Resolution (no. 17/80) established that Petrobrás was also to directly collect hydrous alcohol from the production units so as to guarantee the security stocks referred to in CNAL Resolution no. 6/80. The Distribution Companies would collect the fuel destined for consumer markets.

At the end of 1982, the quotas established by the CNP were distributed in the following way: 10% of the alcohol produced (anhydrous and hydrous to be used as a fuel was collected by Petrobrás, and the remaining 90% was distributed amongst the various Distribution Companies.[79] The Petrobrás share, however, varies considerably according to circumstances.[80]

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[78]Official Petrobrás estimates.

[79]Interviews with Jair Pereira Dias and Paulo Garcia, respectively Chief of the Division of Energy Alternatives and Chief of the Alcohol Sector in the Division of Energy Alternatives of the Commercial Department of Petrobrás, on 10/27/82, Rio de Janeiro.

CNP Resolution no. 17/80 represents, however, in the language suggested in this thesis, only a "stop" in the "bargaining situation" connected with the control of the initial point of the alcohol distribution system. In fact, Petrobrás continued to press for an increase in the quota of alcohol production it was permitted to buy directly from the usinas and autonomous distilleries.[81] To become the only direct buyer of alcohol from the production units appears to remain its ultimate goal.

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[80]The CNP can, for instance, "give" the entire consumption market for one month to Petrobrás. This has, in effect, been done in the past, to help usinas that had an excess of hydrous alcohol and needed a quick outlet for it. (Interview with Jair Pereira Dias, Chief of the Division of Energy Alternatives of the Commercial Division of Petrobrás, on 10/27/82, Rio de Janeiro.)

[81]A piece of legislation passed later, in August 1983, after chapter 8 had already been written, confirms the author's interpretation of this point. By decree no. 88,626/83, Petrobrás was assured the right to acquire the volume of alcohol that: (i) flows through its transport system of ducts, tankers, and trucks and is needed to satisfy demand; (ii) is earmarked for security stocks; and (iii) corresponds to the difference between the volume of alcohol needed to meet the monthly demand for alcohol and 1/9 of the total volume of authorized production of alcohol, per crop, for energy use and security stocks. This means that Petrobrás buys the volume of alcohol that is in excess of consumption plus the security stocks. This enterprise also purchases the alcohol that is directed to consumption through its transport system (about 50% of the total volume of alcohol distributed in the country). The marketing of the alcohol destined for consumption through the "direct system" (usinas --> Distribution Companies) is not regulated by decree no. 88,626. Nonetheless, the National Petroleum Council has assigned from 40 to 60% of this volume of alcohol to Petrobrás. Moreover, it should be noted that after the distribution of all authorized alcohol production during the course of a 9 month period (1/9 per month), Petrobrás will be the only unit in the storage and distribution network (which includes the alcohol production units, Petrobrás, and the Distribution Companies) able to offer the product. (The source of this information is an interview with Petrobrás officials.)

Undoubtedly, a Petrobrás monopsony over alcohol purchasing is very close to becoming a reality.

If Petrobrás were not to command a significant share in the total volume of alcohol collected monthly from the production units, it would still be safe to assert that it gained a firm grasp on the alcohol distribution system during phase two of the National Alcohol Program. In addition to achieving significant control over the collecting tanks, the state enterprise, through its powerful system of ducts, tankers, and trucks, distributed nearly 50% of the physical volume of alcohol, both hydrous and anhydrous, in the Center-South (about 164,000 cubic meters per month) and the North-Northeast (around 28,000 cubic meters per month) regions. For São Paulo and its environs, the industrial heartland of the country, this proportion was as high as 100% for both types of alcohol.[82] Moreover, Petrobrás also owns an extensive network of service stations for hydrous alcohol throughout the country. As with oil products, the Petrobrás Distribuidora owns more alcohol service stations than any other Distribution Company. At the end of 1982, Petrobrás had 2,641 alcohol service stations, followed by Shell, with 2,058 and Esso, with 1,595 (see Table 53). As one Petrobrás official put it, "If Petrobrás withdraws from the PNA, the Program will come to an end."

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[82] Approximate data for the physical distribution of alcohol by Petrobrás are:

(in m^3/month)	hydrous alcohol	anhydrous alcohol
Center-South Region	79,000	85,000
São Paulo and environs	55,000	55,000
North-Northeast Region	15,000	13,000

Beyond the question of control, it can be affirmed that an efficient system for alcohol distribution was put in place rapidly after the outlet crisis manifested itself at the end of phase one of the PNA. According to the National Petroleum Council, as of June 1983, all retail outlets in the country will be permitted to install hydrous alcohol pumps, meaning that this fuel will be available throughout the national territory. Since 1981 the major problems in the system of alcohol storage and distribution have been adequately solved.[83] The big question was the transfer of alcohol from the large production centers, such as São Paulo, in the Center-South region, and Alagoas, Pernambuco, and Paraíba, in the North-Northeast region, to the major centers of consumption such as Rio de Janeiro, Rio Grande do Sul, Espírito Santo, and Bahia. The last consumer center to have the distribution of alcohol properly assured was Rio Grande do Sul, which finally in 1981 could depend on tankers to solve the high costs of transporting fuel to that state.[84]

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82 (cont.)
Consumer markets for hydrous and anhydrous alcohol are in the vicinity of 150,000 and 200,000 cubic meters per month, respectively. The Center-South region demand for both types of alcohol represents 85% of the market. (Source of data: Petrobrás.)

[83]To be sure, two problems related to the expansion of the alcohol storage and distribution system today in the state of São Paulo can be cited, although one has already been worked out: a collecting center needs to be built in the west of São Paulo, where about 20 new distilleries are scheduled to enter into operation in the near future; and a new system of ducts had to be created (and will begin operating soon) to avoid a bottleneck which was predicted in 1983 in the transfer of alcohol from São Paulo to the port of Santos. (Interview with Sergio Coelho, Assistant to the Presidency of the National Petroleum Council, 3/14/83).

Price of Alcohol Paid to Producers

As an essential policy instrument to entice producers to participate in the Alcohol Program, the price of alcohol has always been the object of complaints. Decree no. 75,966/75 which created the PNA reestablished the principle that the price of alcohol was to be fixed in parity with that of sugar, such that whether the producer invested in alcohol or sugar would be immaterial. Initially fixed at 44 liters of alcohol per 60 kg sack of standard crystallized sugar ready loaded at the usina (decree no. 75,966/75), the parity between the prices of sugar and alcohol has been successively altered from 44 to 42 liters of alcohol per 60 kg of sugar (MIC Directive no. 138/78), 40 liters per kg (MIC Directive no. 22/79), 39 liters per 60 kg (MIC Directive no. 292A/79), and finally, to 38 liters per 60 kg.[85] This final parity relationship is fairly close to the true economic equivalency (calculated by COPERSUCAR to be 37.5 liters of alcohol per 60 kg sack of sugar), which producers have pressed to obtain over the years.[86] Considered a major bottleneck for PNA implementation in phase one and, notwithstanding the persistent producer complaints, the price of alcohol paid to the producer can today be considered fairly satisfactory, at least for the Center-South.[87]

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[84]Both oil products and alcohol were transferred all the way from São Paulo to Rio Grande do Sul by truck. Today, a system has been devised whereby the same tankers transport oil products one way and alcohol on the return trip.

[85]This last parity relationship between the prices of sugar and alcohol was not subject to formal regulation.

[86]See Chapter 7, pp. 333-334.

Development of Technology for Internal Combustion Engines Propelled by Pure Alcohol

In 1978, when the gasohol phase of Proálcool showed the first signs it would successfully meet the goal for 1980 of a gasoline-anhydrous alcohol mixture of 20%, attention was directed to the development of the technology for the world's first hydrated alcohol-fueled cars. The technology was developed by the Aerospace Technical Center (CTA) of the Air Force Ministry and the automobile industry under the supervision of the Industrial Technology Secretariat (STI)[88] of the Ministry of Industry and Trade, in two stages:

(i) the adaptation of gasoline engines to run on alcohol; and

(ii) the manufacture of pure alcohol-powered cars.

The motivations of the two actors were quite different. The CTA[89] raising the banner of the development of indigenous technology, continued research[90] on the use of alcohol in internal combustion engines ongoing since the beginning of the National Alcohol Program, promoted a demonstration trip with pure alcohol-driven vehicles in 1976,[91] par-

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[87]According to COPERSUCAR, the price of alcohol established in October 1982 in the Center-South region was sufficient to compensate production costs, including capital investment. The fixed price was, in fact, only slightly less than the price demanded by the producers. However, a problem is posed by rapid inflation, approaching 100% in recent years (Interview with Aloisio Nunes de Almeida, Assistant to the Director, COPERSUCAR, on 12/20/82, São Paulo). Actually, the inflation rate surpassed the 200% mark in 1982. See the Conclusions, pp. 496-497 for the consequences of this fact for sugar cane and alcohol price adjustments.

[88]STI, the organ responsible for the supervision of the development of technology for alternative sources of energy, conducts substantial research itself.

ticipated in the operation of a fleet of experimental vehicles running on alcohol since 1977, and lobbied intensively in favor of the alcohol car.[92] Moreover, in addition to the adaptation of the Otto cycle engine to run on gasohol at increasing proportions of alcohol, and the adaptation of the engine to run on pure (hydrated) alcohol,[93] the CTA set itself the task of designing an entirely new engine, intended specifically for alcohol:

> "Alcohol (ethanol) is a fuel with extraordinary properties for use in internal combustion engines. Both the gasoline engines converted to alcohol or the conventional engines already manufactured for use with alcohol do not take complete advantage of the potential characteristics of alcohol as a fuel.
>
> The experience acquired from research on alcohol as fuel and the development of theoretical knowledge over the years have produced many insights that can be assimilated in a project of an engine designed specifically for alcohol.
>
> An original engine also affords an opportunity of developing internal combustion engines in Brazil with an entirely domestic design."[94]

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[89]The CTA was first funded from the federal budget, and later, by the World Bank as well.

[90]See Chapter 6, footnote 53, and p. 246.

[91]In this demonstration trip, three alcohol-fueled vehicles crossed the interior of the country, covering 8,000 km of roads of varying quality, from October 19 to November 12, 1976.

[92]See Chapter 6, p. 247.

[93]See Chapter 6, p. 249.

The new engine project was begun secretly in 1977, at the end of the Geisel administration, with the support of the STI and its secretary, Baupista Vidal. The project was meant for loading vehicles with an engine power of between 220 and 240 HP, to compete with diesel engines. There also existed a desire to establish a National Engine Factory (Fábrica Nacional de Motores) with the support of domestic private enterprises such as Villares (an important capital goods firm), to compete with the existing automobile industry manufacturers, who were all multinational corporations. This project was called off in 1979 by the new Secretary of STI, Israel Vargas, and resumed in 1981 with less nationalistic overtones.[95]

The automobile manufacturers adopted a "wait-and-see" attitude toward the second phase of the National Alcohol Program.[96] They did have plans to develop technology for alcohol-fueled cars, but contended that CTA efforts to produce an engine specifically designed to run on alcohol would not result in the creation of anything really new. Rather, whatever the fuel used, the engine would still be an Otto cycle, with the same basic engineering.[97] The first automobile manu-

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[94]See "CTA Activities Related to Fuel Alcohol", Colloquium delivered by Ernesto Stumpf, CTA, to the COPPE/UFRJ Seminar on "Análise dos Êxitos Brasileiros em P & D" (Analysis of Brazilian Success Cases of R & D), Rio de Janeiro, December 1979.

[95]Cf. OG, 2/5/79, "Circulam no país 725 veículos movidos a etanol"; TI, 4/14/79, "Carro movido a álcool já bate recordes em testes"; ESP, 4/24/79, "CTA ditará padrões para motor a álcool"; and ESP, 7/22/79, "Álcool: STI abandona projeto".

[96]See Chapter 9.

[97]Interview with Dr. George Pischinger and Dr. Rolf Wilhelm Siekman, respectively, Manager of the Research Division and Manager of the New Technologies and Techniques for Energy of Volkswagen do Brasil, São Paulo, December 14, 1982.

facturers to produce alcohol-fueled vehicles were FIAT, Volkswagen, Ford, and General Motors. The production of alcohol cars began in 1978, and reached 4,624 vehicles in 1979, 3,120 of which were sold mostly to public enterprises and government bodies.[98] These cars constituted the "test fleet" for the new product.[99]

The automobile industry petitioned the National Institute of Industrial Property (INPI) for the payment of royalties for the development of the hydrated ethanol-powered engines. This met with the strong opposition of the CTA ("The technology has already been developed in the country"), the STI, and the INPI itself. The government pressured the automobile industry not to import the technology. An agreement was reached whereby the technology for alcohol-fueled cars was developed entirely in Brazil, and no royalty payments were made.[100]

The principal problems encountered in adapting the Otto cycle engine to run on alcohol were:

- increasing the compression ratio for the higher octane rating of alcohol;
- calibrating the carburetor;
- adding a fuel preheating system for the higher temperature vaporizing point;

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[98]Data are from ANFAVEA.

[99]In April 1979, 1,498 alcohol-fueled vehicles in six different states composed the "test fleet". The majority belonged to the Telephone Company of São Paulo, TELESP (810 vehicles). (Cf. "Álcool excedente ...", ESP, 4/15/79.)

[100]See OG, 4/2/79, "CTA: carro a álcool já não oferece problemas técnicos"; ESP, 4/24/79, "CTA ditará padrões para motor a álcool"; OG, 4/24/79, "INPI não aceita royalty sobre motor a álcool"; and ESP, 5/23/79, "Governo desiste da Alcoolbrás e só vai distribuir". See also interview with Volkswagen R & D managers (see footnote 97 above).

- corrosion of the metallic parts of the engine

- cold-start of engines

One problem not yet satisfactorily solved is that of the cold-start of engines. Starting an ethanol-powered engine is very difficult at temperatures below 15° C. A very small gasoline tank vehicle was developed which, when needed, can be used to ignite the engine. The system employed today is completely automatic, hardly noticeable to the consumer who has only to press a button. Apart from this, a satisfactory technical solution was developed for all other problems. Corrosion in the metallic parts of the engine was the thorniest problem to be overcome. Experiments with several metallic alloys were conducted until nickel was determined to be the most resistant to corrosion by alcohol. All metallic parts of the engine are now coated with this alloy. This is a rather expensive process and people inside the automobile industry métier refer to the vehicle treated with nickel alloy as the "golden car". The auto industry is now conducting research to develop an alcohol anti-corrosion additive.[101]

One remaining technological problem was the quality of the alcohol itself. STI studies demonstrated that the alcohol contained acidic residues innocuous in pharmaceutical uses but harmful to engines. The process to manufacture alcohol for fuel purposes was then improved.[102]

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[101]Interview with Volkswagen R & D managers (see footnote 97 above).

[102]On the quality of alcohol for fuel purposes see JB, 5/5/79, "Álcool está à venda mas só um carro se abastece"; OG, 6/4/79, "Álcool: MIC só autoriza adaptação em carro oficial"; VEJA, 6/13/79, "O petróleo da cana"; and DCI, 7/3/79, "Técnicos negam corrosão".

In a strengthening of the inspection system, the Ministry of Industry and Trade and the IAA were placed in charge of controlling the quality of alcohol production, and the National Petroleum Council was made responsible for the alcohol quality in the distribution system. But while the quality control performed by at least the main alcohol producers has improved considerably,[103] the alcohol leaving the Distribution Companies often shows signs of having been tampered with or otherwise being substandard.[104]

As a rule, alcohol vehicles have performance characteristics (maximum power of the engine, maximum torque of the engine, acceleration, pick-up, and so forth) equal or superior to gasoline vehicles.[105] However, alcohol consumption is higher than that of gasoline, and, if the engine is not properly adapted, this can be as much as 60 to 80% higher.[106] The Government developed a control system for engine per-

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[103]To be sure, some elements harmful to engines are still found today in fuel alcohol, such as high copper levels in anhydrous alcohol and a high proportion of "superior alcohol" in the hydrated variety (Interview with Eliane de Souza Fontes, Assistant to the Coordinator of the Planning Department, IAA, on 10/17/83, Rio de Janeiro, RJ).

[104]This may be due to contamination in the complex distribution system (e.g. by oil products, acids, ferric oxide, impurities of different kinds); fraud (for instance, the addition of water or poor quality alcohol); and the increase in the corrosive effect of alcohol due to long-term storage. ("Tecnologia VWB para Veículos a Álcool", presented to the IX Encontro dos Centros de Apoio Tecnológico, Brasília, July 1982, and interviews with Volkswagen R & D managers.)

[105]For a detailed analysis of the performance of alcohol-fueled engines as compared to gasoline-powered engines, see Stumpf, 1975 and 1978. For the technology of alcohol-fueled vehicles developed by the auto manufacturers, the problems, solutions, and present topics of research, refer to the Annals of the IX Encontro dos Centros de Apoio Tecnológico, Brasília, July 1982.

formance, headed by the STI, which today incorporates 15 Technological Support Centers (CAPs - Centros de Apoio Tecnológico) located in 12 different states. These Centers utilize the services of important institutes and university research stations. The CAPs are in charge of determining modifications for various automobile models; making technology available to repair shops that undertake conversion work and qualify them to be accredited by the STI; approving prototypes of convertors incorporating any required modifications; and providing accredited repair shops with continued technical assistance.[107] For its technological capacity, the CTA is the most important of the CAPs. The CAPs are also responsible for setting standards for new alcohol engines to be manufactured by the automobile industry. The maximum consumption of alcohol was fixed initially at 15% higher than that of gasoline. This proportion today actually varies from 20 to 25%.[108]

In 1980 the issue of simplified versus conventional conversion of gasoline engines to alcohol became salient. The "simplified conversion" -- accomplished with a "backyard technology" was proposed by the Secretary of Industry and Trade, Science and Technology of São Paulo, Oswaldo Palma, and enjoyed the enthusiastic support of the taxicab drivers of that state. The Minister of Mines and Energy sympathized with the proposal. This position met with stiff opposition from the

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[106] See Stumpf, 1978: 340.

[107] Interview with Reinaldo F. Dana, STI, on 10/11/83.

[108] This was the result reported by most car manufacturers in the IX Encontro dos Centros de Apoio Tecnológico (IX Meeting of the Technological Support Centers), Brasília, July 1982.

Minister of Industry and Trade, the STI, and the CNP, who held that all engine conversions from gasoline to alcohol should take place only in repair shops accredited by the STI. Tests conducted by the CTA showed that an engine converted by the simplified method would consume about 50% more alcohol than gasoline and cause a power loss of about 15%. But while those bodies were concerned with an imbalance in supply and demand for alcohol that such an inefficient method of engine conversion might produce, Palma believed that market forces, if allowed to operate freely, would stimulate the supply of alcohol. Both Palma and the Minister of Industry and Trade called on Figueiredo to settle the question in his capacity as President and "arbiter of the last instance." While his sympathies reportedly lay with the simplified conversion, Figueiredo declined to take a personal stand on the issue. In April, 1981, the STI made it known that henceforth non-authorized conversions were to be considered a crime punishable by law. In May the representatives of 260 repair shops from throughout the country who were accredited by the STI gathered in São Paulo to receive stickers to be displayed in the windshields of all converted vehicles beginning that August. Service stations, moreover, were to fill with alcohol only the tanks of vehicles that displayed these official CNP stickers.[109] Later in 1982 this measure was revoked as part

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[109] On the subject of simplified versus conventional conversion of gasoline engines to alcohol see DCI, 3/13/80, "Álcool desgasta menos que a gasolina, diz STI"; GM, 3/21/80, "Plano triplica o Proálcool"; JC, 3/22/80, "Planalto dará novo impulso ao Proálcool"; GM, 5/7/80, "A polêmica sobre a conversão de motores em São Paulo"; FSP, 5/11/80, "Proálcool não vai tão bem"; JC, 5/31/80, "Penna quer aumentar o álcool para desestimular o consumo"; RR, 5/26 to 6/1/80, "Só 100 mil barris diários pagam risco das 7 irmãs"; ESP, 6/1/80, "Dúvidas e críticas contra a

of a set of incentives to increase the sales of alcohol cars during the PNA "discrediting phase". But by this time the conversion of engines had given way to alcohol cars whose major technological problems had been solved (see Table 48, 49, and Figure X).

In sum, all major technological problems relating to the adaptation of the Otto cycle engine to run on alcohol were resolved satisfactorily. The new alcohol engines have undergone three generations of engine changes in three years -- a major accomplishment if one considers that gasoline engines have changed little during the past 30 years in the American automobile industry.[110] Currently, the technological issue being addressed is that of substituting diesel oil,[111] an issue which overlaps with that of expanding the National Alcohol Program to loading vehicles.[112]

Resources (and World Bank participation in the National Alcohol Program)

The worsening of the economic crisis in Brazil coincided with phase two of the National Alcohol Program, which required more resources

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109 (cont.)
política oficial de conversão"; OG, 6/4/80, "Camilo: Figueiredo não criticou o Proálcool"; JC, 6/18/80, "STI só admite conversão de motor sob sua norma"; GM, 4/2/81, "Projetos registrados pela CENAL"; OG, 4/8/81, "Álcool: conversão ilegal dá cadeia"; and GM, 5/23-25/81, "Programa bate recorde ao enquadrar 24 novos projetos de destilaria".

110 This remark was made by Isaac Sam, Industrial Projects Department, World Bank (interviewed on 7/21/83). He also called attention to the fact that Brazil is the only developing country that has developed engine technology.

111 See footnote 11, pp. 368-369.

than phase one. In fact, with the expansion of annexed distillery capacity being exhausted, the Program had to turn to autonomous distilleries, which were three times more costly to build.[113]

Up to 1979, the resources to finance the National Alcohol Program came from federal budget allocations plus the profits of the sales of anhydrous alcohol added to gasoline, which was administered by the National Petroleum Council (decree no. 83,700/79, article 16).[114] In

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[112] See Chapter 9, section 9.2.

[113] During phase one of Proálcool (1975-1978), 112 projects for annexed distilleries were approved, representing 65% of the total. During phase two, autonomous distillery projects (150) represented 70% of the total projects approved (as of November 11, 1982). Source: CENAL.

[114] Below is a simplified version of the price structure of hydrated alcohol, anhydrous alcohol, and gasoline as of October 1982, to illustrate the balance sheet of anhydrous alcohol:

Price Structure of Alcohol and Gasoline
(in cruzeiros/liters - 20° C)

	hydrated alcohol	anhydrous alcohol	gasoline
ex-distillery price	87.7700*	92.7200*	
"realization price"[a] (preço de realização)	--	--	78.8441
various taxes	--	8.0489	46.5459
price charged to distributor companies	87.7700	100.7689	122.3900***
distribution item (alínea distribuição)	(20.0100)[b]	26.5111[c]	4.8900
others	16.2400	16.7200	16.7200
selling price at pumps	84.0000**	144.0000**	144.0000**

1980, resources deriving from the sale of anhydrous alcohol were applied to other energy programs as well. In the 1980-82 period, the Program came to depend substantially on the resources of the Energy Mobilization Program (PME),[115] which, as noted, fell under the control of the SEPLAN Energy Commission, created at the end of 1981. With the worsening of national economic conditions, however, the Program could rely on only meager federal budget allocations, and consequently attempted to capture foreign resources as well.

With the second oil shock, the Brazilian government boosted the second phase of the National Alcohol Program, establishing the new alcohol production goal of 10.7 billion liters for 1985. During a meeting of the Council for Economic Development held in June 1979, the needed financing to meet that goal was estimated at US$ 5 billion to be allocated as follows:

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114 (cont.)
*beginning 10/18/82

**beginning 9/16/82

***beginning 10/21/82

a - "realization price" is the price Petrobrás could charge the Distribution Companies if it were not for the various taxes added.

b - value repaid by the CNP to the Distribution Companies on account of freight and other items.

c - the difference in value between the billing price and the retail price (except for "others"); collected by the CNP and controlled by the SEPLAN Energy Commission (CSE). The resources from the "distribution item" of the anhydrous alcohol price are used to subsidize hydrated alcohol as well as to finance other energy programs as determined by the CSE.

Information is derived from Petrobrás.

[115] See p. 384 and footnotes 28 and 29 of this chapter.

- expansion of crops (raw material) and of alcohol distillery capacity (US$ 4 billion)

- technology development program to improve biomass energy raw materials and processing technologies (US$ .4 billion)

- expansion of storage facilities and miscellaneous (US$ .6 billion).

The sources of federal funds from which to draw were matters of serious concern and disagreement among the economic Ministries. It soon became clear, however, that a substantial part of Program financing would have to come from foreign sources.

The presence of foreign funds in the National Alcohol Program would become translated into the two major issues of phase two: (1) the negotiations with the IBRD for a financing contract; and (2) the entry of foreign capital into the Program as a participant in production activities. These issues were to involve almost all important actors, both public and private.

The entry of foreign capital in the PNA was actually embroiled in the historical issue of state versus private control of the economy in general and of key economic sectors, in particular. The sugar-alcohol sector was no exception to this controversy. The issue came to the fore when, lacking resources, the government needed a greater involvement on the part of national entrepreneurs in the Program if the PNA was to meet its new alcohol production goal for phase two (10.7 billion liters in 1985). Thus, the Ministry of Industry and Trade (MIC), in charge of overseeing the Program, in consistent and recurrent statements of its Minister, Camilo Penna, and its Secretary-General and President of CENAL, Marcos José Marques, "threatened" national entrepreneurs with

the participation of foreign capital and, to a lesser extent, of state capital in alcohol production if they did not respond adequately.

The participation of state capital in production would be in the form of a Petrobrás investment. Petrobrás proposed a "tripod model" to produce alcohol, a scheme supported by Camilo Penna. This proposal did not come to fruition, but it did mobilize national entrepreneurs for and against the proposal,[116] and incurred the opposition of the privatista "liberal" press.[117]

The proposed entry of foreign capital exerted strong pressure on the national entrepreneurs. The Ministry of Industry and Trade even fixed a date, July 1980, beyond which if the private sector did not submit to CENAL proposals to produce sufficient alcohol to meet the 1985 goal, foreign companies would be allowed into the PNA.[118] A Government Working Group[119] was set up to study the conditions under which the foreign groups would participate in the Program. Penna made public the MIC position on financing conditions to apply to foreign firms: they could have equal access to PNA subsidized credit if they entered into joint ventures with domestic groups as minority partners.[120] On occasion various members of the Government announced the interest of various foreign groups to participate in the Alcohol Program.[121]

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[116] See pp. 402 - 403 of this chapter.

[117] See footnote 60 of this chapter.

[118] See on this subject, ESP, 2/10/80, "Foi providencial a cautela no Plano do Álcool"; RR, 2/4-10/80, "Até julho o Governo abre o Proálcool para as multis"; and GM, 2/15/80, "Penna admite estrangeiros".

[119] The group was composed of representatives of several Ministries: Foreign Affairs; Planning; Industry and Trade; and Mines and Energy.

The direct participation of foreign capital in alcohol production aroused strong nationalist reaction from a group of military hardliners. Public statements were made during the first half of 1980 by General Andrade Serpa, Chief of the General Department of Personnel of the Army, against the presence of multinational corporations in the energy sector on the grounds that it posed a threat to national security. He received strong public support from General Ernani Airosa, Chief of the Army General Staff. Reportedly, he was also backed by a group of generals and coronels.[122] Support was also forthcoming from the President of the PMDB, the opposition party, some deputies, and interest groups such as the Association of Interstate Loading Transport Firms of São Paulo. The issue occupied and divided the Congress; a Senate Hearing on the National Alcohol Program was proposed. Practically all interest groups involved in the alcohol policy took public stands on the issue. On balance, the majority of sentiment ran against the participation of foreign capital in production (this was the position of Zanini), at least as majority partners (a view held by ANFAVEA). The alcohol producers responded to the Government "threat" of allowing foreign groups into the PNA by demanding a guaranteed price for sugar cane and alcohol.[123] In April 1980 they made public a manifesto signed

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[120]Cf. RR, 2/4-10/80, "Até julho o Governo abre o Proálcool para as multis".

[121]See GM, 2/15/80, "Penna admite estrangeiros"; JC, 4/17/80, "Serpa foi demitido"; and DCI, 5/9/80, "Proálcool desperta interesse na França".

[122]Cf. FSP, 2/14/80, "Serpa condena presença das multis na política energética brasileira"; GM, 4/8/80, "Shell e Texaco querem apenas a

by 13 sugar and alcohol producers' associations acknowledging their responsibility in the National Alcohol Program, but demanding an adequate pricing policy and better credit terms so they could fulfill their role in the Program.[124] In September representatives of the major entrepreneurs engaged in the National Alcohol Program, from the sugar and alcohol producers and the distillery equipment suppliers, assured the Government that they could meet the alcohol production goal for 1985.[125]

Inside the government bureaucracy, the direct participation of foreign capital in the PNA was no less polemmical an issue. Although President Figueiredo dismissed General Andrade Serpa from his position in the Army, this did not mean that the President was performing his role as "arbiter of the last instance" in intra-bureaucracy disputes. Rather, the Presidential Act was aimed at a broader political target.[126]

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122 (cont.)
distribuição"; ESP, 4/9/80, Capital externo fora do Proálcool em 80"; and ESP, 4/16/80, "Serpa prega 'correção de rumo' em quatro setores".

[123]Sugar and alcohol producers pressed for an increase in the price of cane, sugar, and alcohol in April 1980. After the government conceded the requested increase, the producers still claimed that it did not compensate for the costs of production. Cf. JT, 3/17/80, "O que há de errado no Proálcool"; GM, 3/20/80, "O avanço da Dedini no Proálcool", by José Casado; DCI, 4/9/80, "Financiamento e preço, os problemas do setor da cana"; FSP, 4/10/80, "Governo autorizará reajuste do álcool"; ESP, 4/11/80, "Os produtores de açúcar e álcool do Brasil manifestam suas preocupações"; JB, 4/11/80, "Usineiro dá prazo ao Governo para uma solução definitiva"; JC, 4/29/80, "Álcool com preço novo"; JB, 4/30/80, "Açúcar subirá 40% e kg poderá custar até Cr$ 19"; JB, 5/1/80, "Ometto diz que preço do açúcar e do álcool continuam desfasados"; JB, 5/4/80, "Produtores de açúcar e álcool de RJ acham aumento insuficiente"; and JB, 5/4/80, "Plantadores de cana também reclamam".

[124]Cf. ESP, 4/11/80, "Metas de Minas Gerais".

[125]Cf. JB, 9/15/80, "Empresários garantem meta do Proálcool em 85 já no próximo ano"; and JB, 9/20/80, "Camilo nega capital externo no Proálcool".

On this issue, the President's decision can be interpreted to mean that he was leaving the option open for foreign participation, because meeting the alcohol production goal was his overriding concern.[127] The Minister of Mines and Energy, Cesar Cals, and the Minister of Planning, Delfim Netto, frankly favored the direct participation of foreign capital in alcohol production.[128] Delfim Netto's strongest motivation seemed to be the contribution which foreign capital, either in the form of direct investment or loans (see below), could make to improving the country's balance of payments. The Vice President, Aureliano Chaves, also President of the National Energy Commission, the body which rightfully should have decided the issue, represented the dissenting voice, opposing the presence of foreign capital in the PNA. He stated repeatedly that he was confident that national entrepreneurs would respond well.[129] It is plausible that the Minister of Industry and Trade, while

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[126]President Figueiredo has been a key element in the process of political liberalization and democratization Brazil has been experiencing for six years. During his administration he has been challenged on various occasions by a remaining core of military hardliners, some of them radical nationalists as well. The dismissal of General Andrade Serpa constituted not only the punishment of an officer who had violated military regulations by making public pronouncements without the permission of his military superior, but also, it is suggested, had the objective of putting down a growing hardliner movement.

[127]See DCI, 4/16/80, "Destilarias de médio porte vão ter créditos especiais".

[128]Cf. ND, 9/5/80, "Cals defende outra vez multi no álcool".

[129]See, for instance, DCI, 4/16/80, "Destilarias de médio porte vão ter créditos especiais"; OG, 6/3/80, "Álcool: Aureliano não discute capital externo"; and JC, 9/11/80, "Aureliano desmente Cals sobre as multis no álcool".

"threatening" the national entrepreneurs, intended to align with Aureliano Chaves, using the threat as a means to encourage the private sector to invest in expanding agricultural and industrial capacity to raise alcohol production to the 1985 target.[130]

By September, 1980, Cals and Delfim Netto were endorsing the same proposition. Alcohol production was to be a private undertaking: the National Alcohol Program would remain in the hands of domestic entrepreneurs, while a separate program would be developed with foreign capital for the exclusive purpose of exporting. This parallel program was to be applied in large-scale distilleries in the North, Northeast, and Center-West regions of the country. Praised by the privatista "liberal" press, this proposal was approved by Figueiredo without being submitted for the consideration of the National Energy Commission.

The foreign capital alcohol program aimed at exporting never materialized. The issue of direct participation of foreign groups in alcohol production faded during 1981 and had by 1982 disappeared altogether. The main reason probably lies in the fact that, except for one Japanese group, foreign groups displayed little interest in investing in alcohol production in Brazil. At the present time, no alcohol distillery has the participation of foreign capital.

The government attempt to capture foreign financing for the PNA was more successful. Although contacts with a few foreign funding sources did not at first result in the anticipated finances,[131] a credit

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[130]This is suggested by reading between the lines of the statements made by Penna in this respect, and it was confirmed by an interview with Vinicius Tasca Ferreira, Coordinator of Project Analysis, CENAL, on 10/10/80, Brasília.

contract was successfully negotiated with the IBRD in 1981, two years after discussions had begun. While the credit contract with the IBRD did not arouse the same nationalist protests that the direct participation of foreign capital in alcohol production had, it was a no less polemical issue. On the one hand, the Vice-President, Aureliano Chaves, thought it to be unnecessary,[132] while on the other, the powerful Minister of Planning, Delfim Netto, campaigned hard for it, for principally two reasons: first, to improve the country's balance of payments position; and secondly, with World Bank approval, to capture other international loans for the Program.

At the end of 1979 an IBRD mission arrived in Brazil to make a new economic and financial assessment of the Program.[133] Early the following year, the Ministry of Industry and Trade announced a favorable appraisal of the PNA by the World Bank. Negotiations opened shortly thereafter. The sticking point in these negotiations and the source of controversy in this issue was the terms required by the IBRD as pre-conditions for the loan. These requirements were:

- international bidding for distillery equipment for industrial projects to be supported by the Bank
- reduction and eventual elimination of

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[131] A US$ 1.2 billion loan from a consortium of several banks in London was conceded to the National Alcohol Program. Reportedly, however, this loan served the purpose of improving the country's balance of payments and did not reach the PNA.

[132] See JC, 9/19/80, "Aureliano: multis ...".

[133] One should recall that in early 1978 the World Bank released a report in which Proálcool was considered a non-viable program in economic terms.

interest rate subsidies on Proálcool loans

- an alcohol pricing policy that would maintain the ex-distillery alcohol prices paid to producers at levels that would adequately remunerate them, implying a constant adjustment according to the rate of inflation

The first point provoked immediately the strong opposition of the domestic distillery equipment suppliers, who publicly protested through the various interest group associations of the capital goods sector (ABDIB, ABINEE, ABIMAQ) and in recurrent statements from individual suppliers, especially Zanini. The reduction of interest rate subsidies were a matter of lengthy negotiations between the Bank and the Brazilian government. As for the constant adjustment according to inflation rates of the alcohol price paid to producers, the Brazilian government's concern was with the inflationary effect this measure would produce.

In February 1981, Camilo Penna announced that the IBRD had backed down on these three points.[134] It was announced that the IBRD would not interfere in the alcohol pricing policy as much as it had originally intended to.[135] The agreement reached between the two parties on the conditions of Proálcool loans was translated into Central Bank Resolution no. 671, passed in December 1980. Though not to the extent initially re-

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[134]See Camilo Penna's statements in this regard in "Penna diz que o BIRD recua", GM, 2/17/81.

[135]To be sure, the final contract between the IBRD and the Brazilian government includes an exchange of views from time to time on the reduction and gradual elimination of interest rate subsidies on Proálcool.

quired by the IBRD, substantial reductions were made in the percentage of total estimated project cost to be financed and in the interest rate subsidies for both agricultural and industrial ventures.[136]

The most difficult point to be negotiated was the Bank requirement for international bidding for distillery equipment. The government was under pressure from two sources, the Bank and the domestic equipment suppliers. Although the Brazilian government as a whole was opposed to the afore-mentioned clause demanded by the IBRD, some segments of the bureaucracy were more strongly opposed than others. Thus, the Ministry of Planning and the Ministry of Finance, to which the IBRD contract appeared vital to strengthen the country's balance of payments position, seemed more willing to accept the international bidding clause than the Ministry of Industry and Trade and the CENAL. To be sure, the representatives of all these bodies declared during the negotiations

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[136]Before Resolution no. 671, Proálcool financed up to 80% of the total estimated costs for distillery projects using sugar cane alcohol and 90% for other raw materials. With Resolution 671 this proportion came down to 70% for annexed distilleries. Autonomous distilleries, however, could have 80% of their estimated costs financed, while distillery projects of cooperatives and producers' associations were entitled to have credit on 90% of the project costs. Interest rates, which had been adjusted according to 40% of the ORTN* annual variation plus a maximum tax of 5%, were now with Resolution 671 to be adjusted on the basis of 45% of the ORTN annual variation for the North-Northeast regions and 55% for other regions. (According to Camilo Penna the IBRD first required this proportion to be 70%. See "Penna diz que o BIRD recua", GM, 2/17/81.)

The credit ceiling for agricultural projects was reduced from 90 to 80% and from 80 to 60%, respectively, for medium and large producers. Individual mini and small producers as well as cooperatives composed of at least 70% mini and small producers continued to receive credit on 100% of the estimated costs of the project. Interest rates suffered a sharp increase, from a maximum of 26% for large producers in the North-Northeast and 29% for the other regions to 35% and 45% respectively. (See CENAL, "Informações Básicas para Empresários," Brasília, January 1980 and Banco Central do Brasil, Resolução no. 671, 12/17/80).

*ORTN - see Chapter 7, p. 317.

that Brazil would accept the IBRD clause given they were certain the domestic suppliers would win in international bidding. Yet, the Minister of Industry and Trade and the President of CENAL pressed hard to gain favorable conditions of competition for national entrepreneurs. Brazilian government pressure paid off: a 15% preference margin was granted for national enterprise. An open international bidding system was dropped in favor of a limited bidding invited by each project sponsor from among a restricted number of foreign and domestic enterprises. These enterprises, five national and five foreign, were to be selected by CENAL on the basis of their past experience in distillery construction.[137] The project sponsor would then invite at least two qualified

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[137]Most of the enterprises formed consortiums. They are:

Domestic Suppliers:

a. Consortium Conger S/A - Equipamentos Pesados/COSINOR, Cia. Siderúrgica do Nordeste/Equipamentos Villares S/A/PROQUIP S/A Projetos e Engenharia Industrial.

b. Consortium IESA - Internacional de Engenharia S/A/ Five Lille Industrial do Nordeste S/A.

c. Consortium TECHNIT - Cia Técnica Internacional/Metalúrgica Barbosa Ltda/Fundição Goytacaz Ltda.

d. M. Dedini S/A (M. Dedini S/A Metalúrgica/CODISTL - Construtura de Destilarias Dedini S/A).

e. Zanini S/A - Equipamentos Pesados.

Foreign Suppliers:

a. Consortium Fletcher & Steward Ltd/Constructors John Brown Ltd/Natron Consultoria e Projetos S/A.

b. Consortium Mitsubishi Corp./A. Araujo S/A - Engenharia e Montagens/Japan Gasoline Corp./K.F. Engineering Co. Ltd/ Kyowa Hakko Kogyo Co. Ltd.

national and two foreign firms to present their offers, select one, and contract the winner under the turnkey system.

Although the limited bidding system can be seen as a major concession from the IBRD and a victory for the Brazilian government, it did not satisfy the domestic suppliers of distillery equipment. Notwithstanding the fact that until the present, all bidding rounds have been won by domestic suppliers,[138] they feared opening the domestic market to foreign firms of great financial strength, who were given an opportunity to develop alcohol-processing technology.[139]

In April 1981 after an extensive analysis of the PNA, the World Bank produced a Staff Appraisal Report, "Brazil: Alcohol and Biomass Energy Development Project", highly favorable to the Program. On May 12, 1981, credit contract no. 1989 BR was signed be-

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137 (cont.)

c. Consortium SETAL - Instalações Industriais/Buckau-Walther A.G.

d. SPEICHIM - Societé pour L'Equipement des Industries Cliniques.

e. Stork - Werkspoor Sugar B.V.

[138]Through December 1982, competitive bids had been invited six times (CENAL Report, November-December 1982).

[139]Interviews with Waldyr Gianetti, Vice-President of Dedini and President of ABDIB, and Jayme Pena Shutz, Commercial Director of Dedini, both on 12/22/82, Piracicaba, São Paulo; interview with Luiz L. Biagi, Vice-President of Zanini on 12/20/82, São Paulo, SP. To be sure, Biagi showed less concern with the participation of foreign firms in the bidding. For him, if national enterprises were free to compete (that is, free to purchase raw material wherever in the world it was cheaper), they would win the bidding every time.

The World Bank view on this issue differs significantly. The Bank's intention was to break the Dedini-Zanini oligopoly on the dis-

tween the Brazilian government and the International Bank for Reconstruction and Development, IBRD (World Bank). At the beginning of the negotiations a US$ 1 billion loan was considered,[140] but the final version of the contract was for a credit value of US$ 250 million. It was a long-term loan (15 years) with a grace period of three years and an interest rate equal to 9.6% per year. The IBRD resources were to be applied as follows:

- US$ 281.5 million to finance alcohol producing units, including agricultural projects, approved during the 1981-83 period.
- US$ 30 million to finance R & D projects in the areas of raw material production, industrial processing and utilization of alcohol, and the development of other forms of biomass energy.
- US$ 1.5 million to conduct studies on monitoring and assessing the impact of the PNA.

One year later, CENAL Act no. 774/82 established the credit terms and the procedures for projects financed by the World Bank. The projects located in traditional sugar cane growing areas were not eligible, except when sponsored by small farmer cooperatives. Priority was to be given to projects sponsored by cooperatives or small agricultural or industrial entrepreneurs; based on raw materials other than sugar cane;

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139 (cont.)
tillery equipment sector. Introducing foreign firms to the market would force Dedini and Zanini to develop new technologies in order to decrease production costs (Interview with Isaac Sam, Industrial Projects Department, World Bank, on 7/21/83).

140 A World Bank official interviewed, however, said that a US$ 1 billion loan was never really under consideration (Interview with Isaac Sam, see footnote 139 above).

based on sugar cane if 50% or more came from independent suppliers; located in areas which reduce transport costs and regionally disperse alcohol production; and using non-conventional technology.

A CENAL assessment of the National Alcohol Program released in September 1981 reappraised the resources necessary to implement phase two of the PNA at US$ 6.1 billion, due to "the effects of the devaluation of the cruzeiro in the /1979-1981/ period and the price increase, above the rate of inflation, of some basic inputs (fertilizers, fuels, machinery and equipment, wages, and so forth).[141] The IBRD loan represented, therefore, only 4% of the total amount of resources needed, and what might appear to be a disproportionate influence in the management of the Program. However, on closer examination, the IBRD deal was important in several respects. First, as noted, the IBRD loan was expected to play a role in ameliorating Brazil's balance of payments. Secondly, along the same lines, with the concession of this loan, the World Bank would serve as a guarantor, so to speak, of the National Alcohol Program in the eyes of the international community. This was expected to not only gain the confidence of international sources of financing, but also to awaken interest among other oil-importing countries in the Brazilian pioneering experience with fuel alcohol, thereby opening up new exporting opportunities for both alcohol and distillery equipment. Third, although the IBRD loan was not a large amount, given the cuts in public expenditure, it was the only source of finance for projects approved in 1982.[142] It also served, as expressed

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[141] See "Terceira Avaliação do Proálcool, Documento Preliminar", September 1981, p. 8.

by the Vice-President of Dedini, "to keep the PNA flame alive" (manter a chama do PNA acesa),[143] after CENAL announced that beginning on June 31, 1981, no alcohol projects would be approved.

To be sure, CENAL resumed alcohol project approval in the following year, depending exclusively on IBRD resources. This is, in itself, an important indicator of the severe shortage of domestic resources available for the Program. A no less important indicator is the progressive tightening of the credit terms throughout the second phase of the PNA. While it is true that the tightening of the financing terms was to a large extent imposed on the Brazilian government by the World Bank as a precondition of credit, the deteriorating economic situation of the country also contributed. Consequently, in mid-1981, a postponement of the 1985 alcohol production goal of 10.7 billion liters until 1987 was announced.

Up to December 1982, approximately US$ 5 billion had been expended on the National Alcohol Program. But, as seen above, resources have been drained. To be sure, major producers can maintain operations for some time, as demonstrated by the number of projects approved by CENAL in 1982 which were to be financed exclusively with the sponsor's own resources.[144] However, the lack of resources could become a serious bottleneck for the extension of the Program to loading vehicles, currently under consideration.[145]

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[142]Until the end of 1982, of the 406 projects approved by CENAL, only 44 did not have Proálcool financing. Of these 44, nearly 60% were approved in 1982. Data are from CENAL.

[143]Interview with Waldyr Giannetti, Vice-President of Dedini and President of ABDIB on 12/22/82, Piracicaba, SP.

Conclusion

Despite the recent stabilization and even decline in real terms of oil prices and the waning influence of the international oil market on Brazilian energy policy, the second oil shock and subsequently the Iran-Iraq war provided the definitive incentive for phase two of the PNA. The stimulus of a very weak international sugar market, coinciding with the "disappearing crisis phase" (Choucri, 1982a) of the oil market, was insufficient to accelerate alcohol production, even with a powerful sugar and alcohol lobby, as had occurred when both markets were in similar situations during the implementation of the gasohol phase. The blame is attributable to the ever worsening economic situation which slowed down the alternative energy programs, especially with the oil market now favorable to consumers, as well as the successful adaptation of Petrobrás' refining structure and the "Bottom of the Barrel" Program. In fact, the economic policy which had until this point constituted a basic parameter for decisions concerning alcohol policy through, so to speak, energy policy,[146] now began to exert direct influence on these decisions as the economy worsened.

Economic difficulties notwithstanding, the phase of alcohol-fueled cars seems firmly in place and not easily reversible. To have reached this point in the Program, solutions had to be devised for a number of

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[144]See footnote 142 above.

[145]On the extension of the PNA to loading vehicles, see Chapter 9, section 9.2.

[146]See Chapter 6, p. 217.

problems. This chapter examined the main problems, assessed the solutions, and pointed out the yet unsolved questions, such as the lack of financial resources. Two basic problems which, if not properly redressed, would have hindered the successful implementation of phase two, were, however, not raised: the commitment of the automobile industry to the Program and consumer behavior with respect to the alcohol car. Both will be examined in the next chapter.

CHAPTER 9

The Alcohol-Fueled Car Phase: The Automobile Industry and Consumer Behavior

At the onset of phase two of the PNA, the Program still suffered from production-related problems: the price of alcohol was not considered compensatory by the producers; the processing of proposed distillery investments was slow and drawn-out; credits authorized to alcohol producers to expand agricultural and industrial capacity had to be adjusted in line with the monetary corrections; and the storage and distribution system constituted a major bottleneck for the implementation of the Program. However, these were problems of phase one properly speaking; to assure a volume of anhydrous alcohol sufficient for the 20% proportion of alcohol in the carburant mixture, the production itself of the carburant mixture (i.e. gasohol at 20% alcohol), and an adequate distribution of the fuel, these problems had to be overcome. With phase two and the increase in scale of alcohol production and distribution of both the anhydrous and hydrated varieties, it became all the more urgent to develop solutions to the existing problems.

Inherent to phase two alone, however, were the questions relating to the consumption of hydrated alcohol. Even if the new fuel were properly produced and delivered, automobiles to run on pure alcohol still had to be manufactured and consumers still had to buy the new product. Consumer behavior was to be of fundamental importance for the unfolding of the second stage of the National Alcohol Program. However, the success of the whole Program would hinge on the willingness of the automo-

bile industry to invest in this new product line. Consumer preferences would, of course, figure prominently in any decisions made by the manufacturers to proceed with the alcohol-fueled car.

The first section of this chapter will deal with the process of formulating phase two of Proálcool and, accordingly, with the commitment of the automobile industry to the Program. Section two will analyze the implementation process of the second phase of the PNA. In attempting to explain the peaks and troughs of alcohol car sales, it will also examine consumer behavior.

9.1. The Formulation Process: The Commitment of the Automobile Industry

The formulation of the program to produce alcohol-driven cars was initiated in December 1978, when the Ministry of Industry and Trade publicly called for the cooperation of the automobile industry, and drew to a close in September 1980, when the Iran-Iraq War triggered the "euphoria phase" of the PNA. The demand for alcohol cars rose dramatically, and the automobile industry engaged itself in earnest in fulfilling the Program targets.

At the beginning of the second phase of Proálcool, in 1978, the Ministry of Industry and Trade had pressured the automobile industry to begin production of alcohol cars. Throughout that year, both individual manufacturers and the interest group, ANFAVEA, repeated the industry's response: the automobile industry would be technically prepared to commence production of alcohol cars in two or three years, provided the government guarantee an adequate system of alcohol distribution. They also insisted that the government be solidly united behind the program. Their anxieties and demands were reasonable when one remembers that one of the distinctive features of the first phase of the PNA was the ambiguity of Program objectives among different segments of the government bureaucracy.

The automobile industry maintained what has here been called a "wait-and-see" attitude, which, as discussed in Chapter 8, included the initial steps in developing the technology for internal combustion engines propelled by alcohol ("just in case"). There was little change in this profile on the part of the auto industry, despite the second oil shock. What did change, however, was the government's view of the

National Alcohol Program. If there had remained any doubts about the Program, they were quickly dispelled by the strong stand taken by Figueiredo in support of alternative energy sources. Proálcool, the most advanced program for alternative energy, gained special prominence.

Thus, at the same time that measures were taken to improve the efficiency of the alcohol distribution system,[1] the government renewed its pressure on the automobile industry to engage in the Program. The Ministry of Industry and Trade again took the lead, through the actions of its Minister, Camilo Penna, and its Secretary-General and President of CENAL, Marcos J. Marques. Penna and Marques, in striving to meet the 1985 production goal of 10.7 billion liters, announced a series of incentives for consumers of alcohol cars in order to guarantee demand for alcohol. In exchange for their efforts to assure demand, they required, in turn, that the automobile industry produce the necessary supply of alcohol vehicles. In August, the National Energy Commission (CNE) created a Working Group coordinated by the Ministry of Industry and Trade comprising representatives of the National Petroleum Council, the Ministry of Mines and Energy, and the private sector. This Group was to establish a timetable for substituting alcohol-fueled for gasoline-powered cars. During the same month, several meetings were held in the Ministry of Industry and Trade with the presidents of the automobile manufacturers to accomplish this aim of determining a coherent timetable for alcohol production, its nationwide distribution, and the manufacture of alcohol cars in the following years. In that same month, Penna attended the Seventh National Meeting of Sugar and Alcohol

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[1]See Chapter 8, pp. 395-411.

Producers, as noted, a most important forum for debating sugar and alcohol policy, held annually in Campos, Rio de Janeiro. The Minister reaffirmed the centrality of the National Alcohol Program to the country's energy policy, acknowledged the challenge posed by the new 10.7 billion liter alcohol target for 1985 to alcohol producers, and enlisted their support in supplying fuel for the new alcohol cars.[2]

Finally, on September 19, 1979, the CNE approved a Memorandum of Intent establishing the principle of "co-responsibility" of the government and the automobile industry to produce alcohol and alcohol-fueled cars. The Memorandum, signed by ANFAVEA as the representative of the automobile industry and government delegates on September 19, 1979, established the following schedule for the production of alcohol cars:

1980 - up to 250,000 vehicles

1981 - up to 300,000 vehicles

1982 - up to 250,000 vehicles

The Memorandum referred only to passenger cars, something which met with the dissatisfaction of both the Minister of Industry and Trade and the Minister of Mines and Energy, who indicated that by not including loading vehicles in the agreement, the automobile industry showed disinterest in the country's energy problems. Although some manufacturers claimed to have already developed the technology for loading vehicles,

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[2]See JB, 7/17/79, "Governo incentivará carro a álcool taxando mais o comum"; JB, 8/2/79, "Governo define bases para o carro a álcool"; JB, 8/10/79, "Indústria quer fazer só carro a álcool para mercado interno"; JB, 8/10/79, "CNE aprova ..."; and RR, 9/10-16/79, "Sem compromissos com o ônibus a álcool". See also the address of Minister Camilo Penna to the VII National Meeting of Sugar and Alcohol Producers in COPERFLU, 1979: 15-21.

the industry as a whole preferred to wait for a clearer government policy for diesel substitution for these vehicles.[3]

On November 9, 1979, the completion of the first round of negotiations for alcohol-fueled cars produced another Memorandum of Intent. In the second Memorandum the regional Associations of Convertors (to which all STI accredited alcohol conversion stations should belong) agreed to the following schedule for conversion of gasoline engines to run on hydrated alcohol:

1980 - up to 80,000 engines

1981 - up to 90,000 engines

1982 - up to 100,000 engines

In March 1980, ANFAVEA and ABRAVE, the interest groups for the automobile industry and the car dealers, respectively, sponsored a public event in Brasília to celebrate the beginning of the sale of alcohol cars to private consumers. This event was attended by several Ministers of State and the President of Brazil himself. The auto manufacturers took the occasion as an opportunity to boast of their accomplishments in the development of both diesel and Otto cycle alcohol-propelled engines. At this point the Ministry of Industry and Trade declared - a bit too optimistically as seen below - that the technology for alcohol vehicles had already been successfully developed. After a first round of negotiations with the CIP (Inter-Ministerial Price Commission), ANFAVEA agreed to sell the alcohol car at the same price as the gasoline car despite its higher production costs in order to stim-

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[3]Cf. RR, 9/10-16/79, "Sem compromissos com ônibus a álcool"; and JB, 9/20/79, "Carro em série só virá no final de 80".

ulate consumption.[4] Other consumer incentives announced for alcohol cars were: lower pump prices for alcohol than for gasoline,[5] a lower taxa rodoviária única ("road tax"),[6] longer repayment periods for auto loans, and the benefit of Saturday service at filling stations denied to gasoline cars for the entire weekend.

Everything seemed to fall into place in terms of advancing the production of alcohol cars to meet the targets established in the Memoranda. However, recurrent government complaints were issued during the first semester of 1980 about the retarded pace of alcohol vehicle production. Exacerbating the situation was a strike by workers in April which paralyzed most automobile manufacturers in the country.[7] While the workers' strike certainly contributed to the poor results in alcohol car production in the first semester of 1980, the automobile industry's weak commitment to the Program was also a contributing factor.[8] The government sensed this. Up to May 1980, a total of 17,450

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[4]See JC, 3/26/80; "Começa a venda de veículos a álcool"; JC, 3/27/80, "Governo lança carros a álcool em ato simbólico"; and DCI, 3/29/80, "Preço do carro a álcool será igual ao do movido a gasolina".

[5]The price ratio fuel alcohol/gasoline was fixed first at a maximum of 65%. Later, in March 1982, it was changed to 59%.

[6]The taxa rodoviária única is an annual tax levied on every vehicle and collected by the National Department of Roads. This tax varies with the value of the vehicle.

[7]See Figure X for the effect of the workers' strike on the overall sales of passenger cars. The drop was from 76,175 gasoline and alcohol cars in March to 26,069 cars in April (Cf. Table 53. Note that for the purposes of this work passenger cars include "light trucks for mixed/multiple uses" when gasoline or alcohol fueled).

[8]Mário Garnero, President of ANFAVEA, confirmed this assessment of the auto manufactuers' commitmenet to the PNA, even after the signature of the Memorandum of Intent. In an interview with the Jornal do Brasil,

alcohol passenger cars had been produced, a result that surely cast doubt on the ability of the manufacturers to meet their 250,000 car production goal for that year, consistent with the signed Memorandum of Intent. The government called attention to the fact that the alcohol car could be an important escape valve for the economic recession that was threatening the economy as a whole and could soon reach the automobile sector.[9] And it renewed its pressure on the industry to honor its agreements set forth in the Memorandum.[10]

As a consequence of the disappointing levels of alcohol car production in the first half of 1980, stocks of hydrated alcohol rose in excess of storage capacity. In April the government lifted restrictions on alcohol exports. The large São Paulo producers and COPERSUCAR were among the major exporters. Also Petrobrás received authorization from the National Petroleum Council to export from its stocks of hydrated alcohol. Alcohol was sold to Japan and especially to the United States.[11]

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8 (cont.)
Garnero indicated that "as gasoline-fueled automobiles were selling well, the sales managers of the auto manufacturers were not willing to alter the situation by introducing a new, complicating element" (free translation) (cf. JB, 9/19/83, "Brasil festeja hoje o sucesso da sua ousadia").

[9]In 1980, while the official economic policy was to curb inflation and at the same time maintain a reasonable rate of growth (around 6%), another position was also defined: to fight inflation with economic recession. Though both positions were under consideration, inside and outside the government bureaucracy, it was clear that economic recession was being considered seriously, especially with regard to the industrial sector. In the first semester of 1980, several industrial subsectors were showing a decline in activity. The automobile industry was an exception, but there were already signs that a contraction in production and sales could affect this sector. (Sources: various issues of Negócios em Exame, Visão, and Relatório Reservado.)

[10]See RR, 5/12-18/80, "Governo acusa 'multis' de retardarem o Proálcool".

In fact, the potential U.S. market for alcohol fuel[12] raised expectations for Brazilian alcohol exports beyond the temporary surplus of the product caused by the slow pace of alcohol car manufacture. This optimism, however, was soon frustrated by the protectionist measures lobbied for by American alcohol producers.[13] Thus after the first jump in alcohol exports during the 1979/80 cane crop, and the maintenance of the same level in 1980/81, they fell significantly during the subsequent crop year. This decline occurred despite an ever increasing inventory of alcohol built up during the 1981 - mid-1982 "Discrediting Phase" of Proálcool (see Table 30).

In May, given the workers' strike and the priority that was placed on auto exports,[14] the Minister of Industry and Trade agreed to revise

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[11]Cf. JB, 4/7/80, "Brasil exportou 40 milhões de litros de álcool em tres meses"; OG, 4/25/80, "Só para exportação"; OG, 5/5/80, "Interbrás vende álcool ao Japão"; and GM, 5/9/80, "Cr$ 44 bilhões destinados ao Proálcool, diz Camilo Penna".

[12]According to Schnittker Associates' projections, by 1985 the US market for ethanol could be around 11 billion liters, 10% of which could be imported. Western Europe and Japan, whose markets were estimated at 1 billion liters each, could be importing over half of their needs. Combined, the potential ethanol market could be from 2 to 4 billion liters per year (See Thomas C. Earley, Schnittker Associates, "The External Market for Alcohol", paper presented to the Simpósio Interamericano sobre o Desenvolvimento de Fontes Alternativas de Energia, São Paulo, Brazil, September 3, 1980).

[13]In the 1970s US alcohol imports averaged about 40 million liters/year. In the first seven months of 1980 alcohol imports reached 150 million liters, the large part of which came from Brazil. This sharp increase in alcohol imports immediately incurred the protest of domestic alcohol producers. As a consequence, in December 1980, legislation was passed which imposed a duty on ethanol imports to offset the existing subsidy of US$ .40 per gallon. See Early, 1980 and GM, 12/4/80, "EUA sobretaxam galão exportado pelo Brasil em 40 centavos de dólar". See also, for the reactions of American alcohol producers against Brazilian alcohol exports, OG, 6/8/80, "Álcool: EUA limitarão importação do Brasil";

downward from 250,000 to 200,000 the number of alcohol-driven cars to be manufactured in 1980.[15] The government also conceded a price increase for alcohol cars of 1.3%. Additionally, it guaranteed the fuel and its adequate distribution, and, in return, expected that the automobile industry would keep its part in the bargain.

From May onwards, a significant decline in the overall sales of gasoline vehicles, including passenger cars, shifted industry hopes to the alcohol car, given the incentives consumers enjoyed for its purchase. Table 50 and Figure X confirm this tendency. A sharp break occurred in September with the onset of the Iran-Iraq War, when previous trends in sales of gasoline and alcohol cars were abruptly reversed.

The sudden Iraqi cutoff of crude oil supplies corresponding to about half the total imports of oil (900,000 b/d), and the fear of a major disruption in the international oil market -- a fear which did not mat-

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13 (cont.)
JC, 6/11/80, "Aureliano alerta para o teto e o piso do álcool"; OG, 6/16/80, "Álcool para os EUA"; GM, 6/25/80, "IAA nega 'dumping' nas vendas para clientes norte-americanos"; and OG, 10/27/80, "Importação de álcool já preocupa americanos".

[14] In 1980 to depress imports and to increase exports to the maximum was the backbone of the economic policy for improving the country's balance of payments and curbing inflation.

[15] See JB, 5/2/80, "ANFAVEA confirma que o preço de veículo vai subir 13,3% dia 12"; RR, 5/19-25/80, "ANFAVEA obtém abatimento de 50 mil carros"; and JB, 6/29/80, "Plano do carvão continua atrasado".

erialize -- meant consumers faced a real possibility of petroleum rationing, or yet successive increases in gasoline prices. Demand for alcohol cars skyrocketed; alcohol car sales jumped from 21,799 in August to 46,591 in December, while gasoline car sales fell almost 4 times during the same period, from 58,932 to 14,961.[16-17]

From this point on, the automobile industry began to press the government to increase its production targets for alcohol cars above those agreed upon in the Memorandum of Intent. This marked the beginning of the "euphoria phase", to be taken up in the next section.

[16-17] See Table 50.

9.2. The Implementation Process: Recovering After Euphoria and Discrediting (September 1980 - December 1982)

As noted, the analytical, if artificial, division between the formulation and implementation processes of phase two of the National Alcohol Program was placed at the Iran-Iraq War, when demand for alcohol cars skyrocketed and the automobile industry engaged fully in the Program.

Three distinct phases can be identified during the implementation period, each of them defined in terms of consumer behavior. Taking as an indicator the ratio of alcohol-fueled cars to total car sales, the phases can be characterized as follows:

(i) the "euphoria phase", which began with the Iran-Iraq War in September 1980, when alcohol car sales were 34% of total car sales, and closed at the end of this same year, when a peak of 76% was reached;

(ii) the "discrediting phase", when the alcohol car to total car sales ratio decreased sharply during the first semester of 1981 and then stabilized at approximately 9% until the early months of 1982, when a series of consumer incentives were passed; and

(iii) the "recovery phase", when alcohol car sales recovered dramatically, reaching a 70% peak in December 1982.

The Euphoria Phase

As noted, the onset of the Iran-Iraq War in September 1980, accompanied by the Iraqi cutoff of about 50% of total daily oil imports and fear of a major disruption in the international oil market, led Brazil to the verge of panic.

Government Reaction:

The government's immediate reaction to the War was to temporarily cut off exports of alcohol, sugar, gasoline, vegetable oils, and every type of fuel or raw material that could be transformed into fuel, at the same time that it eagerly sought alternative oil suppliers. Emergency meetings of the National Energy Commission (CNE) were convened. Three main measures were considered for recommendation if the country's oil supply suffered any further disruptions: to increase the prices of oil products; to accelerate programs for alternative sources of energy already in progress; and rationing of oil products. This Commission served as a bargaining arena, with visible conflict among the member Ministries of CNE over these measures. Agreement was reached only on raising the prices of oil products;[18] an average increase of 16% for the principal products took effect on October 3. At this juncture, consideration was given not only to restricting the consumption of oil products in general, but also to discouraging what was called the "dieselization" of the loading vehicle fleet by, among other policy tools, changing the diesel oil/gasoline price ratio. However, despite the first and second oil shocks, the persistent increase in diesel oil consumption began to reverse itself only in the next two years,[19] when the diesel oil/gasoline price ratio became increasingly less favorable to diesel oil beginning in 1981.

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[18]Cf. RR, 10/6-12/80, "Aureliano queria racionamento. Delfim vetou"; GM, 10/2/80, "CNE eleva preços para não racionar".

[19]For a detailed analysis of the consumption trends of gasoline, diesel oil and fuel oil since the first oil shock and their relation to price policy, see Chapter 8, p. 366.

Oil product rationing was supported by the Vice-President of Brazil, Aureliano Chaves, and the President of the National Petroleum Council, but was opposed by the Minister of Mines and Energy and the Minister of Planning. Its opponents argued that petroleum rationing would jeopardize Brazilian exports and, therefore, a much needed balances of trade surplus. Backed by the Minister of Foreign Affairs, their position prevailed: the rationing of oil products never came into being.[20]

In the area of alternative energy development, further progress was achieved toward fuel oil substitution. In addition to a Memorandum of Intent signed between representatives of the Ministry of Industry and Trade (MIC) and the cement industry to substitute coal for fuel oil after the second oil shock, one was signed between the MIC and the paper and cellulose industry for the same purpose. Other fuel-intensive sectors, such as steel, soon followed course. As noted in chapter 8, section 8.1, the substitution of fuel oil primarily with coal, but also with charcoal and wood, would be accomplished successfully in various industrial sectors.

Since early 1980, the substitution of diesel oil has been a hotly disputed issue involving bureaucratic agencies and auto manufacturers. Lining up on one side was Mercedes-Benz, the largest producer of buses and trucks in the country, who strongly advocated the use of alcohol with

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[20]See JC, 9/24/80, "O Governo volta atrás"; OG, 9/26/80, "MIC quer sustar exportações de álcool e gasolina"; GM, 9/26/80, "A sucessão do diesel"; JB, 9/27/80, "Governo já tem planos para fazer racionamento"; OG, 9/30/80, "As principais sugestões"; GM, 10/2/80, "CNE eleva preços para não racionar"; and RR, 10/6-12/80, "Aureliano queria racionamento. Delfim vetou".

additive in place of diesel oil as fuel for all types of loading vehicles. Mercedes was firmly supported by the Secretary of Industry and Trade, Science and Technology of the state of São Paulo. Both lobbied intensively in Brasília. A few other, smaller manufacturers also favored this solution. On the other side, strongly opposing this course, was the Industrial Technology Secretariat (STI), backed by the Aerospace Technological Center (CTA), the Ministry of Industry and Trade, and the Minister of Agriculture. The STI contended that the solution of alcohol with additive as a substitute for fuel in loading vehicles would require a volume of no less than 1.5 times as much as the 10.7 billion liter goal for alcohol for 1985;[21] that the additive would render the fuel dangerously explosive;[22] and that alcohol consumption in diesel engines, even with an additive, would be 70 to 80% higher than diesel oil consumption. These Government officials favored the substitution of diesel oil with vegetable oils for heavy loading vehicles. In their scheme, light loading vehicles would run on Otto cycle engines fueled by pure alcohol. They were able to interest major car manufacturers, such as Volkswagen, in this solution, since it apparently created an opportunity for these auto makers to win a larger share of the loading vehicle market, until then controlled by Mercedes-Benz. The Iran-Iraq War pressured the Gov-

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[21]Taking into account the substitution of 15% of diesel consumed.

[22]On this occasion, the Swedish firm BOFORDS, operating in Brazil, called the attention of the auto manufacturers to the fact that the element dinitro diethylene glycol, as dangerous as nitroglycerin, was being used in an alcohol additive developed to fuel diesel engines. The OXITENO firm, which had been conducting research on alcohol additives using that chemical product, denined any explosive risk was present in the final product, given all the precautions that were being taken to avoid such risks. Cf. RR, 6/9-15/80, "Aditivo para álcool se parece

ernment to reach an early decision. During a CNE meeting in early October a decision was arrived upon which favored vegetable oils as a substitute for fuel oil. An inter-ministerial Work Group was created to formulate the Vegetable Oils Program. But, before the end of the year, this Work Group had recommended that the process of substituting diesel oil be long-term. The economic soundness of replacing diesel oil with vegetable oils was considered debatable due to the effect this would have on cooking oils, on the one hand, and the success of the change in Petrobrás' refining structure together with the oil products sales policy in a stabilizing world oil market, on the other. The vegetable oils solution for diesel substitution has since then been, as noted, a subject of technological research as a kind of insurance policy against other oil price hikes or oil supply cutoffs.[23] However, the issue of substituting diesel-cycle engines with Otto cycle ones running on alcohol in light loading vehicles became a matter of serious consideration in 1982, when it converged with the issue of PNA expansion (see below).

Consumer Reaction and the Alcohol Car Euphoria:

The series of emergency meetings held by the Government to deal with the Iraqi oil cutoff and the lack of consensus and contradictory statements from Government members on possible measures to be taken conveyed the impression to the consumers of passenger cars that gasoline rationing and frequent price increases were distinct possibilities.

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22 (cont.)
com nitroglicerina"; RR, 6/16-22/80, "OXITENO explica aditivo com explosivo"; and GM, 6/25/80, "STI rejeita a aditivação". At this point, competition was surfacing among the chemical industries producing an alcohol additive to substitute for diesel oil.

Their reaction was to turn to the alcohol car in a collective state of near hysteria.

In São Paulo, consumers had to wait two months for alcohol-fueled automobiles, and then pay a surcharge imposed by the car dealers.[24] From September to October alcohol car sales rose 38.4% and the number of engines converted from gasoline to alcohol increased by 127%. Con versions dropped sharply in the following months while alcohol car sales increased another 14.4% in November and stabilized in December. Yet, even with this drop, the number of engines converted since the beginning of the Iran-Iraq War in September represented 61% of the 28,653 engines converted to alcohol during 1980. In the same period, alcohol car sales reached 70.4% of the 288,193 cars sold during the entire year.[25] The monthly consumption of hydrated alcohol rose almost 60% from September (57.7 million liters/month) to December (91.1 million liters/month).[26] At the end of December, 76% of total passenger car sales were alcohol-fueled cars. When one considers that the sales of gasoline vehicles as a whole had declined steadily since the second quarter of 1980, it is easy to understand the euphoria that enveloped the car manufacturers.

At this time, the President of Volkswagen called the alcohol car "the real Brazilian miracle". The President of the Ford Car Dealers Council likened the importance of the alcohol car for Brazil to the im-

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[23] See Chapter 8, pp. 367-368 and footnote no. 11.

[24] Cf. RR, 9/8-14/80, "Procura já justifica 'Cobrança por fora'".

[25] See Table 50.

[26] Source of data: CNP/CENAL/STI/ANFAVEA, apud. CENAL, "Terceira Avaliação do Proálcool", Brasília, September 1981.

plantation of the automobile industry in the country, and, for the American automobile industry, the "invention" of the planned obsolescense of style. A São Paulo banker stated that "no one can hold back Pro-álcool". Interestingly, the slogans of the Medici government (1969-1973) were being revived; at a time when economic growth rates averaged higher than 10%, the military had fostered a mentality of grandeur in the country. In fact, the widespread feeling among the entrepreneurs whose interests lay with fuel alcohol seemed to be similarly euphoric.[27]

In a suppliers' market, the alcohol car manufacturers, individually and through their interest group, ANFAVEA, put pressure on the government to: double the production of alcohol cars agreed upon in the Memorandum of Intent; convert a substantial proportion of hard to sell gasoline cars to alcohol cars; decrease the proportion of anhydrous alcohol mixed with gasoline, or cease to mix it at all, in order that more hydrated alcohol could be produced to fuel the larger number of new alcohol cars; and increase by 10% alcohol car prices, which, as previously agreed with the Interministerial Price Council (CIP) were to be kept in line with the price of gasoline cars. Frequently bypassing CIP control, the manufacturers managed to sell alcohol cars at higher prices by offering only luxury models.[28]

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[27]See RR, 9/8-14/80, "Procura já justifica 'cobrança por fora'"; VEJA, 9/17/80, "A explosão do álcool"; and GM, 11/28/80, "O susto da guerra provocou o 'boom'".

[28]See RR, 10/27 - 11/2/80, "O negócio é outro"; RR, 11/3-9/80, "Mercado paga"; RR, 11/3-9/80, "Quanto quiser"; JC, 11/18/80, "Delfim nega aumento para carro a álcool"; and RR, 11/24-30/80, "Delfim vetou aumento: montadoras surpresas".

In other words, within six months the Government and the automobile industry had reversed positions. Whereas in the Memorandum of Intent signed in 1979 between the two parties the automobile industry had required that the words "up to" be inserted before the number of alcohol vehicles to be produced in the following three years, and during the first semester of 1980 the Government had pressured the car manufacturers to honor the terms of the Memorandum, now it was the car industry which pressed the Government to increase the quotas for the production of alcohol cars. And if six months earlier the Government had to cope with an excess of hydrated alcohol, now it feared a shortage of this fuel.

The alcohol car market was not really a suppliers' market, for Government exerted considerable control over prices and production volumes. Thus, even though the CIP (Ministry of Planning) had reportedly approved the increase in alcohol car prices requested by the automobile industry, the Minister of Planning himself vetoed this decision because of its potential inflationary effect.[29] However, by the end of the year the pressure of the car manufacturers had paid off: the price of cars ceased to be controlled by the CIP.

The diversion of a determined amount of anhydrous alcohol to gasohol was viewed by the Minister of Industry and Trade and the President of CENAL as insurance against weak sugar cane harvests (caused by plagues and climatic conditions), inasmuch as it could be transformed into hydrated alcohol as needed. The volume of anhydrous alcohol in the mixture

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[29]Cf. RR, 11/24-30/80, "Delfim vetou aumento: montadoras surpresas".

with gasoline also represented an important policy tool to avoid crises of sugar overproduction.[30] These advantages notwithstanding, MIC and CENAL considered a gradual reduction in the proportion of anhydrous alcohol in gasohol to a minimum of 5%, below which tetra-ethyl lead again had to be imported to raise the octane rating of gasoline to an adequate level.[31]

The Minister of Industry and Trade and the President of the Executive National Alcohol Council (CENAL) took a strong stand against automobile industry demands to increase the production of alcohol cars above the number of units stated in the Memorandum of Intent, or to increase the quotas of converted cars.[32] Their opposition was based on concern with balancing the supply and demand for hydrated alcohol. Not only did the monthly consumption of hydrated alcohol increase substantially following the rapid growth of alcohol car sales but also, on a per vehicle basis, it far exceeded the value estimated (300 l/month) in the Memorandum of Intent signed between the Government and the automobile industry. In fact, although considerably lower than the peak reached in April and May (720 l/month and 670 l/month, respectively), the average consumption of hydrated alcohol per vehicle was, in September 1980, 52 million l/month.[33] These results were attributed to principally two factors: the "simplified conversion" of gasoline to alcohol engines, which was

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[30] See Chapter 8, section 8.1.

[31] See GM, 11/28/80, "O Governo contém a escalada da indústria".

[32] Cf. OG, 11/25/80, "Álcool deve subir 15% e litro passa para Cr$ 28,40 este mes"; and GM, 11/28/80, "O Governo contém a escalada da indústria".

very inefficient in fuel consumption,[34] and the illegal use of hydrated alcohol mixed with gasoline ("rabo de galo"). Moreover both tended to be inversely related to the alcohol/gasoline price ratio, especially since a substantial part of the alcohol car fleet was comprised of taxis. With the advent of the Iran-Iraq War and the rapid increase in alcohol car sales (vis-à-vis converted ones) to private motorists, the monthly consumption of hydrated alcohol per vehicle tended to decline and become considerably less sensitive to the variation of the alcohol/gasoline price ratio.[35] During the months of euphoria, however, this declining trend in alcohol consumption per vehicle was not yet perceptible. The Minister of Industry and Trade and the President of CENAL made recurrent pronouncements against the indiscriminate, clandestine use of alcohol in illegally converted engines or engines converted with a "backyard technology".[36] At the same time, however, they guaranteed an adequate supply of alcohol for the new alcohol cars and the cars converted in repair shops accredited by the Industrial Technology Secretariat (STI), provided the terms of the Memoranda signed with the automobile industry and the repair shops were honored.[37]

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[33]Source of data: CNP/CENAL/STI/ANFAVEA, apud. CENAL, "Terceira Avaliação do Proálcool", Brasília, September 1981.

[34]See Chapter 8, pp. 418-421.

[35]Cf. CENAL, "Terceira Avaliação do Proálcool", Brasília, September 1981.

[36]Cf. GM, 10/4/80, "Técnicos temem o aumento do uso do álcool"; OG, 10/13/80, "SECOM prepara campanha para orientar consumo de álcool"; OG, 10/20/80, "Camilo Penna criticou desperdício"; JB, 10/20/80, "Penna ameaça punir práticas que afetem crédito do Proálcool"; and OG, 10/21/80, "Álcool ameaçado".

In April and May 1981, other measures were taken by the Government to curb the excess consumption of hydrated alcohol. First, the alcohol/gasoline price ratio was raised to 64% in April (the established limit was 65%), up from around 54% during the euphoria months. Also, STI and CNP control over non-authorized engine conversions was expanded.[38] At this time, the National Energy Commission held a meeting with the participation of the heads of the bureaucratic agencies involved with the PNA, specifically those concerned with ensuring an adequate supply of alcohol: the Ministers of Industry and Trade, Mines and Energy, and Planning; the Presidents of the Executive National Alcohol Commission National Petroleum Council, Petrobrás, and of the Institute of Sugar and Alcchol; and the Coordinator of the CNE Special Group for Energy Alternatives. In CNE Resolution no. 10, passed on May 14, a compromise was reached between the Government and the automobile industry in which a reduction of up to 12% in the volume of anhydrous alcohol in gasohol as well as the establishment of a production ceiling of 350,000 alcohol vehicles for 1981 (50,000 more than the number agreed upon in the Memorandum) were decided. However, no increase in the quota of converted engines was allowed for that year.

By this time, however, consumer behavior had completely reversed itself. The "discrediting phase" of the National Alcohol Program had begun, despite the fact that alcohol policy decision-makers did not perceive it as such for quite some time.

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[37]Cf. GM, 10/22/80, "Penna garante a oferta do produto hidratado"; and GM, 11/3/80, "A produção não é suficiente".

[38]See Chapter 8, pp. 419-420.

The Discrediting Phase

Striking to the observer of the National Alcohol Program is the abrupt reversal of consumer behavior two times in an eight month period. In September 1980, when the Iran-Iraq War began, gasoline car sales represented 66% of total car sales. In December of this same year, the situation was precisely the opposite: 76% of all cars sold were alcohol-fueled. Five months later, the situation had once again reversed itself, this time back to its starting point. At that time, 71% of the 31,629 passenger cars sold ran on gasoline.[39]

While the alcohol car euphoria can be attributed to the single cause of the Iran-Iraq War for reasons discussed above, there are several factors which explain why consumers turned their backs on the new product. As time passed, the Iran-Iraq War did not have any further serious repercussions. It did not disrupt the world oil market, nor interrupt the trend toward surplus oil that had been manifesting itself since the first semester of 1980. Petrobrás could adequately compensate for the loss of crude imports from Iraq. Moreover, the heavy investments in domestic oil production were beginning to come to fruition. With crude imports assured and no major oil price hikes expected, the stimulus to produce alcohol provided by the slide of world sugar prices in early 1981 could not offset the disincentive of the ever worsening economic situation of the country.

In November 1980 the powerful Minister of Planning, Delfim Netto, claimed that the National Alcohol Program unmistakably exerted an infla-

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[39]See Table 50 and Figure X.

tionary pressure on the economy.[40] Although the Minister of Industry and Trade, Camilo Penna, who was in charge of the Program, rushed to qualify this statement,[41] the message reached entrepreneurs and the general public. Following Delfim's statement, credit conditions were tightened for industrial and agricultural projects geared to alcohol production. To be sure, the anti-inflationary policy was also responsible for the changes in the terms of credit of the PNA, as was the IBRD loan requirements.[42] Cuts in the Program's budget for 1981 and the delay in releasing funds to distillery projects already approved by CENAL were the objects of complaints from the sugar and alcohol entrepreneurs. They blamed Delfim Netto and his anti-inflationary policy for the already noticeable slowdown of Proálcool.[43] As all these facts were widely publicized, the consumer became aware of the great financial difficulties involved in sustaining the Program.

In March the National Petroleum Council informed the distribution companies that their quotas of hydrated alcohol would not be increased before June.[44] Moreover, Petrobrás converted anhydrous alcohol to hydrous. In April, as noted, the proportion of anhydrous alcohol in gasohol was reduced. Alcohol exports were cancelled in May.[45] The President

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[40]See JC, 11/27/80, "Visão inflacionária do Proálcool".

[41]See JC, 1/6/81, "Camilo Penna contesta Delfim sobre Proálcool"; and ESP, 1/6/81, "O Proálcool, inflacionário".

[42]See Chapter 8, pp. 421-437.

[43]Cf. RR, 3/16-22/81, "Proálcool cresce só 5% em 4 meses".

[44]See JB, 3/20/81, "Confiança Queimada"; and DCI, 3/21-23/81, "Álcool congelado".

of Petrobrás called for a reduction in alcohol car production until the hydrated alcohol supply normalized, which, incidentally, would relieve Petrobrás of large reserves of gasoline.[46] Although the Ministry of Industry and Trade denied statements from Government officials implying that the supply of hydrated alcohol was inadequate, the above facts, combined with increasing Government control over hydrated ethanol distribution to the public and engine conversions,[47] led the public to fear for a fuel shortage.

In addition, as 1981 progressed, the costs of purchasing and maintaining an alcohol car were rising in comparison with those for a gasoline car, despite the incentives provided to consumers of alcohol-fueled automobiles.[48] Novaes (1981) compared these costs from January 1980 to May 1981. He divided the consumer's expenses into "immediate expenses", consisting of the downpayment (where applicable) plus the taxa rodoviária única (road tax) for the first year, and "long-term expenses", which included the loan repayments (again, if applicable), fuel expenses, the taxa rodoviária única for subsequent years, and vehicle main-

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[45]The CNP accused the IAA, CENAL, and the Ministry of Industry and Trade of authorizing substantial exports of alcohol during the first months of 1981, which resulted in the fuel shortage in the domestic market (cf. JB, 4/3/81, "Perturbação Alcoólica").

[46]See RR, 5/18-24/81, "Proálcool continua com poucos amigos".

[47]See pp. 459-462 of this chapter. See also GM, 1/15/81, "Camilo Penna anuncia medidas para evitar fraudes no Proálcool"; JC, 1/15/81, "Sobre preço do álcool"; JC, 1/29/81, "Litro de álcool-motor no Rio custa hoje Cr$ 32,66"; GM, 4/2/81, "Projetos registrados pela CENAL"; OG, 4/8/81, "Álcool: conversão ilegal dá cadeia"; and GM, 5/23-25/81, "Programa bate recorde ao enquadrar 24 novos projetos de destilaria".

[48]See pp. 445-446 of this chapter for the list of incentives to consumers of alcohol cars in effect during this period.

tenance costs. Both types of expenses for alcohol cars showed an upward trend vis-à-vis gasoline cars. The rising price of cars running on alcohol after the Interministerial Price Council abrogated control over vehicle prices in December 1980 was primarily responsible for the increase in "immediate expenses". In the case of "long-term expenses", Novaes identified the increase in interest rates - part of the economic policy of the period to capture much needed domestic resources - as the main cause of their climb. The longer repayment period for alcohol car loans and the smaller downpayment than required for gasoline cars, intended as incentives for alcohol cars, were ultimately offset by the high interest rates. While it is true that the average consumer does not normally make such detailed calculations to decide which type of vehicle he will purchase, it was no less true that the 5 to 10% higher price of alcohol cars in early 1981, as well as the significant increase in the alcohol/gasoline price ratio in April 1981 (see above), had adverse effects on consumer decisions to opt for automobiles powered by alcohol.

Last but not least in the series of factors explaining public disillusionment with the alcohol car during the discrediting phase was the great number of technological problems manifested by the first generation of alcohol engines.[49] The converted engines, especially those accomplished with a "backyard technology" performed no better. This negative information spread rather quickly. Actually, public opinion

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[49] See Chapter 8, pp. 413-421.
for references to the principal technological problems that had to be solved to adapt internal combusion engines to the use of alcohol as fuel.

polls conducted by the major cooperatives of sugar and alcohol producers in São Paulo - COPERSUCAR and SOPRAL - to discover why consumers had turned their backs on the alcohol car, cited the technological problems of cars running on ethanol as the principal motive.[50] Some car manufacturers defended themselves by claiming that they were pressed and rushed by the Government to produce the alcohol car, and as a consequence, the technology of internal combustion engines was not developed properly.[51] However, there was a widespread feeling among the sugar and alcohol producers and other actors involved in the National Alcohol Program that some auto makers did not take the job of developing this technology as seriously as they should have. They were quick to point out, as a contrasting case, the excellent performance of alcohol engines developed by one car manufacturer.[52]

On June 15, 1981, the Executive National Alcohol Commission (CENAL) decreed that the Financial Agents of Proálcool temporarily suspend all credit contracts for distillery projects due to lack of funds. The

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[50]Interview with Ernani Donato, Assistant to the President, COPERSUCAR, 12/14/82, São Paulo, SP; and with Luiz G. Bertelli, Director-Superintendent of SOPRAL, 12/20/82, São Paulo, SP.

[51]Interview with Georg Pischinger and Rolf Wilhelm Siekman, respectively, Manager of the Research Division and Manager of the New Technologies and Techniques for Energy of Volkswagen of Brazil, on 12/14/82, São Paulo, SP.

[52]In fact, the accusations were directly principally to Volkswagen, especially to the first alcohol "beetles", the best selling model during this period, which was purchased mainly by taxi drivers. The most praised manufacturer was Ford. From the beginning of the second phase of the PNA, their alcohol models were spared from consumer criticism. This appraisal of these two manufacturers' commitment to develop adequate technology for internal combustion engines fueled by alcohol was voiced frequently in meetings held by private actors with an interest in the PNA. It was repeated during an interview with the Director of

reasons for the Council's decision seeemd to lie with difficulties with the federal budget[53] and the miscalculations of the inflation rate.[54] For the potential consumer of the alcohol car this was a definitive indicator of the great, maybe insurmountable problems the Program was experiencing.

The CENAL decision can be viewed as the factor that propelled Proálcool into its "discrediting phase". From that time until the first quarter of the following year, alcohol car sales stabilized at approximately 9% of total automobile sales. At least two car manufacturers discontinued alcohol car production except on a custom made basis. Others decided to reconvert alcohol cars which had not left their plant lots to gasoline cars. A great number of gasoline cars converted to alcohol were reconverted to gasoline. Some filling stations stopped selling hydrated alcohol altogether,[55] which contributed to the rapid accumulation of hydrated alcohol stocks.

The rise in alcohol inventories was a major problem of the "discrediting phase". Alcohol producers "drowning" in alcohol complained

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52 (cont.)
SOPRAL (on 12/20/82) and with a World Bank official who participated in the IBRD loan negotiation process (on 7/21/83). It was also stated publicly by the President of the National Petroleum Council (see RR, 3/22-28/82, "A culpa é do carro").

[53]See "Começam os Remendos", in Visão, no. 24, XXX (June 15, 1981).

[54]See ESP, 6/16/81, "Suspensos até 2ª ordem empréstimos para álcool"; OG, 6/17/81, "CENAL confirma: crédito do Proálcool suspenso"; JC, 6/17/81, "BC desmente suspensão"; GM, 6/17/81, "Proálcool terá mais Cr$ 22 bilhões"; and JB, 6/22/81, "Governo avalia hoje os recursos para o Proálcool em 1981".

[55]Cf. FSP, 5/11/80, "Proálcool não vai tão bem"; 6/1/80, "Dúvidas

that Petrobrás and the distribution companies were not collecting their quotas from the production units. Petrobrás replied that it could not add more alcohol to its already large stocks. The distribution companies alleged that the alcohol producers did not comply with their planned quotas.[56] The producers from the North-Northeast region petitioned the National Petroleum Council (CNP) to increase the proportion of anhydrous alcohol in gasohol from 12 to 20%. Two months later, CNP Directive no. 368 provided for this increase. For the Center-South region, the proportion of anhydrous alcohol in the carburant mixture was first raised to 15% in December 1981 (CNP Directive no. 443), and then to 20% in May 1982 (CNP Directive no. 191). These measures, however, did not prevent the accumulation of stocks of hydrated alcohol to reach 1.3 billion liters by the end of 1981.

In the second half of 1981 - when the "discrediting phase" was acknowledged by all - and the first quarter of 1982, all public and private actors involved in the National Alcohol Program sought the causes of consumer distrust of the alcohol car. Generally, they identified in different combinations the factors indicated above. The mutual accusations were pervasive.

Once again the Ministry of Industry of Trade, through its Minister, Camilo Penna, and its Secretary-General, Marcos J. Marques, also Presi-

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55 (cont.)
e críticas contra a política oficial de conversão"; and GM, 7/5/80, "Os dez projetos do BNDE".

56See JB, 8/28/81, "Usineiro para se retirada de álcool pela Petrobrás continuar morosa"; and JB, 8/29/81, "Brasil exportará mais álcool para reduzir estoques".

ident of the Executive National Alcohol Council (CENAL), took the lead in the attempt to transform the negative image of the alcohol car held by the consumer. Over the second half of 1981, Penna and Marques made reassuring declarations that fuel alcohol would be adequately distributed, that additional resources to develop the PNA were guaranteed, that CENAL would soon resume the processing of credit applications for distillery projects (which in fact occurred in September), that the Program was still a Government priority, and that the technological problems of the alcohol cars were being worked out in an ongoing process of technological development.

In September, during the important forum of debates for sugar and alcohol policies embodied by the annual National Meetings of Sugar Producers, Marques reiterated the Government's intention and efforts to promote the National Alcohol Program. On this occasion, the interest groups concerned with alcohol policy were called upon to join in these efforts with the Government with that purpose in mind. Meetings with Marques and these groups, the car manufacturers (ANFAVEA), alcohol producers (COPERSUCAR), and distillery equipment suppliers (ABDIB) were then held to organize a broad publicity campaign to inform the public of the accomplishments of each of these sectors in the National Alcohol Program.[57]

When 1982 began, the accumulation of hydrated alcohol stocks was the object of concern of all bureaucratic agencies and interest groups involved in Proálcool. In January, the National Energy Commission decided

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[57]Cf. JB, 8/30/81, "Governo e empresários buscam mudar a imagem do Proálcool"; JB, 9/2/81, "Campanha promoverá Proálcool"; and GM, 9/2/81, "O Proálcool vai ganhar espaço em Rádio e Televisão".

to authorize the CNP to establish a proportion of 20% of anhydrous alcohol in the mixture with gasoline for the entire country (see above), as well as to give priority to anhydrous over hydrated alcohol production during the 1982/83 sugar cane crop (CNE Resolution no. 12). With the enactment of protectionist measures in the American alcohol market and the stabilization of the world oil market, alcohol exports were increasingly difficult and could hardly serve as an outlet for accumulated alcohol. In fact, exports dropped by 57%, from 252 to 143 million liters, between the 1980/81 and 1981/82 cane crops (see Table 30).

Several solutions were proposed and discussed by public and private actors in the alcohol policy for the hydrated alcohol flow. These proposal included: yet another increase in the proportion of anhydrous alcohol in gasohol; an attempt to open the European market to Brazilian alcohol; the extenstion of the alcohol fleet to include loading vehicles; and an increase in the use of alcohol in the chemical industry.[58] To recuperate the tarnished image of the alcohol car, however, seemed to be, however, considered unanimously as a most important step in creating an outlet for the surplus of hydrated alcohol.

Thus, during the first quarter of 1982, the task of recuperating the sales of alcohol-cars mobilized the private actors whose interests were at stake. Major producers of sugar and alcohol, major distillery equipment suppliers, auto manufacturers and engine convertors, acting individually or through their interest group associations (ANFAVEA, COPERSUCAR, SOPRAL, and CONAREM),

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[58]See GM, 1/6/82, "Mistura será de 20% em todo o país"; JC, 1/22/82, "Álcool para a Europa"; GM, 2/3/82, "SOPRAL prevê sobra de 1,25 bilhão de litros"; RR, 9/2-8/82, "Petrobrás quer gasolina com 25% de álcool"; RR, 9/13-19/82, "CNE quer escoar o grande estoque de álcool"; and GM, 12/8/82, "As alternativas da SOPRAL para acelerar a redução do estoque".

made public suggestions and directed demands to the Government, mostly to the Minister of Industry and Trade, Camilo Penna, and to the President of the National Energy Commission and Vice-President of Brazil, Aureliano Chaves, and, to a lesser extent, to the Minister of Mines and Energy, Cesar Cals. Penna not only received, filtered, and channeled the demands of the interest groups to the decision-making arena within the state apparatus (see below) but also took action to bring these groups (ANFAVEA, ABRAVE, ANAPA) into a joint effort to bolster alcohol car sales. Inside the state apparatus Penna led the campaign for the alcohol car. Ministries disagreed over the causes of the "discrediting phase" of Proálcool and therefore, over the remedies as well. The arena for bargaining was the National Energy Commission and its President, Aureliano Chaves, the arbiter in the last instance (note the recurrent pattern of decision-making). Finally, on March 24, 1982, CNE Resolution no. 14 was passed, symbolizing the "resultant" of the "political forces" in confrontation over the measures to recuperate alcohol-car sales. Among the most important measures were: a decrease in the alcohol/gasoline price ratio ceiling from 65% to 59%; an increase in the IPI (tax on industrial products) for gasoline vehicles and a corresponding decrease for alcohol vehicles (as a result of which the price of the alcohol vehicles would be reduced by 6%); the installation in filling stations of densimeters so that owners of alcohol cars could control the quality of alcohol; and the repeal of the obligatory use of stickers identifying vehicles legally converted to run on alcohol. In addition, as the control of the Interministerial Price Council over vehicles had been lifted, a "gentlemen's agreement" was reached between the Government and the automobile industry whereby the price of alcohol cars and gasoline

cars were to be the same, despite, as seen above,[59] the higher costs of the former.[60]

Some actors were pleased with these CNE decisions. Others found them to be insufficient to promote the increase in alcohol car sales.[61] CNE Resolution no. 14/82 can be considered, however, the ending point of the "discrediting phase" and the beginning of the "recovery phase" of Proálcool.

The "Recovery Phase"

Consumer reaction to the incentives established by the cited CNE Resolution passed in March 1982 was immediate and positive. Alcohol car sales jumped by 59.7% in April, continuing to increase by 20.2% and 46.9% respectively, in the subsequent two months (see Figure X and Table 50).

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[59] See Chapter 8, p. 417.

[60] When, for instance, Volkswagen announced in October 1982 a 1% increase in the price of the alcohol car, the pressures from the alcohol producers (COPERSUCAR, COPERFLU) and the car dealers (ABRAVE) on the one hand, and from the Ministry of Industry and Trade on the other, were so great that the firm retracted its decision (see GM, 10/29/82, "Carro a álcool acima da inflação"; GM, 10/29/82, "VW aumenta mais preço dos carros a álcool do que o dos a gasolina"; GM, 10/30 - 11/3/82, "ABRAVE protesta junto ao MIC e diz que a Volks rompeu o acordo"; GM, 11/4/82, "A ANFAVEA consultará a VW e explicará ao MIC razões do reajuste maior"; OG, 11/5/82, "Protestos contra a alta dos carros a álcool"; JB, 11/11/82, "Sauer acha que o carro a álcool deveria custar mais"; and ESP, 11/11/82, "Sauer explica o aumento diferenciado").

[61] While FORD, FIAT, ANFAVEA, and the "liberal press" praised the CNE incentives (cf. GM, 3/25/82, "Álcool mais barato"; GM, 3/25/82, "Política mais sensata para o carro a álcool"; GM, 3/25/82, "Previsão é de vendas maiores"; and JB, 3/26/82, "Caminho coerente"), the alcohol producers felt these incentives were not strong enough to recover the alcohol market (see GM, 3/25/82, "Álcool mais barato").

In June the Government adopted another very important set of measures to stimulate the alcohol car market. Decree-law no. 1944 (6/15/82), signed by President Figueiredo, exempted passenger cars with alcohol engines of up to 100 HP, for use as taxis, from the industrial products tax (IPI) for a one year period. Shortly thereafter, the Minister of Finance received the approval of the Finance Policy Council to exempt taxis with alcohol engines from the sales tax (ICM). It was also decided that, beginning in August, the Caixa Econômica Federal would finance 80% of the value of these cars, and that car dealers would accept used taxis as downpayments. Taxi drivers, in turn, were expected to sign a contract with the Caixa Econômica Federal by which they would not be allowed to sell the car for a three year period, except to another taxi driver. All in all, the alcohol cars would cost the taxi driver 45% less. The taxi fleet was calculated to be around 150,000 vehicles and, with those incentives, the Government anticipated that 75,000 new alcohol vehicles would be sold in the following 12 months.[62]

The interest groups for the car manufacturers (ANFAVEA) and for the car dealers (ABRAVE) praised the decision and expressed their hope for the revitalization of the alcohol car market.[63] In August the Government sponsored a public ceremony attended by several Ministers and the

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[62]Cf. GM, 6/16/82, "Álcool: redução do IPI aumenta expectativas"; JB, 6/17/82, "Caixa vai financiar em 36 meses carros a álcool para taxi"; FSP, 6/17/82, "Isenção do IPI de carro a álcool não anima os taxistas"; OG, 6/17/82, "Isenção de ICM para taxi a álcool é debatida hoje"; and FSP, 6/18/82, "CONFAZ aprova os incentivos para os taxis a álcool".

[63]See GM, 6/16/82, "Álcool: redução do IPI aumenta expectativas"; JB, 6/17/82, "Caixa vai financiar em 36 meses carros a álcool para taxi"; and FSP, 6/17/82, "Isenção do IPI de carro a álcool não anima os taxistas".

President of Brazil himself, to deliver the first taxis bought under the privileged conditions indicated above.[64] The associations of taxi drivers generally believed, however, that their main problem was the high price of fuel, even if the price of alcohol was "a little lower than that of gasoline".[65]

The effect of taxi purchases on the alcohol car market was profound. Of all the alcohol cars sold in the period from September to December, 1982, 40%[66] were for use as taxis. The revival of the alcohol car market was due to a large extent, therefore, to the privileged conditions alcohol taxis enjoyed. In fact, it is readily observable that in the major capitals of Brazil the overwhelming majority of taxis are brand new alcohol cars.

The car manufacturers and car dealers increased their optimism cautiously. In July a poll conducted by COPERSUCAR among a great number of car dealers throughout the country revealed that they still preferred the gasoline car, and made no effort to promote alcohol car sales. The poll showed as well that the alcohol car required three times as much to be delivered to the dealers by the automobile manufacturers. By September, with alcohol car sales showing substantial monthly increases since April and with the new incentives for alcohol taxis, optimism grew among the auto makers. With the rise in alcohol car sales in October, the auto-

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[64] See JC, 8/4/82, "Taxis mais barato tem cerimônia no Planalto".

[65] Cf. FSP, 6/17/82, "Isenção do IPI de carro a álcool não anima os taxistas".

[66] 138,467 alcohol cars were sold during September-December 1982, 55,261 of which were taxis (Data are from ANFAVEA).

mobile industry finally displayed its confidence in the alcohol car market. Very important for this outcome was the success in creating a taxi drivers' market. For, as articulated by the car manufacturers, the taxi market is the showcase for the products available, and is as such closely watched by the private motorist.[67]

Sales of alcohol cars continued to grow even faster than before. At the end of 1982, 219,974 alcohol cars had been sold, representing 38% of total passenger car sales. The December sales showed that more than 67% were alcohol-powered automobiles.[68] Government officials in charge of Proálcool as well as the car manufacturers have expressed concern over this "overheated" market. In their view, the monthly sales target for alcohol cars should be 35%. However, they anticipate that with the end of the privileged conditions taxi drivers enjoy to purchase alcohol cars, planned for June 1983,[69] this goal will be achieved. At this point in time, there exists a consensus that the alcohol car is, by now, a well-established product.

But if the alcohol car appears to be a widely accepted product in Brazil, there remained the major problem of the hydrated alcohol accumulated during the "discrediting phase" of the PNA. The recovery of the alcohol passenger car market probably would not have absorbed the large stocks of hydrated alcohol. To expand the use of alcohol, then, was at time a major concern.[70]

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[67] Cf. GM, 10/8/82, "A fatia do carro a álcool fica maior".

[68] Cf. Table 50.

[69] The privileged conditions for alcohol taxis were extended until September 30, 1983. By then, 93.3% of total car sales were alcohol-powered automobiles.

As 1982 drew to a close, another fact reinforced the urgency of increasing the use of alcohol. The low price of sugar in the international market fell to an extreme: around 6 cents per pound. In October the Institute of Sugar and Alcohol (IAA) suspended new contracts for sugar exports. The President of IAA announced that in the next sugar cane crop, cane was to be diverted to alcohol production. Even the transformation of sugar into alcohol - an extreme measure resorted to only in the thirties and early forties - was not ruled out.[71]

To increase alcohol production at a time when there already exists a large inventory of alcohol with no outlet and a 20% proportion of anhydrous alcohol in gasohol has been accomplished,[72] is not an easy task. Moreover, the lack of resources exacerbated by the extreme economic crisis [73] poses an additional constraint. As noted,[74] various

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[70] The problem of the accumulation of alcohol stocks is today considered to be solved. Decree no. 88,626, enacted on August 16, 1983, determined that Petrobrás would absorb the stocks remaining from the 1982/83 cane crop. Petrobrás is also to absorb, each year, any alcohol in excess of consumption (see Chapter 8, footnote , for a detailed account of this aspect of decree no. 88,626/83). On the other hand, while it is true that alcohol production is increasing continuously, especially because of the low price of sugar in the international market, alcohol car production is increased at unexpected rates: about 50,000 new vehicles are being produced per month since August 1983. Yet, hydrous alcohol stocks are today still considered to be high (see Conclusions, pp. 83-84).

[71] See GM, 10/6/82, "Suspensas as negociações de novos contratos de exportação"; GM, 10/14/82, "Um plano de US$ 2 bilhões para o álcool"; and OG, 10/15/82, "Açúcar estocado pode virar álcool".

[72] Except for some territories. In January 1983, however, all national territory was included.

[73] A good indicator of the severity of the crisis is the recourse to the IMF already under consideration at that point.

[74] See p. 470 of this chapter.

solutions to this matter were discussed and proposed by various public and private actors. One issue stood out among others, however, as the overriding one of this period: the expansion of the alcohol fleet to include loading vehicles, or, alternatively, the substitution of diesel oil.

The substitution of alcohol for diesel in light loading vehicles (less than 15 tons) is a proposal advanced by alcohol producers. SOPRAL has taken the lead, lobbying intensively in Brasília (especially in the Ministry of Industry and Trade, CENAL, and the National Petroleum Council). SOPRAL submitted two proposals on behalf of the alcohol producers:

> (i) the prohibition of trucks running on any fuel other than alcohol in usinas and distillery jobs (about 30,000 vehicles). At the end of November this proposal was translated into a CNP directive, to take effect beginning with the 85/86 cane crop.
>
> (ii) increasing the industrial products tax (IPI) for light loading vehicles running on diesel oil and reducing it for the same class of vehicles propelled by alcohol. Submitted to the National Energy Commission for review, no formal decision had yet been reached by the end of 1982. There are, however, indications that light trucks with Otto cycle engines propelled by alcohol will probably receive incentives, while diesel engines will be reserved for heavy loading vehicles (more than 20 tons).[75]

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[75]Interview with Lamartini Navarro Jr., member of the Special Group of the National Energy Commission for Energy Alternatives.

The prospect of the market for light loading vehicles being left to Otto cycle engines propelled by hydrated alcohol is a source of anxiety for car manufacturers. As noted, the auto manufacturers have pursued alcohol with additive, vegetable oils, and the double injection system (alcohol and diesel) as alternative fuels for diesel engines which, until now, were the type of engine used in the vast majority of loading vehicles in the country. But they have not, to this point, invested much in Otto cycle engine adaptations to be used in loading vehicles, especially if alcohol is to be used as a fuel. Strains are likely to develop between the automobile industry and the alcohol producers concerning the expansion of the alcohol fleet. This alcohol fleet expansion means diesel oil substitution for the former and the expansion of the National Alcohol Program for the latter. It remains to be seen to which side Brasília will bend.

Conclusions

In concluding this discussion, it is important to stress that, in reality, the automobile industry has not displayed a strong commitment to the National Alcohol Program. Reacting rather than acting, it answered to government pressure and to consumer demand. As multinational corporations, the auto manufacturers compromised with the government of the host country. As industrial enterprises, they depended on consumer behavior. The automobile producers were acutely aware of the fact that consumer behavior, ultimately their primary concern, depended heavily upon government incentives and disincentives for the alcohol car, provided technical problems were solved.[76] Stated another way, the automobile industry was actually indifferent about the manufacture of alcohol versus gasoline cars. This depended, then, on government alcohol policy and on the government's commitment to the alcohol car. The multinational car manufacturers were in a sufficiently strong financial position to invest in a new technology, and then "wait" until the conflicts within the government bureaucracy were resolved and "see" in which direction the principal trend was pointing. More resistance is expected to the use of alcohol as fuel for light loading vehicles given that they did not invest much in the substitution of engines (Otto cycle for diesel cycle), opting instead to emphasize the substitution of fuel

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[76] This perception could be clearly detected in the interviews with Volkswagen R & D managers. In their view, consumer behavior depended on government incentives and disincentives for alcohol cars, as well as on their perception of the technical reliability of these vehicles. The issue of technical reliability was very important, they argued, given the fact that to own an alcohol car did not enhance the consumer's position in the social hierarchy.

(alcohol with additive, vegetable oils for diesel oil) in the diesel engine. The auto manufacturers will have to change their posture from one of "wait and see" to "rush" if this policy of diesel oil substitution for light loading vehicles is really put into effect.

In marked contrast, the sugar and alcohol agroindustry and the distillery equipment sector, whose interests were at stake, acted and pressured the government to support and expand the National Alcohol Program. To capture the light loading vehicles market is a major part of their strategy to increase the use of alcohol. The dispute over the light loading vehicles market is, therefore, the new game to watch in the future.

ALCOHOL AS FUEL IN BRAZIL:

AN ALTERNATIVE ENERGY POLICY AND POLITICS

Vol. 2

by

MARIA HELENA DE CASTRO SANTOS

B.S., Physics, Universidade de Brasília, Brazil
(1965)

B.A., Sociology and Political Science, Pontíficia
Universidade Católica, Brazil
(1971)

M.P.A., The Kennedy School of Government, Harvard University
(1975)

Submitted to the Department of
Political Science
in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

February 1985

Signature of Author: M Helena Castro Santos
Department of Political Science, January 10, 1985

Certified by: Nazli Choucri
Professor Nazli Choucri, Thesis Advisor

Accepted by: Harvey M Sapolsky
Professor Harvey M. Sapolsky, Chairman, Graduate Program Committee

CONCLUSION

Is Proálcool a Success?

The production goal of the National Alcohol Program - 10.7 billion liters of alcohol in 1985 - has been postponed until 1987,[1] despite the fact that the productive capacity of approved distilleries in place and in the planning stages was sufficient to meet that goal in 1979. Nonetheless, with the resolution of important production problems and the overproduction of sugar in the years 1976-1978, alcohol production expanded 14 times since the PNA was created in 1975 to 1983, from 580.1 million to 7,949.9 million liters. During the same period, distillery capacity increased from 903.6 to 11,075.6 million liters/crop. In the 1975-76 crop year, all crushed cane was used in sugar production, which means that virtually no direct alcohol was manufactured in that year. In the early 1970s, at least 96 percent of all alcohol produced had been a byproduct of sugar. The rising importance of alcohol after the mid-1970s and the creation of the PNA is evidenced by the diversion of sugar cane to the manufacture of alcohol: 40 percent of the total crushed cane of the 1982/83 crop went to direct alcohol production, and this proportion is expected to continue to increase in the following years. Thus alcohol has become the prime product of the sugar cane industry and is consumed basically in transport (approximately 10 percent of total transportation energy).

A storage and distribution network for fuel alcohol, which had been identified as a major bottleneck in the Program's implementation, was

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[1] A new production goal of what the Government has called the "third phase of the National Alcohol Program" was approved by the CNE in May 1983: 14.3 billion liters, which is expected to meet demand in the coming years.

quickly erected. The old system operated by the IAA and the CNP was replaced by a more efficient one organized by Petrobrás and the private distribution companies (to be sure, under the de facto control of the former) to handle the large increase in the scale of alcohol production. Since 1981, when the state of Rio Grande do Sul was assured proper alcohol distribution, no major problems have been reported in this area. By mid-1983, all gasoline stations were allowed to install hydrated alcohol pumps, meaning that this fuel, at least theoretically, is available everywhere in Brazil. At the close of 1983 there were 13,415 retail outlets for hydrous alcohol throughout the country. The proportion of anhydrous alcohol in the mixture with gasoline in January 1983 reached 20 percent in the entire country. Thus, the major demands made by the automobile industry as preconditions of their participation in the PNA, a uniform gasoline mixture to assure the proper working of the engines and the guaranteed nationwide distribution of hydrous alcohol, were fulfilled.

The technology to adapt Otto cycle engines to run on pure alcohol was developed by the Aerospace Technical Center (CTA) and the automobile industry under the aegis of the Industrial Technology Secretariat (STI). The new alcohol engines have undergone three generations of engine changes in three years, an impressive accomplishment when one considers that gasoline engines in the United States have changed little in the past 30 years. Advances have also been scored in domestic agricultural (PLANALSUCAR/IAA, STI, EMBRAPA, COPERSUCAR) and industrial (STI, distillery equipment suppliers) technologies for alcohol production.

After drastic swings in their behavior due mainly to contradictory government policies, the inadequate use of policy instruments, and technical problems with converted engines, consumers have definitely been won over to the alcohol car. The auto manufacturers, who maintained a "wait-and-see" attitude at the beginning of phase two (the pure alcohol-fueled car phase) of Proálcool, finally displayed their confidence in the alcohol car market. In September of 1983 the country celebrated the sale of the one millionth alcohol car. Today, alcohol-powered cars represent more than 90 percent of total passenger car sales, and alcohol-fueled automobiles correspond to 15 percent of the national Otto cycle fleet.

The production, distribution, and consumption of the new fuel are, by now, well integrated activities. Proálcool is, without doubt, an institutionalized Program. Today, Brazil operates the largest alternative fuels program in the world, and is the only country in the world which was able to sever the bond between the automobile industry and petroleum.

In light of these impressive results, the question, "Is Proálcool a success?", may seem pointless. Yet, any adequate assessment of a governmental program must go beyond providing a simple account of the program's difficulties and bottlenecks, and their solutions, during its implementation. For a well established program may be considered a failure from the point of view of an affected group. Or, it may be judged a success for group X and a failure for group Y. Decision-makers may opt to support a program with a negative social rate of return in order to attain other political or macro-economic objectives. The eco-

conomic viability of a program may be, at the same time, evaluated negatively and positively by different participants in the decision-making process, as well as by non-participants (e.g., the analyst, intellectuals). In the same vein, different participants and non-participants may assign distinct objectives to the program and evaluate it accordingly. In other words, a complete assessment of the success or failure of any program must take into consideration the questions, success or failure from whose perspective? by which criteria?

There are two basic perspectives from which to assess a government program or policy. These may be termed the "outsider" and "insider" perspectives. The "outsider" perspective produces a program evaluation from the viewpoint of those who do not participate in the decision-making process and/or are not affected by it. Conversely, the "insider" perspective assesses the program through the eyes of those who participate in decisions and/or are affected by them. The "outsider" approach relies on the criteria of efficacy (goals vs. results) and efficiency (optimization of resource allocation given defined objectives or, put another way, obtaining the maximum objectives given the available resources). The "insider" perspective permits the confrontation between the different viewpoints of competing groups and individuals involved. A basic program evaluation criterion of this perspective is the "satisfaction of actors and affected individuals." Yet, this does not rule out applying the criteria of "efficacy" and "efficiency" typically associated with the "outsider" perspective. This fact alone challenges the idea of a value-neutral judgment inherent in the criteria of efficacy and efficiency. Both the "insider" and the "outsider" perspectives pro-

vide valuable policy instruments for planners and decision makers, as well as basic information for the assessment of policies and government programs, and should be combined whenever possible.

Fuel alcohol policies and programs from the 1930s to 1975 when the National Alcohol Program was established were analyzed in Volume I and evaluated according to the attainment of stated goals. Possible causes of success or failure in the program's implementation were sought in the applied policy instruments, the decision-making structure (including the institutional framework and modes of interest representation), the interplay between the interests of public and private actors as influenced by world conditions (e.g., the sugar and oil markets) as well as by the characteristics of the different political regimes that succeeded one another during this period.[2]

The assessment of the pre-PNA fuel alcohol policies and programs according to the attainment of stated goals was provided solely from the analyst's perspective. The "insider approach" to program evaluation could not be applied due to the type of data available. Interviews with key actors and newspaper clippings are the sources of data par excellence of the "insider" perspective. Yet, this approach would have required rather costly and very time consuming archival research which seemed inappropriate at the time, especially since the purpose of analyzing past alcohol policies was to provide the necessary background with which to understand the contemporary National Alcohol Program. Moreover, the scarce published memoirs of actors and the few interviews possible with

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[2]See Chapters 2, 3, 4, and 5.

participants[3] in the decision-making process of fuel alcohol policies and programs of this period rendered impractical an evaluation from the viewpoint of the major actors.

The assessment of the National Alcohol Program will, however, whenever possible be provided from both the "outsider" and the "insider" perspectives, according to the following criteria: the satisfaction of the actors, goals attained (efficacy), economic viability (efficiency), as well as distribution (who wins and who loses). Brief reference will also be made to the environmental and social impacts of the program.

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[3]Most key actors are either dead or very difficult to contact.

10.1 The Satisfaction of the Actors

Agreement frequently has been considered to be a "test" of a "good" policy. Lindblom, in his well-known article, "The Science of Muddling Through," proposes a "successive limited comparisons" test as a more realistic approach to studying policy formulation than the "rational-comprehensive" approach. According to the latter method, a "good" policy is one which can be shown to be the most appropriate means to reach desired and agreed-upon objectives. In contrast, the incremental approach takes agreement on the policy itself as the test of a "best" policy.[4] In both cases, however, consensus among decision-makers is required.

Agreement or disagreement as a criterion for the success of a policy has also been conceived of in terms of consensus among those groups and individuals affected by the policy (rather than among decision-makers). In this case, the test applies to the policy alternative which was implemented. How can consensus (or satisfaction) among those affected by a policy or program be assessed? Sapolsky, in his study of the Polaris Program,[5] proposed a standard of policy success be the satisfaction of those affected by governmental programs and organizations. As the assessment of the satisfaction of all affected groups poses difficult methodological problems, the absence of criticism is taken as an "operationalizable surrogate."[6]

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[4]See Charles E. Lindblom, "The Science of Muddling Through," Public Administration Review, vol. XIX, no. 2 (Spring 1959), pp. 79-88.

[5]Harvey M. Sapolsky, The Polaris System: Bureaucratic and Programatic Success in Government. Cambridge, Mass: Harvard University Press, 1972.

The voicing of complaints (or its absence) from those affected by a policy or program may be a reasonable yardstick by which to judge the success of Proálcool. This criterion applies especially well to the assessment of decision-making in the PNA from the "insider" perspective, through which research was undertaken in this work.[7] It captures not only the bargaining nature of decision-making but also the political character of the process of building an institutional framework for the Program's implementation. The absence of complaints indicates that a successful political arrangement was arrived at by the public and private actors, whereby "satisfactory" (from the viewpoint of the actors) modes and mechanisms of decision-making and an institutional system capable of accomodating the array of divergent interests were established.

Despite its strengths, Sapolsky's method for evaluating policy success requires further refinement in order to be a fair test of the Proálcool program. The basic assumption underlying the equation of the "absence of complaints" with satisfaction is that all those dissatisfied with a program (even if they do not directly participate in the decision-making process) may express their grievances.[8-9] In other

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[6]Sapolsky explains that "satisfaction would be a difficult standard to employ since it would require that all affected groups and persons be surveyed to discover the degree of satisfaction that exists for each program or organization. Just the identification of affected groups alone would pose important methodological problems." (Sapolsky, 1972: 231).

[7]Refer to the Preface.

[8-9]Cf. Sapolsky, 1972: 231-232. For a description of the channels of communication between the affected citizen and both the Executive branch and Congress in the USA, see, for example, Shultze, 1968: 51-52.

words, all affected groups and persons have a voice in policy-making and are able to articulate their interests.[10] If the citizen is to be "the best judge of his own interests and is expected to express his dissatisfaction with government" (Sapolsky, 1972: 231), a further assumption is needed: the citizen must be an informed, active, rational participant in the political system. While the political participation of all citizens in fact may be true only in the wishful thinking of some democratic theorists,[11] the criterion of "absence of complaints" to evaluate the success of a program remains a valuable one in this type of political system. In this case, it is possible to assume that all those who in fact participate in the political system do express their dissatisfaction with government. Thus the existence or absence of complaints from whose who are affected by governmental programs and who participate in the political system can be taken as a proxy of the level of satisfaction of all affected individuals.

The absence-of-complaints criterion (as defined above) to assess a program's success holds for both democratic and authoritarian regimes, with one major qualification. While in democratic systems, political alienation notwithstanding, participation is open to the great bulk of the population, limited participation is a basic, defining characteristic of authoritarian regimes.[12] The application of the "absence of complaints" criterion in authoritarian polities therefore

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[10]Refer to Albert O. Hirschman, Exit, Voice and Loyalty: Responses to Decline in Firms, Organizations and States, Cambridge, Mass.: Harvard University Press, 1970.

[11]See Lindblom (1968: 43-52) for an analysis of the thin participation of citizens in a democratic regime.

begs the question: Who is excluded and who is not from participating in the political system? Also, the mode of interest representation is, in authoritarian contexts, quite distinct from the forms prevailing in democratic systems.

That Brazil has been subject to authoritarian rule for the last twenty years is not open to question.[13] While a comprehensive identification of the characteristics of the post-1964 authoritarian regime[14]

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[12]The best known definition of authoritarianism is that offered by Linz:

> Authoritarian regimes are political systems with limited, not responsible political pluralism; without elaborate and guiding ideology (but with distinctive mentalities); without intensive nor extensive political mobilization (except some points in their development); and in which a leader (or occasionally a small group) exercises power within formally ill-defined limits but actually quite predictable ones" (Juan Linz, "An Authoritarian Regime: Spain," in Erik Allardt and Stein Rokkan (eds.), Mass Politics, New York: The Free Press, 1970).

See also his "Totalitarian and Authoritarian Regimes" (in Fred I. Greenstein and Nelson W. Polsby, Macropolitical Theory. Reading, Mass.: Addison-Wesley Publishing Co., 1975) where he distinguishes authoritarianism from both democracy and totalitarianism.

[13]To be sure, whether the present authoritarian regime in Brazil is an extension of the previous authoritarian period, the Estado Novo (1937-1945), or is distinguished by new, basic characteristics, has been a subject of some debate. For two views of this question, see Thomas Skidmore, "Politics and Economic Policy-Making in Authoritarian Brazil, 1937-1971" and Philippe C. Schmitter, "The Portugalization of Brazil?", both in Alfred Stepan (ed.), Authoritarian Brazil: Origins, Policies, and Future, New Haven and London: Yale University Press, 1973.

[14]There is now a rich literature devoted to the analysis of the military authoritarian rule in Brazil, e.g., Schmitter (1971, 1973), Cardoso (1972, 1973, 1975), Stepan (1971, 1973), Linz (1973), Skidmore (1973). In 1973, the results of a workshop held two years earlier in Yale . which was dedicated to examining the origins, policies, and prospects for the consolidation of the authoritarian regime in Brazil were published in Stepan (ed.).

is beyond the scope of this work,[15] it is beyond dispute that previously mobilized "popular sectors" have been excluded and a coalition which includes the "upper bourgeoisie" has been dominant.[16] The use of the

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14(cont.)

No consensus on the basic characteristics of the Brazilian military-authoritarian system has ever been achieved. However, O'Donnell's formulation of the bureaucratic-authoritarian "model" (cf. O'Donnell, 1973, 1975, 1977, 1979a) became obligatory reading for all those interested in the subject. O'Donnell attempted to distinguish the BA state - typical of some Latin American countries after 1964, but also characteristic of some European countries - from other authoritarian forms such as populism, and fascism. In 1979, the product of a working group charged with consolidating and refining the criticisms of the bureaucratic-authoritarian model appeared in Collier (ed.). Although not the main focus of the work, the case of Brazil was a basic reference point because "the special conjunction /in this country/ of economic and political crises, followed by harsh authoritariansim, regressive economic policies, and successful economic growth has made Brazil in a sense the 'paradigmatic case' for the bureaucratic-authoritarian model" (Collier, 1979: 12).

The gradual movement toward a more open polity in Brazil since 1974 (the "political decompression" of the Geisel Government and the "abertura" of the Figueiredo Administration), and the more drastic changes in Portugal, Spain, Greece, and most recently, in Argentina, have raised the question of tensions and change in the BA State. Theorists of bureaucratic-authoritarianism are currently devoting attention to an analysis of the BA State in transition (see, for example, O'Donnell, 1979b).

The main characteristics of the BA State may be summarized as follows:

(1) the principal social base of the BA state is the highly oligopolized and transnationalized (upper) bourgeoisie;

(2) the two great tasks of the BA State are the restoration of "order" in society by means of the political deactivation of the popular sector and the "normalization" of the economy;

(3) it is a system of political exclusion of a previously activated popular sector;

(4) it is also a system of economic exclusion of the popular sector;

(5) it promotes an increasing transnationalization of the productive structure;

(6) it endeavors to "depoliticize" social issues by dealing with them in terms of the supposedly neutral and objective criteria of technical rationality;

"absence of complaints" criterion to evaluate the success of Proálcool requires the identification, beyond the broad categories of "popular sectors" and "upper bourgeoisie", of those groups excluded from participation but still affected by the Program, and those who have access to

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14(cont.)

(7) in the first stage, the political regime of the BA State closes the democratic channels of access to the government for the representation of popular and class interests. Such access is limited to those who stand at the apex of large organizations (both public and private), especially the military and large oligopolistic enterprises (cf. O'Donnell, 1979: 292-293).

In a different vein, Alker (1981) proposes that every region in the world reflects unequally the mutually interpenetrating and opposed four world orders. These world orders, identified along the "North versus South" (level of technological development) and the "East versus West" (capitalist and socialist modes of production) axes are: (1) capitalist power-balancing; (2) Soviet socialism; (3) corporatist-authoritarianism; and (4) collective self-reliance. While Brazil best approximates corporatist-authoritarianism, Alker's approach illuminates other characteristics of the national development model adopted in the country. The National Alcohol Program, for instance, exhibits some self-reliant characteristics, although in a statist variant (See Tickner, 1983, on the distinction between the statist and the communal self-reliant variants). On this subject, see the sections in Chapter 8 that deal with the building of a system for alcohol storage and distribution, the development of the technology for alcohol engines, and the issues related to the Program's resources.

[15]The characteristics of the authoritarian system in Brazil - especially the patterns of decision-making and interest representation - are, as pointed out in the Preface, constructed inductively from the analysis provided here of the Proálcool decision-making process (see below).

[16]"Popular sectors" are the rural and urban lower classes and the lower middle class. "Upper bourgeoisie" incorporates the professional and managerial strata as well as the elite who owns and controls the forces of economic production. Both expressions are widely used in the literature of bureaucratic-authoritarianism in Latin America and were taken from David Collier (ed.), The New Authoritarianism in Latin America (Princeton, N.J.: Princeton University Press, 1979), pp. 402, 403.

The dominant coalition includes the (highly oligopolized and transnational) "upper bourgeoisie and the State as entrepreneur. At the apex

alcohol policy-making. Below, the questions: What were the grievances of participants and how did these grievances change over time, shall be addressed.

Who participates? With the poliarchic instruments of authority control restricted or excluded altogether and the role of Congress reduced to a minimum,[17] influence in decision-making has depended on the capacity of societal actors to gain access to the State apparatus, where

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16(cont.)
of government are found high ranking military and civilian technocrats. This widely accepted characterization of the ruling coalition of the Brazilian military-authoritarian system is emphasized in the works of O'Donnell and Cardoso. See Guillermo O'Donnell, "Corporatism and the Question of the State" in James M. Malloy (ed.) Authoritarianism and Corporatism in Latin America (Pittsburgh: University of Pittsburgh Press, 1977), and Fernando Henrique Cardoso, "Associated-Dependent Development: Theoretical and Practical Implications" in Alfred Stepan (ed.), Authoritarian Brazil: Origins, Policies and Future (New Haven and London: Yale University Press, 1973).

[17]According to Dahl, the poliarchic instruments of control are:

- the freedom to form and join organizations;
- the freedom of expression;
- the right to vote;
- eligibility for public office;
- the right of political leaders to compete for support;
- the right of political leaders to compete for votes;
- alternative sources of information;
- free and fair elections;
- institutions for making government policies depend on votes and other expressions of preference (Dahl, 1971: 3).

In the twenty years since the military coup, Brazil has experienced different degrees of authoritarianism. The highest point in authoritarian rule was ushered in by Institutional Act No. 5 in 1968; AI-5 suppressed all poliarchic instruments of social control. In 1974, the Geisel Government began a slow process of liberalization which has been continued

all decision-making takes place. In these circumstances, economic power becomes the relevant power resource. Accordingly, participation in the PNA decision-making process has been restricted to affected proprietors' groups: sugar-cane suppliers, usineiros, distillery owners, distillery equipment suppliers, and automobile manufacturers.

Rural workers and peasants are outsiders to Proálcool's decision-making. They have not and do not enjoy any say on issues that directly affect their livelihood, such as changes in land ownership and denial of access to land under non-proprietary forms of tenure for subsistance agriculture (and, in some cases, for the market). For this weakly organized social group, expressions of collective protest signalling policy preferences are very limited. While workers directly employed in sugar cane areas in the Northeast have launched two strikes for better wages, their influence in alcohol policy-making is at best indirect. When sugar and alcohol producers lobby for price increases, they often "threaten" the government with social unrest, claiming they are unable to pay minimum, subsistence wages.

17(cont.)
by the Figueiredo Administration. Some democratic controls have been at least partially restored. Thus, press censorship has been abolished and direct elections for state governors have been resumed. While workers currently enjoy the legal right to strike, it remains a right which in practice is very difficult to exercise given a series of complex requirements with which strikers must comply. Thus far, only urban workers in the country's most industrialized centers have been able to launch repeated strikes for better wages. The role of the Congress is also gaining in strength. For a detailed analysis of the Brazilian authoritarian state and its instruments of control over regime opponents, see Moreira Alves (1984).

Actors' grievances. It is in reference to the proprietors' groups identified above, who have the ability to voice dissatisfaction and influence decision-making, that the success (or failure) of Proálcool can be measured. Yet, there is another group whose grievances must be taken into consideration in an evaluation of the program's success.

Although they have no direct access to the state apparatus, consumers of the alcohol car have exerted a strong influence in PNA policy-making. When dissatisfied with the quality and price of the product, they may withdraw from the alcohol car market and turn instead to gasoline-fueled automobiles. In Hirschman's terms, rather than complain (the "voice option") consumers exercise the "exit option".[18] Conversely, responding either to a fear of future gasoline rationing or to governmental incentives, they can elevate demand to extremes. The National Alcohol Program depends, ultimately, on consumer behavior.

During the implementation of the PNA, several important issues were solved, such as whether foreign capital should participate in alcohol production, who should control the distribution and storage system, and what should be the priority end-use of alcohol. Major complaints lodged by the proprietors' groups on the production, distribution, and consumption of fuel alcohol (and the alcohol-fueled car) business receded as the Program developed. Among these grievances were the lengthy processing of proposals for distilleries, the adjustment in the credit value according to inflation rates conceded by the Financial Agents (which substantially affected the price of distillery equipment), achieving a uniform mixture of anhydous alcohol, and the technological difficulties of the first

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[18]Refer to Hirschman, 1970.

alcohol engines. Even the recurrent complaints against the institutional framework and the decision-making process of Proálcool during the first (gasohol) phase of the Program subsided as the second (pure-alcohol driven cars) phase proceeded. After "exiting" during the "discrediting phase" of the PNA, consumers again turned to the alcohol car, with renewed enthusiasm.

To be sure, sugar cane suppliers did demand the "institutionalization" of their participation in the Program[19] through the establishment of legal, individual quotas of alcohol supply.[20] They also complained about the price of sugar cane; even Northeastern suppliers who benefit from a 40 percent subsidy still consider it insufficient to compensate for production costs. Alcohol producers as well continue to complain about the price of alcohol. As should be recalled, the parity relation between the prices of alcohol and sugar reached a level (38 liters of alcohol per 60 kg of sugar) fairly close to the true economic

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[19]This demand was presented explicitly by the Secretary-General of the Federation of Sugar-Cane Suppliers (FEPLANA) to the Government during the IV National Meeting of Alcohol Producers in Goiania, November 1983.

[20]At present, annual alcohol quotas are set by the IAA for each distillery, and the supply of sugar cane for each distillery is calculated accordingly. As may be recalled, the procedure for determining sugar supply is quite different. The IAA assigns each usina in the country a legal quota of sugar production, currently based on the production of the previous three months (see Chapter 2, footnotes 19 and 16 for a discussion of the bargaining process over the criteria for fixing quotas). The official sugar quotas serve as the basis for the IAA's annual determination of the national production limit and its distribution among the usinas, so as to balance supply and demand (see Chapter 2, footnote 34 for an account of this procedure). In special circumstances, especially when sugar is being overproduced, the IAA decides to "repress" production" (recalque da produção), and, accordingly, sets a production limit for each usina below its legal quota.

equivalency as estimated by COPERSUCAR (37.5 liters of alcohol per 60 kg of sugar).[21] Nonetheless, as a COPERSUCAR official put it, the producer is never satisfied, despite the fact that for the few years since the 1980/81 crop, the price of alcohol was sufficient to cover production costs in the Center-South region.[22] However, as an effect of the ever worsening economic crisis plaguing Brazil, and especially of the inflation rate which surpassed 200 percent in 1983, price adjustments have fallen significantly behind both the percentage demanded by producers and suppliers and that recommended by the IAA.[23] Apart from this grievance, the absence of criticism since 1982 of the National Alcohol Program on the part of consumers and participating proprietors has been striking. The claim that major grievances have dissipated is supported by the extensive examination of newspaper clippings and interviews with major actors. Even those actors who do not acknowledge significant benefits from the PNA, at least in the short run, place high value on Proálcool as an undoubtedly successful Program.[24]

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[21] See Chapter 8, p. 412.

[22] Interview with Aloisio Nunes de Almeida, Assistant to the Director, COPERSUCAR, São Paulo, 12/20/82.

[23] In March 1984 sugar cane suppliers demanded an 85 percent price increase. The IAA recommended a substantially lower figure of 63 percent, and they were granted only 46 percent. Similarly, alcohol producers demanded an 82 percent increase in the price of alcohol and received only 46 percent. (See JB, 3/8/84, "Usineiros reclamam do preço, mas mantêm meta de produção de álcool" and interview with João Eudes Leite Soares, Secretary-General of FEPLANA, Rio de Janeiro, 3/14/84).

[24] See below, pp. 549-551.

While a detailed analysis of the problems, issues, and solutions in implementing the National Alcohol Program was provided in Chapters 7, 8, and 9, it is worth readdressing the actors' dissatisfaction with the Program's decision-making process and how this was resolved. To arrive at a decision-making structure which could accomodate the array of different interests was a sine qua non for the Program's institutionalization.

The Decision-Making Structure of the Alcohol Policy:

During the first phase of the National Alcohol Program (the gasohol phase) complaints against the fragmented structure of decision-making were pervasive among key societal actors. They believed that the great number of bureaucratic agencies involved in the PNA - with their contradictory statements and actions - was a major cause of the difficulties in the Program's implementation. Many complained, moreover, that they did not even know to where to channel their grievances.

Today, the number of agencies involved in the alcohol policy is about the same. Yet, complaints have disappeared. Major actors have a clearer idea of where to address their demands, and their access to decision-making presents no difficulties. Some still think that a centralization of decision-making would be beneficial to the Program's development. Others, however, believe the fragmentation of the decision-making structure allows the Program greater flexibility. All, however, acknowledge that the decision-making structure is functioning smoothly; no longer is an association drawn between the fragmentation of decision-making and any bottlenecks in or slowdown of the Program's pace. The

question to be addressed, then, is: "What changes in the decision-making structure of the PNA made possible the accomodation of the interest groups and of the competing bureaucratic agencies?

We may recall that with the authoritarianism established in Brazil after the military coup in 1964, the State apparatus significantly strengthened itself as the privileged arena of policy-making. The object of any analysis of the decision-making process of the National Alcohol Program must be, therefore, to unveil how the State apparatus accomodated the divergent interests at stake so as to enable the formulation and implementation of the fuel alcohol policy.

A decision-making structure can be characterized by (i) the institutional arrangement of bureaucratic agencies established to formulate and implement a policy; (ii) modes and mechanisms of interest representation of societal actors; (iii) mechanisms of decision-making, that is, the interplay between the bureaucratic agencies and the societal actors, and the outcome of that interplay - the decision; and (iv) implementation. Implementation is, in fact, formulation in progress; the distinction between the two processes is merely of an analytical nature. Therefore, (i), (ii), and (iii) are perpetually changing and mutually adjusting.

The analysis of the case of the PNA, through the eyes of the "affected-participant" actors, indicates that the "proper" working of the decision-making structure was especially influenced by the Program's institutional arrangement. In fact, no major grievances were voiced concerning interest representation or mechanisms of decision. Moreover, once the complaints centering on the lack of explicit decision-making centers were withdrawn, other grievances disappeared altogether.

The institutional arrangement of the PNA. I shall suggest that how bureaucratic agencies engaged in policy-making are arranged, that is, the nature of the institutional framework established to formulate and implement a policy depends on the clear identification of decision-making centers, their number, nature and interrelationship.

A center of decision can be conceived of as the locus to which the demands of interest groups and bureaucratic agencies are directed, and where decisions are effectively taken. A center of decision emerges or imposes itself as such when it manages not to be subordinated to other agencies in the context of bureaucratic politics. It can be a bureaucratic agency (e.g., the IAA, the CNP, the MIC, or the SEPLAN Energy Commission), or a board comprised of several agencies (the CDE and the CNE), depending on the specific aspect of a particular policy.

Centers of decision may be multiple or single. Alcohol policy-making in Brazil has always had more than one center of decision-making. Competition may or may not develop among the different centers, depending on the circumstances, and influence the structure of decision-making accordingly.

The center of decision-making may, moreover, be monolithic or fragmented, that is, constituted by one or more bureaucratic agencies. The kind of development model imposed by the Brazilian military-authoritarian regime, with its emphasis on rapid economic growth and its bureaucratic-"rational" style,[25] engendered the proliferation of bureaucratic agen-

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[25]The bureaucratic "rational" style of the military-authoritarian regimes which seized power in Latin America in the mid-sixties is contrasted to the political, often corrupt style of previous regimes by authors who studied these regimes. O'Donnell explicitly includes the "rational" style among the characteristics of the Bureaucratic-Author-

cies, each in charge of a specific facet of the economy.[26] The centralization of power in the executive branch (especially in the President and his inner circle) notwithstanding, fragmentation of the state apparatus increased the probability of competition among the relatively autonomous bureaucratic agencies who frequently had overlapping jurisdictions. Thus twenty years of military-authoritarian rule has resulted in a propensity toward competitive, fragmented centers of policy-making.

The analysis of fuel alcohol policy-making in Brazil indicated that fragmentation in itself does not necessarily jeopardize the "proper" functioning of the decision-making structure. Rather, fragmentation becomes a major obstacle only if intense competition develops among bureaucratic agencies with similar power resources. However, once the conflict is settled politically, and the hegemonic agency identified (with or without the exclusion of agencies which unsuccessfully disputed decision-making power), a modus vivendi is likely to evolve within that fragmented center. Thus each established center of decision acts like feuds, each one in control of a part of the alcohol policy (production, distribution, or financial matters). Cooperation and conflict avoidance is the most likely strategy to evolve among the distinct centers.[26a]

The analysis now turns to a comparison of the different institutional arrangements established to administer the National Alcohol Program in its first and second phases, according to the characteristics of the structure of decision-making described above. In both the gasohol (1975-1978) and

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25(cont.)
itarian State: "Through its /the BA's/ institutions it endeavors to 'depoliticize' social issues by dealing with them in terms of the supposedly neutral and objective criteria of technical rationality" (O'Donnell, 1977: 293).

[26]This process of multiplication of state agencies after the military coup in 1964 is well analyzed by Abranches, 1978b.

the pure-alcohol driven car phase (1979-present) of Proálcool, separate centers of decision-making can be distinguished for (1) financial matters, (2) production, and (3) distribution. This was not without precedent: the institutional arrangement developed to implement the policy of mixing alcohol with gasoline in a proportion of 5 percent (a fundamental element of the most important of the pre-PNA fuel alcohol policies, the 1933 sugar support policy designed by the newly created IAA),[27] similarly had encompassed centers of decision for production, distribution, and financial matters. Decisions governing financial activities were centered in the Bank of Brazil. Production and distribution were first the sole responsibility of the IAA. However, the National Petroleum Council created in 1938 to manage the country's supply of oil gradually accumulated decision-making power over distribution. As seen in Chapter 2, the IAA competed intensively with the CNP to maintain its decision-making power over the distribution of fuel alcohol. The annual establishment of the volume of anhydrous alcohol to be added to gasoline and its price brought the two agencies into rivalry and renewed their dispute. The CNP always emerged the winner. The liquid fuels policy based on the import of cheap petroleum and an expected increase in domestic production put gasohol at a comparative disadvantage and boosted the position of the CNP at the expense of the Institute of Sugar and Alcohol. Soon it became clear that the National Petroleum Council was the undisputed (de facto) center of decision-making for distribution activities, from which the IAA was excluded. Despite the CNP's political control over distribution (recognized de jure a few years later), a modus vivendi could not be worked out between the Council and the IAA, which

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[26a] I am in debt to Guillermo O'Donnell for the development of the idea of "conflict avoidance strategy among feuds".

[27] See Chapter 2, section 2.3.

controlled production, because at the core of the dispute over where the center of decision-making for distribution would lie was the fate of the gasohol policy itself. Disputes between the two organs reflected the attempt of the IAA to keep the gasohol policy alive, in so doing defending its own institutional interests and those of the sugar sector as well, and the efforts of the CNP to resist that policy, in order to enhance the country's liquid fuels policy based on petroleum. Eventually, the CNP came to enjoy veto power over the gasohol policy. At the end of the fifties, for reasons described above,[28] it exercised this prerogative and the policy collapsed. Thus, more than a power contest between two distinct decision-making centers for the same (gasohol) policy, the CNP/IAA competition represented the underlying conflict between two separate policies (the sugar policy and the fuel policy).

From this perspective, the institutional arrangement set up to administer the National Alcohol Program was simpler: all participating bureaucratic agencies were concerned with the fuel alcohol policy. The great number of agencies engaged in the Program, however, enormously complicated the PNA's implementation. The institutional arrangement established to implement the gasohol phase of the PNA was characterized by three decision-making centers, of which two were fragmented. While no dispute arose among the centers, competition was intense within the center of decision-making for production activities.

The organization of the decision-making center for alcohol production was rather complicated. One should recall that during the process of

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[28] In the era of cheap petroleum, the price of pure gasoline became increasingly less expensive than that of the alcohol-gasoline mixture, because the price of alcohol rose substantially commensurate with that of sugar (See Chapter 4, pp. 146-148).

formulating the PNA, there developed intense competition among bureaucratic agencies over the control of the Program's production and distribution. As traditionally had been the case in the alcohol policy, financial matters were to lie within the authority of a separate center of decision-making. At this point, the centers of production and distribution had not yet been established. Conflict arose between Petrobrãs and the IAA, and, to a lesser extent, the CNP. At the ministerial level, the dispute was between the Ministry of Industry and Trade and the Ministry of Mines and Energy. In decree no. 76,593/75, which created Proãlcool, Petrobrãs and the IAA were the losers. While Petrobrãs' participation in the Program was to be restricted to its distribution subsidiary, the state enterprise continued to fight for a place in fuel alcohol policy-making. If its attempts to encroach upon alcohol production activities bore no fruit, it did quite successfully manage to gain a firm grasp on the alcohol distribution system (storage and retail outlets) during the second phase of Proãlcool, thereby securing an important role in distribution decision-making. The IAA, as well, was to play a secondary role in fuel alcohol policy-making. However, the technical knowledge of the sugar and alcohol industry it had accumulated in its four decades of existence and its well-established role of "broker" of the interests of alcohol and sugar producers vis-à-vis other bureaucratic agencies involved in the PNA assured the Institute a definite and important role in decisions governing production.

The MIC/MME dispute was formally settled by decree no. 76,593. One should recall that after a number of meetings of the CDE (Economic Development Council), the "high court" for intra-bureaucratic conflicts, no agreement could be achieved between the parties. The President of

the Republic, also President of the Council, in his role as arbiter of the last instance, decided to hand control of the PNA to a board, the National Alcohol Commission (CNAl). The CNAl was comprised of representatives of various Ministries, including the MIC and the MME, and chaired by the General-Secretary of the MIC. The Commission was charged with formulating general guidelines for alcohol policy-making, especially those governing production. But, if settled formally, the MIC versus MME dispute was not resolved politically. The two organs continued to wrangle over the overall control of the PNA during the gasohol phase of the Program. It was only in the pure alcohol-driven car phase that this conflict was to be politically resolved (see below). Thus, the CNAl did not fulfill the role of a decision-making center, but rather came to constitute a board that merely aggregated contending agencies.

Regulating the sale and distribution of alcohol was the responsibility of the National Petroleum Council. The CNP passed a number of Resolutions and Directives for this purpose. Up until 1978, the IAA retained the legal authority to collect alcohol from the usinas, pay for it, and send it on to the Distribution Companies of Petroleum Products. In that year, it became clear that the existing infrastructure for the storage and distribution of alcohol was insufficient for the scale on which alcohol was being produced, and this inadequacy was becoming a major bottleneck in the PNA's implementation. The private Distribution Companies and Petrobrás hotly disputed the control of this system. It was the Distribution Companies which were handed jurisdiction over alcohol distribution in a CNP resolution which also revoked all IAA authority over the matter. As noted, Petrobrás was to

participate only through its distribution subsidiary, but continued to press for and won control over the storage and distribution network of fuel alcohol in the years that followed. All in all, it can be asserted that during the first phase of the PNA, the National Petroleum Council shared with no other bureaucratic agency the center of decision-making for matters pertaining to the distribution of fuel alcohol.

Proálcool resources were administered by a fragmented center. The National Monetary Council allocated funds for Proálcool's industrial and rural operations, the Central Bank regulated the PNA's financial operations, and the Financial Agents, the most important of which was the Bank of Brazil, transferred Program resources to the investor. No competition developed among the agencies as their jurisdictions and positions in the hierarchy were well-defined. However, difficulties did arise in the interaction between the regulatory and executing agencies (the Central Bank and the Bank of Brazil) on the one hand, and the agencies involved in production decisions, on the other.

At the core of the problem between the decision-making centers for financial matters and production was the processing of proposals for new distilleries. As may be recalled, the process for analyzing and approving proposals was complex, inefficient, and extremely lengthy, and as such was the object of frequent complaints from sugar and alcohol producers as well as distillery equipment suppliers. As there was no overlapping of agency jurisdictions, the problem was in essence a clash between relatively autonomous bureaucratic agencies. The National Alcohol Commission and the Central Bank and the Bank of Brazil applied

different criteria for project evaluation and held different outlooks toward the PNA in line with their respective positions in the state apparatus and in fuel alcohol policy-making.[29] However, when during the second phase of Proálcool the decision-making center for alcohol production activities was awarded to the MIC, the newly defined center was able to simplify the bureaucratic procedures of distillery project processing performed by its agencies (CENAL, IAA, STI, EMBRATER) and to press the Financial Agents to speed their analysis of the financial aspects of the projects.

Thus the major, unresolved kink in the institutional arrangement established to implement the first phase of Proálcool was the non-definition of a center of decision-making for production activities. The cane suppliers and the sugar and alcohol producers -- the "older" actors in the fuel alcohol story -- were quite vocal in expressing their confusion over the lack of a locus to which to direct their demands and grievances. What would substitute for the IAA was a question which would be worked out only during the Program's second phase.

The National Alcohol Program was accelerated at the beginning of its second phase, that of pure alcohol-driven cars, in the wake of the second oil shock. New and important actors who produced and distributed alcohol vehicles such as auto manufacturers and car dealers, were added to the Program, which in turn increased the complexity of fuel alcohol policy-making. To boost the National Alcohol Program, many problems had to be confronted;[30] chief among them was the reform of the PNA's

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[29] See pp. 324-326.

[30] See Chapter 8, pp. 381 et passim.

decision-making structure. During a meeting of the Economic Development Council (CDE) on June 6, 1979, responding to private actors' demands, the government decided to replace the National Alcohol Commission (CNAl) with the National Alcohol Council (CNAL) and its Executive Commission (CENAL). While the new National Alcohol Council was in charge of formulating the directives for the PNA, CENAL, as the executive body of the fuel alcohol policy, was made responsible for the processing of the proposals to expand or install new distilleries. The new Council had as members top-level officials of the Ministries (their Secretary-Generals) and was chaired by the Minister of Industry and Trade. CENAL, too, was under the jurisdiction of the MIC, chaired by its Secretary-General, and had as members the President of the CNP, the President of the IAA, the Secretary of the STI and the Executive Secretary of the CDI, the latter three of which were under this same Ministry's authority.[31]

Thus the Ministry of Industry and Trade's control over production activities was increased. This formal strengthening of the MIC was the resolution of the inter-bureaucratic agency dispute arrived at by the President of the Republic as arbiter of the last instance. This dispute between the MIC and the MME over the control of the Program which, as noted, had not been settled politically in the course of the gasohol phase of the PNA was intensely renewed during the early months of the Figueiredo Government. Figueiredo's preference that the MIC control Proálcool, formally expressed in the reform of the decision-

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[31]The presence of the President of the CNP in CENAL was to represent the previously non-existent formal link between the centers of production and distribution.

making structure described above, was to translate into reality. In the months which followed, the position of the Ministry of Mines and Energy was weakened both in the overall energy policy[32] with the creation of the National Energy Commission (CNE), and in alcohol policy-making, at the same time that the Ministry of Industry and Trade was consolidating its decision-making power over alcohol production. MIC's command over production-related activities was exercised by the Minister of Industry and Trade himself, and the Ministry's Secretary General, also CENAL's President. CENAL, in practice, became the important organ regulating the PNA's production activities, its main function was to satisfy the supply of and demand for alcohol. To comply with this task, it could not dispense with the technical and political cooperation of the IAA. The National Alcohol Council, a board composed of potentially contending agencies, came to perform only a secondary role.

Thus, a decision-making center for alcohol production activities finally was politically defined during the second phase of Proálcool. While still a fragmented center (including CNAL, MIC, CENAL, IAA), private actors knew where to present their interests and how to influence decision-making. And, as noted, the solution of at least one major problem of the PNA - the slow processing of distillery projects - can in large part be attributed to the political leverage the MIC gained over activities related to alcohol production.

At first, distribution remained the sole concern of the CNP. However, as Petrobrás increased its control over the alcohol storage and distribu-

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[32]The MME was responsible for the formulation of energy policy during the Geisel administration.

tion network during the course of phase two of Proálcool,[33] the Enterprise's importance also rose in the center of decision-making for distribution activities. The relation between the CNP and Petrobrás is not, however, conflictual. As a matter of fact, these agencies long ago worked out a modus vivendi to end their intense competition over the control of petroleum policy which began with Petrobrás' creation in 1954.[34] In matters pertaining to fuel alcohol policy, through both agencies, the state exerts a high degree of control over distribution. I would further suggest that Petrobrás and the CNP behave as allies against the private Distribution Companies' (most of which are multinational enterprises) interests in distribution activities.[35]

During phase two of Proálcool decision-making over financial matters was increasingly centralized in the Ministry of Planning (SEPLAN). As seen in chapter 8, the SEPLAN Energy Commission (CSE) was created in December 1981 to administer the resources of the Energy Mobilization Program (PME). The PME had been established in 1979 to promote energy conservation and the development of alternative energy sources as part of the Brazilian Government's response to the second oil shock. At present, the Minister of Planning and the Executive Secretary of the SEPLAN Energy Commission enjoy absolute control over financial resources targeted for alternative energy programs. This process of centralization may be explained by an objective need to tighten control

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[33]See pp. 395-411.

[34]For an account of the competition between Petrobrás and the CNP in the 1950's, see Smith, 1976.

[35]See Chapter 8, especially pp. 404-409.

over energy policy. The nation's ever worsening economic situation, with foreign indebtedness rising to unthinkable proportions, necessitated that oil imports be slashed in order to improve the country's balance of trade. A trade surplus was essential to service the rapidly escalating debt. All alternative energy programs are thus subject to the fiscal control of the CSE. Currently, PME resources derive from the federal fiscal budget, except for those resources allocated to Proálcool which come from the monetary budget. This means that PNA finances are directly controlled by the Minister of Planning,[36] while the decision-making power over financial matters of the other agencies active during phase one of Proálcool has been limited.

Once the decision-making centers for the financial, productive, and distributive facets of the alcohol program were clearly defined and politically settled, the complaints by major, private actors regarding the Program's structure of decision-making subsided.[37] This was the case because they could now easily identify where to channel their demands and pursue their interests.[37a] With the competition ended among the

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[36]It should not be forgotten, however, that apart from the PME resources the National Alcohol Program had a US$ 250 million World Bank loan and a modest amount deriving from the Program's operations.

[37]It is important to note that the idea of distinct "center(s) of decision-making" is the author's. Private actors do not perceive centers for deciding production, distribution, or financial matters. Rather, they identify individual agencies (not a cluster of agencies forming a decision-making center), each in charge of a specific aspect of the Program, as the targets of their demands. This is evident in interviews with those actors. When asked to identify the center of decision-making of the PNA, the typical respondent first seemed puzzled, then challenged, and finally able to produce a list of bureaucratic agencies. This list, however, varied among respondents.

[37a]Participation in the decision-making process implies: (i) access to centers of decision (input) and (ii) responsiveness to demands and grievances (output). I am here referring to both. While no private actors are dissatisfied with their access to decision-making, some have complained about the degree of responsiveness to their demands. See p. 523 and footnote 65 below.

bureaucratic agencies, their large number and the fragmented nature of the centers of decision-making of the fuel alcohol policy did not impair the integration of alcohol production, distribution, and consumption, nor the institutionalization of the Program.

Modes of interest representation and mechanisms of decision-making. The major private actors participating in fuel alcohol policy-making before the creation of the National Alcohol Program were directly engaged in sugar and alcohol production. Sugar cane suppliers and sugar and alcohol producers were formally represented by delegates of major sugar producing states on the IAA's Executive Commission.[38] The Institute was the central locus of decision-making for the sugar and alcohol policy, as conceived by the first president of the IAA, until challenged by the National Petroleum Council, especially for control of the fuel alcohol policy. Another means of formal access to decision-making was to present demands, either individually or collectively through representative groups, to the President of the IAA. Private actors also enjoyed informal access to decision-making through personal contacts and patronage; the Institute was especially attentive to the interests of Northeastern usineiros. The IAA "represented" the interests of sugar and alcohol producers, especially those from the Northeast, before higher authorities (the Pres-

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[38] To be sure, sugar cane suppliers were first restricted to the IAA's Advisory Council, which was of secondary importance in sugar and alcohol policy-making. They only gained access to the Executive Commission eight years after the creation of the Sugar and Alcohol Institute, with the promulgation of the Sugar Cane Production Statute in 1941. For a detailed analysis of interest representation in sugar and alcohol policy prior to the PNA, see chapter 2, pp. 80-89 and also chapter 5, pp. 184-187.

ident of the Republic and, after 1960,[39] the Ministries active in sugar and alcohol policy-making) and foremost, the National Petroleum Council, which controlled fuel alcohol distribution. It is safe to say that up until the fifties, the IAA had a "monopoly" of interest representation of sugar and alcohol producers. A break in this pattern was registered in 1959, when the São Paulo alcohol producers, through representative associations, demanded directly of the CNP an outlet for surplus alcohol.[40] By the late 1960's, the Center-South producers had organized two associations to represent their interests - COPERSUCAR and COPERFLU. As the modernization program for the sugar industry proceeded, which had the effect of concentrating capital and production in the Center-South region, these producers were able to strengthen their bargaining positions with the aid of these representative bodies. They could then dispense with the IAA as the "broker" of their interests in the upper echelons of decision-making for sugar and alcohol policy.

With the National Alcohol Program, new actors joined those directly engaged in the production of alcohol. Prominent among these private actors were distillery equipment producers, manufacturers and distributors of alcohol cars, and shops adapting Otto cycle engines to run on pure alcohol. These key actors, whose access to policy-making is guaranteed fundamentally by economic power, influence decision-making

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[39]The Sugar and Alcohol Institute which had, until 1960, reported directly to the President of the Republic, now fell under the jurisdiction of the Ministry of Industry and Trade.

[40]See p. 154.

through a variety of means, principally statements and paid announcements in the press and speeches in public forums for alcohol policy, such as the traditional Annual National Sugar Producers Meetings sponsored by COPERFLU and the more recent Annual Autonomous Distilleries of Alcohol meetings sponsored by SOPRAL. Formal representation in organs participating in alcohol policy-making is available only to sugar cane planters and sugar and alcohol producers, and is restricted to the IAA's Executive Commission.

Informal contacts are clearly the typical mode of interest representation in recent fuel alcohol policy-making. These contacts with the State bureaucracy are made either on an individual basis or through representative Associations and Syndicates.[41] Generally, the more powerful an individual actor is economically, the less dependent he is upon representative Associations or Syndicates to bring his demands to the State apparatus. Thus, the major sugar and alcohol producers, the five largest distillery equipment suppliers, and all auto manufacturers enjoy direct access to Brasília. Less powerful individual actors are represented by the pertinent Associations, such as the Cooperatives and Syndicates of Sugar and Alcohol Producers, the Sugar Cane Planters Federation (FEPLANA), the Brazilian Association for the Development of the Capital Goods Industry (ABDIB), or even channel their demands through the most powerful individual actors of their sector (as reportedly is the case with distillery equipment suppliers). Interestingly, Northeastern al-

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[41]The informality of the contacts between public and private actors is attested to by the fact that when interviewed on this subject, private respondents always referred to incumbents by name.

cohol producers can still rely upon the Governors of their states to lobby for their interests. This is because the sugar-alcohol sector is vital to the economy of the Northeastern states,[42] something which is not true of the Center-South.[43]

In alcohol policy-making, the "extra-corporatist" structure of interest representation[44] has come into play at the expense of the official corporatist network. "Extra-corporatist" interest groups represent associations of an industrial subsector (e.g. the Brazilian Association for the Development of the Capital Goods Industry) parallel to the official corporatist network of vertically integrated Syndicates (representing each industrial sector, e.g., metallurgy, chemicals, textiles), regional Federations (made up of Syndicates), and the National Confederation of the Industry (comprised of the Federations) created during Vargas'

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[42]See interviews with representatives of FEPLANA, COPERFLU, Volkswagen, COPERSUCAR, DEDINI, ZANINI, and SOPRAL.

[43]In Pernambuco, for instance, sugar cane generates 80 percent of the state's external revenue, 20 percent of its income from sales tax, and 1.5 million jobs. See JB, 03/30/83, "Álcool sem destino".

[44]Eli Diniz and Renato Boschi in their study of the political behavior of enterpreneurs in two authoritarian periods in Brazil (1930-1945) and 1964-1976) identify four modes of interest representation in the 70's:

i) the official corporatist structure (Syndicates, Federations, and the National Industry Confederation);

ii) the extra-corporatist structure (the parallel associations);

iii) countervailing rings (see footnote no. 53);

iv) personal contacts.

See Diniz and Boschi, 1978: 170-185.

Estado Novo. In fact, the vertical, corporatist links[45] between the public and private domains are visibly absent in alcohol policy-making. The demands of private actors are channeled through representative Associations as well as Syndicates and reach the State apparatus through informal contacts. It can be said, moreover, that the Syndicates (part of the official corporatist network) play the role of representative Associations of the extra-corporatist structure, acting generally in conjunction with,[46] but sometimes complementing,[47] the latter. While the extra-corporatist structure of interest representation has been

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[45]Philippe Schmitter provides a well-known definition of corporatism:

> Corporatism can be defined as a system of interest representation in which the constitutent units are organized into a limited number of singular, compulsory, noncompetitive, hierarchically ordered and functionally differentiated categories, recognized or licensed (if not created) by the State, and granted a deliberate representational monopoly within their respective categories in exchange for observing certain controls on their selection of leaders and articulation of demands and supports (1974: 93-94).

[46]Frequently the representative Association and the Syndicate have in common members of their respective Boards of Directors. This is the case with the sugar and alcohol producers of the state of São Paulo. The President of COPERSUCAR is also the President of the official Syndicate for sugar and alcohol producers in the state.

[47]The political representation of the interests of the sugar producers of the state of Rio de Janeiro is divided between COPERFLU and the Syndicate of Sugar and Refining of the States of Rio de Janeiro and Espírito Santo. While the Syndicate is in charge of contacts with the National Petroleum Council and the Bank of Brazil (the Bank can penalize the Cooperative, which handles the marketing of its members' products, but not the Syndicate, which engages only in political representation), COPERFLU enjoys easy access to offices in Brasília (Interview with Celson A. de Oliveira Mendes, Economic Assistant to COPERFLU, Rio de Janeiro, 4/12/83).

likened[48] to Schmitter's "societal corporatism",[49] there is no institutionalized ("official) representation of private actors' interests on any Board, Commission, Council, or bureaucratic agency active in recent fuel alcohol policy-making which would warrant the identification of extra-corporatist structures with this type of corporatism. To be sure, as noted, sugar cane planters and sugar and alcohol producers are formally represented on the IAA's Executive Commission. This could, however, be considered a vestige of interest representation in the pre-PNA period.

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[48] See Diniz and Boschi, 1978: 83.

[49] Proceeding beyond the definition of corporatism (see footnote 45), "a heuristic and logicoanalytical construct", Schmitter (1974) distinguishes two subtypes of corporatism, products of distinct historical, political, social and economic processes: "societal" and "State". The former is autonomous and penetrative, corresponding to advanced, monopoly or concentrated capitalist development and collaborative class relations. "State corporatism", dependent and penetrated, is identified with delayed, dependent capitalist development and non-hegemonic class relations (for a detailed description of the characteristics of the two types of corporatism see pp. 103-104). O'Donnell (1977), on the other hand, attributes both "statizing corporatism" and "privatist corporatism", roughly equivalent to Schmitter's "State" and "societal" corporatism, to a single polity - the Latin American bureaucratic-authoritarian State. "Statizing corporatism" penetrates, statizes, subordinates and controls the class organizations of the popular sector, especially the trade unions. "Privatist corporatism" corresponds to the representation of interests of the dominant classes and sectors vis-à-vis the State. Here a degree of mutual control and complex interpenetrations between those sectors and classes and the State are present. The interrelationships between State and society in "privatist corporatism" are not of the informal kind. Rather, they are institutionalized links constituted by "commissions, boards, councils, and other centralized and decentralized State institutions in which one finds the bourgeoisie... 'represented' by those directly designated by the State or proposed by their class organizations" (O'Donnell, 1977: 48. See also pp. 47, 49, and 64-67).

In many circumstances horizontal, temporary links are established between public and private actors around a specific issue. Generally the actors involved change along with the issues. Most of the time these links imply that private groups have been coopted by contending State agencies. Thus, on two separate occasions during the second phase of Proálcool, in exchange for a long term guarantee for the purchase of alcohol (which in turn would serve as collateral for much needed bank loans to expand or install new distilleries) Petrobrás gained the support of major alcohol producers for its plan to secure a monopsony of the purchase of the new fuel;[50] the MIC mobilized the support of the Brazilian Association of Chemical Industries (ABIQUIM) and the Syndicate of Industries of Chemical Products for Industrial Use for the State's monopoly of the distribution of alcohol intended for the chemical industries[51] during the formulation phase of the PNA; later, the Minister of Mines and Energy, who favored the use of alcohol as raw material for the chemical industries over its use as fuel, was backed by COPERSUCAR and some representatives of the chemical industry.[52] This relationship between the public and private spheres in policy-making can be represented conceptually by Cardoso's "countervailing rings".[53]

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[50] See pp. 399 to 401 and 402-403.

[51] See pp. 278-279 and 281-282.

[52] See pp. 334-336.

[53] According to Cardoso, the private economic groups which have benefitted from the regime installed in Brazil in 1964 have been coopted through political mechanisms, which he called "countervailing rings". These horizontal rings cut across the public and private sectors, incor-

Participating actors, individually or through their interest groups (Associations and Syndicates), address their demands to the agency in charge of the relevant aspect of the alcohol policy. Thus, for example, alcohol producers would bring to the IAA any grievances about the distribution of production quotas, to Petrobrás any complaints of delays in collecting alcohol from the production units, and to the CNP any problems related to the payment for collected alcohol; auto manufacturers would contact the STI if technical aspects of alcohol engines were under consideration, and the CNP to guarantee a uniform octane rating for fuel; and distillery equipment suppliers would turn to the Industrial Development Council (CDI) for questions related to equipment prices and to the Planning Minister with grievances concerning the monetary correction applied to the credit conceded to distillery projects. In many instances, these State agencies serve as "brokers" for private actors, processing and channeling their demands to other agencies, Commission and Councils engaged in the alcohol policy.[54]

53(cont.)
porate technocrats and entrepreneurs, and are located inside the State apparatus. Through these "countervailing rings" parts of the private sector have access to decision-making. The "rings" are formed on a temporary basis around an incumbent office holder or a powerful state organ (such as the National Monetary Council or the Interministerial Price Commission) to address specific interests (issues, policies, etc.) and permit bargaining between the interests of the public and private sectors (See Cardoso, 1975: 182-184, 206-209).

[54]The typical case is the Institute of Sugar and Alcohol, which "represents" the interests of cane suppliers and sugar and alcohol producers before the CNP and the Ministry of Industry and Trade. Another example is the MIC, which frequently "represents" the interests of the IAA and its "clients" on the National Energy Commission on such issues as the establishment of the price of alcohol.

At times, to settle a broader issue which divided private and public actors, it was necessary to resort to higher authorities. The Economic Development Council (CDE) in phase one of Proálcool, for example, was called upon to decide whether priority should be assigned to the use of alcohol as fuel or as raw material for the chemical industry,[55] and in the second phase of the Program, the National Energy Commission (CNE) was responsible for choosing between alcohol with additive and vegetable oils as a substitute for diesel oil.[56] Private actors made their preferences known to these boards either directly (COPERSUCAR and ABIQUIM sent draft reports and proposals directly to the CDE on the subject of the decree creating Proálcool),[57] or through a member of these bodies (the Minister of Industry and Trade received and processed various suggestions and demands from major sugar and alcohol producers, distillery equipment suppliers, auto manufacturers, and engine convertors, and directed those on the CNE which pertained to the recovery of the sales of alcohol cars at the end of the "discrediting phase.")[58] More often than not, however, the issues were settled within the relevant bureaucratic agency of a decision-making center. Thus, for instance, the CNP mediated the dispute between Petrobrás and the Distribution Companies over the control

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[55] See pp. 334-336 and pp. 338-339.

[56] See pp. 453-455.

[57] See p. 276.

[58] See pp. 470-472.

of the system of storage and distribution of fuel alcohol,[59] and the MIC determined the monetary correction of credit values conceded to distillery projects.[60]

The President of the Republic plays a special role in policy-making. When intra-bureaucratic conflict over an issue cannot be resolved, the President performs the role of arbiter in the last instance. His interference may not settle the matter definitively (e.g., the delay on the part of Financial Agents in releasing credit for approved distillery projects),[61] but merely represent a "stop" in the bargaining situation.[62] The President's preference, however, becomes an obligatory frame of reference for contending actors, who attempt to strengthen their position vis-à-vis their opponents by identifying their preference rhetorically with the President's. The President may intervene in an intra-bureaucratic conflict on his own initiative (as was the case in the intra-bureaucratic conflict over the control of the National Alcohol Program),[63] or he may be called upon to do so by the contending agencies. In this event, he may decline to perform his role of arbiter in the last instance, as he did on the issue of the simplified versus conventional

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[59] Cf. pp. 348, 349 and pp. 404 to 410.

[60] See pp. 330 to 332.

[61] See pp. 326 to 330.

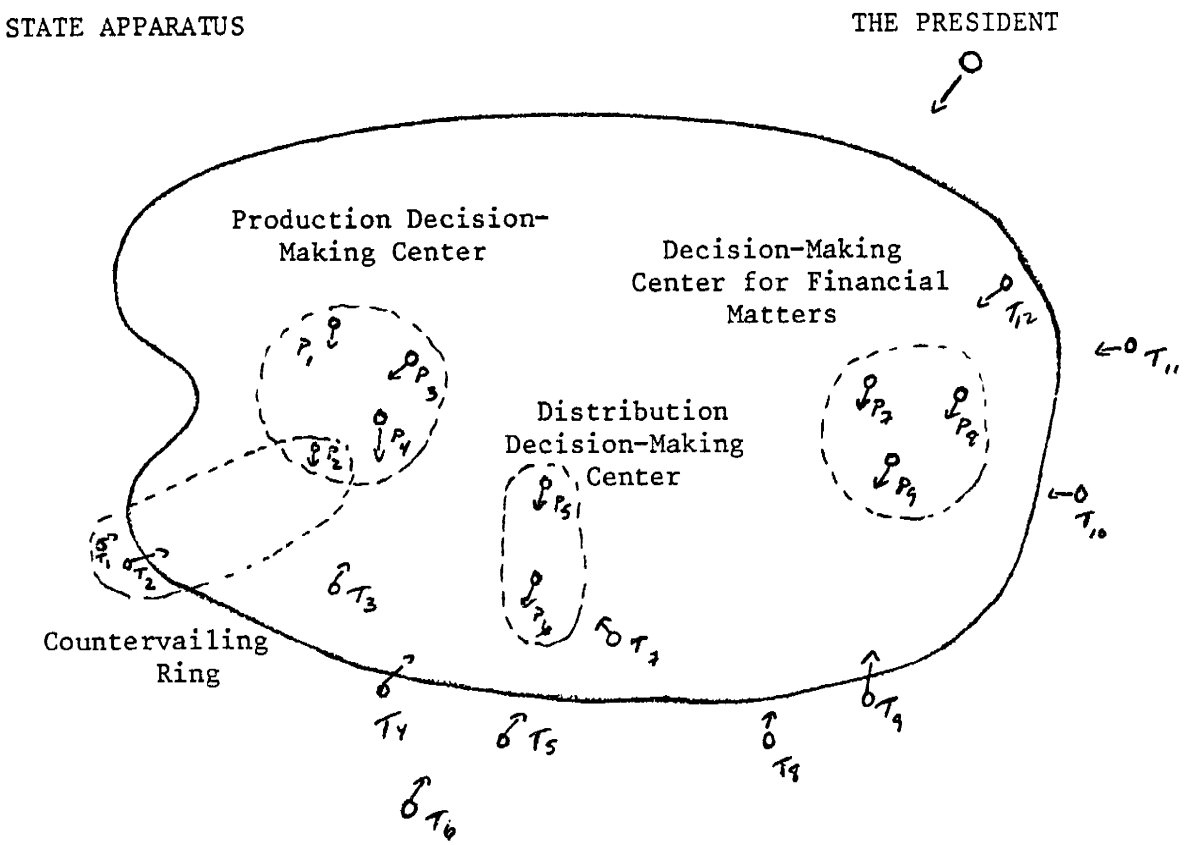
[62] Refer to the Introduction to this volume.

[63] See pp. 282 to 284.

conversion of gasoline engines to alcohol.[64]

From the above analysis the schematic representation of the decision-making process indicated in the Introduction to this volume (p. 18) should be redefined as follows:

Figure 4: Decision-Making in Alcohol Policy



WHERE $P_1, P_2, \ldots P_n$ = PUBLIC ACTORS

$T_1, T_2, \ldots T_n$ = PRIVATE ACTORS

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[64] Cf. pp. 419-421.

Note that the above figure is the detailed, complex representation of a "bargaining situation" at a given moment of the political game. It represents input toward decision-making. The output, or the decision finally reached, is represented by a "resultant" of the "political forces" in confrontation, not indicated above (See Figure 1, p. 205).

Summing up. This complex, fragmented structure of decision-making does not precipitate complaints from private actors, provided they can clearly identify where to address their demands. If during the gasohol phase of the PNA the center of decision-making for alcohol production was not well-defined, this was corrected during phase two of the Program, when the conflict among the bureaucratic agencies involved in alcohol production was settled politically. Actors who were interviewed seemed rather contented with their access to decision-making. To be sure, some claimed that while they did enjoy easy access to the centers of decision-making, their influence over policy was limited.[65] All, however, appeared satisfied with the authoritarian, informal nature of interest representation and the mechanisms of decision-making prevailing in alcohol policy-making, which takes place entirely within the state apparatus. If Congress were to become a locus of decision-making, it could cause problems were it to bring to the fore the grievances of "affected non-participant actors", such as rural workers.

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[65]This limitation of influence was most vividly expressed by a FEPLANA representative. He claimed sugar planters have easy access to all Ministers and offices, but decisions are not handed down in their favor. (Interview with João C. Leite Soares, Secretary-General of FEPLANA, Rio de Janeiro, 3/14/84).

Thus, the "appropriate" (informal, institutional, and in the Northeast, through the State Governors) representation of the interests of the "affected-participant" actors (that is, large capital), the political resolution of major conflicts between competing bureaucratic agencies, the clear definition of centers of decision-making, the establishment of mechanisms of decision-making, including the role of the President as the arbiter in the last instance of intra-bureaucratic conflict, all made possible the satisfactory accomodation of the interests of the large number of private and public actors, as well as the establishment of an institutional arrangement capable of implementing Pró-álcool, today a well-institutionalized Program. The apparent "Tower of Babel" which is the complex, highly fragmented structure of decision-making for alcohol policy works, and works quite well for large capital.

Below, attention is turned to an assessment of the National Alcohol Program according to the attainment of its objectives.

10.2 Attainment of the PNA Objectives

It was seen that although the fulfilment of the 1985 alcohol production goal has been postponed, the problems of the National Alcohol Program have been satisfactorily resolved, and a number of impressive results have been accomplished. Consumers and private actors involved in the PNA today have no major complaints, and the Program is firmly institutionalized. By the criteria "satisfaction of the affected-participant groups", Proálcool may be proclaimed a success. One should now assess the Program according to the attainment of its expressed objectives.

The success of a governmental program judged by the satisfaction of its affected-participant groups does not automatically imply that the program has successfully attained its stated objectives. As shall be seen below, some of Proálcool's objectives were not met or, at best, the results can be considered modest. This may be explained by the fact that a program's objectives are defined by public actors (decision-makers), not private actors. Private sector participants make an effort to accomodate their interests to the program's objectives.[66] Thus they may be satisfied with a program (provided their interests have been served) which has not met, for instance, its macroeconomic objectives.

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[66]This observation is confirmed by interviews with private actors. Some seemed at first to be taken by surprise (Volkswagen); all clearly cited one or more of the politically defined objectives of Proálcool (see below in the text): oil product substitution (mentioned by Volkswagen, COPERSUCAR, SOPRAL), an improvement in the balance of payments (cited by DEDINI), and a lessening of the country's dependence on imported energy (offered by ZANINI).

The assessment of a program according to the attainment of its objectives therefore provides a measure of the gap between decision-makers' intentions and reality. Thus, it complements the view of the program from the perspective of the affected groups.

The Objectives of the National Alcohol Program:

The "exposition of motives" of decree no. 76,593/75 which created the National Alcohol Program defined the following as objectives of the Program: (i) saving foreign exchange by reducing petroleum imports; (ii) reducing regional income disparities; (iii) reducing personal income inequality; and (iv) expanding the production of capital goods used in newly-expanded and newly-installed distilleries.

The definition of a Program's objectives is fundamentally a political process. In this sense, the decree which created the PNA and the list of the Program's objectives therein contained correspond, to use the language proposed in this work,[67] to the "resultant", in a given moment, of the "bargaining situation" of the competing actors during the formulation of the PNA. However, as the political game is perpetual, the "bargaining situation" regains motion, and the objectives of the Program are accordingly redefined. Thus the objectives of the National Alcohol Program that will be considered in this work are those which, reinterpreted by the political process, endured the first and second phases of the Program.

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[67] See Introduction to Volume II, pp. 205-208.

As noted,[68] the implementation of the gasohol policy launched in the first phase of Proálcool was complicated by a number of factors. The balance of payments recovered remarkably well, although this was accomplished at the expense of incurring a monumental debt. After the price hikes of 1974, the international oil market more or less stabilized which diminished concerns for national security which had been based on a fear of an interruption of the oil supply needed for the smooth functioning of the economy. And the sugar industry stumbled from a climate of euphoria in the years from 1972 to 1974 when the world market price increased sharply and sugar exports climbed to record levels, to an unprecedented crisis of overproduction, which fully manifested itself in the 1976-77 harvest year. These two extreme situations in the sugar industry prompted the usineiros and the IAA whose early support for the gasohol policy was guarded (except in São Paulo), to lobby intensively for it. At the same time, strong competition surfaced during the formulation of Proálcool among bureaucratic agencies over the Program's control.[69] The stimulus from the weak world sugar market was not sufficiently strong to mobilize all contending agencies in the same direction.

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[68] Cf. Introduction to Volume II, pp. 196-198 and also pp. 212-229, 297-313, 322-323 and 351-352.

[69] This conflict among bureaucratic agencies was formally settled by President Geisel with the creation of the National Alcohol Commission, which was comprised of several Ministries. For a detailed description of the contest for control of the PNA, see pp. 267-290. For a discussion of the resolution of conflict among bureaucratic agencies at the formal and political levels, and its consequences for decision-making, see the Conclusions, pp. 500-512.

All these factors combined to produce what has been called here the "ambiguity of objectives of the PNA". Three objectives, each sponsored by different bureaucratic agencies, can be identified during the gasohol phase of Proálcool:

i) to improve the balance of payments by reducing oil imports (alcohol as fuel or as raw material for the chemical industry);

ii) to decrease the country's dependence on imported energy (fuel alcohol) in line with national security objectives. The aim of this objective was energy self-reliance; [69a] and

iii) to establish a safety valve for the crises of sugar overproduction (fuel alcohol or alcohol as raw material for the chemical industry).

The support of the bureaucratic agencies for the different PNA objectives varied over time, and with changing circumstances and incumbent office-holders. A summary of this process follows.

The prime concern of the President, his immediate aides, and the Ministries in charge of economic affairs was the balance of payments. The bureaucratic agencies split, however, over the best end-use for the alcohol to be produced: fuel or raw material for the chemical industry. The latter option was promoted by the Minister of Mines and Energy, and was promoted by the Secretary-General of the Ministry of Industry and Trade, who was as well the President of the National Alcohol Commission. They based their position on calculations questioning the economic viability of fuel alcohol production. Reflecting divisions within the Ministry of Industry and Trade, the Minister himself

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[69a] It is worth noting that although both improving the balance of payments position (objective i) and decreasing the country's dependence on energy (objective ii) imply curbing oil imports, the political meaning of the objectives are quite distinct.

favored the use of alcohol as fuel. After his resignation, the new Minister of Industry and Trade adopted an unenthusiastic position about the entire National Alcohol Program.[70] This attitude, however, was offset by the overt support lent to the Program by his new Secretary-General. The latter strongly backed the fuel alternative. His preference was endorsed by the Industry Technology Secretariat (STI) and the Ministry of Agriculture. They argued that even at production costs higher than gasoline, fuel alcohol still saved much needed foreign exchange. Besides, they continued, alcohol was a fuel derived from renewable sources, produced entirely within the country with Brazilian raw material, equipment, and technology. They believed its contribution to the lessening of the country's dependence on imported oil should not be disregarded, even if the world oil market was free from an immediate threat of disruption.

The IAA consistently supported policy alternatives which favored the sugar industry. At first, during the period when the world market price of sugar was high, the IAA's concern was for an alcohol policy which would not jeopardize sugar exports.[71] This concern coincided with the preference of those members of the government, including the Presi-

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[70]The reader should recall that the new Minister of Industry and Trade was accused of slowing down the approval process for distillery projects (see p. 345).

[71]Remember that at the beginning of the PNA the IAA favored the expansion of alcohol production through autonomous distilleries in non-traditional sugar regions (see pp. 233-236).

dent, who thought that a major objective of the PNA should be to improve the country's balance of payments. By expressing concern with the balance of payments, the IAA "legitimized" its position of favoring the sugar industry. Within this context, the Institute and its "clients", the usineiros, were more or less indifferent to which priority use should be assigned to alcohol. They were, moreover, less than enthusiastic about Proálcool itself (except for São Paulo usineiros, for special reasons),[72] fearing the program would divert raw material from sugar exports. When the accumulation of sugar stocks reached unprecedented levels, however, the IAA and sugar producers nationally manifested strong support for the Program. The government moved to rescue the sugar industry, adopting a series of measures to alleviate the sugar crisis by stimulating alcohol production. The amount of cane stipulated to be transformed into direct alcohol was the equivalent of 50 million 60 kg sacks of the sugar during the 1977/78 and 1978/79 harvest years. The same piece of legislation (EM/MIC no. 30/77) settled the issue of the best end-use for alcohol in favor of fuel. Alcohol, and more precisely, fuel alcohol as a safety valve for the sugar industry, had thus become a major PNA objective.

The three objectives of Proálcool -- the improvement of the balance of payments, the lessening of the country's dependence on imported oil, and the establishment of a safety valve for the sugar industry -- survived to the second, pure alcohol-driven car, phase of the Program. The use of alcohol as raw material for the chemical industry was definitively subordinated to its use as fuel. In fact, despite rising, the

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[72] See Volume I, pp. 177-178.

amount of alcohol earmarked for the chemical industry was only .6 percent of the total consumption in 1983.[73] Due to its marginal significance, this end use of alcohol will be disregarded in the assessment of the attainment of the PNA objectives which follows. As the institutionalization of the Program proceeded and conflict among bureaucratic agencies was resolved, the distinct objectives of the PNA advocated by different public agencies and officials coexisted rather than competed with one another.

The "social objectives" of the PNA (to reduce disparities in regional and individual income) expressed in decree no. 76,593/75 creating Proálcool, while supported by the Ministry of Agriculture and the Industrial Technology Secretariat in the Program's first phase, were never politicized and hence never realized. For example, the Ministry of Agriculture proposed the building of micro-distilleries (5,000 1/d) as a way to bring small holders and cooperatives into the Program. These small distilleries, however, were not economical and the government could not guarantee the quality of their alcohol to consumers and automobile manufacturers. Because the purpose of the National Alcohol Program, as defined by the principal bureaucratic agencies (such as the MIC, CENAL, and the MME) and "big capital" was primarily economic,[74] micro-distilleries were ruled out. During the

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[73] See Table 31. In 1983, 380,000 cubic meters were consumed in the chemical industry of a total consumption of 6,261,000 cubic meters (data are from the CENAL Report, 1983).

[74] A World Bank official who was part of the team which favorably appraised the National Alcohol Program for a Bank loan of US$ 250 million shares this view of the Program. In his opinion, the Government must

phase of pure alcohol-powered cars, only intellectuals and the Program's critics questioned the decision-makers' commitment to the "social objectives" of Proálcool. The "social objectives" will be discussed in greater detail in assessments of the PNA's redistributive and indirect effects provided below.

Evaluating the Attainment of the National Alcohol Program's Objectives:

The assessment of the attainment of the objectives of a Governmental program may be provided from the perspectives of the "insider" (the actors), the "outsider" (intellectuals and analysts), or both. In the case of Proálcool, while it was possible to assess the fulfilment of the objective of "safety valve for the sugar industry" from a combination of the "insider" and "outsider" perspectives, the available data limited the evaluation of the "lessening of the country's dependence on imported energy" and the "saving of foreign exchange" to the perspective of the analyst.

The objective that alcohol serve as a safety valve for the sugar industry was undoubtedly met successfully. Truda's ideal of making fuel alcohol the essential support for the sugar industry came to fruition fifty years after his initial conception. Recurrent crises of overproduction are today avoidable. An important test for the func-

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74(cont.)
look elsewhere to solve the country's social problems, especially those of the Northeast region (Interview with Isaac Sam, Industrial Projects Department, World Bank, July 21, 1983).

tioning of alcohol as a safety valve for the sugar industry came when sugar prices peaked on the world market (mid-1979 to November 1980) and subsequently plummeted to the very low levels which persist until today. Coinciding with the second oil shock, authorized levels of sugar production for the 1980/81 harvest were set short of the country's capacity. In addition to the expansion of the area newly-cultivated with sugar cane which was being directed to alcohol during the second phase of the PNA beginning in 1979, a portion of the crop from traditional sugar-growing areas was diverted from the manufacture of sugar to the production of alcohol. While sugar prices decreased in 1981, no substantial increase in either sugar production or sugar stocks followed as traditionally had occurred in the sugar industry following a period of high prices. Nor did the sugar cane industry find itself in a tenuous economic situation in the years which followed low world market prices, primarily because the mechanisms to increase alcohol production were by then well in place.

Alcohol is today the most important product of the sugar cane industry. In the 1982/83 harvest, 83 percent of all alcohol produced was derived directly from sugar cane extract.[75] The anhydrous alcohol mixed with gasoline serves as a safety valve for sugar production. In 1983, 2.2 billion liters of anhydrous alcohol was added to gasoline, corresponding to 20.2 percent of the carburant mixture.[76] This proportion can

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[75] See Table 25. The following equivalents were used:

1 ton of crushed cane = 70 liters of direct alcohol (Center-South)
9.72 liters of indirect alcohol

1 ton of crushed cane = 62 liters of direct alcohol (North-Northeast)
8.55 liters of indirect alcohol

[76] Data are from the CENAL Report, 1983.

be varied, within limits,[77] to increase or decrease sugar production as needed to expand or contract export levels in line with price fluctuations on the international market. Alcohol exports not accounted for by bilateral trade agreements can also serve as a safety valve for sugar production, although on a modest scale: total alcohol exports corresponded in 1983 to 6.7 percent of total consumption.[78] In short, that alcohol production has stabilized sugar production levels is a fact acknowledged by sugar producers and industry analysts alike. Table 21 and Figure I provide further evidence for this claim: these data confirm the low level of sugar stocks accumulated in the years of falling international prices.

Fuel alcohol is used as a substitute for gasoline in Otto cycle engines, either in part (anhydrous alcohol is mixed with gasoline in a carburant mixture), or in whole (pure hydrous alcohol). In 1983, 5.1 billion liters of fuel alcohol (2.2 anhydrous and 2.9 hydrous)[79] were consumed in the country, equal to 4.4 to 4.5 billion liters of gasoline.[80] Thus, alcohol met between 33.6 and 34.3 percent of the total

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[77]Manipulating the proportion of anhydrous alcohol to gasoline is restricted, on the one hand, by the agreement between the Government and the auto industry to keep the octane rating of gasohol at approximately 80, so as to preserve the integrity of car engines. To lower the proportion of alcohol in the carburant mixture would necessitate raising the level of tetraethylead, an imported product, in order to maintain an acceptable fuel octane rating. On the other hand, to increase the proportion of alcohol in gasohol would require progressively profound adaptations of the car engines.

[78]Data are from the CENAL Report, 1983.

[79]Data are from the CENAL Report, 1983.

demand for automotive fuel (8.7 billion liters of gasoline plus the 4.4-4.5 billion liters of gasoline equivalent indicated above). This means that in 1983, for each 1.7 liters of gasoline consumed in the country, so too was one liter of fuel alcohol, or, for each liter of gasoline, .6 liters of its equivalent in fuel alcohol was consumed in that year.

The external dependence of the country on primary energy in 1973 was 26.8 percent. It peaked in 1978/79 at around 37.4 percent, then declined in 1982 to the 1973 level (see Table 3). Estimates from the SEPLAN Energy Commission indicate that the trend toward decreasing energy dependence continued in 1983, falling to 22.1 percent, which corresponds to 32,218,000 toe. The share of petroleum in total primary energy consumption was 35.7 percent in 1982, down from 42.8 percent in 1973 (see Table 1). The renewable energy share rose from 54.7 percent in 1973 to 59.6 percent in 1982, due mainly to the increased use of hydroelectric power (from 19.0 to 28.2 percent) and sugar cane (from 8 to 10.2 percent). The rate of growth of sugar cane was second only to water resources during this period. Cane provides energy in the forms of both bagasse and fuel alcohol. Bagasse, used as fuel in sugar mills and alcohol distilleries, is an abundant resource (250 kg of bagasse is produced for each ton of crushed cane) whose constant excess explains its inefficient use. Thus, despite remarkable progress, the

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[80]The energy equivalence ratio of gasoline to anhydrous alcohol is 1:1. Experts diverge over the gasoline equivalence of hydrous alcohol; the ratio of hydrous to gasoline typically ranges from 1:2 to 1:25. In this work, calculations are based on the value of the two limits.

consumption of bagasse was still more than three times greater than the consumption of ethanol in the 1978-1982 period, down from a use levelof 9 times ethanol in the years from 1973-1977. An attempt to estimate the contribution of Proálcool to lessen dependence on external sources of energy should thus "discount" bagasse. Proálcool's contribution to decreasing the country's energy vulnerability can be measured roughly by the share of fuel alcohol in total liquid fuel consumption (oil products plus fuel alcohol). Thus, in 1973 fuel alcohol contributed 1.2 percent of total liquid fuel consumption; in 1982, this proportion had risen to 6.2 percent.[81] In other words, while the nation's pattern of energy use had shifted in favor of renewable sources and dependence on primary resources declined significantly, the contribution of fuel alcohol was undoubtedly low. A note, however, must be mentioned which should qualify this result.

To lessen the country's dependence on liquid fuels was, as seen, an objective of Proálcool defined by the political process that prevailed during the two phases of the Program. This objective, sponsored by some public actors, influenced fuel alcohol policy-making. Thus the preference of those public actors to move toward energy self-reliance was important to help offset the preference of those who, arguing that fuel alcohol was not economically viable, wanted to transform the PNA into a Program directed to supply raw material for the chemical industry.[82] However, if decreasing the

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[81] Total liquid fuel consumption was 33,243,000 and 45,349,000 toe respectively in 1973 and 1982. Data are from the Balanço Energético Nacional, 1983.

[82] See p. 529 above in the Conclusions.

country's dependence on liquid fuels through the increased use of fuel alcohol was politically expedient, it was, nonetheless, a secondary consideration. The basic dependence of the country was not on gasoline,[83] but on diesel. In fact, if a disruption in the international oil market were to occur, the main problem for Brazil would be to replace around 300,000 b/day of diesel. As noted, Petrobrás is at present dedicated to modifying its refining structure to yield a crude slate richer in diesel oil.[84] Available information indicates that in an emergency, Petrobrás refineries could rapidly produce the needed volume of diesel, though at a high cost. Government contingency plans include adding 5 percent alcohol to diesel, increasing the proportion of ethanol in the mixture with gasoline, prohibiting automobile use for private citizens, reorganizing the mass transportation system, and prohibiting loading vehicles to travel empty.

The energy dependence of the country should be seen less as on the physical availability of petroleum in the international oil market than on foreign exchange. Despite the significant decrease of consumption and the remarkable increase in domestic production,[85] net imports of

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[83]Experts estimate that had Proálcool not been launched, the curve of pure gasoline consumption would probably not have differed from the actual curve of gasoline and alcohol consumed.

[84]Table 16 shows the modification of crude slate favoring diesel oil over time. One means by which this tendency might be accentuated is to produce the so-called diesel B, derived from gasoil cracking.

[85]Consumption reached a peak of 1.1 million b/d in 1979. In 1983 the country consumed 961,000 b/d. While consumption fell, domestic production picked up from a 1978 low of 166,000 b/d to 339,000 b/d in 1983. By June 1984 production had reached 500,000 b/d, or around 50 percent of total consumption, up from 15.5 percent in 1978. Data are from Petrobrás.

crude oil and products is still responsible for 31% of total Brazilian exports.[86] Although created in 1975, it was only in 1977 that Proálcool began to yield results.[87] In the years from 1977-1983, US$ 48.3 billion were expended on net crude and oil products imports.[88] Rough estimates indicate that in this same period, the upper limit of total savings accounted for by fuel alcohol was between US$ 4.4 and US$ 4.5 billion,[89] or

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[86]Net imports of crude oil and products were estimated at US$ 6.8 billion in 1983, while total Brazilian exports in this same year reached US$ 21.9 billion. Original data are from the Central Bank, and reworked by the SEPLAN Energy Commission.

[87]In 1977, alcohol production jumped 116 percent over the previous level of 600 million liters, and continued to grow rapidly in the following years (see Table 26).

[88]Data are from the Central Bank, manipulated by the SEPLAN Energy Commission.

[89]Foreign exchange savings were estimated as follows: first, the volume of fuel alcohol consumed and its equivalence in gasoline was calculated using the conversion ratios anhydrous/gasoline = 1:1 and hydrous/gasoline = 1:1.2 and 1:1.25; second, the value of fuel alcohol equivalent consumed in the 1977-1983 period was calculated using the price of gasoline on the international market. The price of gasoline was itself estimated by adding the annual average freight cost to the annual average FOB price of one barrel of crude paid by Brazil times 1.33. The factor of 1.33 (price of gasoline/price of crude petroleum) was determined empirically by the World Bank by observing the price fluctuations of crude vis-à-vis gasoline on the world oil market; third, to the value of fuel alcohol equivalent consumed was added the value of alcohol exports, according to the following formula:

Net foreign exchange savings	=	Value of consumption of alcohol equivalent (2)	+	Value of alcohol exports (3)

This formula, however, gives an upper limit of the net foreign exchange savings accounted for by fuel alcohol, because the agricultural input (fertilizers, insecticides, lubricants, etc.) component of foreign exchange costs should be discounted. The complexity of these estimates, however, goes beyond the purpose and scope of this work.

between 9.1 and 9.3 percent of the total cost of petroleum and petroleum product imports. While this represents a modest gain, one should be aware of the fact that during the course of Proálcool, the share of foreign exchange savings on net crude and oil product imports accounted for by alcohol has steadily increased with the single exception of 1981 during the "discrediting phase" of the PNA. In 1982 and 1983 this proportion reached 12 and 18 percent respectively. While these results are fairly good, other factors must be cited which also have contributed to foreign exchange savings:

(i) the steady decline of crude and oil product spot prices beginning in 1981 and the substantial decrease in OPEC prices in 1983;

(ii) the significant contraction of petroleum consumption in the country following the second oil shock. The decrease in petroleum consumption, in turn, is attributable not only to energy conservation measures and the substitution of oil with alternative energy sources (especially alcohol and coal), but also to the domestic price policy for oil products,[90] and the severe economic recession of the last few years; and

(iii) the rapid increase in the domestic production of oil.

Of the three objectives of Proálcool which became politicized and were examined here, only the achievement of a permanent safety valve for the sugar industry was an unqualified success. With unfavorable conditions for sugar on the world market, the strong lobby of sugar and alcohol producers were able to push decision-makers to rescue the sugar

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[90] See p. 366.

industry through alcohol production. The objective of self-reliance in energy lost much of its political clout when world petroleum prices levelled off and subsequently declined at the same time that domestic consumption was shrinking substantially for reasons seen above, including a striking increase in the domestic production of petroleum. Today, as mentioned, in the event of a disruption in the world oil market, Brazil can provide for its liquid fuel needs, although at a high economic cost. With a soaring foreign debt which reached around 100 billion dollars in 1983 and which has required difficult negotiations with the IMF, the country's major dependence is undoubtedly a dependence on foreign exchange. In this regard, the contribution of alcohol has been only modest.

10.3 Economic Viability of Proálcool

If the assessment of the goal attainment of a program is related to efficacy, calculations of economic viability are based on efficiency. The next question to be posed is: Is Proálcool economically efficient?

Experts measure economic viability by cost-benefit analyses. A project may be appraised from the private and from the social point of view. The private evaluation consists of measuring the profitability of a project from the standpoint of the private investor. Costs and benefits are then estimated according to market prices. The social appraisal measures the profitability of a project from the perspective of society or the economy as a whole. It evaluates the benefits of the project accruing to society and the costs to society of moving factors and resources from their best alternative use into the new project. Many benefits do not have a well-defined market price, however (for example, public safety, public health, education). Moreover, market prices are frequently distorted by controls, monopoly power, regulated prices, taxes and subsidies, externalities, and so forth. To compensate for these deficiencies, projects are evaluated for their social worth by using social, or "shadow" prices, estimated by adjusting the market prices to reflect the above-mentioned distortions.

The social evaluation of a program or project is frequently taken to be a neutral facet of policy making. This is a misconception, for attributing an economic value to project outputs which have no market price, or determining the adjustment of "distorted" market prices involve value judgements which depend on a number of factors, including the posi-

tion occupied by those assessing the project in the decision-making structure.[91]

The above objections notwithstanding, the social appraisal of a project or program is a valuable instrument of policy-making.[92] It permits, for instance, the ranking of alternative projects and the dismissal of the worst ones. As Hirschman (1967) put it, the rate of return can inform the judgement of the decision-maker but does not substitute for judgement altogether. In other words, economic viability or non-viability can enter as a benefit or cost in the political calculation of a decision-maker whether to support or to withdraw support for a project or program under consideration. Thus, even if the economic assessment is unfavorable, the decision-maker can still decide to back a program on the basis of its political importance or macroeconomic objectives. In this case, subsidies will be necessary. This was precisely the case of the first phase of Proálcool. In Proálcool's early years, the potential of fuel alcohol to substitute for gasoline was negatively appraised by both the Getúlio Vargas Foundation and the World Bank. Some members of the Government opposed this end-use of alcohol on the basis of its economic inviability, and favored instead its

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[91] See Wildavsky, 1966, for a classic critique of the neutrality of cost-benefit analysis.

[92] Hirschman offers insight on the utility of cost-benefit analysis for the decision-maker. In Development Projects Observed (1967), he claims that cost-benefit analysis is an additional element of judgement, but cannot substitute for feel, instinct, and intuitive discretion of the raison raisonnante (see p. 8).

use as a raw material for the chemical industry. Yet, fuel alcohol was ultimately the winning alternative; those public actors who backed it despite its higher cost vis-ã-vis imported gasoline cited arguments of foreign exchange savings and the lessening of energy dependence to justify their preferency.[93] Those decision-makers disregarded the "warning" of the Program's negative economic evaluation or, said better, computed it as a cost of a decision which was in essence political.

Available information allowed the social appraisal of Proálcool from both the "insider" (bureaucratic agencies) and "outsider" (intellectual) perspectives, but limits the assessment of the Program from the private standpoint to only the "outsider" perspective.

Private Profitability of Proálcool:[94]

Available estimates suggest that the rate of return for most distilleries installed with Proálcool resources was favorable to the industrial entrepreneur, which in Brazil means a rate equal to or superior than 12 percent. This is especially true for distilleries in the North-Northeast region whose significantly lower agricultural and industrial productivity are heavily subsidized by the Government.[95] In

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[93] See Chapter 7 and Conclusions, p. 529.

[94] The information in this section is basically derived drom a careful study conducted by Melo and Pelin, 1984. They calculated the private (and social) costs of production and the rate of return of three projects of standard distilleries of hydrous alcohol (120,000 l/d), two in São Paulo and one in Alagoas. The authors considered separately the agricultural costs, the industrial costs with all raw material purchased from outside the distillery, and the industrial costs with all raw material produced internally.

Alagoas (Zona da Mata), for instance, the rate of return of a 120,000 l/d, hydrous alcohol distillery has been estimated at greater than 30 percent.

The sugar cane suppliers have suffered, in part due to unfavorable Government pricing policies. The deterioration of the terms of sugar cane trade during the PNA, especially up to 1980, squeezed the planters' profit margins. Since 1980, there has been a slight improvement. Again, the Northeastern planters are better off than their southern counterparts due to Government subsidies;[96] since the creation of Proálcool, their terms of cane trade have steadily improved.

Social Profitability of Proálcool

The larger issue of whether the country as a whole is benefitting from the National Alcohol Program has been the object of broad concern from both the bureaucratic agencies involved in the Program and outside critics. A great number of studies have been produced,[97] with an equal

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[95] The price of alcohol paid by the Government to Northeastern producers is around 40 percent higher than that paid to the Southeastern producers. The terms of repayment of credit made available for industrial investment have also been more favorable to the Northeast than to the Center-South (see pp. 317).

[96] A price subsidy of about 40 percent is paid by the Government to Northeastern sugar cane planters. The resources to fund this "equalizing subsidy" came from a tax applied to a sack of sugar and passed on to the consumer.

[97] Melo and Pelin (1984) have reviewed most of the studies available on this subject. See:

Ministério da Indústria e do Comércio, "3a. Avaliação do Proálcool", documento preliminar, September 1981.

number of different results. The authors diverge in their estimates of the correction factors of private prices, especially with regard to the exchange rate and the opportunity cost of capital. While these discrepancies may explain part of the difference in their findings, the position occupied by the authors of these studies in alcohol policy-making and their energy policy preferences are without doubt crucial factors in understanding the widely divergent appraisals of Proálcool's social benefits.

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Conselho Nacional de Pesquisas, Avaliação Tecnológica do Álcool Etílico. Coordinator: Adolpho W. da F. Anciaes. Brasília: CNPq, 1978.

Fundação Getúlio Vargas, "Subsídios para a Fixação dos Preços do Álcool Anidro, safra 1981/82". Convênio IAA/FGV/IBRE, 1981.

Matar, H., Programa Energético Nacional: Possibilidades e Impactos. São Paulo: IPE, 1980.

Barzelay, M., "The Efficiency of Producing Alcohol for Energy in Brazil," in Economic Development and Cultural Change, vol. 31, no. 1, October 1982, pp. 131-144.

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Julio M.M. Borges, "Desenvolvimento Econômico, Política Energética e Álcool". São Paulo, mimeo, 1980.

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Williamson, C., "The Impact of the Brazilian Alcohol Program on Food Supply and Nutritional Status". Harvard University, mimeo, April 1981.

Mendonça de Barros, J.R., et al, "Agricultura e Produção de Energia: Avaliação do Custo da Matéria-Prima para Produção de Álcool". Rio de Janeiro: IPEA, January 1982.

World Bank, "Alcohol Production from Biomass in the Developing Countries." Washington: World Bank, September 1980.

_____, "Brazil: Alcohol and Biomass Energy". Washington: World Bank, Staff Appraisal Report, April 1981.

The 1981 MIC/CENAL study[98] represents one extreme in the calculation of the PNA's social costs and benefits. It estimated that in July of 1981 the break-even point between imported petroleum and domestically-produced alcohol was US$ 39.9/barrel CIF for hydrous and US$ 39.7 barrel CIF for anhydrous mixed with gasoline at 20 percent.[99] These estimates compare favorably with the average price of a barrel of imported crude oil at the time, US$ 37.3/barrel CIF. The MIC/CENAL calculations and methods were endorsed by the Institute of Sugar and Alcohol.[100]

On the other extreme are the estimates of Melo and Pelin (1984). he first author is known as a harsh critic of Proálcool. These authors estimated the social costs of production and the social rate of return of 3 standard distilleries of hydrous alcohol in São Paulo and Alagoas at May 1981 prices.[101] They concluded that hydrous alcohol was totally inviable as a substitute for gasoline, basing their claim on what they

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[98] See Minister of Industry and Trade, "3a. Avaliação do Proálcool", documento preliminar, September 1981.

[99] The MIC/CENAL document used the following equation:

$$C_p = \frac{0.8 \times Ca \times R \times 159}{Tc}$$

where C_p = price of petroleum (dollar/barrel)
Ca = alcohol costs (cruzeiros/liter)
R = energy equivalence between alcohol and gasoline
Tc = exchange rate
1 barrel = 159 liters

[100] Cf. interview with Eliane de Souza Fontes, Assistant to the Coordinator CODEPLAN/IAA, October 17, 1983, Rio de Janeiro.

[101] See footnote no. 94 above.

determined were unfavorable social rates of return for the distilleries they studies: 7.34 percent in Ribeirão Preto, SP, 10.04 percent in São Paulo as a whole, and 12.51 percent in Alagoas (the opportunity cost of capital was taken to be 15 percent). In addition, they estimated that the social costs of alcohol in dollars per barrel of gasoline equivalent were very high (US$ 79.01 in Ribeirão Preto, SP, US$ 84.04 in São Paulo as a whole, and US$ 90.84 in Alagoas) when compared wiht the May 1981 price of a barrel of gasoline on the Rotterdam spot market, plus an additional 10 percent to cover transportation costs (US$ 45.35).

Representing an intermediate position between the extreme estimates of the preceding two studies was a study conducted by a consulting firm hired by CENAL.[102] Its findings were basically positive for Proálcool. This study first evaluated the social costs of alcohol production in the most important sugar-producing regions of the country (São Paulo, Minas Gerais, Rio de Janeiro, Pernambuco, and Alagoas). It concluded that the social value of alcohol was greater than its social costs in São Paulo and Minas Gerais (except for the Zona da Mata), both in the Southeast. Seven distilleries in São Paulo and Minas Gerais were targeted for further study: all presented a rate of return much higher than the 11 percent level proposed by the World Bank, with a 1.5 correction factor for the exchange rate. When the more pessimistic scenario of a 1.25 correction factor for the exchange rate was substituted, only two distilleries still presented a positive rate of return, though less than 11 percent.

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[102] Cf. CENAL, Proálcool: Avaliação Social de Projetos, August 1983 (prepared by ASTEL, Assessores Técnicos Ltda., Coordinator: João Paulo de Almeida Magalhães).

All in all, it is possible that in the long run, provided there are no major increases in the world market price of petroleum, the country as a whole could benefit from Proálcool. The ratio of social costs of alcohol to the price of gasoline on the international market can be expected to decline due to rising agricultural and industrial productivity in alcohol production as well as the improvement of alcohol-fueled engines.[103]

In sum, to invest in alcohol is good business, especially for Northeastern entrepreneurs who benefit from government subsidies. It is not quite as lucrative for agricultural entrepreneurs from the Southeast of Brazil, although an improvement in the terms of sugar cane trade in this region can be detected in the last 3 years. Whether the country as a whole is reaping benefits from Proálcool is a major issue; those who have attempted to answer this question in program assessments have brought not only their technical expertise, however, but also their value judgements. The subject is still open to debate.

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[103] On this subject, see Borges, 1983.

10.4 Who Wins and Who Loses in Proálcool

A major winner is, of course, the Government itself. With the Program well institutionalized, 15 percent of the Brazilian automobile fleet running on pure alcohol and consumers overwhelmingly displaying their preference to the alcohol cars[103a] Proálcool is, from the viewpoint of the country's rulers, a major accomplishment. The National Alcohol Program means a creative, totally indigenous solution for gasoline substitution or, in other words, a successful adaptation to an adverse external environment attributable to the oil shocks. Something that strengthened the image of the authoritarian military regime domestically and increased the much needed country's prestige in the eyes of the international community. The political gains of the Government are, therefore, notorious.

It is fair, however, to characterize the National Alcohol Program as an economic program, with economic (not social) objectives, which mobilizes and benefits "large capital", especially the sugar and alcohol producers.

With fairly good economic rates of return, investments in alcohol production have paid off. As noted, alcohol now plays the role of a "safety valve" or "stock regulator" for the sugar industry. Thus, recurrent crises of domestic sugar overproduction have been avoided, and Brazil, a major exporter, has been able to increase or decrease the volume of sugar offered in the international market as necessary. Alcohol has become, moreover, the primary product of the sugar cane industry.

Sugar cane planters enjoyed a less favorable situation when, as mentioned above, the terms of trade in sugar cane deteriorated, especially before 1980. Proálcool prompted the usinas to expand their agricultural

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[103a] As of October 1983, more than 90 percent of total monthly automobile sales are alcohol-powered cars.

land at the expense of the independent sugar cane suppliers' properties. Sugar cane growers assert, however, that given the condition of a very weak world sugar market for a prolonged period, their position would be untenable were it not for Proálcool.[104]

The PNA gave a great boost to the Dedini group of distillery equipment suppliers, which controls about 60 to 70 percent of the market.[105] The second major group in this product line, Zanini,

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[104]Interview with João Eudes Leite Soares, Secretary-General of the Federation of Sugar Cane Planters of Brazil (FEPLANA), Rio de Janeiro, March 14, 1984.

[105]From 1946 to 1975, the CODISTIL/DEDINI group sold 180 distilleries whose capacity in liters per day increased over time, varying from 4,000 l/d to 120,000 l/d. With Proálcool, the number of distilleries sold (295) in the five year period from 1976 to 1983 was 1.6 times as many as the number sold in the previous 29 years, with a capacity per distillery varying from 30,000 l/d to 240,000 l/d. (Data are from CODISTIL/DEDINI.)

claims that the PNA has not yet proven itself to be a good business investment for the capital-goods sector. Both, however, value Proálcool highly. They stress that the sector has developed its own technology, and believe the continuous efforts to perfect it will substantially reduce production costs.

Auto manufacturers do not view the alcohol car primarily as a rescue vehicle for the automobile industry amidst economic recession. Rather, they argue that government incentives and disincentives affect the market for alcohol cars more profoundly than do general economic conditions. The investment decisions of the automobile industry are attuned to consumer behavior more than to any other single factor, for it is worthless to manufacture a product which simply will not sell. The alcohol car is, of course, doing very well, representing today more than 90 percent of all passenger car sales. From the auto manufacturers' point of view, the National Alcohol Program is therefore not surprisingly an important alternative outlet

for their goods.

Small sugar cane planters have been excluded from any benefits of Proálcool (recall the frustrated initiative of the Ministry of Agriculture to develop a micro-distilleries program for small holders and small cooperatives). As for rural workers, critics of the PNA point to various indirect effects of the program such as the displacement of food crops and the concentration of land ownership which adversely affect the income of this social group. There are, however, many unanswered questions on this subject. A more detailed account of this issue will be provided below.

10.5 Indirect Effects of Proálcool

The social and environmental impacts of Proálcool are among the indirect effects of the Program which have been the object of serious concern.

Anxiety about the enviromental impact of the Program[106] has centered on the emissions of alcohol-propelled engines and on stillage, a by-product of the fermentation and distillation of ethanol. While the former can cause air pollution and damage to human lungs, skin, and eyes, the latter when dumped untreated into waterways can kill aquatic life. In fact, available evidence suggests that internal combustion engines propelled by ethanol give off a lower level of emissions than gasoline-powered engines. Also, accidental spills of ethanol are less damaging to the environment than gasoline spills.

Stillage is produced in large quantities, at a ratio to ethanol that varies from 10:1 to 13:1.[107] It has two principal potential economic uses: animal feed and fertilizer. In Brazil the market for animal feed is small and therefore this end use of stillage is not attractive. The use of stillage as fertilizer in the agricultural fields near distilleries is more widespread, especially in São Paulo. Typi-

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[106] Information on the environmental impact of alcohol production provided here is based on Trindade (1984a) World Bank (1981) and the National Council of Scientific and Technological Development - CNPq (1978).

[107] A new fermentation process has been developed by DEDINI in a joint venture with the Swedish enterprise, Alfa Laval. The so-called "biostil process", now in the testing stage, reduces the proportion of stillage to alcohol to between 0.5: 1 to 1:1.

cally, it is either fed through the irrigation system of sugar cane plantations, or it is transported by truck and sprayed directly onto the ground. Stillage is elsewhere disposed of through stabilization in ponds and, on an incipient basis, the production of biogas. CENAL now requires distillery investors to have satisfactory means of stillage disposal, a requirement which proscribes the traditional and damaging common practice of disposing of raw stillage straight into streams. The proper disposal of stillage, however, is not yet common in the most traditional sugar cane regions of Campos in Rio de Janeiro and the Northeast.

Critics of the National Alcohol Program have also been apprehensive about the PNA's social impact. Causes for concern on this front encompass the displacement of food crops, the concentration of land ownership, and the impact on employment which would negatively affect the real income of rural workers and peasants.

One question about the PNA which has been undeniably settled is the PNA's positive impact on employment.[108] A careful study by CEBRAP reached the conclusion that Proálcool will create 259,000 jobs in 1985, assuming alcohol production will reach 8.2 billion liters, and 337,000 jobs in 1987, if alcohol production is 10.7 billion liters. These estimates take seasonality and substitution effects into account.[109] Of

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[108] See Melo and Fonseca (1981), Pereira (1983), and CEBRAP (1982). Melo and Fonseca analyzed PNA employment in the state of São Paulo for the year 1980; Pereira (1983) focusing on the same year, studied job creation in the entire country; while CEBRAP (1983) projected the number of new jobs for 1985 and 1987 which could be anticipated both nationwide and in the Center-South and Northeast regions in particular. While differing methodologically, the three works concur that the impact of Proálcool on employment is positive.

the new jobs to be created in 1985 82 percent are expected to be in the agricultural sector, and 28 percent will be seasonal. These proportions are projected to hold for 1987 as well. Assuming an alcohol production increase of one million liters per year, this study estimates that Proálcool in the coming years will generate between 40,000 and 50,000 jobs per annum, corresponding to 3 percent of the estimated annual need for new jobs in the country. The new jobs created by Proálcool will also correspond to 3 percent of the economically active population in the rural job market in 1985. The potential for indirect employment, both rural and industrial, is more difficult to assess, but experts believe it will not be significant in comparison with the direct employment generated by the program.

If the positive impact of Proálcool on direct employment is a well-established fact, an assessment of the Program's effects on workers' real incomes is rather difficult to accomplish. It depends on several factors other than wages, for which little evidence is available. The phenomenon of seasonal labor, for one thing, which is especially prevalent in the Northeast, is conditined by fluctuations in family income, migration, and poor dwelling conditions. Given the characteristics of sugar cane plantations, it is reasonable to expect that if direct employment has increased with Proálcool, seasonal labor has probably increased as well.[110] It is likely that the concentration

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[109] See CEBRAP (1983), pp. 129-146. The CEBRAP study subtracts from the total jobs created by Proálcool those which are filled by workers who were previously employed in productive areas displaced by sugar cane. The resulting level of new job creation is referred to as the "net demand for labor".

[110] See Melo and Fonseca (1981), pp. 82-94.

of land ownership has also occurred. Melo and Fonseca (1981) use the average size of the crop area needed per distillery approved by the National Alcohol Commission and CENAL - 6,400 hectares for the 1976-1980 period - as an indicator of the degree of concentration of land ownership. Their result was an overestimate.[111] Frequent evictions of peasants from subsistance land in order to replace their food crops with sugar cane have been rumored, especially in the Northeast, but no hard evidence is thus far available to confirm or deny these reports. Despite this, the broader issue of food crop displacement by sugar cane has been fairly well evaluated.

In Brazil, total sugar cane area is currently estimated to surpass 3 million hectares, corresponding to only 6 percent of the 50 million hectares under cultivation in a country whose land mass approaches 850 million hectares. If one takes into consideration the country as a whole, no problems of competition arise among the so-called energy, food, and export crops. The CEBRAP study, however, called attention to the fact that in those states without an agricultural frontier, precisely the same ones in which Proálcool led to the greatest expansion of alcohol production, land is a scarce resource.

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[111] The authors estimated the increase in distillery capacity approved by Proálcool in the 1976-1980 period (6.8 billion liters for 336 projects) required an additional 2.2 million hectares. Alcohol production, however, depends on many factors overlooked by Melo and Fonseca, such as the diversion of sugar cane from the production of sugar to alcohol, increases in agricultural and industrial productivity, the use of idle lands, and the displacement of other crops. As noted above, the Government authorized the transformation of 50 million 60 kg sacks of sugar in cane equivalent during the harvests of 1977/78 and 1978/79 as a way of reducing sugar production and inventories. Also, since most distillery projects approved before 1980 were annexed distilleries, the diversion of cane from sugar to alcohol above the stipulated levels for 1977/78 and 1978/79 should not be discounted.

The study then proceeds to assess food crop displacement in São Paulo, Pernambuco, Alagoas, and Paraíba, the largest alcohol producing states with limited land availability. The overall conclusion is that whenever sugar cane expansion occurred at the expense of other crops, those were food crops. However, cane expansion in most states occurred mainly in non-cultivated areas, such as pastures or non-agricultural land. Thus, although food crops have been doing poorly in recent years, other causes must be sought for their decline or stagnation, such as the modernization of agriculture. The state case studies show that in Alagoas and Pernambuco sugar cane was only marginally responsible for food crop displacement (with the exception of rice in Alagoas). The reduction of food crops and the expansion of sugar cane were, therefore, merely parallel events. In the state of São Paulo, the largest alcohol producer, cane displaced 46.5 percent of the area under cultivation, hitting hardest rice, corn, and cassava, as well as cotton and peanuts among crops for export. Cane was not, however, solely responsible for the displacement of those crops; rather, oranges and soybeans, both export crops, also contributed significantly to the decline of traditional food crops. In the state of Paraíba, sugar cane did undeniably detract from other crops, displacing 76.8 percent of the area under cultivation. Cane replaced broad beans (41.9 percent), cassava (93.9 percent) and cotton (75.7 percent).[112] It should also be noted that many sugar cane planters are intercropping sugar cane and food crops. In São Paulo, intercropping black beans and cane is especially common.

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[112]See CEBRAP, 1983: 230-252.

Thus, at the heart of the food versus fuel issues in Brazil, where conditions are optimal for agriculture, is whether agricultural policy can assure that sugar will not displace food crops in states whose land is limited. However, although CENAL approves projects only after taking the potential displacement of food crops under consideration, state governments can endorse projects outside the areas previously established according to socio-economic criteria.

Conclusions

Before the creation of the National Alcohol Program in 1975, fuel alconol policies in Brazil were sugar price support policies. The an-anlysis of fuel alcohol (gasohol) policies prior to the PNA revealed that in order to increase private alcohol production for mixture with gasoline, the following conditions had to be present: the sugar sector in a crisis of overproduction; financial resources reserved for the alcohol program; adequate policy instruments (favorable terms of credit and a government-guaranteed minimum price for alcohol); and an "adequate" institutional framework (a clear center of decision-making to which producers could channel their demands and a bureaucratic agency attentive to those demands which would "represent" producers' interests before other agencies involved in the administration of the alcohol policy). While necessary for the successful implementation of the gasohol policy these conditions were not sufficient. The sufficient condition was the demand for an energy policy favorable toward fuel alcohol which, as noted, was absent in the pre-PNA period (1930-1975).

By the time the National Alcohol Program was formulated, some conditions had substantially changed. Fuel alcohol, for one thing, had been incorporated in the energy policy devised by the Government as a response to the first oil shock and the need to save foreign exchange by substituting imported petroleum with domestic and alternative sources. Thus the sufficient condition to promote an alcohol program was present. This meant that the incentive provided by the oil shocks for fuel alcohol would be stronger than that of the world sugar market. While a

weak sugar market could supply a shot in the arm for the alcohol program when the oil market did not, high world market prices for sugar could not offset the pull exerted by a strong oil market on fuel alcohol. Thus, after the first oil shock was absorbed and oil prices decreased in real terms during 1976-1977, the rapid buildup of sugar stocks following a sharp decrease in sugar prices was critical to the launching of the first phase of Proálcool. In contrast, peak sugar prices on the world market from mid-1979 to the end of 1980 did not work against alcohol as might have been expected because of the second oil shock and the Iran-Iraq war. These events counterbalanced the pull toward sugar. The economic situation of the sugar cane industry in the PNA period did not, therefore, exert the same leverage on the alcohol program as it did when gasohol policies were essentially sugar price support policies.

An examination of the other necessary conditions to support a fuel alcohol program based on private enterprise indicates that the availability of separate financial resources for the program and (highly) favorable credit terms were conditions easily fulfilled by Proálcool. Arriving at an "adequate" institution framework with which to implement Proálcool, however, was considerably more problematic. The large and growing number of private and public actors involved in the Program and the highly fragmented State apparatus -- which increased the likelihood of intra-bureaucratic conflict and that the program's objectives would be ambiguously defined -- complicated the tasks of accomodating the divergent interests and organizing an institutional system capable of implementing the Program, finally achieved during the second phase of the Program.

The far more complex task of developing an alcohol program under the conditions prevailing in the second half of the 70's leaves no room for simplified interpretations of Proálcool. Widespread among PNA anlysts was the belief that the creation of Proálcool could be attributed to a "strong sugar lobby". Chapter 6 provides a detailed analysis of the origins of the PNA. The first movements toward Proálcool took place in 1974 when world market sugar prices peaked at unprecedented levels, and the sugar sector adopted a guarded position toward the program. The sole exception were the São Paulo producers, who were PNA advocates for special reasons.[113] The Program was the result of the combined initiative of incumbent officeholders, bureaucratic agencies, isolated producers, and President Geisel, who, in his typical political style, made "Prince-like" decisions. From the Program's beginnings, the IAA made every effort to impede the diversion of sugar cane from sugar to alcohol production because of its effect of reducing sugar exports. When prices on the world sugar market dramatically declined in November 1974, the IAA and most producers (outside of São Paulo) interpreted the situation as one of the market readjusting itself to more realistic price levels after a period when prices had been artifically high. Alcohol production was still viewed as contingent upon the unlikely event of a crisis of sugar overproduction.[114] It was not until 1977 when investments made in sugar production when prices were

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[113] See pp. 238 to 243.

[114] See the statements of producers, IIA officials and the IAA President at the National Sugar Producers Meetings held in 1975, 1976, and 1977.

high were coming to fruition, prices were very low on the world market, and, as a consequence, sugar stocks were reaching dangerously high levels, that the IAA strongly backed the PNA. To rescue the sugar sector, the Government authorized the transformation of the cane equivalent of 50 million 60 kg sacks of sugar from the 1977/78 and 1978/79 harvests into direct alcohol. While the active support and lobbying of the sugar sector anxious to escape its unbearable economic situation was important in the fulfillment of the PNA's phase one 1980 production goal of 3 billion liters of alcohol, the formulation of the PNA was State-initiated, much the same as were pre-PNA fuel alcohol policies.

All in all, the conditions for the successful implementation of the National Alcohol Program based on private enterprise (the sugar cane industry, the distillery equipment suppliers, and the car industry) and encumbered by the large number of bureaucratic agencies involved in alcohol policy-making can be summarized as follows:

1) the sufficient condition: an energy policy favorable to fuel alcohol

To meet this condition required first and foremost a political decision to support a program that, at least in the beginning, had to be heavily subsidized.

2) necessary conditions:

2.1 adequate policy instruments and attending to the major demands of private actors so as to win their commitment to the Program.

i. sugar cane planters and sugar and alcohol producers: availability of resources, favorable credit terms, guaranteed minimum sugar cane and alcohol

prices, credit value adjustments according to the rate of inflation (the combined effect of these policy instruments should be to transform alcohol into a safety valve for the sugar cane industry);

ii. distillery equipment suppliers: monetary correction of the credit value conceded to distillery projects according to the rate of inflation, protection against foreign competition;

iii. auto manufacturers: uniform mixture of anhydrous with gasoline throughout Brazil, an octane rating of 80 for the carburant, guaranteed adequate distribution of alcohol, incentives for consumers of alcohol cars.

2.2 government incentives to foster consumer preferences for the alcohol car.

2.3 a reasonably stable political arrangement providing a workable structure of decision-making and an institutional system capable of accomodating the array of divergent interests and implementing the program by working out emerging issues and operational problems.

These conditions were basically met, and the PNA was successfully implemented.

Today, Proálcool faces important problems. Credit subsidies have been drastically reduced.[115] Resources are scarce. Since 1982, the only

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[115]The credit limit for industrial investment has remained the same since June 1982 (See p. 317 and footnote no. 36). The 5 percent interest rate is also unchanged. The monetary correction of the principal based on the percentages of the annual variation in the ORTN's (an index of Government bonds adjusted regularly to reflect inflation), however, is scheduled to progressively increase until 1985 when it is expected to reach 100 and 85 percent respectively in the Center-South and the Northeast. This means that from this point on, monetary correction applied to the Center-South region will accompany inflation in full, at least theoretically.

Percentage of ORTN's Variation

Year	North-Northeast region, Espírito Santo, Vale do Jequitinhonha (MG)	Other Regions
1983	70%	85%
1984	80%	95%
1985 on	85%	100%

resources available to expand alcohol production came from the US$ 250 million World Bank loan. Of 76 new distillery projects approved in 1983, almost 50 percent were self-financed. The other 40 projects were financed by the World Bank,[116] which accords priority to projects of small holders and farmers' cooperatives. CENAL is currently trying to obtain a new loan from the Bank. While from the point of view of the producers the scarcity of resources represents a serious constraint -- although major producers can manage for a while on their own -- decision-makers believe that available resources are sufficient to finance the expansion of production estimated to be necessary to meet the demand for alcohol in the coming years. The Government is now confronted with an alcohol surplus inherited from the "discrediting phase" of Proálcool. Despite the somewhat unexpected very rapid increase in the alcohol car fleet,[117]

115(cont.)

The credit limit for agricultural investment is the same as it was in June 1982 (See p. 319 and footnote no. 40). The interest rate on this credit is, however, now fixed at 3 percent, to which is added monetary correction of the principal, arrived at by calculating percentage of the variation of the ORTN's. The percentage of the variation of the ORTN's follows the same schedule as that for industrial investments (see above). (Cf. "Informações Básicas para Empresários", Brasília, June, 1983).

The reduction of subsidies may be attributed to both World Bank requirements to release the US$ 250 million loan to Proálcool (see pp. 430-432 and footnote nos. 135 and 136), contracted in May 1981, and the country's ever worsening economic crisis, the amelioration of which depended at least in part on restricting Government expenditures.

[116]Data are from the CENAL Report, 1983.

[117]In 1983, alcohol passenger car sales reached a monthly average of 46,000. The monthly sales average for all types of alcohol vehicles was approximately 48,000. In this same year, total alcohol vehicle sales were expected to reach 500,000 units, upon which calculations were based for the size of the 1983/84 crop required to meet demand. Instead, total sales exceeded this number, reaching 581,373 vehicles.

and the legislation passed in August 1983 (Decree no. 88,626/83) which assigned an important role to Petrobrás in the absorption of surplus alcohol, stocks are still considered to be high.[118] It should also be noted that the Government has recently increased the alcohol/gasoline retail price ratio,[119] with still unknown consequences for the consumer. The strong producers' lobby, led by SOPRAL, advocates extending the use of hydrous alcohol to light loading vehicles (fuel alcohol in Otto cycle engines substituting for diesel oil in diesel cycle engines). This would represent an important outlet for surplus alcohol as well as provide an opportunity to expand alcohol production. It is, however, likely to incur the opposition of car manufacturers.[120]

Yet another potential obstacle for Proálcool is the severe economic crisis which Brazil is experiencing which necessitates drastic reductions in Government expenditure. Sugar cane and alcohol price adjustments have falled significantly behind the inflation rate.

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[118] Cf. CENAL Report, 1983.

[119] Recall that the ceiling for the alcohol/gasoline price ratio was set at 59 percent, down from the previous 65 percent level, as part of the Government's package of incentives to the consumer intended to end the "discrediting phase" of Proálcool (see pp. 471, 472). The 59 percent ceiling was to be effective for two years, beginning in May 1982. The alcohol/gasoline ratio has recently been increased to 64 percent; this level represents a compromise between those actors who did not wish the 59 percent ratio to be altered and those who pressed for a 70 percent ratio, a level which would have put an end to this subsidy for consumers of the alcohol car. Reportedly, the decrease in the subsidy to consumers was needed to pay alcohol producers.

[120] On this subject, see pp. 477-478.

Subsidized alcohol has already been significantly reduced, and other consumer incentives may also be gradually withdrawn. These factors raise important questions: Would consumers stick with the alcohol car if incentives to buy these vehicles are dropped? Would sugar cane growers and alcohol producers remain in the alcohol business if the prices they could get for their products continue to lose ground to inflation? In other words, can Proálcool resist a prolonged, severe economic crisis?

It should by now be clear that meeting the necessary and sufficient conditions to implement Proálcool guarantees the institutionalization of the Program and its success from the standpoint of the participating actors: decision-makers and affected, private participants whose satisfaction with the Program is beyond dispute. Large capital (major sugar cane planters, sugar and alcohol producers, distillery equipment suppliers, and car manufacturers) undoubtedly benefit from the PNA. Establishing alcohol as a safety valve for the important sugar cane industry, which used to suffer from recurrent crises of overproduction, is undoubtedly a major accomplishment of the National Alcohol Program.

Proálcool's consequences for non-participant affected groups, however, have yet to be fully understood. The sole point of contention about how the Program affects rural workers which has been resolved to data is the PNA's impact on employment, which has been positive. Debates continue, however, about how Proálcool has changed seasonal opportunities for labor, the structure of land tenure, the pattern of non-proprietary

access to land, and the planting of food (displaced by sugar cane), all of which exercise an impact on the real income of the rural worker, yet about which little concrete evidence is available. Whether food crops have been displaced is the issue which has thus far been best assessed. Available information indicates that sugar cane expansion has occurred mainly on non-cultivated land devoted to pasturage and other uses, except in the state of Paraiba where sugar cane did displace as well as export crops. Moreover, the subsidies and incentives for the alcohol car benefit primarily the upper and middle classes who own private automobiles.

The PNA's contribution to reducing the country's dependence on imported energy has undoubtedly been poor (fuel alcohol contributed 6.2 percent of Brazil's total liquid fuel consumption, up from 1.2 percent in 1973), although energy self-reliance is technically a secondary issue. Were a disruption to occur in the international oil market, domestic sources of energy combined with Government contingency plans can assure the smooth functioning of the country's economy, though at a high cost. The real dependence of the country is on foreign exchange. In this respect, the Proálcool contribution is modest, around 9.2 percent of the US$ 48.3 billion expended on oil and oil product imports during the 1977-1983 period.

The social profitability of the PNA is still open to debate. The subject has generated controversy among experts who have studied this question, for its analysis requires not only technical expertise, but also a value judgement. The reader, however, may answer for himself: Is Proálcool a success?

FIGURE 5

FRAMEWORK FOR THE EVALUATION OF PROÁLCOOL FROM A POLICY ANALYSIS PERSPECTIVE

Criteria / Approach	SATISFACTION OF THE AFFECTED PARTICIPANT ACTORS (absence of complaints)	GOALS ATTAINMENT (efficacy)	ECONOMIC VIABILITY (efficiency)	WHO WINS, WHO LOSES (distribution)
INSIDER (evaluation of Proálcool through the eyes of those who participate and/or are affected by the Program).	o This criterion permits the confrontation between the different viewpoints of competing groups and individuals affected by the Program and participants in the policy-making process. o This criterion captures yet the bargaining nature of decision-making as well as the political character of the process of building and institutional framework for the Program's implementation. o This criterion applies especially well to the Program's evaluation from the insider perspective. o The absence of complaints indicates that solutions (or political arrangements) for the actor's grievances and demands were satisfactorily arrived at. o With the poliarchic instruments of authority control restricted or excluded altogether, influence in alcohol policy-making has depended on the capacity of societal actors to gain access to the state apparatus, where all decision-making takes place. Economic power becomes the relevant power resource. o Participation in Proálcool's decision-making process has been restricted to affected proprietor's groups (the "large capital").	o This criterion allows the confrontation between the Program's results and the defined set of goals. o The evaluation of the Program's goals attainment may be undertaken both by the affected participant groups (a fact which alone challenges the idea of value neutral judgment inherent to this criterion) or outside analysts. (see below)	o This criterion permits the assessment of the Programs' economic profitability. o The evaluation of the Program's economic viability may be performed either by the affected participant actors or outside analysts. (see below)	o This criterion allows the evaluation of the distribution of the Program's benefits among social groups affected by it. o The distribution of Proálcool's gains may be undertaken from the perspective of those affected by the Program, participants and non-participants, as well as outside analysts. (see below)

FIGURE 5

FRAMEWORK FOR THE EVALUATION OF PROÁLCOOL FROM A POLICY ANALYSIS PERSPECTIVE (Cont.)

Approach \ Criteria	SATISFACTION OF THE AFFECTED PARTICIPANT ACTOR'S (absence of complaints)	GOALS ATTAINMENT (efficacy)	ECONOMIC VIABILITY (efficiency)	WHO WINS, WHO LOSES (distribution)
INSIDER (concl.) (evaluation of Proálcool through the eyes of those who participate and/or are affected by the Program).	o Principal participant-affected actors: sugar-cane suppliers, usineiros, autonomous distillery owners, distillery equipment suppliers, automobile manufacturers. o Consumers of automobiles also exert strong influence in alcohol policy-making, by withdrawing from the alcohol car market or elevating demand to extremes. o Outsiders: small sugar-cane suppliers, rural workers.			
OUTSIDER (evaluation of Proálcool from the viewpoint of those who do not participate in the decision-making process and/or are affected by it, like the author and outside analysts).	Not undertaken in this analysis.	o A Program's objectives are defined by public actor's (decision-makers). Private sector participants either endorse or make an effort to accomodate their own interests to the Program's objectives. o This criterion provides a measure of the gap between decision-makers' intentions and reality. o The definition of a Program's objectives is fundamentally a political process. o The list of objectives contained in the decree which created Proálcool corresponded to the outcome, in a given moment, of the "bargaining situation" of competing actors during the formulation of the Program. As the political game is perpetual, the Program's objectives were accordingly redefined. o The objectives of Proálcool considered in this work are those which, reinterpreted by the political process, endured the first and second phases of the Program.	o Economic viability is generally measured by cost-benefit analyses. o Cost-benefit analyses may be applied from the private or the social point of view. o Private appraisal: measures the profitability of a project (or a Program) from the standpoint of the private investor; costs and benefits estimated according to market prices. o Social appraisal: measures the profitability of a project (or a Program) from the perspective of the society or the economy as a whole; costs and benefits estimated according to their social value or "shadow" prices (market prices adjusted to reflect distortions like Government controls, taxes and subsidies, externalities and so forth).	o The benefits of Proálcool are unevenly distributed among the social groups affected by the Program. o The benefits may be of a political, economic or social nature.

FIGURE 5

FRAMEWORK FOR THE EVALUATION OF PROÁLCOOL FROM A POLICY ANALYSIS PERSPECTIVE (Concl.)

Criteria / Approach	SATISFACTION OF THE AFFECTED PARTICIPANT ACTORS (absence of complaints)	GOALS ATTAINMENT (efficacy)	ECONOMIC VIABILITY (efficiency)	WHO WINS, WHO LOSES (distribution)
OUTSIDER (Concl.) (evaluation of Proálcool from the viewpoint of those who do not participate in the decision-making process and/or are affected by it, like the author and outside analysts).		o The objectives of Proálcool here considered are: (1)to improve the balance of payments by reducing oil imports (alcohol as fuel or as raw material for the chemical industry); (2)to decrease the country's dependence on imported energy, in line with national security concerns, aiming at energy self-reliance (fuel alcohol); and (3)to establish a safety valve for the crises of sugar overproduction (fuel alcohol or alcohol as raw material for the chemical industry). o The support of the bureaucratic agencies for the different Proálcool objectives varied over time, and with changing circumstances and incumbent office-holders. o The use of alcohol as raw material for the chemical industry came definitively to be subordinated to its use as fuel. o As the institutionalization of the Program proceeded and conflict among bureaucratic agencies was resolved, the distinct Proálcool objectives advocated by different public agencies and officials coexisted rather than competed with one another. o The "social objectives" of Proálcool (to reduce disparities in regional and individual income) expressed in the decree which created the Program, although supported by the Minister of Agriculture and the STI during the Program's first phase, were never politicized and hence never realized. Since the beginning, the purpose of Proálcool was defined by the principal bureaucratic agencies involved (MIC, CENAL, MME), and endorsed by "big capital", as primarily economic (see Figure 6, "Who Wins, Who Loses").	o The determination of adjustment factors to "distorted" market prices involves value judgments which depend on a number of factors, including the position occupied by those assessing the project or program in the decision-making structure. o The social evaluation of a project or program is not a neutral but still a valuable instrument of policy-making. The rate of return can inform the judgment of the decision-maker but does not substitute for judgment altoghether.	o Principal social groups affected by Proálcool: sugar-cane suppliers, usineiros, autonomous distillery owners, distillery equipment suppliers, automobile manufacturers, rural workers. o The Government itself may benefit or not from the Program's results.

FIGURE 6

IS PROÁLCOOL A SUCCESS?

Criteria / Approach	SATISFACTION OF THE AFFECTED PARTICIPANT ACTORS (absence of complaints)	GOALS ATTAINMENT (efficacy)	ECONOMIC VIABILITY (efficiency)	WHO WINS, WHO LOSES (distribution)
INSIDER (evaluation of Proálcool through the eyes of those who participate and/or are affected by the Program).	o Except for complaints on the price of alcohol, all grievances from participant actors, i.e., large proprietors groups and consumers, disappeared as of 1982. o Particularly relevant was to achieve at a "satisfactory" structure of decision-making capable of accommodating the array of divergent interests and implementing Proálcool. o From the viewpoint of participant actors, Proálcool is a success. (evaluation based on newspaper clippings and interviews with major actors).	Goals: (1) To establish a safety valve for the sugar industry: o recurrent crises of sugar overproduction are today avoidable. o safety valve mechanisms: diversion of sugar-cane to direct alcohol production, variation of the proportion of anhydrous alcohol mixed with gasoline, alcohol exports (to a lesser extent). o alcohol production has stabilized sugar production levels. Goal successfully met. (evaluation by sugar producers).	o Social profitability: positive results. (evaluation by bureaucratic agencies (MIC, CENAL, IAA, The World Bank). o Private profitability: not undertaken in this analysis.	o Affected Participant Actors's Self-Perception: - usineiros are fully satisfied with Proálcool: investment in alcohol production presents fairly good economic rates of return; alcohol plays the role of a "safety valve" for the sugar industry. - autonomous distillery owners are satisfied with the Program, although enjoying less favorable economic rates of return. - sugar-cane growers consider that, although less economic benefits accrue to them, their position, with a very weak world sugar market for a prolonged period, would be untenable were it not for Proálcool. - distillery equipment suppliers value high Proálcool: economic gains especially accrued to the major supplier; the sector has developed its own technology and producers in general believe that its continous perfecting will reduce production costs. - auto-manufacturers consider the alcohol car a most important alternative outlet for their industry. (evaluation based on interviews). o Affected Non-Participant Groups' self-perception not undertaken in this analysis.

Main findings are underlined.

FIGURE 6

IS PROÁLCOOL A SUCCESS? (Cont.)

Criteria / Approach	SATISFACTION OF THE AFFECTED PARTICIPANT ACTORS (absence of complaints)	GOALS ATTAINMENT (efficacy)	ECONOMIC VIABILITY (efficiency)	WHO WINS, WHO LOSES (distribution)
OUTSIDER (evaluation of Proálcool from the viewpoint of those who do not participate in the decision-making process and/or are affected by it, like the author and outside analysts).	Not undertaken in this analysis.	Goals: (1) To establish a safety valve for the sugar industry (see above) Goal successfully met. (evaluation by sugar industry analysts). (2) To decrease the country's dependence on imported energy aiming at self-reliance(national security concerns): o the nation's pattern of energy use has shifted in favor of renewable sources and dependence on primary sources declined significantly. o contribution of fuel alcohol to decrease dependende on primary sources of energy: share of fuel alcohol in total liquid consumption: 1973 - 1.2% 1982 - 6.2% Modest results. (evaluation by the author). (3) To improve the balance of payments by reducing oil imports: o net foreign exchange savings (upper limit) accounted for by fuel alcohol: 1977-1983: between US$ 4.4 and $ 4.5 billion, or between 9.1 and 9.3% of the total cost of petroleum and products. (cont.)	o Social profitability: divergent results. (evaluation by outside analysts). o Private profitability: positive results, especially for North-eastern entrepreneurs. (evaluation by outside analysts). While investing in alcohol is good business, whether the country as a whole is benefitting from Proálcool is a major issue still open to debate.	Who benefits from Proálcool: o The Government itself, by increasing its prestige both domestically and in the view of the international community through the accomplishment of a creative, totally indigenous solution (political gains). o The consumers of automobiles (middle and upper classes) who have their life style preserved. o The "large capital", especially the sugar and alcohol producers, to whom economic benefits accrue. (see above) Who is excluded from the benefits of Proálcool: o Small sugar-cane suppliers and rural workers, who do not enjoy any say on issues that directly affect their livelihood (advances of the usinas over sugar-cane areas of small holders, concentration of land ownership, labor seasonality, food crops displacement). o The positive impact of Proálcool on direct employment is a well-established fact, but there is little evidence available on factors that affect the worker's real income, e.g., migration, labor seasonality, concentration of land ownership, all of which have probably increased. (cont.)

Main findings are underlined.

FIGURE 6

IS PROÁLCOOL A SUCCESS? (Concl.)

Approach \ Criteria	SATISFACTION OF THE AFFECTED PARTICIPANT ACTORS (absence of complaints)	GOALS ATTAINMENT (efficacy)	ECONOMIC VIABILITY (efficiency)	WHO WINS, WHO LOSES (distribution)
OUTSIDER (evaluation of Proálcool from the viewpoint of those who do not participate in the decision-making process and/or are affected by it, like the author and outside analysis) (concl.)	Not undertaken in this analysis.	o the proportion of the total cost of oil and products accounted for by fuel alcohol has steadily increased along the years: 1982 - 12% 1983 - 18% 1984 - 20% Fairly good results. (evaluation by the author). OBS.: Other factors have also contributed to foreign exchange savings: - the steady decline of crude and oil products spot prices beginning in 1981 and the substantial decrease in OPEC prices in 1983. - the significant contraction of petroleum consumption following the second oil shock (severe economic recession, energy conservation measures, substitution of oil for energy alternative sources). - the rapid increase in the domestic production of oil.		Who is excluded from the benefits of Proálcool: (concl.) o Food crops displacement is fairly well documented: with the exception of the Paraíba State, whenever sugar-cane expansion occurred at the expense of other crops, those were food crops. However, cane expansion in most states occurred mainly in non-cultivated areas (pastures and non-agricultural land) (CEBRAP, 1983). While the Government and the "large capital" benefit from Proálcool, the Program's consequences for small sugar cane planters and rural workers have yet to be fully understood. (evaluation based on newspaper clippings, interviews, and secondary data).

Main findings are underlined.

LIST OF TABLES AND FIGURES

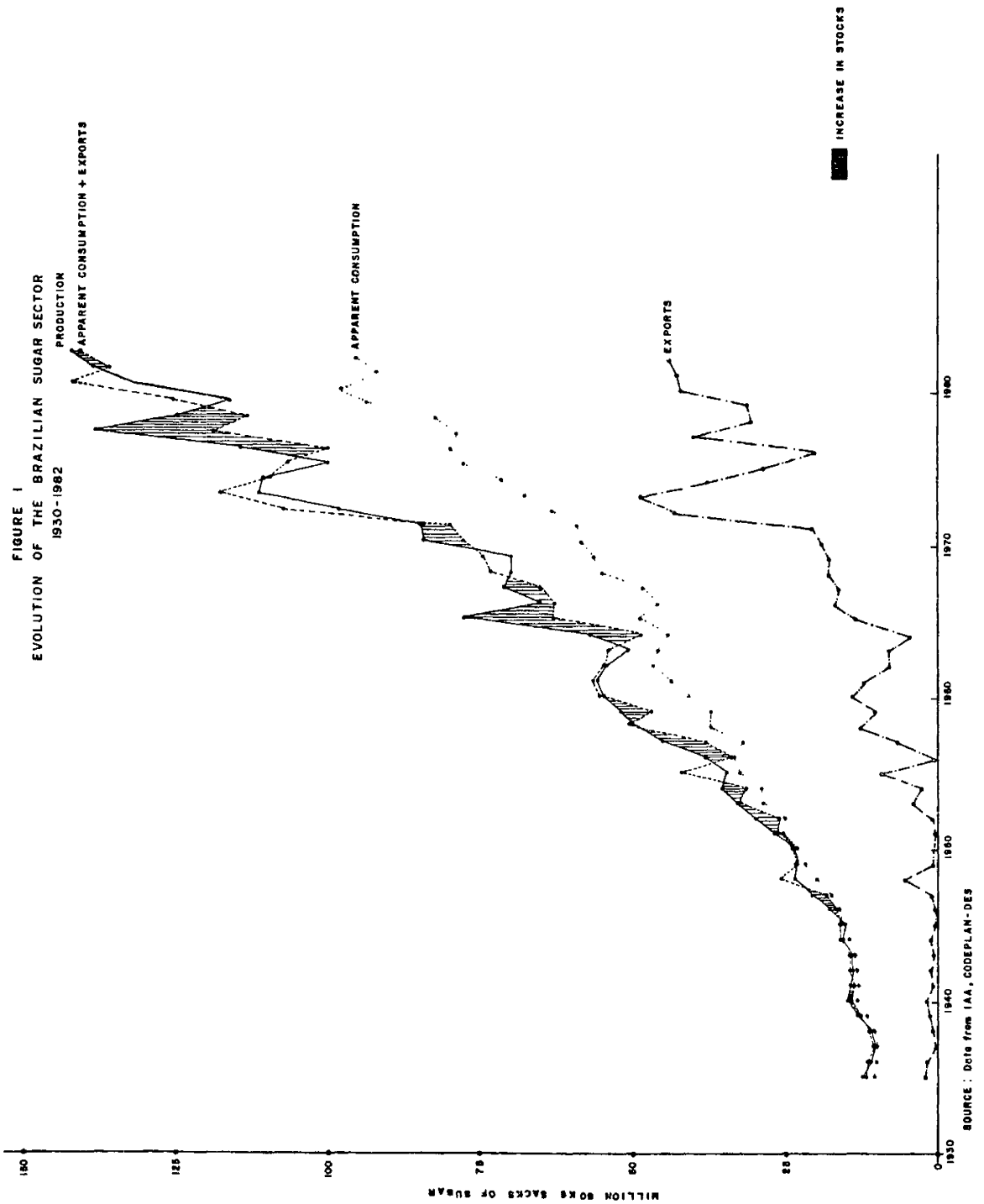
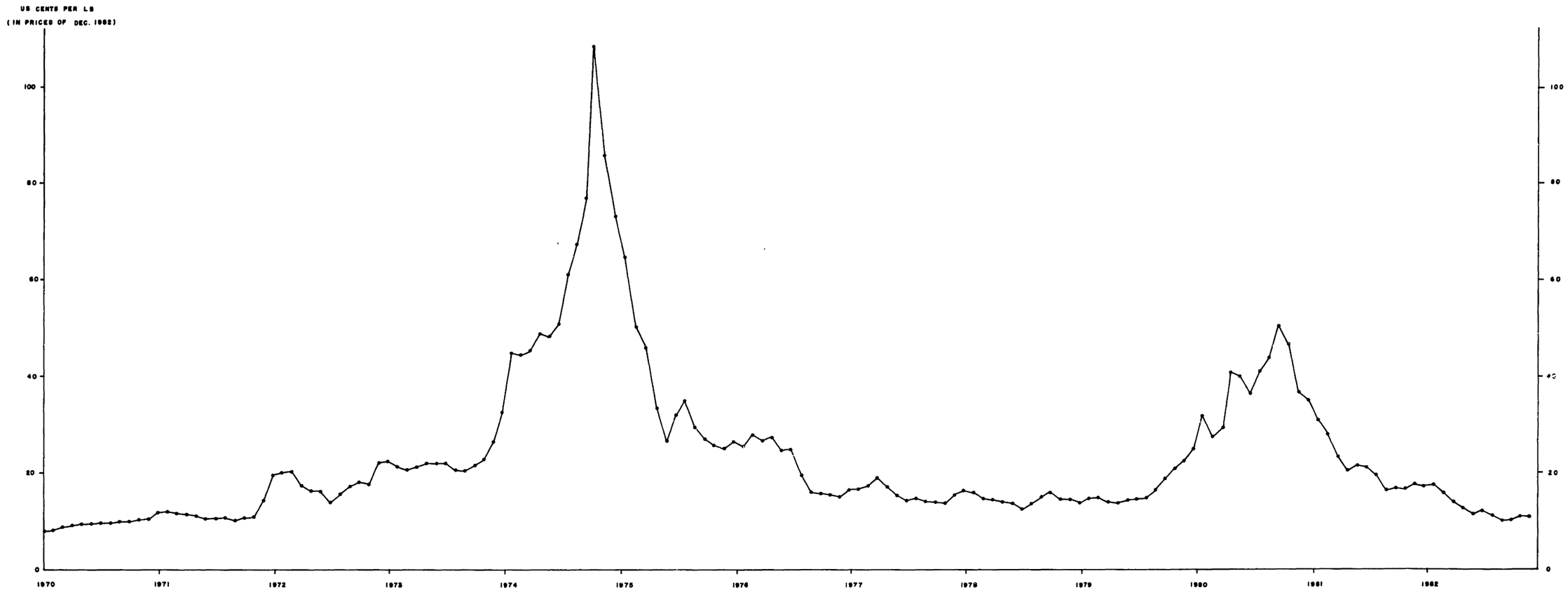


FIGURE I
EVOLUTION OF THE BRAZILIAN SUGAR SECTOR
1930-1982
PRODUCTION
APPARENT CONSUMPTION + EXPORTS
APPARENT CONSUMPTION
EXPORTS
INCREASE IN STOCKS
MILLION 60 KG SACKS OF SUGAR
150
125
100
75
50
25
0
1930
1940
1950
1960
1970
1980
SOURCE : Data from IAA, CODEPLAN-DES

FIGURE II

EVOLUTION OF SUGAR PRICES ON THE WORLD MARKET, 1970-1982
(INTERNATIONAL SUGAR AGREEMENT DAILY PRICE)

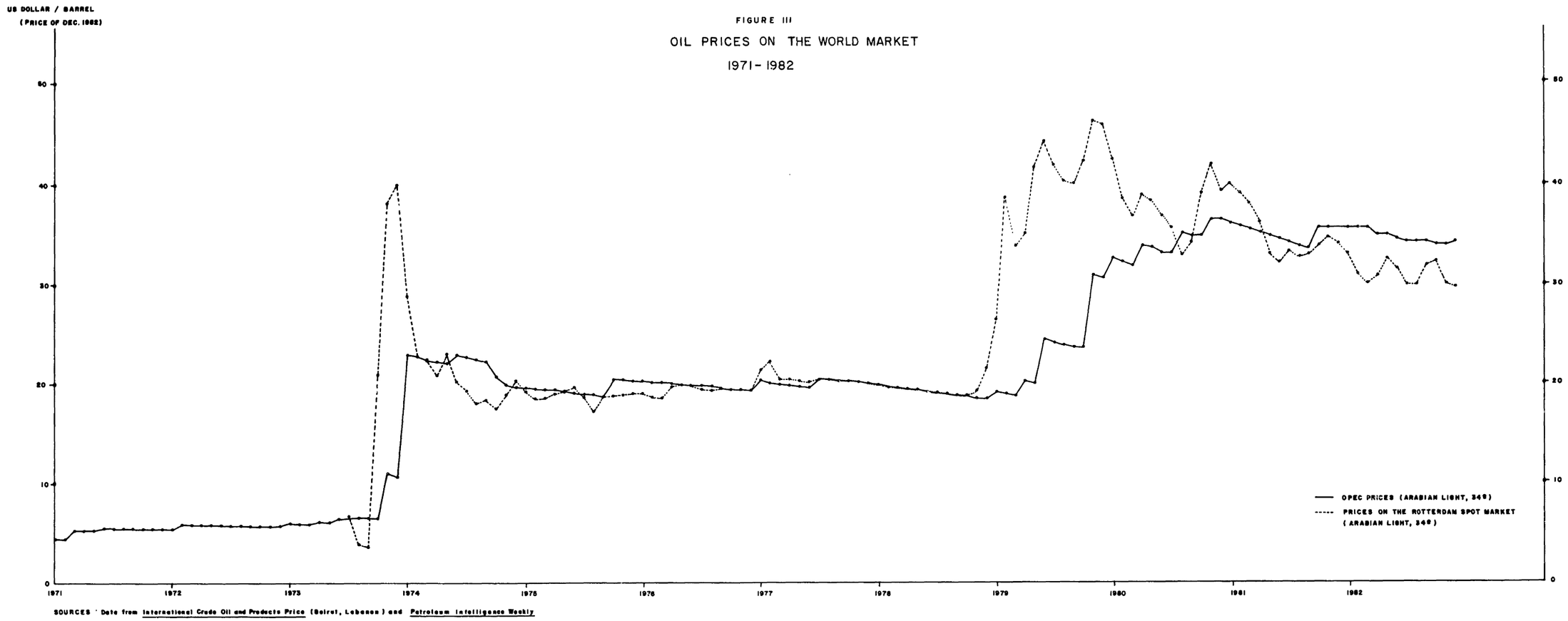


SOURCES Data from International Sugar Organization, Sugar Yearbooks and Statistical Bulletins (1982).

FIGURE III

OIL PRICES ON THE WORLD MARKET

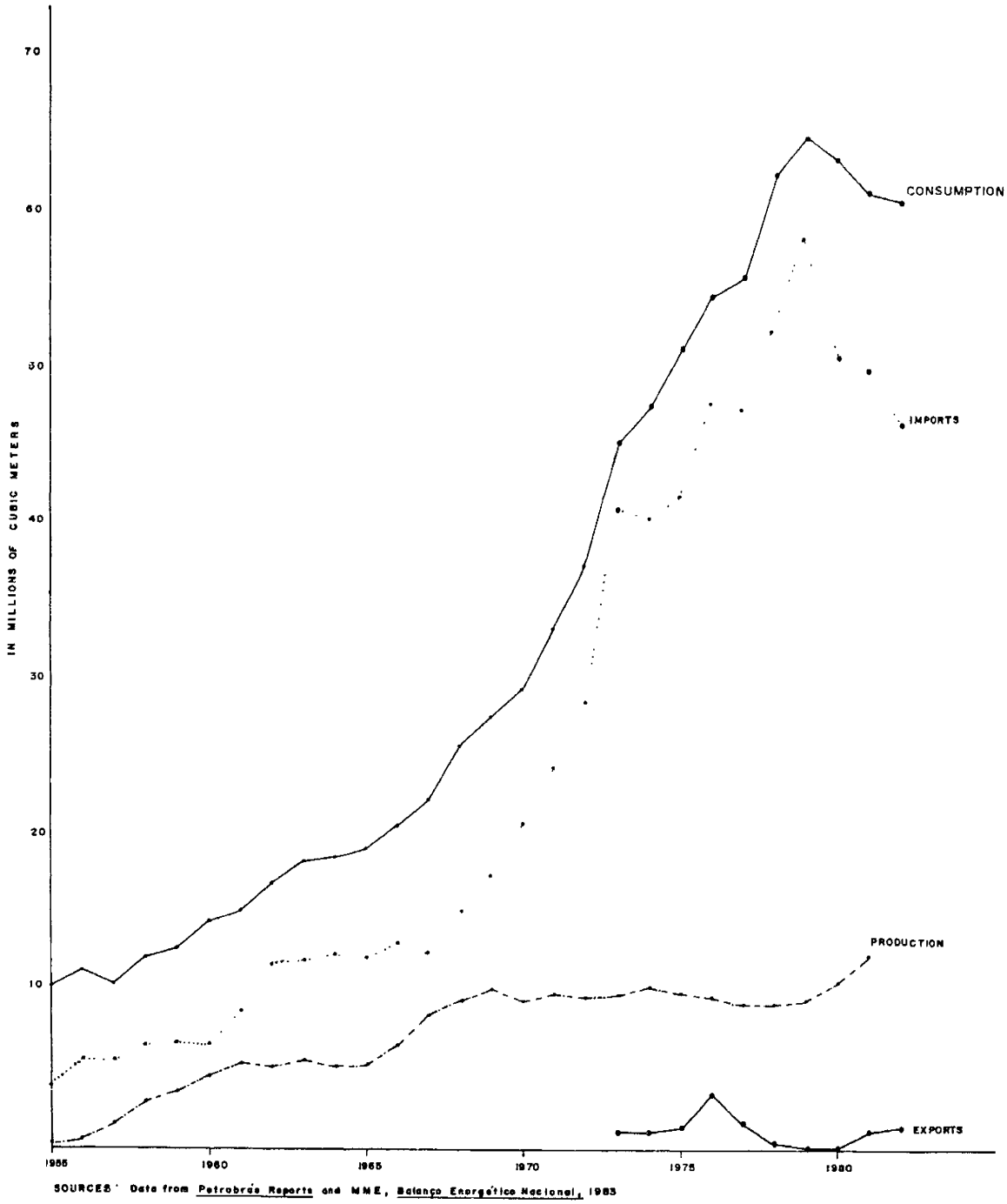
1971 - 1982



SOURCES : Data from International Crude Oil and Products Price (Beirut, Lebanon) and Petroleum Intelligence Weekly

FIGURE IV

EVOLUTION OF THE PETROLEUM SECTOR
1955-1982



SOURCES: Data from Petrobrás Reports and MME, Balanço Energético Nacional, 1983

FIGURE V

EFFECT OF THE OIL SHOCKS
ON THE BALANCE OF TRADE

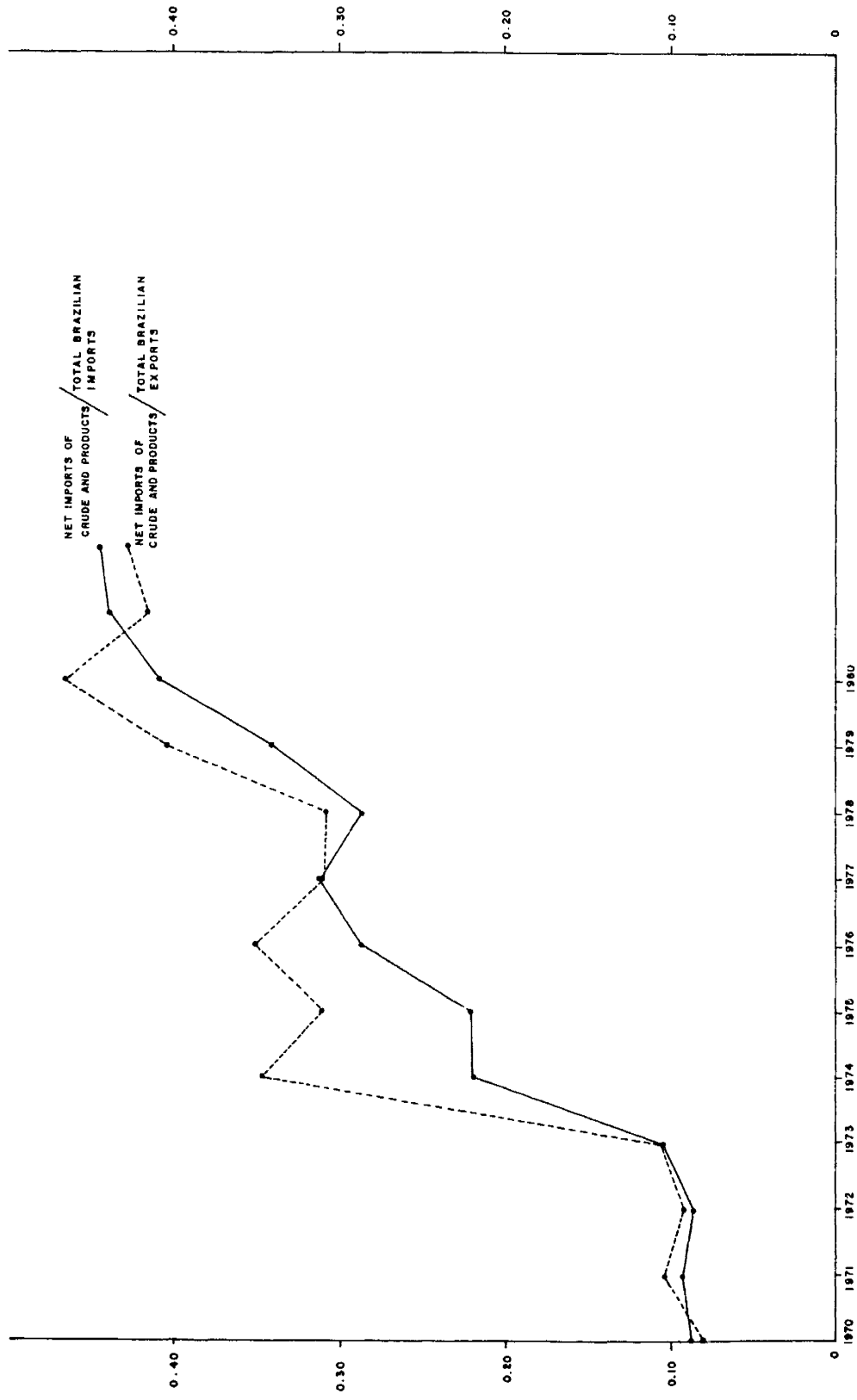
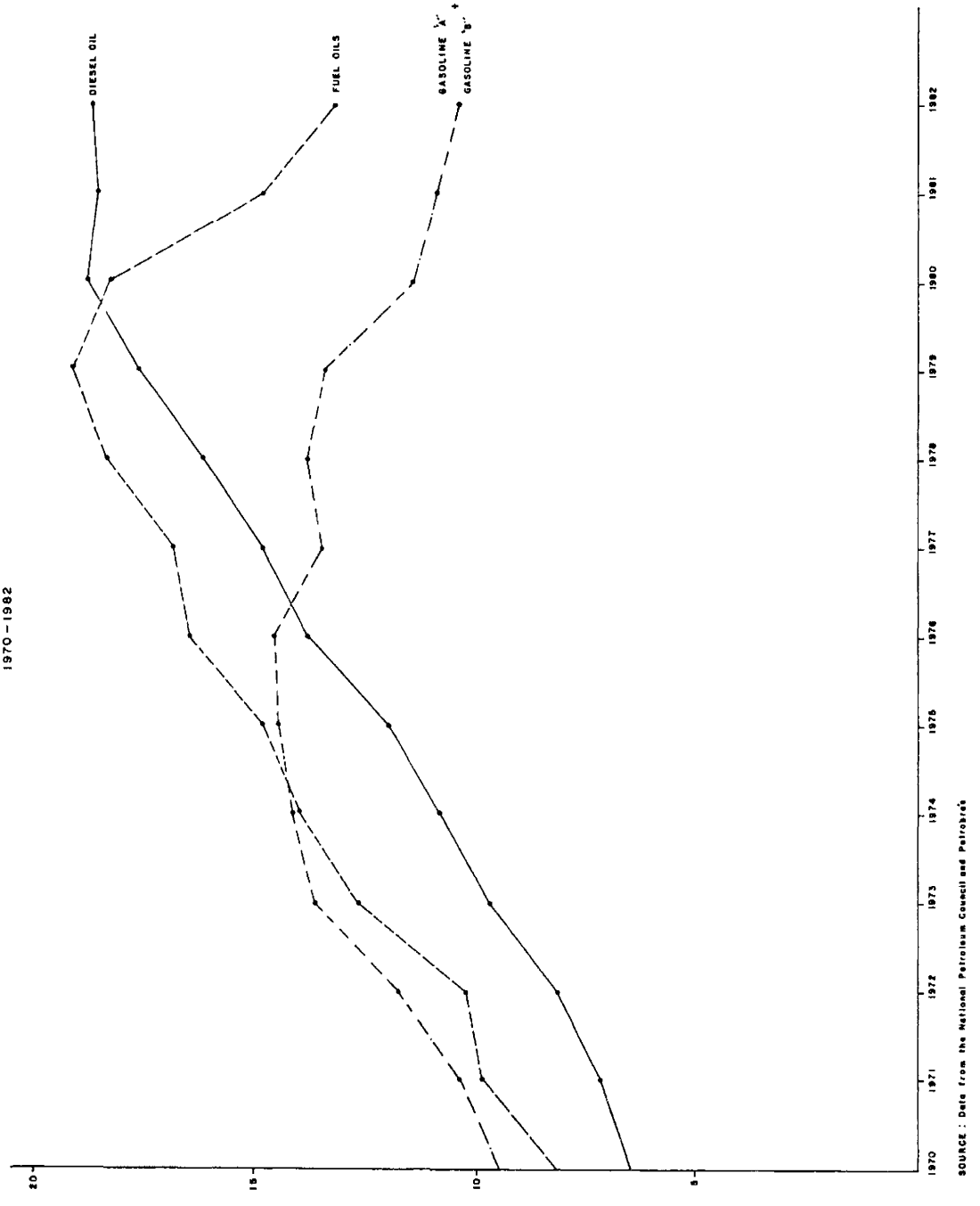


FIGURE VI

CONSUMPTION OF PETROLEUM PRODUCTS

1970-1982

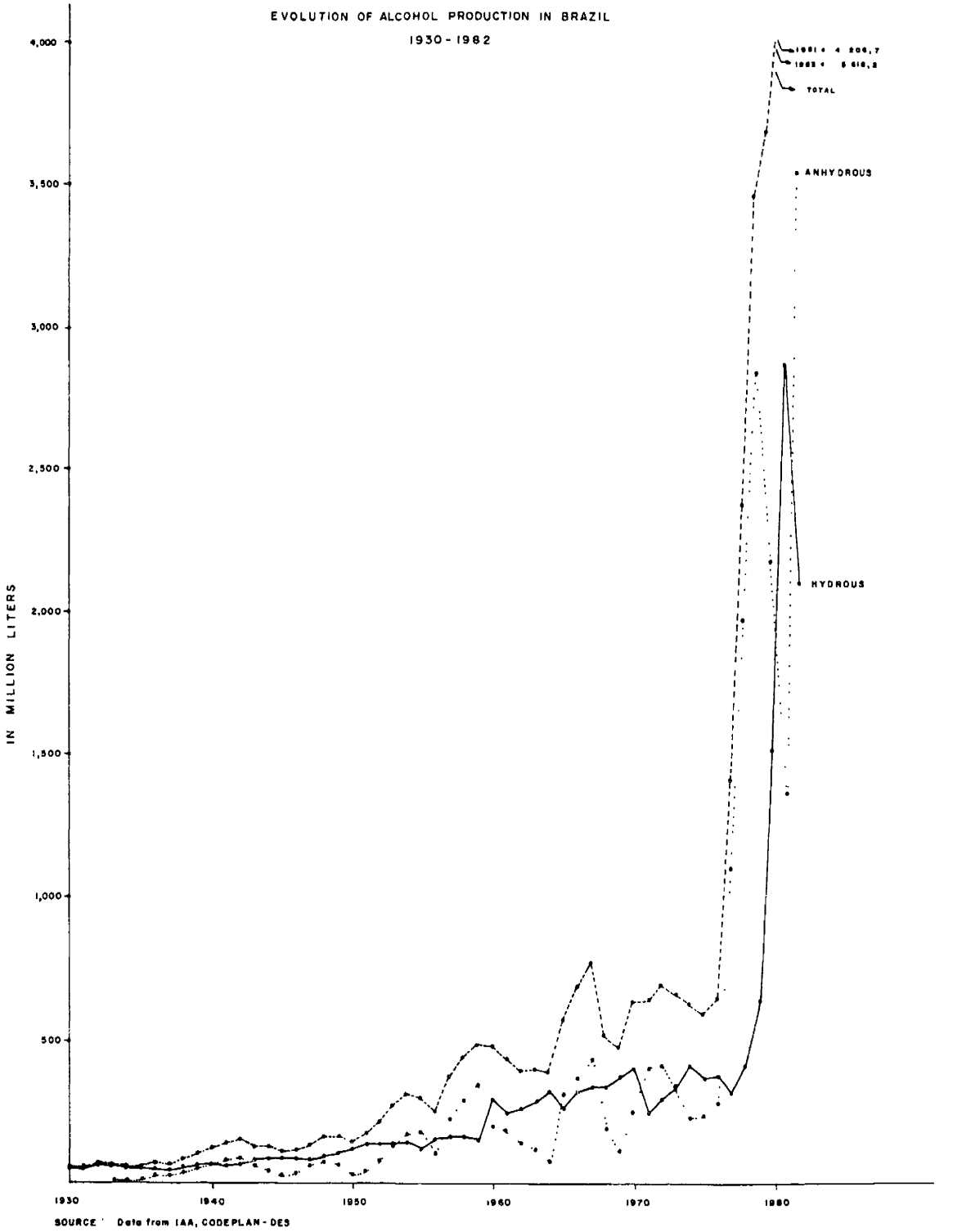


SOURCE : Data from the National Petroleum Council and Petrobrás

FIGURE VII

EVOLUTION OF ALCOHOL PRODUCTION IN BRAZIL

1930 - 1982

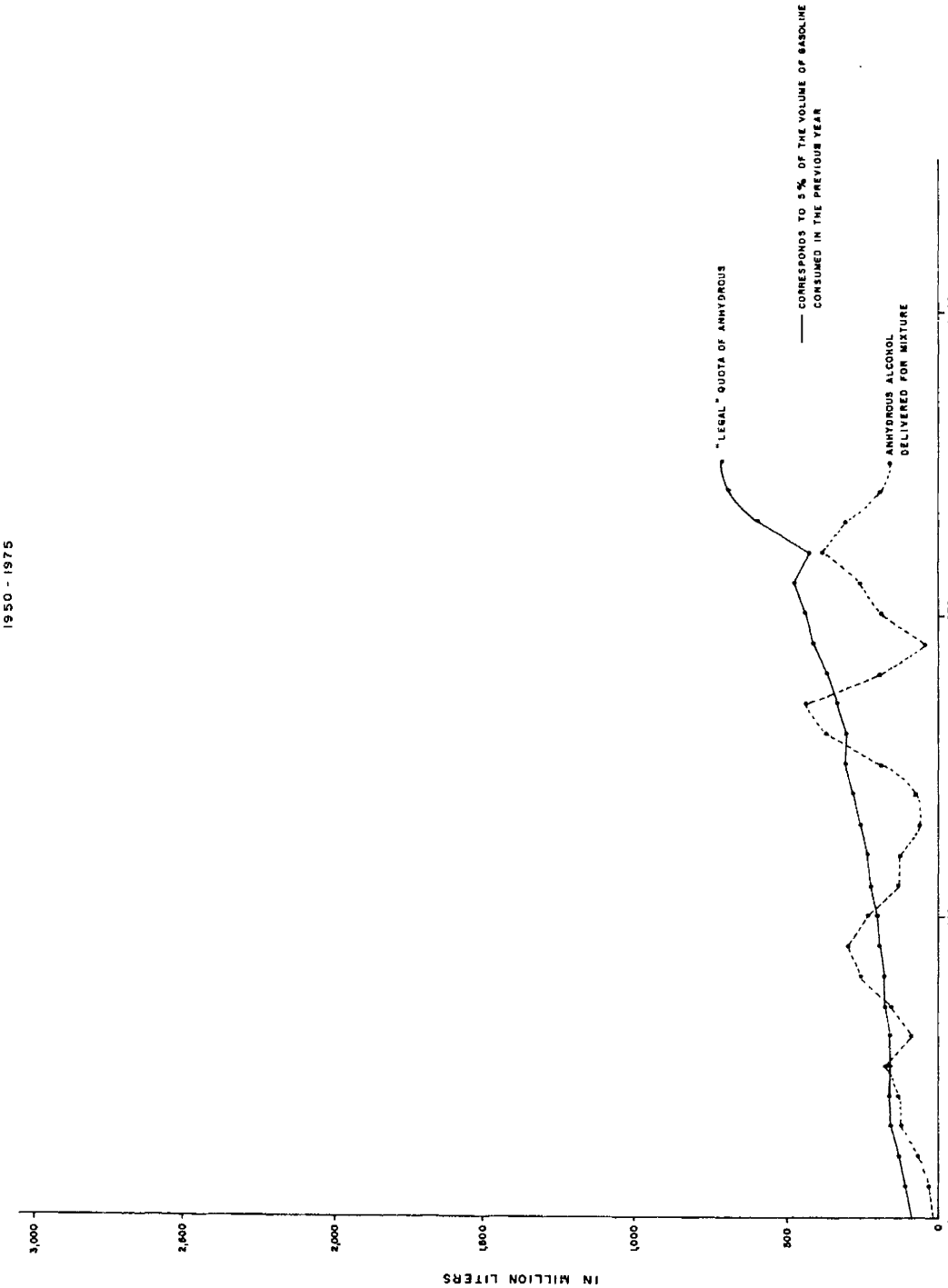


SOURCE : Data from IAA, CODEPLAN - DES

FIGURE VIII

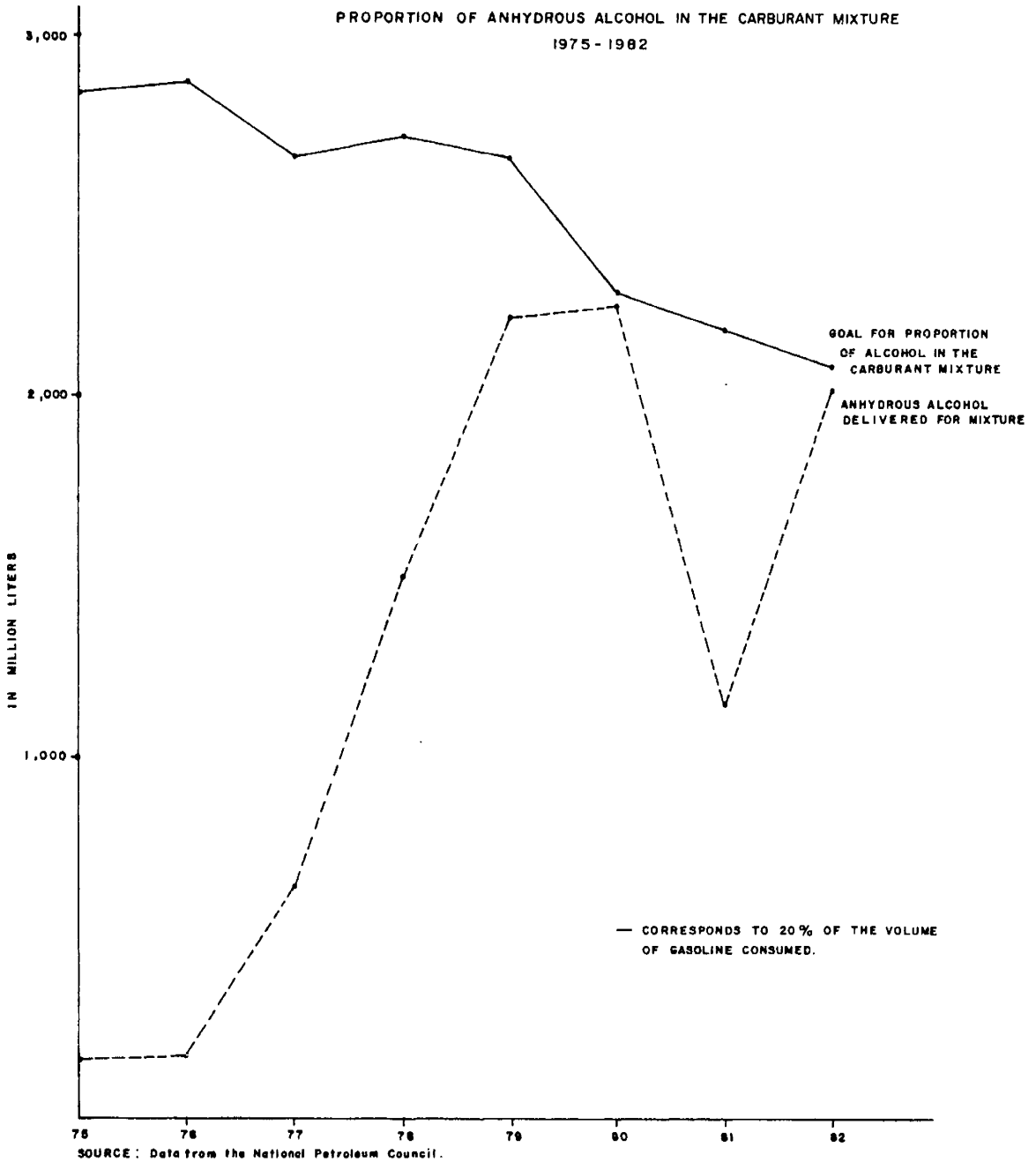
PROPORTION OF ANHYDROUS ALCOHOL IN THE CARBURANT MIXTURE

1950 - 1975



SOURCES: Data from the Institute of Sugar and Alcohol, CODEPLAN-DES, Boletim Estatístico do Álcool (several issues), IAA Reports, IAA Yearbooks, the National Petroleum Council, CNP Yearbooks

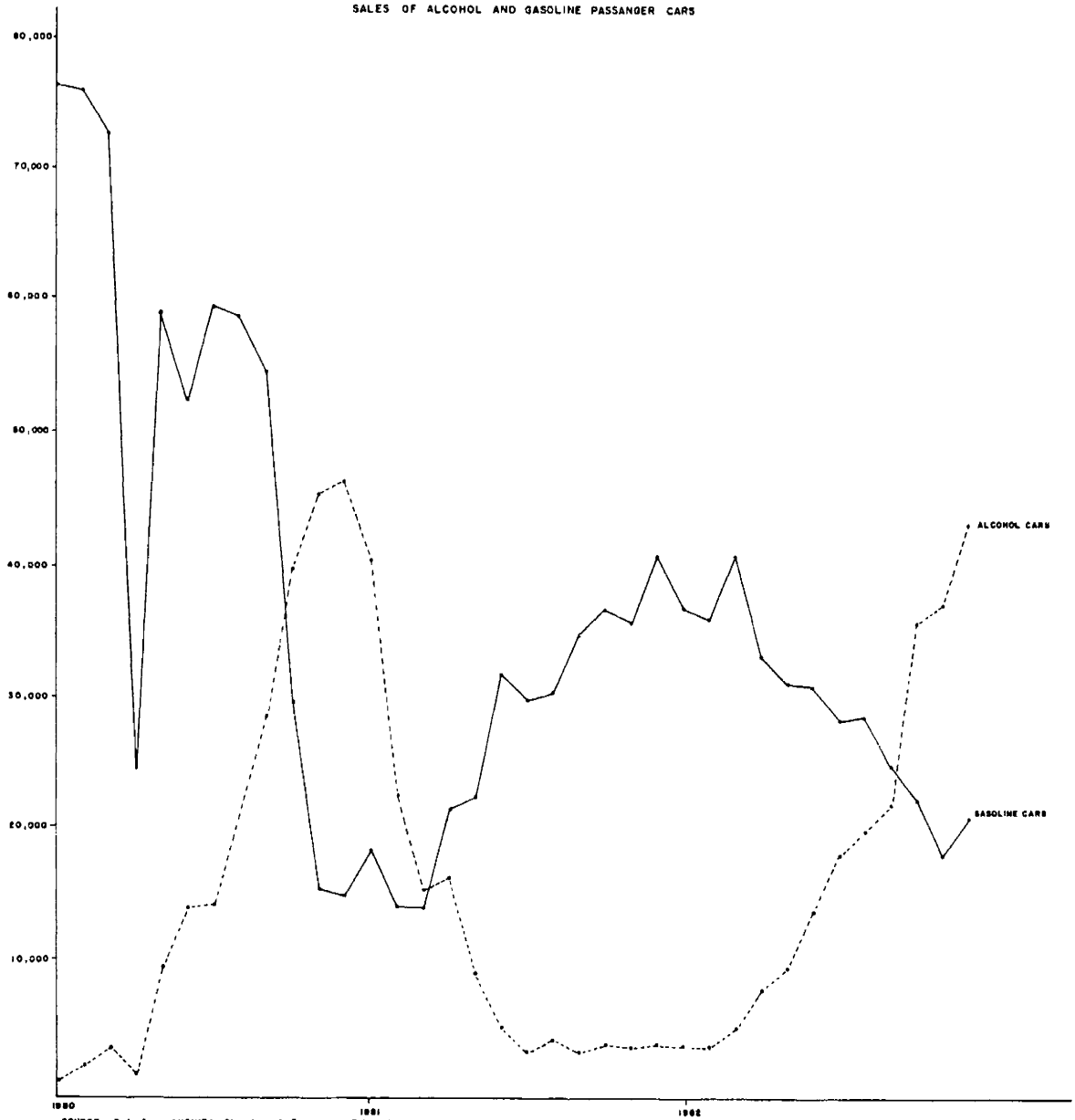
FIGURE IX
PROPORTION OF ANHYDROUS ALCOHOL IN THE CARBURANT MIXTURE
1975 - 1982



SOURCE: Data from the National Petroleum Council.

FIGURE X

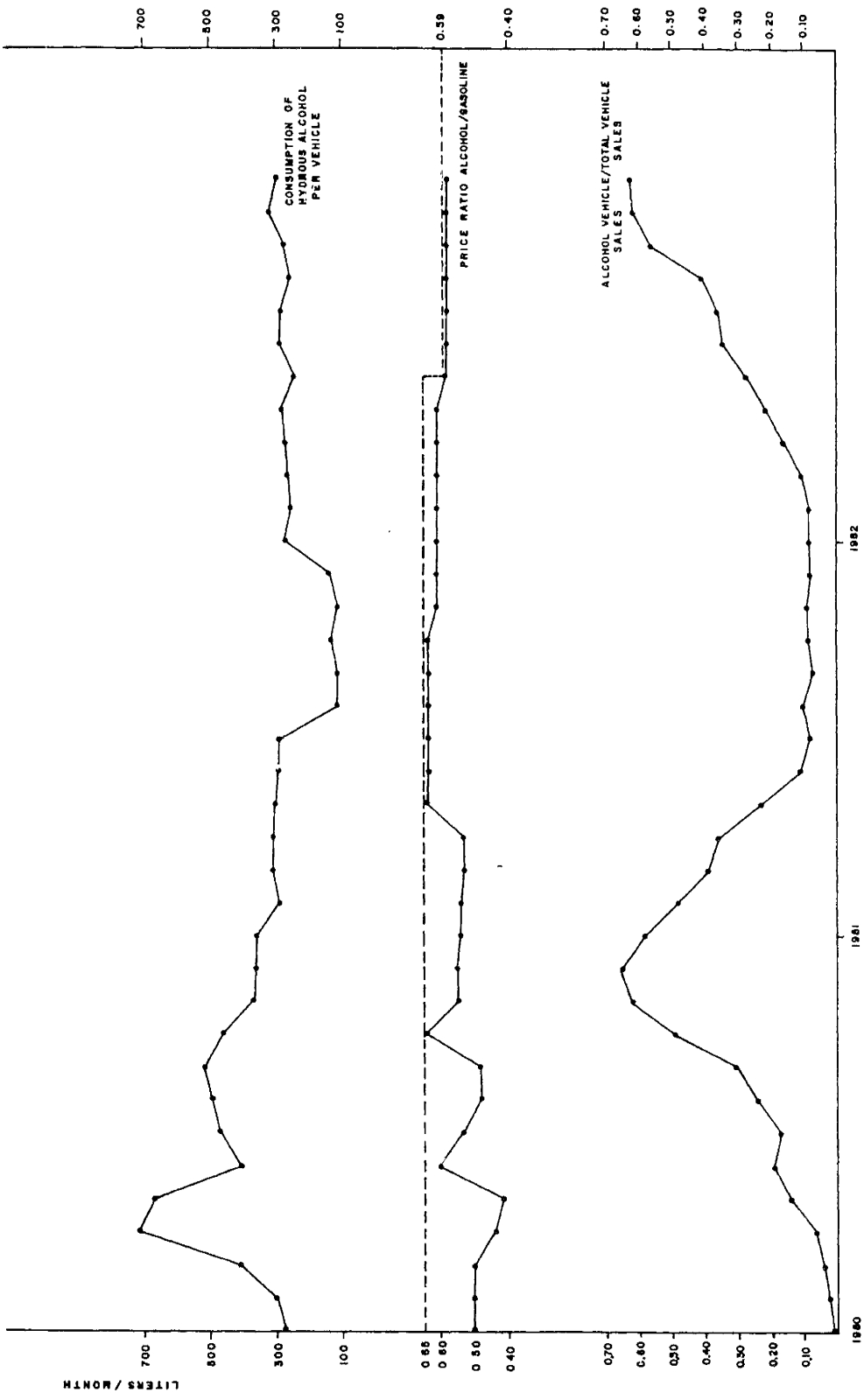
SALES OF ALCOHOL AND GASOLINE PASSANGER CARS



SOURCE Data from ANFAVEA, Planejamento Economico e Estatistico

FIGURE XI

CONSUMPTION OF HYDROUS ALCOHOL PER VEHICLE
PRICE RATIO ALCOHOL/GASOLINE, AND
PROPORTION OF ALCOHOL VEHICLE SALES



SOURCES: Data from ANFAVEA, the Industrial Tecnology Secretariat, the National Petroleum Council and Petrobrás

TABLE 1: Consumption of Primary Energy, 1970-1982 (in thousands of metric tons of oil equivalent and in percent)

	PETROLEUM	NATURAL GAS	STEAM COAL	METALLURGICAL COAL	URANIUM U_3O_8	HIDRAULIC ENERGY	FIREWOOD	SUGAR CANE	OTHER PRIMARY SOURCES*	SUBTOTAL RENEWABLE	TOTAL
1970	25,062	169	600	1,738	-	11,542	22,148	5,351	100	39,141	66,710
	37.6	0.3	0.9	2.6	-	17.3	33.2	8.0	0.1	58.6	100.0
1973	37,865	260	613	1,818	-	16,788	23,899	7,051	121	47,859	88,415
	42.8	0.3	0.7	2.1	-	19.0	27.0	8.0	0.1	54.1	100.0
1974	39,796	519	628	1,785	-	19,047	25,343	7,043	127	51,560	94,288
	42.2	0.5	0.7	1.9	-	20.2	26.9	7.5	0.1	54.7	100.0
1975	43,994	571	650	2,196	-	20,963	26,792	6,351	134	54,240	101,651
	43.2	0.6	0.6	2.2	-	20.6	26.4	6.3	0.1	53.4	100.0
1976	46,794	625	588	2,813	-	24,045	27,233	7,232	161	58,671	109,491
	42.7	0.6	0.5	2.6	-	22.0	24.9	6.6	0.1	53.6	100.0
1977	47,901	1,081	726	3,338	-	27,109	26,733	9,447	166	63,455	116,501
	41.1	0.9	0.6	2.9	-	23.3	23.0	8.1	0.1	54.5	100.0
1978	53,405	922	1,147	3,369	-	29,796	26,521	10,125	184	66,626	125,469
	42.6	0.7	0.9	2.7	-	23.7	21.1	8.1	0.2	53.1	100.0
1979	55,576	980	1,103	3,859	-	33,382	27,265	11,265	236	72,148	133,666
	41.6	0.7	0.8	2.9	-	25.0	20.4	8.4	0.2	54.0	100.0
1980	54,318	1,131	1,202	4,043	-	37,641	28,673	12,471	335	79,120	139,814
	38.9	0.8	0.9	2.9	-	26.9	20.5	8.9	0.2	56.5	100.0
1981	52,593	1,068	1,794	3,617	-	37,922	28,119	13,523	470	80,034	139,106
	37.8	0.8	1.3	2.6	-	27.3	20.2	9.7	0.3	57.5	100.0
1982	52,029	1,462	2,199	3,792	1,154	40,955	28,803	14,907	508	85,173	145,809
	35.7	1.0	1.5	2.6	0.8	28.2	19.7	10.2	0.3	58.4	100.0

(*) Vegetable and Organic Waste for Thermoelectricity

Source: MME, Balanço Energético Nacional, 1983

TABLE 2: Energy Consumption from Secondary Sources, 1970-1982
(in thousands of metric tons of oil equivalent)

	1970	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Natural Gas	73	118	348	378	434	875	713	781	921	821	1,173
Steam Coal	17	61	105	123	91	174	211	316	504	847	1,283
Firewood	18,809	19,467	19,824	20,182	21,288	20,880	20,669	20,462	20,531	20,662	20,668
Other Primary Sources	-	-	-	-	-	-	-	-	-	40	50
Diesel Oil	5,258	7,937	8,800	9,822	11,374	12,230	13,331	14,431	15,445	15,053	15,398
Fuel Oil	6,489	10,339	11,749	12,475	14,334	14,543	15,820	16,574	16,243	12,817	10,365
Gasoline	7,254	10,370	10,745	10,977	10,873	10,061	10,272	10,042	8,685	8,265	7,911
LPG	1,333	1,764	1,879	1,965	2,155	2,268	2,510	2,763	3,004	3,160	3,430
Naphtha	6	909	1,027	997	1,060	1,190	1,600	1,900	1,949	2,403	3,110
Kerosene	1,110	1,527	1,640	1,722	1,909	1,973	2,033	2,299	2,148	2,309	2,325
Gas	388	471	474	561	684	776	820	893	921	845	939
Coke	1,159	1,257	1,283	1,570	1,835	2,425	2,622	2,999	3,157	2,603	2,801
Electricity	11,064	15,929	17,873	19,772	22,496	25,226	28,184	31,589	35,259	35,965	38,161
Charcoal	1,462	1,941	2,417	2,896	2,608	2,568	2,565	2,983	3,555	3,257	3,557
Ethyl Alcohol	393	407	370	353	319	731	1,342	1,859	2,273	1,991	2,810
Cane Bagasse	2,677	3,587	3,557	3,208	3,655	4,962	5,208	5,656	6,233	6,741	7,628
Other Secondary Sources	220	683	1,025	1,037	1,229	1,345	1,745	1,892	1,802	1,549	1,726
Non Energy Products	2,939	4,222	4,437	4,275	4,749	5,262	5,344	5,827	5,871	5,722	4,928
Share of Petroleum Products and Natural Gas*	24,002	36,786	40,099	42,394	46,205	47,173	51,453	54,919	54,132	49,999	48,326
SUBTOTAL-OTHERS	36,649	44,203	47,454	49,919	54,888	66,316	63,536	68,347	74,369	75,051	79,937
T O T A L	60,651	80,989	87,553	92,313	101,093	107,489	114,989	123,266	128,501	125,050	128,263

(*) Includes the Final Consumption of Gas Derived From Processing Naphtha and the Final Consumption of Electricity Derived From Processing Diesel Oil and Fuel Oil.

Source: MME, Balanço Energético Nacional, 1983.

TABLE 3: External Dependence on Energy
(in Thousands of Metric Tons
of Oil Equivalent and in Percent)

	ENERGY DEMAND (a)	PRODUCTION OF PRIMARY ENERGY (b)	EXTERNAL DEPENDENCE ON ENERGY (a-b)
1970	67.443	49.397	13.046
	100.0	73.2	26.8
1973	88.685	58.340	30.345
	100.0	65.8	34.2
1974	95.589	63.097	32.492
	100.0	66.0	34.0
1975	102.000	65.580	36.420
	100.0	64.3	35.7
1976	110.968	70.060	40.908
	100.0	63.1	36.9
1977	117.414	74.953	42.461
	100.0	63.8	36.2
1978	125.529	78.456	47.073
	100.0	62.5	37.5
1979	134.690	84.440	50.250
	100.0	62.7	37.3
1980	141.136	92.704	48.432
	100.0	65.7	34.3
1981	137.294	95.563	41.731
	100.0	69.6	30.4
1982	141.146	103.829*	37.317
	100.0	73.6	26.4

Uranium - $U_3 O_8$ production is not included

Source: MME, Balanço Energético Nacional, 1983

TABLE 4: Balance of Payments in Brazil, 1971-1982
(in US$ millions)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
1. Balance of Trade - FOB	-341	-244	7	-4,690	-3,540	-2,255	95	-1,024	-2,840	-2,823	1,202	778
Exports	2,904	3,991	6,199	7,951	8,670	10,128	12,120	12,659	15,244	20,132	23,293	20,175
Imports	-3,245	-4,235	-6,192	-12,641	-12,210	-12,383	-12,023	-13,683	-18,084	-22,955	-22,091	-19,397
2. Services	-980	-1,250	-1,722	- 2,433	-3,162	-3,763	-4,134	-6,037	-7,920	-10,152	-13,135	-17,050
3. Unrequited Transfers	14	5	27	1	2	1	0	71	18	168	199	-7
4. Current Account (1+2+3)	-1,307	-1,489	-1,688	-7,122	-6,700	-6,017	-4,037	-6,990	-10,742	-12,807	-11,734	-16,279
5. Net Capital Movement	1,846	3,492	3,512	6,254	6,189	6,806	5,269	11,891	7,657	9,679	12,773	7,867
6. Errors and Omissions	-9	436	355	-68	-439	-403	-602	-639	-130	-344	-414	-544
7. Surplus/Deficit	530	2,439	2,179	-936	-950	1,192	630	4,262	-3,215	-3,472	625	-8,956

Source: Central Bank Reports.

TABLE 5 : Inflation in Brasil[(1)], 1972-1982

	%
1972	15.7
1973	15.5
1974	34.5
1975	29.4
1976	46.3
1977	38.8
1978	40.8
1979	77.2
1980	110.2
1981	95.2
1982	99.7

(1) Percent increase in the general price index

Source : Central Bank Reports

TABLE 6: Gross Domestic Product in Brazil, 1979-1982

YEAR	GDP AT CURRENT PRICES (Cr$ MILLIONS)	IMPLICIT DEFLATOR (%)	REAL GROWTH RATE OF GDP (Proportion)					POPULATION (MILLIONS)	GDP PER CAPITA	
			AGRICULTURE	INDUSTRY	TRADE	TRANSPORTS AND COMMUNICATION	TOTAL		CURRENT PRICES (Cr$ MILLIONS)	REAL GROWTH RATE (%)
1972	368,400	18.5	4.1	12.7	11.7	12.2	11.1	97.8	3,766	8,4
1973	508,746	21.2	3.6	16.0	13.3	21.0	14.0	100.3	5,074	11.2
1974	740,504	32.9	8.2	9.1	9.9	13.5	9.5	102.8	7,206	6.8
1975	1,052,062	34.5	5.2	5.6	2.4	16.8	5.6	105.3	9,990	3.0
1976	1,680,233	45.6	2.9	12.5	8.6	8.0	9.7	107.9	15,568	7.0
1977	2,523,101	42.4	11.8	3.9	4.6	5.8	5.4	110.6	22,810	2,8
1978	3,729,798	41.1	-2.6	7.4	3.9	4.6	4.8	113.4	32,901	2.3
1979	6,239,402	56.8	5.0	6.6	6.7	10.6	6.8	116.2	53,704	4.2
1980	13,104,285	94.7	6.3	7.9	8.0	10.8	7.9	119.1	110,054	5.3
1981	26,832,943	108.7	6.8	-5.4	-3.7	-0.5	-1.9	122.0	219,885	-4.3
1982*	53,150,747	95.4	-2.5	1.2	0.0	4.0	1.4	125.1	424,980	-1.1

(*) Estimated data

Source: Central Bank Report, 1982, p.18.

TABLE 7: Brazilian Foreign Debt, 1973-1982

(in US$ millions FOB)

YEAR	SERVICE ON DEBT			GROSS DEBT	FOREIGN RESERVES	NET DEBT	EXPORTS	SERVICE ON DEBT/ EXPORTS -FOB (%)	NET DEBT/ EXPORTS -FOB (%)
	AMORTIZACION 1	NET INTEREST 2	TOTAL 2+1=3	4	6	4-5= 6	7	8=3/7	9= 6/7
1973	2,063	514	2,577	12,572	6,416	6,156	6,199	42	99
1974	1,943	652	2,595	17,166	5,269	11,897	7,951	33	150
1975	2,168	1,498	3,666	21,171	4,040	17,131	8,670	42	198
1976	3,004	1,810	4,814	25,985	6,544	19,441	10,128	48	192
1977	4,123	2,103	6,226	32,037	7,256	24,781	12,120	51	204
1978	5,426	2,696	8,122	43,511	11,895	31,616	12,659	64	250
1979	6,527	4,186	10,713	49,904	9,689	40,215	15,244	70	264
1980	6,689	6,311	13,000	53,847	6,913	46,934	20,132	65	233
1981	7,496	9,161	16,657	61,411	7,507	53,904	23,293	72	231
1982	8,179	11,358	19,537	69,653	3,994	65,659	20,175	97	325

Source: Central Bank Report, 1982, p. 95.

TABLE 8: Indices of Foreign Trade and Terms of Trade in Brazil, 1972-1982 (1977 =100)

YEAR	EXPORTS		IMPORTS				TERMS OF TRADE	
			TOTAL		CRUDE OIL		TOTAL	EXCLUSIVE OF OIL
	PRICES	QUANTITY	PRICES	QUANTITY	PRICES	QUANTITY		
1972	41	76	47	70	22	61	87	72
1973	56	88	59	85	28	85	95	82
1974	71	89	91	115	93	87	78	78
1975	71	98	94	109	94	91	76	76
1976	82	99	96	108	96	101	85	85
1977	100	100	100	100	100	100	100	100
1978	92	113	107	105	101	111	86	84
1979	101	124	128	115	135	124	79	81
1980	107	152	164	115	226	107	65	78
1981	101	183	182	99	270	104	55	71
1982	95	164	175	90	259	98	54	68

Source: Central Bank Report, 1982, p. 81

TABLE 9: Oil Prices in the World Market, 1973-1982
(in US Dollars per Barrel)

	OPEC PRICES (1)											
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
1973 (2)	2.59	2.59	2.59	2.74	2.74	2.89	2.95	3.01	3.01	3.01	5.18	5.03
1974	10.95	10.95	10.95	10.95	10.95	11.51	11.51	11.51	11.51	10.83	10.46	10.46
1975	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	11.51	11.51	11.51
1976	11.51	11.51	11.51	11.51	11.51	11.51	11.51	11.51	11.51	11.51	11.51	11.51
1977	12.09	12.09	12.09	12.09	12.09	12.09	12.70	12.70	12.70	12.70	12.70	12.70
1978	12.70	12.70	12.70	12.70	12.70	12.70	12.70	12.70	12.70	12.70	12.70	12.70
1979	13.34	13.34	13.34	14.55	14.55	18.00	18.00	18.00	18.00	18.00	24.00	24.00
1980	26.00	26.00	26.00	28.00	28.00	28.00	28.00	30.00	30.00	30.00	32.00	32.00
1981	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	34.00	34.00	34.00
1982	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00

	SPOT PRICES (3)											
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
1973 (4)	NA	NA	NA	NA	NA	NA	2.99	1.77	1.64	9.79	18.02	19.03
1974 (4)	13.80	10.97	10.98	10.23	11.46	10.12	9.78	9.20	9.50	9.09	10.00	10.80
1975	10.30	9.91	10.02	10.26	10.42	10.82	10.32	9.54	10.45	10.53	10.65	10.82
1976	10.81	11.23	11.22	11.34	11.50	11.50	11.30	11.30	11.51	11.51	11.51	11.51
1977	12.73	13.44	12.40	12.48	12.47	12.40	12.70	12.70	12.70	12.70	12.70	12.70
1978	12.65	12.65	12.65	12.67	12.73	12.74	12.77	12.79	12.80	12.85	13.20	14.85
1979	18.49	27.38	24.18	25.29	30.59	32.81	31.47	30.54	30.52	32.57	36.33	36.28
1980	34.09	31.17	30.14	32.20	31.98	31.29	30.24	28.12	29.47	33.74	36.98	34.56
1981	35.53	34.97	34.36	33.05	30.33	29.78	31.22	30.96	31.32	32.41	33.21	32.61
1982	31.85	29.78	28.10	29.97	31.70	31.00	29.65	29.60	31.62	32.32	30.05	29.44

NA= Non Available.

(1) Government official sales prices of crude Saudi Arabian Light (34º), from International Crude Oil and Products Prices (Beirut, Lebanon), except where noted.

(2) Posted prices of the crude Saudi Arabian Light (34º), from International Crude Oil and Products Prices (Beirut, Lebanon).

(3) Prices of crude Saudi Arabian Light (34º) at the Rotterdam Spot Market, from Petroleum Intelligence Weekly.

(4) FOB netback value of Saudi Arabian Light (34º) products at the Rotterdam Spot Market, from Petroleum Intelligence Weekly.

OBS.: Data from 1973-1981 were kindly provided by Michael C. Lynch from the Energy Laboratory, MIT.

TABLE 10: The Petroleum Sector in Brazil, 1955-1969
(in millions of cubic meters)

	(1) PRODUCTION (A)	(2) REFINING (B)	CONSUMPTION (C)	(3) CRUDE IMPORTS (D)	PROPORTION B / C	PROPORTION A / C	PROPORTION A / D
1955	0.3	2.4	10.4	4.1	0.23	0.03	0.08
1956	0.6	3.9	11.4	5.8	0.34	0.06	0.11
1957	1.6	4.1	10.6	5.7	0.38	0.15	0.28
1958	3.0	4.9	12.3	6.7	0.40	0.24	0.45
1959	3.7	5.5	12.9	6.8	0.43	0.29	0.55
1960	4.7	7.2	14.6	6.7	0.49	0.32	0.70
1961	5.5	9.6	15.3	8.9	0.63	0.36	0.62
1962	5.3	13.3	17.0	11.9	0.78	0.31	0.44
1963	5.7	14.5	18.4	12.1	0.79	0.31	0.47
1964	5.3	15.0	18.7	12.5	0.80	0.28	0.42
1965	5.4	14.6	19.2	12.3	0.76	0.28	0.44
1966	6.7	16.7	20.7	13.2	0.81	0.32	0.51
1967	8.6	17.4	22.3	12.5	0.78	0.38	0.69
1968	9.5	23.2	25.8	15.2	0.90	0.37	0.63
1969	10.2	24.2	27.7	17.5	0.87	0.37	0.58

(1) Does not include liquid natural gas.

(2) Includes asphalt factories. The data refer only to the Petrobrás refineries. The contribution of the private refineries to the total refined is only relevant during the first years Petrobrás was in operation.

(3) Includes naphtha.

Source: Petrobrás Reports.

TABLE 11: The Petroleum Sector in Brazil, 1970-1982
(in millions of cubic meters)

YEAR	PRODUCTION (A)	IMPORTS (B)	EXPORTS	STOCKS VARIATION LOSSES AND ADJUSTMENTS	CONSUMPTION (C)	PROPORTION A/B	PROPORTION A/C
1970	9,534	20,848	76	-470	29,836	0.46	0.32
1973	9,876	40,890	998	-4,690	45,078	0.24	0.22
1974	10,295	40,261	774	-2,406	47,376	0.25	0.22
1975	9,979	41,683	1,257	751	51,156	0.24	0.19
1976	9,702	47,828	3,466	348	54,412	0.20	0.18
1977	9,331	47,330	1,573	611	55,699	0.20	0.17
1978	9,305	52,275	281	800	62,099	0.18	0.15
1979	9,607	58,197	-	- 3,181	64,623	0.16	0.15
1980	10,562	50,564	70	2,104	63,160	0.21	0.17
1981	12,384	49,025	856	459	61.012	0.25	0.20
1982	15,080	46,291	1,281	339	60.429	0.32	0.25

Source: MME, Balanço Energético Nacional, 1983

TABLE 12: The Value of Brazilian Oil Imports and the Balance of Payments, 1955-1982

YEAR	CRUDE IMPORTS (IN US$ MILLIONS FOB) (A)	CRUDE AND PETROLEUM PRODUCTS IMPORTS (IN US$ MILLIONS FOB) (B)	PROPORTION A / TOTAL BRAZILIAN IMPORTS	PROPORTION B / TOTAL BRAZILIAN IMPORTS	PROPORTION A / TOTAL BRAZILIAN EXPORTS	PROPORTION B / TOTAL BRAZILIAN EXPORTS	AVERAGE ANUAL PRICE OF A BARREL OF IMPORTED CRUDE (US$ - CIF) (1)	AVERAGE ANUAL PRICE OF A BARREL OF IMPORTED CRUDE (US$ FOB) (2)
1955	55	203	0.05	0.18	0.04	0.14	2.97	NA
1956	76	214	0.07	0.20	0.05	0.14	2.93	NA
1957	83	200	0.07	0.16	0.06	0.14	3.25	NA
1958	99	219	0.09	0.19	0.08	0.18	3.02	NA
1959	89	119	0.07	0.16	0.07	0.15	2.84	NA
1960	85	202	0.07	0.16	0.07	0.16	2.63	NA
1961	109	200	0.08	0.15	0.08	0.14	2.45	NA
1962	141	196	0.11	0.15	0.12	0.16	2.35	NA
1963	142	195	0.11	0.15	0.10	0.14	2.21	NA
1964	135	180	0.13	0.17	0.10	0.13	2.11	NA
1965	121	154	0.13	0.16	0.08	0.10	2.06	NA
1966	128	166	0.10	0.13	0.07	0.09	1.96	NA
1967	112	154	0.08	0.11	0.07	0.09	2.51	1.42
1968	138	204	0.07	0.11	0.07	0.11	2.16	1.50
1969	148	204	0.07	0.10	0.07	0.09	2.07	1.51
1970	173	236	0,07	0.09	0.07	0.09	2.11	1.51
1971	251	327	0.08	0.10	0.08	0.11	2.66	1.88
1972	344	409	0.08	0.11	0.08	0.10	2.83	1.99
1973	606	711	0.09	0.11	0.09	0.11	3.86	2.79
1974	2,558	2,840	0.20	0.22	0.32	0.36	12.55	11.10
1975	2,704	2,875	0.22	0.23	0.31	0.33	12.29	10.48
1976	3,353	3,613	0.28	0.29	0.33	0.36	NA	11.50
1977	3,602	3,814	0.31	0.32	0.30	0.31	NA	12.31
1978	4,064	4,192	0.30	0.31	0.32	0.33	NA	12.44
1979	6,264	6,480	0.34	0.36	0.40	0.42	NA	17.11
1980	9,372	9,903	0.41	0.43	0.46	0.49	NA	29.46
1981	10,604	10,989	0.48	0.50	0.45	0.47	NA	34.37
1982	9,568	10,216	0.49	0.53	0.47	0.51	NA	32.85

NA = Non Available.
(1) Source: Petrobrás Reports.
(2) Source: Petrobras.

TABLE 13: Consumption of Petroleum Products, 1970-1982
(in thousands of cubic meters)

PRODUCTS	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
L.P.G.	2,225	2,401	2,655	2,944	3,137	3,255	3,613	3,787	4,191	4,612	4,893	5,206	5,669
Gasoline "A"	9,154	9,821	10,977	12,708	13,683	14,193	14,374	13,337	13,670	13,317	11,431	10,940	10,451
Gasoline "B"	367	542	726	912	449	264	178	127	146	109	7	3	3
Kerosene	614	602	633	702	641	633	683	723	753	816	643	593	606
Diesel Oil	6,515	7,158	8,178	9,712	10,749	11,996	13,797	14,807	16,164	17,600	18,752	18,460	18,655
Fuel Oils	8,237	9,890	10,217	12,630	13,950	14,794	16,478	16,802	18,308	19,003	18,197	14,747	13,138

Source: 1970-1981 (CNP)
1982 (CNA/Petrobrás)

TABLE 14: Exports of Petroleum Products, 1970-1982
(in thousands of cubic meters)

PRODUCTS	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982*
L.P.G.	-	-	23	38	67	102	18	27	76	115	57	76	43
Gasolines	-	-	28	29	19	242	13	343	1,071	473	359	1,459	1,181
Kerosenes	150	60	84	119	194	42	10	67	259	244	376	696	465
Fuel Oil	813	341	1,028	1,462	1,267	398	93	98	24	80	346	1,167	988
Diesel Oil	55	158	337	368	871	455	113	352	471	279	510	518	701
Ship Fuel	-	-	285	844	646	823	783	721	692	498	503	698	757
Others	1	1	1	106	96	8	11	16	19	17	22	112	97
TOTAL	1,019	560	1,786	2,966	3,160	2,070	1,041	1,624	2,612	1,706	2,173	4,726	4,232

* up to September

Source: Petrobrás

TABLE 15: Exports of Petroleum Products, 1970-1982
(in thousands of US dollars)

PRODUCTS	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 *
L.P.G.	-	20	561	956	5,325	7,671	1,582	2,430	5,484	15,985	11,126	14,829	8,304
Gasolines	-	65	1,155	1,304	2,333	21,021	1,367	32,882	105,337	75,743	94,635	384,074	273,403
Kerosenes	3,655	1,509	1,966	3,717	15,066	3,639	1,044	6,794	27,362	47,633	94,005	182,436	106,255
Diesel Oil	943	3,590	7,372	11,909	67,926	39,682	11,096	35,921	48,133	61,741	132,030	133,720	155,777
Fuel Oil	10,716	6,505	15,976	30,897	79,319	29,636	6,769	7,383	1,906	12,236	57,754	214,775	173,169
Ship Fuel	-	-	5,525	24,706	53,429	61,252	58,280	65,376	66,610	102,694	109,738	149,525	142,596
Others	150	84	169	6,543	9,626	1,583	2,352	3,520	4,118	6,753	10,045	45,907	35,128
TOTAL	15,474	11,773	32,724	80,032	233,024	164,484	82,490	154,306	258,950	322,785	509,333	1,125,266	894,632

* up to September

Source: Petrobrás

TABLE 16: Petrobrás Refining Structure, 1970-1982

PRODUCTS	1970 (%)	1971 (%)	1972 (%)	1973 (%)	1974 (%)	1975 (%)	1976 (%)	1977 (%)	1978 (%)	1979 (%)	1980 (%)	1981 (%)	1982 * (%)
Gases	ND	2,65	1,90	3,18	3,35	3,50	2,93	2,94	3,36	3,31	3,19	3,48	3,39
L.P.G.	5,85	5,73	5,34	5,64	5,57	6,04	5,93	5,90	6,35	6,42	7,05	7,22	6,93
Light Products	31,92	30,63	31,40	31,43	31,60	31,19	30,44	27,78	27,80	26,57	23,80	25,27	26,52
Medium Products	30,85	28,59	28,91	27,36	27,78	27,81	29,62	31,41	31,77	32,76	36,64	35,96	37,63
Heavy Products	31,38	32,40	32,45	32,39	31,70	31,46	31,08	31,97	30,72	30,94	29,32	28,07	25,53
TOTAL	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00

* January to October

Source: Petrobrás

TABLE 17: Consumer Price of Petroleum Products, 1970-1982
(September 1982 prices)

YEAR	PERIOD IN EFFECT	GASOLINE (A) (1)	GASOLINE (B) (1)	KEROSENE (1)	DIESEL OIL (1)	FUEL OILS (2)	FUEL OILS (3)	L.P.G.
1970	01.01.70/04.30.70	107.49	141.09	96.64	89.41	21.45	-	165.38
	05.01.70/08.31.70	110.54	134.02	98.73	91.83	21.17	-	166.18
	09.01.70/12.28.70	108.80	133.05	98.64	90.55	21.02	-	172.09
	12.29.70/04.29.71	115.73	141.37	104.41	95.86	21.94	-	177.87
1971	04.30.71/08.31.71	124.09	157.49	109.94	103.08	24.11	-	188,02
	09.01.71/12.22.71	108.62	138.95	100.35	90.80	22.61	-	176,63
	12.23.71/05.17.72	120.09	149.47	112.97	101.47	25.18	-	189.43
1972	25.18.72/09.03.72	190.10	136.76	102.97	92.75	22,64	-	172.92
	09.04.72/12.31.72	108.50	134.30	102.61	92.35	21.73	23.99	174.14
1973	01.01.73/04.30.73	105.79	134 69	99.61	89.09	21.18	23.71	168.36
	05.01.73/08.31.73	109.73	141.27	102.33	91.44	21,92	24,43	173.52
	09.01.73/11.14.73	111.57	144.27	103.87	92.74	22,26	24.87	176,83
	11.15.73/12.31.73	121.94	158.57	103.34	92.27	22.14	24,74	175.93
1974	01.01.74/02.15.74	117.42	158.46	98.95	83.10	20.63	24.85	168.15
	02.16.74/03.30.74	131.02	176.16	95.57	80.26	19.93	24.00	175.06
	03.31.74/08.22.74	172.27	237.54	119.20	98.65	25.14	30.17	215,39
	08.23.74/01.10.75	140.86	173.38	93.65	78.17	19.43	23.30	171.47
1975	01.11.75/05.20.75	151.10	199.72	97.99	84.52	20.49	24.61	179.18
	05.21.75/09.18.75	160.08	208.38	102.88	89.01	21.53	25.81	185.79
	09.19.75/10.10.75	155.23	200.53	99.18	84.56	20.66	24.82	177,48
	10.11.75/01.28.76	173.02	215.20	87.68	82.24	20.13	24.19	156.91
1976	01.29.76/02.28.76	181.14	225.55	91.92	86.33	21.76	26.10	161.98
	03.01.76/06.30.76	159.36	198.87	80.87	75.95	19.14	22.96	142.50
	07.01.76/11.30.76	166.66	207.36	83.33	79.49	20.39	24.23	138.24
	12.01.76/02.15.77	155.04	192.18	78.17	76.55	19.67	23.35	132.43
1977	02.16.76/03.31.76	158.61	195.93	75.26	83,97	18.94	22.48	127.51
	04.01.77/05.07.77	172.20	206.64	69.45	77.49	17.48	20.75	129.15
	05.08.77/09.25.77	152.40	182.88	83,82	83.82	19.30	22.61	132.08
	09.26.77/02.19.78	154.35	186.20	85.75	85.75	19.84	23.03	134.75
1978	02.20.78/08.17.78	159.14	194.02	89.38	87.20	20.49	23.54	137.34
	08.12.78/02.09.79	161.28	195.84	90.62	88.32	20.54	23.81	138.24
1979	02.10.79/05.27.79	157.44	205.00	96.76	88.56	22.96	26.24	137.76
	05.28.79/07.29.79	153.00	202.50	94.50	87,00	24.00	30.00	126.00
	07.30.79/09.09.79	139.74	184.95	129.46	119.19	32.88	41.10	115.08
	09.10.79/11.25.79	131.56	197,80	86.94	80.04	22.08	27,66	85.56
	11.26.79/12.09.79	205.66	309.40	135,59	109,20	21,84	27.30	84,63
	12.10.79/12.31.79	153.68	231.20	101,32	81.60	16.32	20.40	63.24
1980	01.01.80/03.18.80	149.16	224.40	98.34	79.20	15.84	19.80	61.38
	03.19.80/04.23.80	166.40	249,60	104.96	76.80	23.04	28.80	68.48
	04.24.80/05.28.80	162.40	243.60	95.12	72.50	26.10	32.48	68.44
	05.29.80/06.25.80	156.00	234.00	85.28	70.20	29.12	36.40	66.30
	06.26.80/07.30.80	169.05	253.82	80,36	73.50	34.30	42.87	72.03
	07.31.80/10.02.80	159.60	239.40	77.28	65.94	36.96	45.99	68.46
	10.03.80/12.03.80	162.00	-	66.24	62.28	37.80	47.16	64.80
	12.04.80/02.03.81	163.20	-	64,00	64.00	38.72	48.32	60,80
1981	02.04.81/02.24.81	162,00	-	59,40	70.20	39.42	49,14	59.40
	02.25.81/04.16.81	162.00	-	71.55	70.20	39.42	49,14	59.40
	04.17.81/06.27.81	165.00	-	82,50	81.25	45.75	57.00	66.00
	06.28.81/07.15.81	165.00	-	72.60	92.40	40.26	50.16	58.08
	07.16.81/10.17.81	142.50	-	81,70	79,80	38.00	47.31	60.80
	10.18.81/02.13.82	144.50	-	86.70	85.00	39.10	48.62	62.90
1982	02.14.81/05.22.82	145.60	-	88.20	86.80	39.20	49.00	63.00
	05.23.82/07.17.82	150.00	-	91.20	90.00	40.32	50.40	64.80
	07.18.82/09.15.82	145.20	-	83.60	82.50	36.96	46,20	59.40
	09.16.82/09.26.82	144.00	-	85.00	84.00	33.60	42.00	60.00
	09.27.82	144.00	-	85,00	84.00	37,50	46.80	60.00

(1) In cruzeiros per liter.
(2) High/Low Pour Point (in cruzeiros per liter).
(3) Low Sulphur Content (in cruzeiros per liter)
Source: Petrobrás.

TABLE 18: World Market Price of Sugar, 1934-1969
(yearly average, raw value)

	(IN US CENTS PER POUND)	(IN US DOLLARS PER POUND)
1934*	0,91	20,06
1935	0,88	19,40
1936	0,88	19,40
1937	1,13	24,91
1938	1,00	22,04
1939	1,43	31,53
1940	1,11	24,47
1941	1,46	32,19
1942	2,69	59,30
1943	2,69	59,30
1944	2,69	59,30
1945	3,14	69,22
1946	4,24	93,48
1947	5,03	110,89
1948	4,23	93,25
1949	4,16	91,71
1950	4,98	109,79
1951	5,67	125,00
1952	4,17	91,93
1953	3,41	75,18
1954	3,26	71,87
1955	3,24	71,43
1956	3,48	76,72
1957	5,16	113,76
1958	3,50	77,16
1959	2,97	65,48
1960	3,14	69,22
1961**	2,70	59,52
1962	2,78	61,29
1963	8,29	182,76
1964	5,72	126,10
1965	2,08	45,86
1966	1,81	39,90
1967	1,92	42,33
1968	1,90	41,89
1969	3,20	70,55

(*) From 1934 to 1960 the prices on the spot market were taken on the basis of FAS-Cuba, as used by the New York stock market.

(**) From 1961 onwards the price in US cents corresponds to the average on the spot market of New York (Contract no. 11) and London (Contract no. 12), calculated by the International Sugar Organization, and known as the International Sugar Agreement Daily Price. From then on the criteria FAS-Cuba was replaced by FOB, stowed, Caribbean Ports.

Source: IAA, Departamento de Exportação

TABLE 19: World Market Price of Sugar[1], 1970-1982
(monthly average, raw value)
(in US cents per pound)

YEAR	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[2]
JANUARY	3.06	4.72	7.90	9.40	15.16	38.31	14.02	8.34	8.77	7.57	17.16	27.78	12.90
FEBRUARY	3.15	4.82	8.19	8.98	21.09	33.98	13.50	8.59	8.48	8.23	22.75	24.09	13.08
MARCH	3.38	4.69	8.40	8.77	21.10	26.40	14.79	8.98	7.74	8.46	19.64	21.81	11.26
APRIL	3.57	4.56	7.08	8.99	21.60	23.90	14.05	10.04	7.59	7.82	21.25	17.83	9.58
MAY	3.61	4.36	6.63	9.35	23.63	17.37	14.54	8.95	7.33	7.85	30.94	15.06	8.11
JUNE	3.69	4.15	6.63	9.38	23.51	13.65	12.99	7.87	7.23	8.14	30.80	16.38	6.84
JULY	3.82	4.17	5.56	9.52	25.03	16.69	13.21	7.39	6.43	8.52	27.70	16.34	7.80
AUGUST	3.81	4.25	6.26	8.97	30.63	18.61	10.02	7.61	7.08	8.85	31.77	14.76	6.77
SEPTEMBER	3.87	3.99	7.07	8.94	34.15	15.50	8.13	7.31	8.17	9.90	34.74	11.65	5.77
OCTOBER	3.93	4.21	7.41	9.51	39.50	14.07	8.03	7.09	8.96	11.94	40.55	12.04	5.93
NOVEMBER	4.09	4.24	7.28	10.14	56.14	13.47	7.88	7.07	8.01	13.68	37.81	11.97	6.52
DECEMBER	4.11	5.78	9.15	11.85	44.88	13.19	7.55	8.09	8.00	14.93	28.79	12.98	6.31
Average for Year	3.68	4.50	7.27	9.45	29.66	20.37	11.51	8.10	7.81	9.65	28.69	16.83	8.40

(1) The International Sugar Agreement Daily Price is the average of the daily spot price for sugar on the New York Coffee and Sugar Market (Contract no. 11) and the London Sugar Market (Contract. no. 12). Both prices were adjusted to FOB and stowed Caribbean port in bulk.

(2) Source: International Sugar Organization, 1982 Statistical Bulletins.

Source: International Sugar Organization, Sugar Yearbooks (except where noted)

TABLE 20: Sugar Exports. Volume and Value

1970-1982

YEAR	METRIC TONS	US$
1970	1,129,848	126,392,839
1971	1,158,814	143,033,065
1972	2,637,522	421,478,224
1973	2,976,614	600,480,655
1974	2,302,262	1,331,424,214
1975	1,729,911	1,052,412,065
1976	1,238,201	309,558,565
1977	2,486,587	452,448,354
1978	1,924,591	332,578,179
1979	1,941,589(2)	376,726,368
1980	2,661,912(1)	1,272,958,747
1981	2,670,048	1,037,713,422
1982	2,788,245	593,726,502

OBS: The conversion in raw value started from 1972.

(1) Includes 37,674 metric tons of Coarse Grain.

(2) Includes 101,873 metric tons of Coarse Grain.

Source: IAA/DEC-SEE.

TABLE 21: Sugar Sector in Brazil, 1935-1982
(in millions of 60 kg sacks)

YEAR	PRODUCTION	EXPORTS	APPARENT CONSUMPTION 2	FINAL STOCK	TRANSFORMED INTO ALCOHOL	VARIATION IN STOCK/ PROD (%)
1935	12.1	1.4	10.2	4.1	-	4.13
1936	11.2	1.3	10.1	3.9	-	- 1.79
1937	10.1	(1)	10.1	3.9	-	0.00
1938	10.9	0.1	10.8	3.7	0.2	- 1.83
1939	13.1	0.8	11.5	4.2	0.3	3.82
1940	14.9	1.1	12.7	4.9	0.4	4.70
1941	14.3	0.4	13.2	5.3	0.3	2.80
1942	13.9	0.8	13.5	4.8	0.1	- 3.60
1943	14.4	0.4	14.0	4.8	(3)	0.00
1944	15.5	1.0	14.5	4.8	-	0.00
1945	15.3	0.3	15.7	4.1	-	- 4.58
1946	18.0	0.2	16.2	5.7	-	8.89
1947	20.4	1.0	17.6	7.5	-	8.82
1948	23.6	5.7	20.2	5.2	-	- 9.79
1949	23.1	0.9	22.0	5.4	(4)	0.87
1950	23.4	0.4	23.2	5.2	-	- 0.85
1951	26.7	0.3	25.9	5.7	-	1.87
1952	29.7	0.7	24.9	9.8	-	13.80
1953	33.3	4.1	28.7	10.3	-	1.50
1954	35.3	2.5	29.1	14.0	-	10.48
1955	34.6	9.7	32.5	6.4	-	-21.97
1956	37.9	0.4	33.6	10.3	-	10.32
1957	45.1	6.8	31.7	16.9	-	14.63
1958	50.1	12.9	37.6	16.5	-	- 0.80
1959	51.8	10.1	37.2	21.0	-	8.69
1960	55.2	14.2	41.3	20.7	-	- 0.54
1961	55.9	12.4	44.2	20.0	-	- 1.25
1962	54.0	8.0	46.8	19.2	-	- 1.48
1963	51.2	8.2	46.1	16.1	-	- 6.05
1964	57.0	4.5	44.5	24.1	-	14.04
1965	77.7	13.8	49.6	38.4	-	18.40
1966	64.7	17.0	46.0	40.1	-	2.63
1967	71.9	16.8	48.8	46.4	-	8.76
1968	70.1	18.3	55.3	42.9	-	-4.99
1969	70.2	18.0	56.7	38.4	-	- 6.41
1970	84.5	19.2	58.8	44.9	-	7.69
1971	84.7	20.7	59.6	49.3	-	5.19
1972	98.7	43.9	63.6	40.5	-	- 8.92
1973	111.4	49.5	68.2	34.2	-	- 5.66
1974	111.1	38.1	72.0	35.2	-	0.90
1975	100.3	28.6	78.5	28.4	-	- 6.78
1976	114.2	20.2	80.0	42.4	-	12.26
1977	138.4	40.3	79.2	61.3	-	13.66
1978	124.6	31.1	82.5	72.3	-	8.83
1979	116.2	31.6	94.1	62.8	-	- 8.18
1980	130.8	42.8	98.2	52.6	-	- 7.80
1981	137.6	43.0	92.0	55.1	-	1.82
1982	141.5	44.5	95.6	56.5	-	0.99

(1) Exports in this year were 1969 60 kg sacks of sugar.
(2) Apparent consumption, or "output from the usinas for consumption" is understood by the IAA as total production less exports and variation in stocks.
(3) In 1943 42,932 60 kg sacks of sugar were transformed into alcohol.
(4) In 1948 11,440 60 kg sacks of sugar were transformed into alcohol.
Source: IAA, CODEPLAN-DES.

TABLE 22: Uses of Surplus Sugar, by Year, 1935-1949

(in 60 kg sacks)

YEAR	PRODUCTION (A)	APPARENT CONSUMPTION (1) (B)	EXPORTS (C)	SUGAR TRANSFORMED INTO ALCOHOL (D)	VARIATION IN STOCKS (E)	$\frac{C}{A-B}$ (%)	$\frac{D}{A-B}$ (%)	$\frac{E}{A-B}$ (%)
1935	12,154,849	10,173,966	1,440,492	-	540,361	72.7	-	27.3
1936	11,198,629	10,073,572	1,318,250	-	-193,193	117.2	-	-17.2
1937	10,073,313	10,074,906	1,969	-	3,562	(2)-123.6	-	-(2)
1938	10,925,453	10,790,390	128,811	198,934	-192,682	95.4	147.3	-142.7
1939	13,093,034	11,552,107	781,585	295,768	463,574	50.7	19.2	30.1
1940	14,891,868	12,660,358	1,100,318	419,909	711,283	49.3	18.8	31.9
1941	14,244,478	13,195,377	413,784	272,481	362,836	39.4	26.0	34.6
1942	13,866,959	13,470,655	764,648	70,679	-439,023	192.9	17.8	-110.7
1943	14,408,018	14,000,674	386,202	42,932	- 21,790	94.8	10.5	-5.3
1944	15,555,602	14,537,208	963,148	-	55,246	94.6	-	5.4
1945	15,334,565	15,742,112	313,227	-	-720,774	(2) -76.8	-	(2)
1946	17,940,397	16,180,644	170,583	-	1,589,170	9.7	-	90.3
1947	20,424,559	17,580,965	1,019,877	-	1,823,717	35.9	-	64.1
1948	23,502,697	20,195,032	5,692,791	-	-2,385,126	172.1	-	- 72.1
1949	23,180,499	21,962,220	941,990	11,440	264,849	77.3	0.9	21.8

(1) Apparent consumption or "issued from usinas for consumption" is understood by the IAA to be total production minus exports and variation in stocks.

(2) In 1937 and 1945 current surplus sugar production was negative. The calculation of the various uses of this surplus is therefore devoid of meaning.

Source: IAA, CODEPLAN-DES.

TABLE 23: Sugar Cane Crop - Indicators , 1973-1982

	AREA HARVESTED (hectare)	PRODUCTION (tons)	YIELD (tons/hectare)
1973(1)	1,958,776	91,994,024	47.0
1974(1)	2,056,691	95,623,685	46.5
1975(1)	1,969,227	91,524,559	46.5
1976(1)	2,093,483	103,173,449	49.3
1977(1)	2,270,036	120,081,700	52.9
1978(1)	2,391,455	129,144.950	54.0
1979(1)	2,536,976	128,898,882	54.7
1980(1)	2,607,628	148,650,563	57.0
1981(2)	2,803,074	153,779,347	NA(*)
1982(3)	2,882,957	167,951,188	NA(*)

* NA= non available

(1) Source: IBGE/SEPLAN, Produção Agrícola Municipal.

(2) Source: IBGE/CEPAGRO, Levantamento Sistemático da Produção Agrícola.

(3) EstimatedValues. Source: IBGE/CEPAGRO, Levantamento Sistemático da Produção Agrícola.

TABLE 24 : Sugar-Cane Crop - Yield by Region, 1973-1980
(tons per hectare)

	North (1)	Northeast (2)	Southeast (3)	South (4)	Center-West (5)
1973	26.1	45.9	49.3	37.8	44.0
1974	31.8	45.2	48.1	41.6	41.7
1975	29.6	44.7	49.0	38.6	38.9
1976	28.3	44.3	54.5	40.7	39.8
1977	44.1	47.6	57.9	47.3	42.0
1978	53.4	47.8	59.5	45.5	53.6
1979	39.4	48.4	60.4	48.9	48.9
1980	46.6	46.7	64.5	57.5	54.7

(1) Rondônia, Acre, Amazonas, Roraima, Pará, Amapá

(2) Maranhão, Piauí, Ceará, R.G.do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia

(3) Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo

(4) Paraná, Santa Catarina, R.G.do Sul

(5) Mato Grosso, Goiás, Distrito Federal,Mato Grosso do Sul

Source : IBGE/SEPLAN, Produção Agrícola Municipal

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83
(by origin and end use)
(in tons)

harvest of 1970/71

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	8,097,156	10,533,798	18,630,954	-
Pará	-	-	-	-
Maranhão	846	-	846	-
Piauí	16,514	-	16,514	-
Ceará	43,868	70,341	114,209	-
Rio Grande do Norte	103,636	177,314	281,550	-
Paraíba	368,237	420,943	789,180	-
Pernambuco	3,954,993	6,094,107	10,049,100	-
Alagoas	2,947,494	3,302,200	6,249,694	-
Sergipe	189,352	374,638	563,990	-
Bahia	472,216	93,655	565,871	-
CENTER-SOUTH	21,600,759	16,845,698	37,106,131	1,340,326
Minas Gerais	1,578,841	775,880	2,354.721	-
Espírito Santo	137,734	170,773	308,507	-
Rio de Janeiro	2,314,491	3,083,595	5,398,086	-
São Paulo	16,520,686	11,509,612	26,703,404	1,326,894
Paraná	779,766	905,014	1,671,348	13,432
Santa Catarina	136,928	226,870	363,798	-
Rio Grande do Sul	8,115	126,898	135,013	-
Mato Grosso	19,199	20,564	39,763	-
Goiás	104,999	26,492	131,491	-
BRAZIL	29,697,915	27,379,496	55,737,085	1,340,326

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83
(by origin and end use) (Cont.)
(in tons)

harvest of 1971/1972

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	9,515,170	11,698,437	21,213,607	-
Pará	-	-	-	-
Maranhão	51,119	-	51,119	-
Piauí	27,920	7,588	35,508	-
Ceará	130,360	35,400	165,760	-
Rio Grande do Norte	138,291	239,968	378,259	-
Paraíba	570,578	507,817	1,078,395	-
Pernambuco	4,723,163	7,134,833	11,857,996	-
Alagoas	3,204,199	3,283,155	6,487,354	-
Sergipe	180,684	329,571	510,255	-
Bahia	488,856	160,105	648,961	-
CENTER-SOUTH	21,610,703	17,710,833	37,712,012	1,609,524
Minas Gerais	1,651,403	807,271	2,458,674	-
Espírito Santo	99,885	147,735	247,620	-
Rio de Janeiro	1,966,967	3,094,062	5,061,029	-
São Paulo	16,753,235	12,228,985	27,379,135	1,603,085
Paraná	780,846	983,568	1,758,828	5,586
Santa Catarina	120,040	237,811	357,851	-
Rio Grande do Sul	11,243	169,055	180,298	-
Mato Grosso	22,375	33,309	54,831	853
Goiás	204,709	9,037	213,746	-
BRAZIL	31,125,873	24,409,270	58,925,619	1,609,524

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83
(by origin and end use) (Cont.)
(in tons)

harvest of 1972/73

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	10,165,121	13,759,399	23,924,520	-
Pará	-	-	-	-
Maranhão	21,045	-	31,045	-
Piauí	29,701	13,455	43,156	-
Ceará	92,911	77,578	170,489	-
Rio Grande do Norte	126,452	247,778	374,230	-
Paraíba	562,395	721,077	1,283,472	-
Pernambuco	4,817,546	8,218,530	13,036,076	-
Alagoas	3,813,398	3,959,435	7,772,833	-
Sergipe	209,241	356,508	565,749	-
Bahia	482,432	165,038	647,470	-
CENTER-SOUTH	23,635,987	20,309,551	42,564,404	1,381,134
Minas Gerais	1,983,212	1,061,109	3,040,601	3,720
Espírito Santo	92,230	213,784	306,014	-
Rio de Janeiro	2,248,101	4,022,728	6,270,627	202
São Paulo	18,230,877	13,507,090	30,365,571	1,372,396
Paraná	750,531	1,104,058	1,849,773	4,816
Santa Catarina	134,154	251,975	386,129	-
Rio Grande do Sul	11,020	117,900	128,920	-
Mato Grosso	9,480	25,736	35,216	-
Goiás	176,382	5,171	181,553	-
BRAZIL	33,801,108	34,068,950	66,488,924	1,381,134

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83
(by origin and end use) (Cont.)
(in tons)

harvest of 1973/74

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	9,490,480	15,473,988	24,964,468	-
Pará	-	-	-	-
Maranhão	17,804	-	17,804	-
Piauí	31,760	20,176	51,936	-
Ceará	78,682	86,962	165,644	-
Rio Grande do Norte	127,954	213,301	341,255	-
Paraíba	429,743	829,823	1,259,566	-
Pernambuco	4,235,245	9,009,083	13,244,328	-
Alagoas	3,923,167	4,867,427	8,790,594	-
Sergipe	233,433	315,329	548,762	-
Bahia	412,692	131,887	544,579	-
CENTER-SOUTH	28,623,259	22,251,071	50,842,960	31,370
Minas Gerais	2,099,400	1,334,107	3,431,882	1,625
Espírito Santo	197,566	274,917	472,483	-
Rio de Janeiro	2,549,094	4,323,931	6,873,025	-
São Paulo	22,689,311	14,754,721	37,416,287	27,745
Paraná	726,982	1,159,374	1,884,356	2,000
Santa Catarina	200,447	215,549	415,996	-
Rio Grande do Sul	8,958	77,569	86,527	-
Mato Grosso	13,465	47,079	60,544	-
Goiás	138,036	63,824	201,860	-
BRAZIL	38,113,739	37,725,059	75,807,428	31,370

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83
(by origin and end use) (Cont.)
(in tons)

harvest of 1974/75

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	10,788,191	16,930,725	27,718,916	-
Pará	1,429	6,929	8,358	-
Maranhão	12,086	-	12,086	-
Piauí	52,128	22,853	74,981	-
Ceará	85,607	53,483	139,090	-
Rio Grande do Norte	182,149	222,642	404,791	-
Paraíba	675,017	654,216	1,329,233	-
Pernambuco	4,272,788	9,286,264	13,559,052	-
Alagoas	4,805,189	6,217,118	11,022,307	-
Sergipe	318,762	355,960	674,722	-
Bahia	383,036	111,260	494,296	-
CENTER-SOUTH	28,524,565	18,265,162	46,735,833	53,894
Minas Gerais	2,382,593	895,595	3,278,188	-
Espírito Santo	174,656	192,015	366,671	-
Rio de Janeiro	2,329,393	3,236,680	5,566,073	-
São Paulo	21,885,865	12,993,276	34,834,439	44,702
Paraná	1,192,780	723,745	1,907,333	9,192
Santa Catarina	217,905	141,258	359,163	-
Rio Grande do Sul	8,840	58,185	67,025	-
Mato Grosso	63,283	19,505	82,788	-
Goiás	269,250	4,903	274,153	-
BRAZIL	39,312,756	35,195,887	74,454,749	53,894

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83 (by origin and end use) (Cont.) (in tons)

harvest of 1975/76

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	10,277,995	15,322,664	25,600,659	-
Pará	11,516	35,053	46,569	-
Maranhão	-	-	-	-
Piauí	63,364	28,217	91,581	-
Ceará	109,396	100,372	209,768	-
Rio Grande do Norte	225,830	267,170	493,000	-
Paraíba	601,145	528,312	1,129,457	-
Pernambuco	3,998,530	8,761,344	12,749,874	-
Alagoas	4,518,765	5,219,326	9,738,091	-
Sergipe	359,863	278,690	638,553	-
Bahia	399,586	104,180	503,766	-
CENTER-SOUTH	28,915,887	15,806,073	42,721,960	-
Minas Gerais	2,124,219	722,962	2,847,181	-
Espírito Santo	250,837	205,020	455,857	-
Rio de Janeiro	2,706,260	3,677,993	6,384,253	-
São Paulo	20,016,297	10,401,155	30,417,452	-
Paraná	1,260,501	645,033	1,905,534	-
Santa Catarina	256,186	73,814	330,000	-
Rio Grande do Sul	10,893	54,709	65,602	-
Mato Grosso	49,071	16,855	65,926	-
Goiás	241,623	8,532	250,155	-
BRAZIL	37,193,882	31,128,737	68,322,619	-

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25: Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83 (by origin and end use) (Cont.) (in tons)

harvest of 1976/77

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	12,696,199	21,834,743	34,530,942	-
Pará	-	-	-	-
Maranhão	-	69,736	69,736	-
Piauí	24,844	22,926	47,770	-
Ceará	92,597	174,122	266,719	-
Rio Grande do Norte	324,914	400,746	725,660	-
Paraíba	739,892	837,533	1,577,425	-
Pernambuco	4,575,452	11,319,947	15,895,399	-
Alagoas	6,094,600	8,403,126	14,497,726	-
Sergipe	403,013	420,269	823,282	-
Bahia	440,887	186,338	627,225	-
CENTER-SOUTH	32,225,380	21,070,342	53,052,853	242,869
Minas Gerais	2,312,998	916,958	3,229,956	-
Espírito Santo	204,011	226,270	430,281	-
Rio de Janeiro	2,042,339	3,311,405	5,300,669	53,075
São Paulo	25,629,896	15,671,889	41,111,991	189,794
Paraná	1,488,604	812,387	2,300,991	-
Santa Catarina	236,711	49,837	286,548	-
Rio Grande do Sul	16,041	56,702	72,743	-
Mato Grosso	59,754	15,809	75,563	-
Goiás	235,026	9,085	244,111	-
BRAZIL	44,921,579	42,905,085	87,583,795	242,869

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83 (by origin and end use) (Cont.)
(in tons)

harvest of 1977/78

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	13,290,413	22,392,638	35,683,051	-
Pará	151	88,632	88,783	-
Maranhão	-	138,534	138,534	-
Piauí	11,912	33,453	45,365	-
Ceará	177,790	257,496	435,286	-
Rio Grande do Norte	374,455	521,631	896,086	-
Paraíba	669,708	1,080,812	1,750,520	-
Pernambuco	4,669,725	11,488,192	16,157,917	-
Alagoas	6,518,711	8,072,317	14,591,028	-
Sergipe	443,999	515,855	959,854	-
Bahia	423,962	195,716	619,678	-
CENTER-SOUTH	40,825,824	28,125,460	65,493,574	3,457.170
Minas Gerais	2,985,972	1,682,164	4,667,188	948
Espírito Santo	211,370	311,050	522,420	-
Rio de Janeiro	2,785,078	4,781,374	7,401,417	165,035
São Paulo	32,445,860	20,320,495	49,481,083	3,285,272
Paraná	1,737,787	803,416	2,535,288	5,915
Santa Catarina	266,119	83,571	349,690	-
Rio Grande do Sul	15,196	113,236	128,432	-
Mato Grosso	71,560	20,141	91,701	-
Goiás	306,342	10,013	316,355	-
BRAZIL	54,115,697	50,518,098	101,176625	3,457,170

Source: IAA/DEP-Serviço de Estatística e Cadastro

TABLE 25: Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83 (by origin and end use) (Cont.) (in tons)

harvest of 1978/79

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	13,022,701	23,146,765	35,067,522	1,101,944
Pará	-	106,118	106,118	-
Maranhão	5,166	164,127	169,293	-
Piauí	14,916	30,338	45,254	-
Ceará	136,125	340,862	476,987	-
Rio Grande do Norte	448,706	620,344	1,061,516	7,534
Paraíba	739,398	1,114,873	1,805,810	48,461
Pernambuco	4,712,436	11,793,140	16,144,618	360,958
Alagoas	6,173,741	8,370,997	13,864,120	680,618
Sergipe	491,330	464,191	951,148	4,373
Bahia	300,883	141,775	442,658	-
CENTER-SOUTH	42,991,031	28,465,880	57,345,364	14,111,547
Minas Gerais	3,102,264	1,622,317	4,373,275	351,306
Espírito Santo	212,602	301,726	514,328	-
Rio de Janeiro	2,748,240	4,722,020	6,839,723	630,537
Paraná	34,056,669	20,728,995	41,726,424	13,059,240
Santa Catarina	2,166,423	815,897	2,911,856	70,464
Rio Grande do Sul	340,730	97,381	438,111	-
Mato Grosso	99,367	80,850	180,217	-
Goiás	245,000	9,961	254,961	-
BRAZIL	56,013,732	51,612,645	92,412,886	15,213,491(1)

Source: IAA/DEP-Serviço de Estatística e Cadastro

(1) Excluding 2,087,726 tons of milled cane for alcohol in the autonomous distilleries.

TABLE 25: Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83 (by origin and end use) (Cont.)
(in tons)

harvest of 1979/80

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	13,833,719	21,390,460	30,965,977	4,258,202
Pará	-	108,168	108,168	-
Maranhão	-	171,692	171,692	-
Piauí	8,333	28,840	37,173	-
Ceará	151,461	315,262	466,723	-
Rio Grande do Norte	447,243	566,706	892,307	121,642
Paraíba	708,301	964,746	1,544,924	128,123
Pernambuco	4,737,528	11,050,612	14,144,784	1,643,356
Alagoas	6,911,049	7,688,205	12,234,173	2,365,081
Sergipe	564,140	400,873	965,013	-
Bahia	305,664	95,356	401,020	-
CENTER-SOUTH	45,539,459	31,884,785	53,750,654	23,673,590
Minas Gerais	3,360,949	2,474,302	5,249,076	586,175
Espírito Santo	256,669	382,354	639,023	-
Rio de Janeiro	2,663,916	4,343,560	6,190,499	816,977
São Paulo	36,319,208	23,470,456	37,849,494	21,940,170
Paraná	2,000,743	897,542	2,633,148	256,137
Santa Catarina	397,977	120,052	518,029	-
Rio Grande do Sul	14,142	74,613	88,755	-
Mato Grosso	178,739	113,444	292,183	-
Goiás	347,116	8,462	290,447	65,131
BRAZIL	59,373,178	53,275,245	84,716,631	27,931,792(1)

Source: IAA/DEP-Serviço de Estatística e Cadastro.
(1) Excluding 4,673,983 tons of milled cane for alcohol in the autonomous distilleries.

TABLE 25: Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83 (by origin and end use) (Cont.)

harvest of 1980/81

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	17,031,838	23,216,651	34,881,671	5,366,818(1)
Pará	-	135,741	135,741	-
Maranhão	-	189,449	189,449	-
Piauí	10,537	29,701	40,238	-
Ceará	153,654	271,231	424,885	-
Rio Grande do Norte	567,032	631,603	929,969	268,666
Paraíba	746,526	935,817	1,574,269	108,074
Pernambuco	5,657,650	11,539,637	15,443,659	1,753,628
Alagoas	8,841,911	8,826,077	14,431,538	3,236,450
Sergipe	614,473	538,749	1,153,222	-
Bahia	440,055	118,646	558,701	-
CENTER-SOUTH	48,263,358	35,168,750	59,368,061	24,064,047(2)
Minas Gerais	3,232,155	2,701,918	5,052,700	881,373
Espírito Santo	255,582	431,570	687,152	-
Rio de Janeiro	2,590,137	3,848,958	5,288,758	1,150,337
São Paulo	39,214,651	26,752,699	44,518,531	21,448,819
Paraná	2,150,568	1,118,546	2,855,153	413,961
Santa Catarina	308,869	84,104	392,973	-
Rio Grande do Sul	18,445	110,445	126,820	2,070
Mato Grosso	188,092	114,664	195,042	107,714
Goiás	304,859	5,846	250,932	59,773
BRAZIL	65,295,196	58,385,401	94,249,732	29,430,865(3)

Source: IAA/DEP-Serviço de Estatística e Cadastro.

(1) Excluding 3,795,999 tons of milled cane for alcohol in the autonomous distilleries.

(2) Excluding 4,586,136 tons of milled cane for alcohol in the autonomous distilleries.

(3) Excluding 8,382,135 tons of milled cane for alcohol in the autonomous distilleries.

TABLE 25: Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83 (by origin and end use) (Cont.)

harvest of 1981/82

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	18,125,102	23,660,004	32,693,927	9,091,179
Amazonas	25,459	-	-	25,459
Pará	-	103,394	103,394	-
Maranhão	27,283	221,791	184,190	64,884
Piauí	45,048	18,051	22,717	40,382
Ceará	199,517	261,420	326,321	134,616
Rio Grande do Norte	598,017	607,133	684,868	520,282
Paraíba	808,068	1,666,215	1,436,027	1,038,256
Pernambuco	5,778,360	10,341,371	13,830,869	2,288,862
Alagoas	9,605,455	9,725,339	14,408,130	4,922,664
Sergipe	504,346	620,566	1,124,912	-
Bahia	533,549	94,724	572,499	55,774
CENTER-SOUTH	55,434,717	36,066,174	58,387,437	33,113,454
Minas Gerais	3,078,803	3,032,022	4,744,142	1,366,683
Espírito Santo	228,385	409,349	637,734	-
Rio de Janeiro	3,051,584	4,039,865	5,422,531	1,668,918
São Paulo	44,256,744	26,512,891	43,794,644	26,974,991
Paraná	3,306,149	1,392,161	2,745,202	1,953,108
Santa Catarina	440,446	88,960	529,406	-
Rio Grande do Sul	19,249	99,804	98,060	20,993
Mato Grosso do Sul	421,355	377,892	-	799,247
Mato Grosso	202,828	99,540	209,637	92,731
Goiás	429,174	13,690	206,081	236,783
BRAZIL	73,559,819	59,726,178	91,081,364	42,204,633

Source: IAA/DEP-Serviço de Estatística e Cadastro.

TABLE 25 : Milled Cane Production in Brazil: Production of State per Harvest, 1970/71 to 1982/83
(by origin and end use)
(in tons)

harvest of 1982/83

REGIONS AND STATES	ORIGIN		END-USE	
	OWN	SUPPLIER	SUGAR	ALCOHOL
NORTH-NORTHEAST	22,658,644	27,547,323	36,661,001	13,544,966
Amazonas	27,788	-	-	27,788
Pará	16,289	170,475	131,146	55,618
Maranhão	17,945	328,062	234,815	111,192
Piauí	84,589	20,457	24,435	80,611
Ceará	194,336	370,413	445,755	118,994
Rio Grande do Norte	1,007,442	1,126,951	1,240,096	894,297
Paraíba	1,410,802	2,767,611	1,946,681	2,231,732
Pernambuco	7,347,875	11,545,538	15,800,871	3,092,542
Alagoas	11,407,965	10,562,583	15,199,298	6,771,250
Sergipe	526,117	543,093	939,211	129,999
Bahia	617,496	112,040	698,693	30,943
CENTER-SOUTH	70,809,504	45,640,772	65,320,070	51,130,206
Minas Gerais	4,668,535	2,249,984	5,263,056	1,655,463
Espírito Santo	447,042	818,926	794,324	471,644
Rio de Janeiro	3,594,837	4,937,238	6,583,779	1,948,296
São Paulo	55,942,987	34,946,446	49,094,210	41,795,223
Paraná	4,178,595	2,104,963	2,806,756	3,476,802
Santa Catarina	303,865	44,147	334,334	13,678
Rio Grande do Sul	25,538	81,525	85,050	20,013
Mato Grosso do Sul	709,107	218,819	-	927,926
Mato Grosso	299,881	79,455	270,702	108,634
Goiás	639,117	159,269	87,859	710,527
BRAZIL	93,468,148	73,188,095	101,981,071	64,675,172

TABLE 26: Alcohol Production in Brazil by Calendar Year and Type, 1930-1982 (in millions of liters)

	TOTAL	ANHYDROUS	HYDRATED
1930	48.9	-	48.9
1931	43.8	-	43.8
1932	63.3	-	63.3
1933	55.1	0.1	55.0
1934	53.3	0.9	52.4
1935	51.3	5.4	45.9
1936	65.8	18.5	47.3
1937	59.1	16.4	42.7
1938	81.0	31.9	49.1
1939	96.7	38.2	58.5
1940	116.5	53.5	63.0
1941	133.2	76.6	56.6
1942	147.6	82.2	65.4
1943	121.5	50.2	71.3
1944	122.5	41.0	81.5
1945	108.5	22.8	85.7
1946	116.6	30.2	86.4
1947	126.5	50.5	76.0
1948	154.8	65.4	89.4
1949	155.7	56.9	98.8
1950	135.2	18.6	116.6
1951	168.0	38.0	130.0
1952	204.0	71.6	132.4
1953	269.0	137.2	131.8
1954	304.1	163.4	140.7
1955	290.3	177.8	112.5
1956	241.3	97.4	143.9
1957	367.4	214.0	153.4
1958	435.3	280.5	154.8
1959	480.9	341.5	139.4
1960	476.3	188.6	287.7
1961	419.5	181.5	238.0
1962	382.6	132.4	250.2
1963	387.5	111.2	276.3
1964	375.6	62.2	313.4
1965	559.1	305.9	253.2
1966	674.8	362.0	312.8
1967	765.7	432.6	333.1
1968	499.2	171.1	328.1
1969	459.7	98.4	361.3
1970	625.3	233.0	392.3
1971	624.7	394.5	230.2
1972	684.0	399.3	284.7
1973	652.8	319.7	333.1
1974	614.9	215.1	399.8
1975	580.1	220.3	359.8
1976	642.1	272.3	369.8
1977	1,387.6	1,087.9	299.7
1978	2,359.1	1,959.9	399.2
1979	3,448.3	2,830.0	618.2
1980	3,676.1	2,171.5	1,504.7
1981	4,206.7	1,347.6	2,859.1
1982	5,618.2	3,527.4	2,090.7

Source: IAA, CODEPLAN-DES.

TABLE 27: Alcohol Production in Brazil by Harvest, 1930/31 to 1982/83

(in millions of liters)

	TOTAL	ANHYDROUS	HYDRATED
1930/31	33.3	-	33.3
1931/32	37.4	-	37.4
1932/33	39.0	-	39.0
1933/34	43.4	0.1	43.3
1934/35	47.2	3.2	44.0
1935/36	62.0	7.7	54.3
1936/37	57.4	14.1	43.3
1937/38	63.9	20.6	43.2
1938/39	92.3	36.5	55.8
1939/40	93.7	31.5	62.2
1940/41	126.6	67.6	59.0
1941/42	128.6	70.6	57.9
1942/43	151.7	76.9	74.8
1943/44	125.0	46.6	78.3
1944/45	119.8	30.4	89.3
1945/46	106.5	26.1	80.4
1946/47	117.0	36.1	80.9
1947/48	143.8	61.5	82.3
1948/49	167.3	75.1	92.2
1949/50	135.6	30.6	105.0
1950/51	140.1	28.4	111.7
1951/52	170.4	50.0	122.4
1952/53	229.5	99.1	130.4
1953/54	274.0	144.5	129.5
1954/55	306.2	168.5	137.7
1955/56	283.2	165.8	117.3
1956/57	252.4	104.4	148.0
1957/58	398.8	245.1	153.7
1958/59	444.2	281.7	162.5
1959/60	472.0	302.1	170.0
1960/61	456.3	175.3	281.0
1961/62	427.5	206.2	221.3
1962/63	343.7	101.1	242.6
1963/64	405.5	96.1	309.4
1964/65	387.0	110.2	276.7
1965/66	602.7	336.3	266.4
1966/67	727.5	382.1	345.3
1967/68	676.3	358.5	317.8
1968/69	473.6	143.3	330.3
1969/70	461.6	100.4	361.2
1970/71	637.2	252.4	384.8
1971/72	613.1	389.9	223.1
1972/73	681.0	388.9	292.0
1973/74	660.0	306.2	359.8
1974/75	625.0	216.5	408.4
1975/76	555.6	232.6	323.0
1976/77	664.0	300.3	363.7
1977/78	1,470.4	1,176.9	293.4
1978/79	2,490,6	2,095.6	395.0
1979/80	3,396.4	2,713.4	683.1
1980/81	3,706.4	2,104.0	1,602.3
1981/82	4,240.1	1,453.1	2,787.0
1982/83	5,823.3	3,549.7	2,273.6

Source: IAA, CODEPLAN-DES.

TABLE 28: Anhydrous Alcohol Production in Brazil, by State Distilleries and Year, 1933-1940
(in liters)

STATES	DISTILLERIES	1933	1934	1935	1936	1937	1938	1939	1940
PARAÍBA	Dis. Mandacaru	-	-	-	191,928	-	-	-	-
	SUBTOTAL	-	-	-	191,928	-	-	-	-
PERNAMBUCO	Catende	-	-	-	2,172,252	1,449,915	4,653,067	4,480,169	4,884,849
	Central Barreiros	-	22,615	1,054,548	1,103,161	999,019	1,559,290	1,639,310	1,197,250
	Cucaú	-	-	-	-	-	-	-	398,150
	Dist.C.Pres. Vargas	-	-	-	-	-	-	-	3,994,278
	Dist. Prod.Pernambuco	-	-	748,567	3,288,547	255,150	1,357,781	3,779,825	2,575,154
	N.S.das Maravilhas	-	-	-	-	-	-	-	512,095
	Santa Terezinha	-	-	-	2,248,480	2,191,661	3,755,607	2,615,918	3,669,313
	Timbó Assu	-	-	-	222,910	290,150	504,660	377,450	777,730
	SUBTOTAL	-	22,615	1,803,115	9,035,350	5,185,895	11,830,405	12,892,672	18,008,819
ALAGOAS	Brasileiro	-	-	-	-	-	-	-	788,954
	Central Leão	-	187,722	952,132	894,189	1,221,302	2,245,142	2,488,235	2,556,228
	Serra Grande	-	-	-	-	-	-	-	731,190
	SUBTOTAL	-	187,722	952,132	894,189	1,221,302	2,245,142	2,488,235	4,076,372
ESPÍRITO SANTO	Paineiras	-	-	-	-	-	-	127,817	
	SUBTOTAL	-	-	-	-	-	-	127,817	-
RIO DE JANEIRO	Conceição de Macabu	-	203,158	442,541	-	-	-	130,111	188,734
	Cupim	-	-	15,100	740,200	653,735	938,220	965,900	2,145,000
	Dist.Cent.Est. do Rio	-	-	-	-	-	3,811,897	9,530,508	4,120,258
	Laranjeiras	-	-	-	-	-	-	85,000	-
	Outeiro	-	-	329,437	909,903	605,580	1,009,549	116,139	541,678
	Queimado	-	-	-	1,033,880	1,254,990	383,200	147,461	-
	Quissaman	-	-	-	-	-	-	-	789,647
	Santa Cruz	-	-	-	1,127,296	2,701,468	3,110,088	2,529,622	3,058,435
	São José	-	-	-	-	539,868	4,043,910	2,654,798	4,831,021
	SUBTOTAL	-	203,158	787,078	3,811,279	5,835,641	13,296,884	16,159,539	15,674,733
DISTRITO FEDERAL	Usinas Nacionais	-	16,996	70,267	23,094	-	-	-	-
	SUBTOTAL	-	16,966	70,267	23,094	-	-	-	-
SÃO PAULO	Amália	-	-	-	-	-	-	-	662,365
	Ester	-	-	-	-	-	-	245,265	810,745
	Itaiquara	-	-	295,695	239,652	218,026	270,705	404,813	606,654
	Itaquerê	-	-	-	-	-	-	-	-
	Junqueira	-	-	-	-	-	665,943	353,856	593,250
	Monte Alegre	-	-	701,101	469,352	1,538,096	969,812	1,407,208	2,944,259
	Piracicaba	100,000	481,400	342,200	666,800	468,400	838,951	670,813	1,086,500
	Porto Feliz	-	-	-	802,400	450,800	590,600	407,800	1,627,500
	Santa Bárbara	-	-	71,370	778,780	378,750	486,600	344,000	709,000
	Tamoio	-	-	-	-	-	-	1,486,150	2,194,200
	Vassununga	-	-	106,871	67,264	160,871	173,812	13,752	288,305
	Vila Raffard	-	-	275,600	1,028,000	403,000	194,000	456,100	2,531,700
	Dist. Iracema	-	-	-	-	-	252,600	658,528	1,138,000
	SUBTOTAL	100,000	481,400	1,798,837	4,052,248	3,617,943	4,443,053	6,448,285	15,192,588
MINAS GERAIS	Rio Branco	-	-	-	454,344	537,000	104,450	54,954	520,981
	SUBTOTAL	-	-	-	454,344	537,000	104,450	54,954	520,981
	TOTAL	100,000	911,861	5,411,429	18,462,432	16,397,781	31,919,934	38,171,502	53,473,533

Source: IAA, from Melo, 1942

TABLE 29: Alcohol Production in Brazil, by Harvest, State and Type, 1949/50 to 1982/83 (in million liters)

STATE	49/50			50/51			51/52			52/53			53/54		
	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL
PA	-	-	-	0.05	-	0.05	0.01	-	0.01	-	-	-	0.02	-	0.02
MA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CE	0.1	-	0.1	0.02	-	0.02	-	-	-	0.1	-	0.1	0.02	-	0.02
RN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PB	1.9	-	1.9	1.9	-	1.9	1.9	-	1.9	2.2	-	2.2	0.7	0.9	1.6
PE	29.3	12.3	41.6	26.5	15.8	42.3	20.9	34.1	55.0	20.4	56.2	76.6	19.7	57.3	77.0
AL	4.1	2.0	6.1	4.9	2.6	7.5	4.1	1.9	6.0	6.9	2.7	9.6	4.2	3.9	8.1
SE	0.4	-	0.4	0.3	-	0.3	0.4	-	0.4	0.2	-	0.2	0.2	-	0.2
BA	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	0.3
MG	4.4	0.04	4.4	4.8	-	4.8	8.6	-	8.6	6.2	1.6	7.8	5.8	2.7	8.5
ES	0.3	-	0.3	0.08	-	0.08	0.9	-	0.9	0.8	-	0.8	0.6	-	0.6
RJ	24.1	9.4	33.5	21.4	5.1	26.5	21.7	6.9	28.6	16.0	25.7	41.7	16.4	28.3	44.7
SP	37.2	6.0	43.2	46.2	4.9	51.1	58.5	5.1	63.6	71.6	12.6	84.2	78.5	50.0	128.5
PR	2.1	0.8	2.9	4.3	-	4.3	4.2	-	4.2	4.5	0.3	4.8	2.1	1.1	3.2
SC	0.5	-	0.5	0.8	-	0.8	0.7	-	0.7	0.9	-	0.9	1.1	-	1.1
RS	0.2	-	0.2	0.2	-	0.2	0.2	-	0.2	-	-	-	-	-	-
MT	0.08	-	0.08	0.05	-	0.05	0.07	-	0.07	0.1	-	0.1	0.7	-	0.7
GO	0.08	-	0.08	0.07	-	0.07	0.09	-	0.09	0.1	-	0.1	0.2	-	0.2
TOTAL	105.0	30.5	135.6	111.5	28.4	139.9	122.2	48.0	170.2	130.0	99.1	229.1	130.0	144.5	274.5

Source: IAA, Anuário Açucareiro.
IAA, CODEPLAN-DES, Boletim Estatístico do Álcool.

TABLE 29: Alcohol Production in Brazil, by Harvest, State and Type, 1949/50 to 1982/83 (Cont.)
(in million liters)

STATE	54/55			55/56			56/57			57/58			58/59		
	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL
PA	0.01	-	0.01	0.01	-	0.01	-	-	-	0.01	-	0.01	0.02	-	0.02
MA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RN	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	0.02
PB	0.8	1.0	1.8	1.3	1.3	2.6	1.7	1.6	3.3	1.7	1.7	3.4	2.3	1.7	4.0
PE	13.2	58.1	71.3	15.3	64.6	79.9	18.3	79.6	97.9	20.1	80.6	100.7	28.2	69.4	97.6
AL	2.7	4.7	7.4	4.7	5.1	9.8	6.7	3.8	10.5	6.2	3.6	9.8	79.4	3.2	82.6
SE	0.3	-	0.3	0.3	0.5	0.8	0.1	0.6	0.7	0.1	0.6	0.7	0.2	0.2	0.4
BA	-	0.4	0.4	-	0.8	0.8	-	-	-	-	0.6	0.6	-	-	-
MG	6.9	1.5	8.4	5.8	3.1	8.9	4.5	1.2	5.7	6.3	4.5	10.8	7.5	5.2	12.7
ES	0.6	-	0.6	0.6	-	0.6	0.5	-	0.5	0.1	-	0.1	0.6	-	0.6
RJ	18.3	21.3	35.6	21.1	20.5	41.6	23.4	7.4	30.8	16.6	40.1	56.7	14.6	47.6	62.2
SP	89.5	80.7	170.2	62.6	69.2	131.8	86.1	10.2	96.3	92.6	113.2	205.8	91.0	154.4	245.4
PR	4.4	0.7	5.1	4.8	0.7	5.5	5.7	-	5.7	7.8	0.03	7.8	8.0	-	8.0
SC	1.1	-	1.1	0.7	-	0.7	0.7	-	0.7	1.2	-	1.2	1.8	-	1.8
RS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MT	0.1	-	0.1	0.1	-	0.1	0.1	-	0.1	0.1	-	0.1	0.1	-	0.1
GO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	137.9	168.4	306.3	117.3	165.8	283.1	147.8	104.4	252.2	152.8	244.9	397.7	233.7	281.7	515.4

TABLE 29: Alcohol Production in Brazil, by Harvest, State and Type, 1949/50 to 1982/83 (Cont.)
(in million liters)

	59/60			60/61			61/62			62/63			63/64			64/65		
	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL
PA	0.02	-	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RN	0.04	-	0.04	0.1	-	0.1	0.2	0.4	0.6	0.5	0.1	0.6	0.6	0.4	1.0	0.2	1.1	1.3
PB	2.9	2.0	4.9	2.2	1.2	3.4	3.7	1.1	4.8	2.9	1.5	4.4	2.9	0.6	3.5	3.7	0.7	4.4
PE	63.0	57.2	120.2	74.3	28.3	102.8	42.5	57.0	99.5	26.6	36.7	63.3	54.0	16.9	70.9	45.0	43.6	88.6
AL	7.3	3.5	10.8	12.9	7.7	20.6	11.3	16.8	28.1	8.1	9.6	17.7	23.0	3.4	26.4	13.7	13.6	27.3
SE	0.7	0.3	1.0	1.0	-	1.0	0.6	-	0.6	0.7	-	0.7	0.7		0.7	1.0	-	1.0
BA	-	1.6	1.6	-	0.2	0.2	-	0.2	0.2	-	-	-	0.8		0.8	-	-	-
MG	5.1	4.0	9.1	6.7	2.2	8.9	8.2	1.2	9.4	9.1	-	9.1	9.3		9.3	9.4	-	9.4
ES	0.2	0.07	0.2	0.4	18.8	0.4	0.9	-	0.9	0.4	-	0.4	0.5		0.5	0.6	-	0.6
RJ	12.1	42.5	54.6	23.8	116.8	42.6	32.1	23.7	55.8	36.0	8.0	44.0	28.5	2.9	31.4	34.0	10.4	44.4
SP	70.0	191.0	261.0	149.9	-	266.7	110.4	105.9	216.3	145.2	45.2	190.4	176.9	71.9	248.8	154.2	40.8	195.0
PR	6.1	-	6.1	8.0	-	8.0	10.3	-	10.3	11.9	-	11.9	10.1	-	10.1	13.3	-	13.3
SC	2.5	-	2.5	1.5	-	1.5	1.1	-	1.1	1.2	-	1.2	20.6	-	20.6	1.6	-	1.6
RS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MT	0.1	-	0.1	0.03	-	0.03	0.01	-	0.01	-	-	-	0.01	-	0.01	0.02	-	0.02
GO	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	0.02	-	-	-
TOTAL	170.0	302.1	472.2	280.8	175.4	456.2	221.3	206.3	427.6	242.6	101.1	343.7	327.9	96.1	424.0	276.7	110.2	386.9

TABLE 29: Alcohol Production in Brazil, by Harvest, State and Type, 1949/50 to 1982/83 (Cont.)

STATE	65/66			66/67			67/68			68/69			69/70		
	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL
PA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MA	-	-	-	0.07	-	0.07	0.1	-	0.1	0.1	-	0.1	0.1	-	0.1
PI	-	-	-	0.08	-	0.08	0.2	-	0.2	0.1	-	0.1	0.1	-	0.1
CE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RN	0.2	1.2	1.4	0.5	1.2	1.7	0.5	0.2	0.7	1.3	-	1.3	0.06	0.7	0.8
PB	3.5	0.1	3.6	6.5	-	6.5	5.0	-	5.0	5.0	-	5.0	5.4	-	5.4
PE	39.6	46.1	85.7	45.4	44.9	90.3	48.7	18.3	67.0	73.6	7.4	81.0	75.9	7.5	83.4
AL	7.2	15.0	22.2	15.1	12.2	27.3	17.2	5.2	22.4	28.4	1.6	30.0	31.0	2.6	33.6
SE	1.3	-	1.3	1.3	-	1.3	0.9	-	0.9	1.3	-	1.3	1.9	-	1.9
BA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MG	10.5	2.7	13.2	11.3	3.1	14.4	10.4	3.9	14.3	10.2	1.5	11.7	11.5	2.0	13.5
ES	1.0	-	1.0	-	1.0	1.0	-	2.0	2.0	-	2.0	2.0	-	2.1	2.1
RJ	21.2	33.0	54.2	23.2	24.8	48.0	23.4	27.4	50.8	22.6	10.0	32.6	26.7	9.1	35.8
SP	163.7	238.2	401.9	224.3	294.9	519.2	194.9	301.3	496.2	172.2	120.8	293.0	191.6	76.4	268.0
PR	15.1	-	15.1	13.7	-	13.7	12.6	0.2	12.8	12.7	-	12.7	11.6	-	11.6
SC	3.1	-	3.1	4.0	-	4.0	3.5	-	3.5	2.4	-	2.4	4.2	-	4.2
RS	-	-	-	0.01	-	0.01	0.1	-	0.1	-	-	-	0.2	-	0.2
MT	-	-	-	0.02	-	0.02	-	-	-	-	-	-	0.04	-	0.04
GO	-	-	-	-	-	-	0.3	-	0.3	0.4	-	0.4	0.8	-	0.8
MS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	266.4	336.3	602.7	345.5	382.1	727.6	317.8	358.5	676.3	330.3	143.3	473.6	361.1	100.4	461.5

TABLE 29: Alcohol Production in Brazil, by Harvest, State and Type, 1949/50 to 1982/83 (Cont.)
(in million liters)

STATE	70/71			71/72			72/73			73/74			74/75		
	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL
PA	-	-	-	-	-	-	-	-	-	-	-	-	0.09	-	0.09
MA	-	-	-	0.2	-	0.2	0.4	-	0.4	0.09	-	0.09	0.2	-	0.2
PI	0.1	-	0.1	0.1	-	0.1	0.4	-	0.4	0.1	-	0.1	0.4	-	0.4
CE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RN	0.9	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-
PB	5.6	-	5.6	5.0	-	5.0	3.8	-	3.8	2.2	-	2.2	1.4	-	1.4
PE	69.6	11.2	80.8	45.7	3.4	49.1	52.7	2.7	55.4	75.8	1.0	76.8	90.9	2.3	93.2
AL	23.4	5.1	28.5	14.9	4.9	19.8	17.7	2.7	20.4	21.8	0.7	22.5	20.6	0.6	21.2
SE	2.2	-	2.2	1.3	-	1.3	1.1	-	1.1	0.1	-	0.1	-	-	-
BA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MG	13.3	2.4	15.7	14.1	2.2	16.3	18.6	2.5	21.1	19.5	1.4	20.9	20.3	1.3	21.6
ES	-	1.5	1.5	-	1.2	1.2	1.7	-	1.7	1.2	-	1.2	1.4	-	1.4
RJ	26.3	18.2	44.5	29.6	12.2	41.8	32.7	14.6	47.3	59.3	0.2	59.5	48.8	-	48.8
SP	222.9	214.0	436.9	89.9	363.3	453.2	136.7	363.4	500.1	154.5	300.2	454.7	196.9	211.2	408.1
PR	16.0	-	16.0	14.8	2.7	17.5	18.6	3.0	21.6	17.9	2.7	20.6	20.2	1.1	21.3
SC	4.0	-	4.0	3.8	-	3.8	4.6	-	4.6	4.8	-	4.8	5.4	-	5.4
RS	0.3	-	0.3	1.2	-	1.2	1.0	-	1.0	0.3	-	0.3	-	-	-
MT	0.1	-	0.1	0.07	-	0.07	-	-	-	-	-	-	-	-	-
GO	0.1	-	0.1	2.5	-	2.5	2.0	-	2.0	2.1	-	2.1	1.8	-	1.8
MS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	384.8	252.4	637.2	223.1	389.9	613.0	292.0	388.9	680.9	359.7	306.2	665.9	408.4	216.5	624.9

TABLE 29: Alcohol Production in Brazil, by Harvest, State and Type, 1959/50 to 1982/83 (Cont.)
(in million liters)

STATE	75/76			76/77			77/78			78/79			79/80		
	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYD	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL
PA	0.7	-	0.7	1.4	-	1.4	1.4	-	1.4	1.5	-	1.5	3.0	-	3.0
MA	-	-	-	0.8	-	0.8	0.9	-	0.9	-	3.7	3.7	0.003	3.5	3.5
PI	0.2	-	0.2	0.3	-	0.3	0.2	-	0.2	0.2	-	0.2	0.4	-	0.4
CE	-	-	-	-	-	-	-	6.8	6.8	-	4.1	4.1	0.02	2.8	2.8
RN	-	-	-	-	-	-	-	-	-	-	18.5	18.5	0.3	24.9	25.2
PB	0.5	0.3	0.8	0.05	-	0.05	1.8	16.2	18.1	2.5	38.9	41.4	16.8	50.2	67.0
PE	51.9	12.6	64.5	48.9	35.4	84.3	42.2	97.9	140.1	33.8	151.8	185.7	76.8	159.1	236.0
AL	26.6	0.9	27.5	17.7	7.4	25.1	14.9	25.3	40.3	16.0	137.8	153.8	56.6	169.4	226.0
SE	-	-	-	-	-	-	-	-	-	-	0.7	0.7	0.1	3.1	3.3
BA	-	-	-	-	-	-	-	-	-	1.4	-	1.4	2.0	-	2.0
MG	15.5	-	15.5	15.9	-	15.9	24.8	3.7	28.6	16.9	30.8	47.8	15.2	60.6	75.8
ES	2.0	-	2.0	6.9	-	6.9	8.0	-	8.0	-	8.2	8.2	-	10.0	10.0
RJ	55.3	-	55.3	38.3	5.6	43.9	42.9	52.1	95.0	40.2	92.1	132.3	52.8	86.7	139.5
SP	143.6	218.8	362.4	216.9	246.9	463.8	145.5	949.7	1095.2	268.4	1544.1	1812.4	441.1	2031.2	2472.3
PR	19.9	-	19.9	10.3	5.0	15.3	3.7	23.9	27.6	5.9	61.8	67.7	7.3	84.7	91.9
SC	4.6	-	4.6	4.7	-	4.7	4.9	-	4.9	5.9	-	5.9	6.9	-	6.9
RS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MT	-	-	-	-	-	-	-	-	-	-	2.1	2.1	-	9.6	9.6
GO	2.2	-	2.2	1.6	-	1.6	2.0	1.3	3.2	2.3	-	2.3	3.6	3.8	7.4
MS	-	-	-	-	-	-	-	-	-	-	0.7	0.7	0.04	13.7	13.7
TOTAL	323.0	232.6	555.6	363.7	300.3	664.0	293.4	1176.9	1470.3	395.0	2095.4	2490.4	683.0	2713.3	3396.3

TABLE 29 : Alcohol Production in Brazil, by Harvest, State and Type
1949/50 to 1982/83
(in million liters)

STATE	80/81			81/82			82/83		
	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL	HYDRAT	ANHYDR	TOTAL
AM	0.25	-	0.25	0.7	-	0.7	0.8	-	0.8
PA	2.8	-	2.8	2.4	-	2.4	4.6	-	4,6
MA	1.5	2.2	3.7	8.2	-	8.2	10.1	-	10.1
PI	0.2	-	0.2	2.5	-	2.5	5.3	-	5.3
CE	3.3	1.4	4.7	10.7	-	10.7	12.8	-	12.8
RN	20.9	23.4	44.3	23.9	16.4	40.3	32.6	35.2	67.8
PB	41.4	32.9	74.3	33.5	41.8	75.3	78.8	79.9	158.7
PE	145.3	59.4	204.7	134.6	120.8	255.4	209.4	131.4	340.8
AL	148.8	160.5	309.3	161.3	256.5	417.8	270.9	293.4	564.3
SE	3.4	1.6	5.0	5.5	1.7	7.2	14.1	3.8	17.9
BA	1.3	-	1.3	3.5	1.7	5.2	2.5	2.6	5.1
MG	35.0	70.0	105.0	97.1	36.4	133.5	54.0	111.6	165.6
ES	-	17,7	17.7	15,8	-	15.8	23.0	31.3	54.3
RJ	85.7	44.1	129,8	120,2	33.7	153.9	84.5	105,5	190.0
SP	1,062.8	1,545.1	2,607.9	1,961.7	872.0	2,833.7	1,341.9	2,472.9	3,814.8
PR	32.5	109.1	141.6	140.3	55.3	195.6	65.3	228.5	293.8
SC	6.0	-	6.0	10.8	-	10.8	7.9	-	7.9
RS	0.8	-	0,8	1.8	-	1.8	1.6	-	1.6
MS	1.0	8.8	9.8	4.1	5.1	9,2	16.0	30.9	46.9
MT	3.6	24.2	27.8	30.4	11.7	42.1	2.4	10.4	12.8
GO	5.8	3.6	9.4	18.0	-	18.0	34.9	12.3	47.2
TOTAL	1,602.3	2,104.0	3,706.4	2,787.0	1,453.1	4,240.1	2,273.6	3,549.7	5,823.3

TABLE 30: The Alcohol Sector in Brazil by Harvest, 1970/71 to 1981/82
(in thousands of liters)

HARVEST	INITIAL STOCK	PRODUCTION	EXPORTS	APPARENT CONSUMPTION (1)	FINAL STOCK
1970/71	58,631	637,238	606,037		89,832
1971/72	89,832	631,068	11,000	655,108	54,792
1972/73	54,792	680,972	24,300	681,730	29,734
1973/74	29,734	665,979	77,100	591,180	27,433
1974/75	27,433	624,985	58,042	525,913	68,463
1975/76	68,463	555,627	63,500	507,691	52,899
1976/77	52,899	664,022	9,074	617,678	90,169
1977/78	90,169	1,470,404	3,220	1,408,179	149,174
1978/79	149,174	2,490,603	48,304	2,321,499	269,974
1979/80	269,974	3,396,455	243 703	3,053,604	369,122
1980/81	369,122	3,706,375	252,224	3,465,291	357,982
1981/82	357,982	4,240,123	142,962	3,803,032	652,111
1982/83	652,111	5,823,339	279,475	5,179,496	1,016,479

(1) Apparent consumption or "output from the usinas for consumption" is understood by the IAA as the total production less exports and variation in stocks.

Source: IAA, CODEPLAN-DES.

TABLE 31 : Apparent Consumption of Alcohol, by Use, 1980-1982
(in thousand cubic meters)

Use	1980	1981	1982
Carburant			
Anhydrous Alcohol	2,253	1,146	2,021
Hydrate Alcohol	429	1,392	1,674
Chemical Industry	486	118	236
Other Uses (*)	486	283	346
Exports	294	154	286
Total	3,462	3,093	4,563

(*) Beverages, Pharmaceuticals, Household Use, etc...

Source : IAA/CNP/ABIQUIM/CACEX/CENAL, from- CENAL REPORTS

TABLE 32: Idle Capacity in the Brazilian Distilleries, 1974/75
(in millions of liters)

STATE	INSTALLED CAPACITY	PRODUCTION	IDLE CAPACITY
Maranhão	500	500	-
Piauí	500	500	-
Rio Grande do Norte	5,000	2,000	3,000
Paraíba	8,000	6,000	2,000
Pernambuco	120,000	96,000	24,000
Alagoas	33,000	33,000	-
Sergipe	4,000	2,000	2,000
North/Northeast	171,000	140,000	31,000
Minas Gerais	27,000	20,000	7,000
Espírito Santo	2,000	2,000	-
Rio de Janeiro	80,000	70,000	10,000
São Paulo	880,000	480,000	400,000
Paraná	27,000	20,000	7,000
Santa Catarina	4,500	4,500	-
Rio Grande do Sul	1,800	1,050	750
Mato Grosso	450	450	-
Goiás	2,000	2,000	-
Center/South	1,024,750	600,000	424,750
Brazil	1,195,750	740,000	455,750

Source: COPERSUCAR. Reproduced from Sindicato da Indústria de Fabricação de Álcool no Estado de São Paulo and COPERSUCAR, "O Potencial da Mistura Carburante na Solução da Crise de Combustíveis" (September, 1974).

TABLE 33: Idle Capacity of the São Paulo Distilleries
1968/69 to 1974/75
(in millions of liters)

HARVEST	PRODUCTION	INSTALLED CAPACITY (1)	INDEX OF IDLE CAPACITY
1968/69	292.2	650	55
1969/70	268.3	650	59
1970/71	437.1	650	32
1971/72	452.8	750	40
1972/73	500.1	750	33
1973/74	454.6	750	39
1974/75	480.0	880(2)	45

(1) Estimate

(2) Increase due to the modernization projects.

Source: IAA, Boletim de Posição Final de Safra, from Sindicato da Indústria de Fabricação de Álcool no Estado de São Paulo and COPERSUCAR, "O Potencial da Mistura Carburante na Solução da Crise de Combustíveis" (September, 1974).

TABLE 34 : Fuel Alcohol Consumption

(in cubic meters)

	ANHYDROUS ALCOHOL			HYDRATE ALCOHOL			TOTAL
	NORTH-NORTHEAST	CENTER-SOUTH	BRAZIL TOTAL	NORTH-NORTHEAST	CENTER-SOUTH	BRAZIL TOTAL	
1973	3,443	305,369	308,812	-	-	-	
1974	-	190,170	190,170	-	-	-	
1975	-	162,165	162,165	-	-	-	
1976	19,612	151,960	171,572	-	-	-	
1977	57,980	581,319	639,299	(*)	(*)	1.000	639,300
1978	157,030	1,348,705	1,505,735	40	2,373	2,413	1,508,148
1979	316,177	1,954,950	2,271,127	2,199	14,062	16,261	2,287,388
1980	315,466	1,937,642	2,253,108	55,289	373,890	429,179	2,682,287
1981	239,147	906,948	1,146,095	200,145	1,915,564	1,391,709	2,537,804
1982	345,943	1,674,969	2,020,912	233,841	1,440,505	1,674,346	3,695,258

(*) Consumption of hydrate alcohol is less than one cubic meter.

Source: SINDICOM and CNP

TABLE 35: Rural Proálcool: Projects Financed by the Bank of Brazil, by Type, 1976-1982

	1976		1977		1978		1979		1980		1981		1982 (jan/nov)	
	CONTRACTS	AREA (HECTARE)	CONTRACTS	AREA (HECTARE)	CONTRACTS	AREA (HECTARE)	CONTRACTS	AREA (HECTARE)	CONTRACTS	AREA (HECTARE)	CONTRACTS	AREA (HECTARE)	CONTRACTS	AREA (HECTARE)
OPERATING COST	38	6,400	79	34,953	88	31,931	179	90,368	266	153,603	162	39,438	76	8,263
Sugar Cane	35	3,800	74	31,573	78	28,244	105	84,529	256	152,733	55	34,902	67	8,050
Between harvest.....	35	3,800	74	31,573	78	28,244	105	84,629	256	152,713	52	32,099	65	7,495
Renewal.....	-	-	-	-	-	-	-	-	-	20	3	2,803	2	555
Manioc	3	2,600	4	3,350	8	3,685	72	5,619	8	870	105	4,495	1	40
Other costs	-	-	1	30	2	2	2	120	2	-	2	41	8	173
INVESTMENTS	15	3,256	243	53,792	427	62,077	863	176,681	2,154	243,179	2,931	337,181	2,281	234,939
Sugar Cane	-	-	138	38,124	280	46,473	496	136,166	1,631	214,889	2,138	305,961	1,654	209,308
Manioc.	-	-	-	-	1	2,500	3	96	13	890	3	300	16	691
Other Invest	15	3,256	105	15,668	146	13,104	346	40,419	510	27,400	790	30,920	611	24,940
TOTAL	53	9,926	322	88,745	515	94,008	1,042	267,049	2,420	396,782	3,093	376,619	2,357	243,202

OBS.: Beginning in 1980, operating costs are financed with financial institutions own resources, at the same rate as for rural credit in general.

Source: Banco do Brasil, Departamento de Estatística.

TABLE 36: Industrial Proálcool: Projects Approved by CENAL, by State, Region, Type of Raw Material and Capacity

	BEFORE PROÁLCOOL		AFTER PROÁLCOOL (1)							
			NUMBER			CAPACITY (IN MILLION LITERS PER HARVEST)			SHARE	
	NUMBER	CAPACITY (MILLION LITERS PER HARVEST)	CANE	MANIOC	TOTAL	CANE	MANIOC.	TOTAL	REGION	BRAZIL
NORT-NORTHEAST REGION										
Amazonas	-	-	01	-	01	21.0	-	21.0	0.01	0.00 (2)
Alagoas	5	30.4	34	-	34	701,8	-	701.8	0.38	0.09
Bahia	-	-	06	02	08	147.0	52.0	199.0	0.11	0.03
Ceará	-	-	03	-	03	55.5	-	55.5	0.03	0.01
Maranhão	1	2.5	02	-	02	47.6	-	47.6	0.03	0.01
Pará	1	0.9	01	-	01	21.3	-	21.3	0.01	0.00 (2)
Pernambuco	23	137.0	31	-	31	377.6	-	377.6	0.21	0.05
Paraíba	4	24.8	12	-	12	211.3	-	211.3	0.11	0.03
Piauí	1	1.1	01	-	01	27.0	-	27.0	0.01	0.00 (2)
Rio Grande do Norte	-	-	06	-	06	113.3	-	113.3	0.06	0.01
Rondônia	-	-	01	-	01	18.3	-	18.3	0.01	0.00 (2)
Sergipe	2	1.8	03	-	03	34.2	-	34.2	0.02	0.00 (2)
SUBTOTAL	37	198.5	101	02	103	1,775.9	52.0	1,827.9	1.00	23.8
CENTER-SOUTH REGION										
Espírito Santo	1	1.2	08	-	08	110.7	-	110.7	0.02	0.01
Goiás	2	6.6	24	-	24(3)	580.7	-	580.7	0.10	0.08
Minas Gerais	7	16.6	21	01	22	369.2	19.1	388.3	0.07	0.05
Mato Grosso	-	-	07	01	08	216.7	45.0	261.7	0.05	0.03
Mato Grosso do Sul	-	-	11	-	11	354.6	-	354.6	0.06	0.05
Paraná	4	33.9	28	03	31	548.9	26.6	575.5	0.10	0.08
Rio Grande do Sul	-	-	02	01	03	21.0	3.3	24.3	0.00(2)	0.00 (2)
Rio de Janeiro	17	72.4	13	-	13	189.4	-	189.4	0.03	0.02
São Paulo	75	568.4	154	01	155	3,177.0	19.7	3,196.7	0.56	0.42
Santa Catarina	3	6.0	03	02	05	11.0	36.0	47.0	0.01	0.01
SUBTOTAL	109	705.1	271	09	280	5,579.2	149.7	5,728.9	1.000	76.1
BRAZIL	146	903.6	372	11	383	7,355.1	201.7	7,556.8		

(1) As of November 8, 1982.
(2) These States'share of Projects relative to the total of the country is less than 0.005.
(3) Including a Babassu Project.
Source: CENAL

TABLE 37: Frequency of CENAL Meetings (1)

	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1976(2)	3	1	1	-	2	-	1	1	1	1	1	1	13
1977	-	1	1	1	-	1	-	1	-	1	-	-	6
1978	-	2	-	-	-	2	1	-	1	1	1	-	8
1979	-	1	1	-	-	-	1	1	1	1	1	1	8
1980	3	2	2	2	2	2	2	2	1	2	2	2	24
1981	2	2	2	2	1	-	-	-	2	-	2	1	14
1982(3)	-	2	1	1	1	-	1	1	-	1	1	-	9
TOTAL													82

(1) Up to the 5th of July 1979 projects were submitted to the Comissão Nacional do Álcool, which gave way to the Conselho Nacional do Álcool and its Executive Commission-CENAL (dec. no. 83,700).

(2) Includes 1 meeting of 12.17.1975.

(3) As of 8.11.1982.

Source: Elaborated from data from CENAL.

TABLE 38 : Number of Industrial Projects Approved by CENAL [1] per Year, 1975-1982

1975	-	2
1976	-	67
1977	-	40
1978	-	61
1979	-	39
1980	-	95
1981	-	56
1982 [2]	-	23
TOTAL	-	383

(1) Up to 5th of July 1979 projects were submitted to the Comissão Nacional do Álcool, which gave way to the Conselho Nacional do Álcool and its Executive Comission-CENAL (dec. no. 83,700).

(2) As of 8-11-1982.

Source : CENAL

TABLE 39: Status of the Projects Aproved by CENAL (1)

	NUMBER OF PROJECTS	CAPACITY (IN MILLION LITERS PER HARVEST)
DISTILLERY PROJECTS		
Approved (2)	406	7,786.5
With Resources From Proálcool (3)	362	7,129.0
Without Resources From Proálcool (2)	44	657.3
Contracted By The Financial Agents (3)	330	6,391.5

(1) As of 12.31.1982

(2) Source: CENAL

(3) Source: Central Bank

(Taken from CENAL Report, 1982)

TABLE 40: Industrial Projects Approved By CENAl, By Year, State, Region, Type of Distillery, Type of Raw Material, Capacity and Financial Agents, 1975-1982 (1)

1975/1976

	TYPE OF DISTILLERY		TYPE OF RAW MATERIAL		INCREASED CAPACITY		FINANCIAL AGENTS				
	ANNEX.	AUTONO.	CANE	MANIOC	IN DAILY THOUSAND LITERS	IN MILLION LITERS PER HARVEST	BANK OF BRAZIL	BNDE SYSTEM (2)	STATE BANKS	PRIVATE BANKS	NA (3)
North-Northeast region											
Amazonas		1	1		120.0	21.0			1		1
Alagoas	4	2	6		750.0	131.9	5				
Bahia											
Ceará		1	1		120,0	19,5	1				
Maranhão											
Pará											
Pernambuco	8		8		796.0	93.8	1	7			
Paraíba	2	2	4		340,0	62,9	3		1		
Piauí											
Rio Grande do Norte	1	1	2		180.0	30.6	2				
Rondônia											
Sergipe	1		1		30.0	4.5	1				
Center-South region											
Espírito Santo	1		1		70.0	9.3	1				
Goiás		2	1	Babassu	270.0	42.0	1	1			
Minas Gerais	1	1	1	1	180.0	37.0	1	1			
Mato Grosso		1		1	150.0	45.0	1				
Mato Grosso do Sul		3	3		450.0	71.2	3				
Paraná		3*	3		300.0	48.0	2	1			
Rio Grande do Sul											
Rio de Janeiro	4	1	5		620.0	82.5	5				
São Paulo	24	5*	29		7.026.0	1,037.7	25	2			2
Santa Catarina											
T O T A L	46	23	66	3	11,402.0	1,739.9	52	12	2		3

(*) Includes one Project Approved in 12-17-1985.

(1) Up to 5th of July, 1979 Projects were Submitted to the Comissão Nacional do Álcool, which gave way to the Conselho Nacional do Álcool and its Executive Comission - CENAL (Decree nº 83,700).

(2) The National Development Bank and Regional and State Development Banks.

(3) NA = Non Available

Source: Elaborated from CENAL's data.

TABLE 40: Industrial Projects Approved By CENAL, By Year, State, Region, Type of Distillery, Type of Raw Material, Capacity and Financial Agents, 1975-1982[1] (Cont.)

1977

	TYPE OF DISTILLERY		TYPE OF RAW MATERIAL		INCREASED CAPACITY		FINANCIAL AGENTS				
	ANNEX.	AUTONO.	CANE	MANIOC	IN DAILY THOUSAND LITERS	IN MILLION LITERS PER HARVEST	BANK OF BRAZIL	BNDE SYSTEM (2)	STATE BANKS	PRIVATE BANKS	NA (3)
North-Northeast region											
Amazonas											
Alagoas	4	3	7	-	1,084.0	133.2	3		3		1
Bahia											
Ceará		1	1		120.0	18.0			1		
Maranhão		1	1		120.0	21.6			1		
Pará											
Pernambuco	3		3		390.0	64.9		2	1		
Paraíba		1	1		120.0	21.6	1				
Piauí		1	1		180.0	27.0			1		
Rio Grande do Norte											
Rondônia											
Sergipe											
Center-South region											
Espírito Santo											
Goiás											
Minas Gerais	2		2		200.0	30.0		1			1
Mato Grosso											
Mato Grosso do Sul											
Paraná		5	5		540.0	87.4	4				1
Rio Grande do Sul											
Rio de Janeiro	2		2		340.0	35.9	2				
São Paulo	14	3	17		4,266.0	581.5	16	1			
T O T A L	25	15	40		7,260.0	1,071.1	26	4	7		3

TABLE 40: Industrial Projects Approved By CENAL, By Year, State Region, Type of Distillery, Type of Raw Material, Capacity and Financial Agents, 1975-1982 (1) (Cont.)

1978

	TYPE OF DISTILLERY		TYPE OF RAW MATERIAL		INCREASED CAPACITY		FINANCIAL AGENTS				
	ANNEX.	AUTONO.	CANE	MANIOC.	IN DAILY THOUSAND LITERS	IN MILLION LITERS PER HARVEST	BANK OF BRAZIL	BNDE SYSTEM (2)	STATE BANKS	PRIVATE BANKS	NA (3)
North-Northeast region											
Amazonas											
Alagoas	7		7		780.0	139.0	3		4		
Bahia					120.0	18.0			1		
Ceará	1		1								
Maranhão											
Pará											
Pernambuco	3	3	6		610.0	91.9		4	2		
Paraíba	1		1		60.0	8.7			1		
Piauí											
Rio Grande do Norte	1		1		90.0	14.2	1				
Rondônia											
Sergipe											
Center-South region											
Espírito Santo		1	1		120.0	25.2			1		
Goiás	1	1	2		280.0	39.0		1	1		
Minas Gerais	1	2	3		580.0	124.4	1	2			
Mato Grosso	1		1		90.0	13.5	1				
Mato Grosso do Sul		3	3		840.0	162.6	3				
Paraná	1	1	2		190.0	34.6	2				
Rio Grande do Sul											
Rio de Janeiro	2		2		525.0	74.7	1				1
São Paulo	22	9	30	White Rum	7,035.0	1,082.7	18	8			5
Santa Catarina											
T O T A L	41	20	60	1	11,320.0	1,828.5	30	15	10		6

TABLE 40: Industrial Projects Approved By CENAL, By Year, State Region, Type of Distillery, Type of Raw Material, Capacity and Financial Agents, 1975-1982 (1) (Cont.)

1979

	TYPE OF DISTILLERY		TYPE OF RAW MATERIAL		INCREASED CAPACITY		FINANCIAL AGENTS				
	ANNEX.	AUTONO.	CANE	MANIOC	IN DAILY THOUSAND LITERS	IN MILLION LITERS PER HARVEST	BANK OF BRAZIL	BNDE SYSTEM (2)	STATE BANKS	PRIVATE BANKS	NA (3)
North-Northeast region											
Amazonas											
Alagoas	7	3	10		1,350.0	234.5	6		4		
Bahia	1	1	2		300.0	53.8		2			
Ceará											
Maranhão											
Pará		1	1		120.0	21.3		1			
Pernambuco	5		5		830.0	147.7		5			
Paraíba		1	1		410.0	80.0			1		
Piauí											
Rio Grande do Norte		1	1		120.0	21.7	1				
Rondônia											
Sergipe	1	1	2		180.0	29.7			2		
Center-South region											
Espírito Santo											
Goiás											
Minas Gerais	3		3		515.0	74.0	1	2			
Mato Grosso											
Mato Grosso do Sul											
Paraná		1		1		79.8	1				
Rio Grande do Sul											
Rio de Janeiro	3		3		647.0	85.7	2		1		
São Paulo	4	6	9	white Rum	2,235.0	367.9	8	1			1
Santa Catarina											
T O T A L	24	15	37	2	6,767,0	1,135.8	19	11	7		1

TABLE 40: Industrial Projects Approved By CENAL, By Year, State Region, Type of Distillery, Type of Raw Material, Capacity and Financial Agents, 1975-1982 (1) (Cont.)

1980

	TYPE OF DISTILLERY		TYPE OF RAW MATERIAL		INCREASED CAPACITY		FINANCIAL AGENTS				
	ANNEX.	AUTONO.	CANE	MANIOC	IN DAILY THOUSAND LITERS	IN MILLION LITERS PER HARVEST	BANK OF BRAZIL	BNDE SYSTEM (2)	STATE BANKS	PRIVATE BANKS	NA (3)
North-Northeast region											
Amazonas											
Alagoas	2	1	3		660.0	132.1	1		2		
Bahia	1	3	3	1	510.0	107.4	1		2		
Ceará											
Maranhão											
Pará											
Pernambuco	2	3	5		1,020.0	171,5		3	2		
Paraíba		4	4		420.0	74.8	1		3		
Piauí											
Rio Grande do Norte		2	2		480.0	90.0	1		1		
Rondônia		1	1		120.0	18.3	1				
Sergipe											
Center-South region											
Espírito Santo	1	2	3		480.0	73.1	1	2			
Goiás	1	7	8		1,245.0	196.1	6	1	1		
Minas Gerais	1	4	5		790.0	128.6	1	3	1		
Mato Grosso		1	1		150.0	25.0		1			
Mato Grosso do Sul		1	1		120.0	18.2	1				
Paraná	2	9	11		2,200.0	322.4	7	4			
Rio Grande do Sul	1	1	2		140.0	21.0	1	1			
Rio de Janeiro	1		1		240.0	34.2	1				
São Paulo	14	26	39	1	13,920.0	2,202.0	38	2			
Santa Catarina	1	3	2	2	125.0	48.0		4			
T O T A L	27	68	91	4	22,620.0	3,662.7	61	22	12		

TABLE 40: Industrial Projects Approved By CENAL, By Year, State Region, Type of Distillery, Type of Raw Material, Capacity and Financial Agents, 1975-1982 (1) (Cont.)

1981

	TYPE OF DISTILLERY		TYPE OF RAW MATERIAL		INCREASED CAPACITY		FINANCIAL AGENTS				
	ANNEX.	AUTONO.	CANE	MANIOC	IN DAILY THOUSAND LITERS	IN MILLION LITERS PER HARVEST	BANK OF BRAZIL	BNDE SYSTEM (2)	STATE BANKS	PRIVATE BANKS	NA (3)
North-Northeast region											
Amazonas											
Alagoas	1		1		90.0	16.2			1		
Bahia		2	1	1	160.0	37.8		1	1		
Ceará											
Maranhão		1	1		120.0	26.0			1		
Pará											
Pernambuco	2		2		454.0	89.7		2			
Paraíba		1	1		120.0	18.9			1		
Piauí											
Rio Grande do Norte											
Rondônia											
Sergipe											
Center-South region											
Espírito Santo		1	1		40.0	6.0		1			
Goiás		8	8		1,350.0	220.8	6	1	1		
Minas Gerais		3	3		150.0	39.8	1	1	1		
Mato Grosso		4	4		870.0	153.2	3	1			
Mato Grosso do Sul		3	3		1,070.0	159.3	3				
Paraná	1	4	3	2	560.0	88.2		4	1		
Rio Grande do Sul		1		1	10.0	3.3		1			
Rio de Janeiro											
São Paulo	5	18	21	sorghum	7,290.0	1,147.4	19	2			2
Santa Catarina		1	1	white Rum	55.0	8.6		1			
T O T A L	9	47	50	6	12,341.0	2,015.2	32	15	7		2

TABLE 40: Industrial Projects Approved By CENAL, By Year, State Region, Type of Distillery, Type of Raw Material, Capacity and Financial Agents, 1975-1982 (1)

1982*

	TYPE OF DISTILLERY		TYPE OF RAW MATERIAL		INCREASED CAPACITY		FINANCIAL AGENTS				
	ANNEX.	AUTONO.	CANE	MANIOC.	IN DAILY THOUSAND LITERS	IN MILLION LITERS PER HARVEST	BANK OF BRAZIL	BNDE SYSTEM (2)	STATE BANKS	PRIVATE BANKS	NA (3)
North-Northeast region											
Amazonas											
Alagoas											
Bahia											
Ceará											
Maranhão											
Pará											
Pernambuco		2	2		120.0	13.5					2
Paraíba											
Piauí											
Rio Grande do Norte											
Rondônia											
Sergipe											
Center-South region											
Espírito Santo		2	2		100.0	15.7	1	1			
Goiás		4	4		600.0	96.0	3	1			
Minas Gerais		4	4		240.0	24.5		2	2		
Mato Grosso		1	1		150.0	25.0	1				
Mato Grosso do Sul		1	1		60.0	9.2	1				
Paraná		4	4		570.0	91.1		4			
Rio Grande do Sul											
Rio de Janeiro											
São Paulo	3	2	5		4,140.0	575.6	3				2
Santa Catarina											
T O T A L	3	20	23		5,980.0	850.6	9	8	2		4

(*) As of 11.08.1982

TABLE 41: Annual Investments in Proálcool (Industrial and Rural), 1976-1982
(average prices of 1982)

YEAR	RURAL PROALCOOL		INDUSTRIAL PROALCOOL		TOTAL	
	Cr$ millions (1)	US$ millions (2)	Cr$ millions (1)	US$ millions (2)	Cr$ millions (1)	US$ millions (2)
1976	1,301	7	9,512	53	10,813	60
1977	18,186	101	35,670	198	53,856	299
1978	14,187	79	51,170	283	65,357	362
1979	21,619	120	35,517	197	57,136	317
1980	50,610	280	72,966	404	123,576	684
1981	89,835	498	118,670	657	208,505	1,155
1982	24,139	134	87,274	483	111,413	617
TOTAL	219,877	1,219	410,779	2,275	630,656	3,494

(1) Data from the Central Bank-DESDE/DIPLA and the Bank of Brazil, corrected by the IGP-DI.

(2) 1982 prices converted at the average rate of 180.451 cruzeiros per dollar. Elaborated from CENAL Report, 1982.

TABLE 42 : Bank of Brazil financing of Industrial Proálcool and Rural Proálcool in relation to total financing, 1976-1982

YEAR	Industrial Proálcool	Rural Proálcool
	BB/TOTAL (Proportion) (annual flow)	BB/TOTAL (Proportion) (annual flow)
1976	0.94	0.88
1977	0.88	0.76
1978	0.74	0.91
1979	0.69	0.87
1980	0.71	0.61
1981	0.73	0.61
1982	0.64	0.50

Source: Central Bank of Brazil - DESPE/DIPLA and Bank of Brazil S.A., from CENAL Report, 1982.

TABLE 43: Mixed Carburant Policy: Share of Anhydrous Alcohol, 1933-1949 (in millions of liters)

YEAR	IMPORTED GASOLINE THAT MAY BE DENATURED (1) (A_t)	ANHYDROUS ALCOHOL PRODUCTION (2)	ANHYDROUS ALCOHOL DELIVERED FOR MIXTURE (3) (B_t)	LEGAL QUOTA FOR ANHYDROUS (1)	$\frac{B_t}{A_t}$ (%)
1933	293,6	0.1	ND	14.7	-
1934	353.5	0.9	1.1	17.7	0.3
1935	394.0	5.4	3.5	19.7	0.8
1936	430.7	18.5	15.4	21.5	3.6
1937	449.2	16.4	14.6	22.5	3.2
1938	482.5	31.9	24.5	46.8	5.0
1939	497.2	38.2	33.1	49.7	6.6
1940	584.9	53.5	36.3	58.5	6.2
1941	598.8	76.6	74.5	119.7	12.4
1942	316.3	82.2	62.3	31.6	19.7
1943	294.5	50.2	30.8	29.4	10.4
1944	386.1	41.0	25.9	38.6	6.7
1945	499.8	22.8	12.3	49.9	2.5
1946	980.4	30.2	16.7	73.5	1.7
1947	1,101.2	50.5	49.5	165.2	4.5
1948	1,438.3	65.4	62.5	NA*	4.3
1949	1,797.9	56.9	52.7	NA*	2.9

NA = Non Available

(1) Source: IAA Yearbooks

(2) Source: IAA, CODEPLAN-DES.

(3) Source: IAA, CODEPLAN-DES, Boletim Estatístico do Álcool.

TABLE 44: Mixed Carburant Policy: Share of Anhydrous Alcohol, 1950-1969 (in million liters)

YEAR	GASOLINE CONSUMPTION (1) (A_t)	ANHYDROUS ALCOHOL PRODUCTION (2)	ANHYDROUS ALCOHOL DELIVERED FOR MIXTURE (3) (B_t)	"LEGAL" QUOTA OF ANHYDROUS* (3)	$\frac{B_t}{A_{t-1}}$ (%)	$\frac{B_t}{A_t}$ (%)
1950	2,073.7	18.6	7.6	84.7	0.5	0.4
1951	2,491.1	38.0	23.1	103.7	1.1	0.9
1952	2,983.5	71.6	60.7	124.6	2.4	2.0
1953	3,198.8	137.2	117.4	149.2	3.9	0.3
1954	3,206.9	163.4	129.2	159.9	4.0	4.0
1955	3,306.4	177.8	170.0	160.3	5.3	5.1
1956	3,540.4	97.4	86.7	165.3	2.6	2.4
1957	3,572.6	214.0	154.9	177.0	4.4	4.4
1958	3,934.3	280.5	252.0	178.6	7.0	6.4
1959	3,988.6	341.5	295.2	196.7	7.5	7.4
1960	4,426.9	188.6	228.2	199.4	5.7	5.2
1961	4,603.3	181.5	128.2	221.3	2.9	2.8
1962	5,231.8	132.4	124.0	230.2	2.7	2.4
1963	5,594.7	111.2	56.6	251.6	1.1	1.0
1964	6,074.5	62.6	69.3	279.7	1.2	1.1
1965	6,040.6	305.9	184.8	307.8	3.0	3.1
1966	6,638.9	362.0	365.9	302.0	6.1	5.5
1967	7,247.3	432.6	437.2	331.5	6.6	6.0
1968	8,219.0	171.1	191.3	362.4	2.3	2.3
1969	8,747.0	98.4	31.9	411.0	0.4	0.4

(*) Equals 5% of the gasoline consumed in the previous year.

(1) Source: CNP Yearbooks and IAA Yearbooks; CNP, Divisão de Planejamento, from IBGE, Anuário Estatístico do Brasil.

(2) Source: IAA, CODEPLAN-DES.

(3) Source: IAA, CODEPLAN-DES, Boletim Estatístico do Álcool (several issues) and IAA Reports.

TABLE 45 : Mixed Carburant Policy: Share of Anhydrous Alcohol 1970-1982
(in millions of liters)

YEAR	GASOLINE CONSUMPTION (A)	ANHYDROUS ALCOHOL DELIVERED FOR MIXTURE (B)	B/A (%)
1970	9,156.8	183.6	2.0
1971	9,820.7	253.8	2.5
1972	10,887.1	391.1	3.5
1973	12,707.3	308.8	2.4
1974	13,683.2	190.2	1.3
1975	14,192.3	162.2	1.1
1976	14,374.8	171.6	1.1
1977	13,337.1	639.0	4.8
1978	13,594.3	1,505.7	11.0
1979	13,318.5	2,219.1	16.6
1980	11,431.0	2,253.1	19.7
1981	10,939.2	1,146.1	10.5
1982	10,450.8	2,020.0	19.3

Source: CNP.

TABLE 46:"Consolidation of the Domestic Market policy"
Alcohol Production by Type, Origin of Raw Material and Harvest, 1935/36 to 1941/42
(in thousands of liters)

YEAR	TOTAL PRODUCTION	TYPE (1)		ORIGIN OF RAW MATERIAL	
		ANHYDROUS	HYDRATED	DIRECTLY FROM CANE OR DISSOLVED SUGAR	OTHER
1935/36	62,038.6	7,739.8	54,298.8	6,720.5	55,318.1
1936/37	57,382.1	14,075.5	43,306.6	11,034.0	46,348.1
1937/38	63,861.6	20,616.8	43,244.8	10,895,4	52,966.2
1938/39	92,314.1	36,505.9	55,808.2	21,174,8	65,139.3
1939/40	93,714.3	31,499.4	62,214.9	19,848.9	73,865.4
1940/41	126,621.0	67,599.4	59,021.6	54,504.3	72,116.7
1941/42	128,593.1	70,653.6	57,939.5	44,663.4	83,929.7

(1) Source: IAA, CODEPLAN-DES

(2) Source: IAA, from Barbosa Lima Sobrinho, A Ação do Instituto do Açúcar e do Álcool (Rio de Janeiro, 1946, p.308).

TABLE 47: Mixed Carburant Policy: Production of Álcool-Motor*
by Ingredients, 1932-1965
(in thousands of liters)

	Álcool-Motor (A)	Alcohol (Anhydrous + Hydrate) (B)	Gasoline (C)	Kerosene (D)	Other Substances (E)	Anhydrous Alcohol Delivered for Mixture (1) (F)	B/A %	C/A %	D/A %	E/A %	F/B %	F/A %
1932	19,265.8	12,147.9	7,096.4	16.5	5.0	-	63.05	36.83	0.09	0.03	-	
1933	14,630.8	12,963.0	1,639.0	23.9	4.9	-	88.60	11.20	0.16	0.03	-	
1934	27,285.3	14,116.0	13,154.8	14.3	0.2	1,075.2	51.73	48.21	0.05	0.00	7.62	3.94
1935	47,524.4	16,741.9	30,776.4	3.5	2.6	3,542.6	35.23	64.76	0.01	0.01	21.16	7.45
1936	138,611.6	24,340.4	114,268.5	2.7	-	15,420.5	17.56	82.44	0.00	-	63.35	11.12
1937	112,342.5	18,446.6	93,858.9	35.8	1.2	14,620.3	16.42	83.55	0.03	(2)	79.26	13.01
1938	213,477.8	32,689.9	180,774.8	11.6	1.5	24,482.7	15.31	84.68	0.01	(2)	74.89	11.47
1939	312,683.5	49,065.4	263,613.7	2.9	1.5	33,112.2	14.69	84.31	0.00	(2)	67.49	10.59
1940	299,216.6	44,834.0	254,382.3	-	0.3	36,325.4	14.98	85.02	-	(2)	81.02	12.14
1941	462,509.1	102,789.5	359,714.9	4.7	0.04	74,467.3	22.22	77.77	(2)	(2)	72.45	16.10
1942	290,575.3	104,692.1	185,619.7	1.4	262.1	62,323.2	36.03	63.88	(2)	0.09	59.53	21.45
1943	144,472.4	87,934.7	56,508.0	-	29.7	30,789.0	60.87	39.11	-	0.02	35.01	21.31
1944	141,736.3	82,831.6	58,777.5	-	127.2	25,862.9	58.44	41.47	-	0.09	31.22	18.25
1945	111,242.2	36,133.7	75,108.5	-	-	12,322.7	32.48	67.52	-	-	34.10	11.08
1946	117,812.9	28,221.7	89,591.2	-	-	16,740.8	23.95	76.05	-	-	59.32	14.21
1947	504,779.6	76,067.1	428,712.5	-	-	49,512.2	15.07	84.93	-	-	65.09	9.81
1948	633,579.5	92,903.3	540,676.2	-	-	62,512.5	14.66	85.34	-	-	67.29	9.87
1949	466,751.7	70,724.8	396,026.9	-	-	52,690.4	15.15	84.85	-	-	74.50	11.29
1950	111,448.6	10,852.4	100,596.2	-	-	7,614.2	9.74	90.26	-	-	70.16	6.83
1951	81,183.1	15,187.2	65,995.9	-	-	23,143.4	18.71	81.29	-	-	152.39	28.51
1952	402,174.6	51,835.1	350,339.5	-	-	60,728.3	12.89	87.11	-	-	117.12	15.10
1953	946,217.4	122,427.5	823,789.9	-	-	117,444.9	12.94	87.06	-	-	95.93	12.41
1954	1,092,925.4	140,259.3	952,666.1	-	-	129,176.0	12.83	87.17	-	-	92.10	11.82
1955	1,105,049.8	207,666.4	897,383.4	-	-	169,974.5	18.79	81.21	-	-	81.85	15.38
1956	619,658.4	95,728.9	523,929.5	-	-	86,685.7	15.45	84.55	-	-	90.55	13.99
1957	853,892.2	159,141.3	694,750.9	-	-	154,921.8	18.64	81.36	-	-	97.35	18.14
1958	1,400,621.6	277,319.0	1,123,302.6	-	-	251,953.8	19.80	80.20	-	-	90.85	17.99
1959	1,464,664.8	304,679.3	1,159,985.5	-	-	295,196.2	20.80	79.20	-	-	96.89	20.15
1960	1,361,220.9	233,285.0	1,127,935.9	-	-	228,173.4	17.14	82.84	-	-	97.81	16.76
1961	1,005,283.3	130,607.2	874,676.1	-	-	128,184.6	12.99	87.01	-	-	98.15	12.75
1962	874,018.3	139,946.2	734,072.1	-	-	123,985.8	16.01	83.99	-	-	88.60	14.19
1963	609,790.5	62,703.6	547,086.9	-	-	56,519.0	10.28	89.72	-	-	90.14	9.27
1964	662,014.8	82,442.0	579,572.8	-	-	69,275.0	12.45	87.55	-	-	84.03	10.46
1965	1,306,965.4	224,216.8	1,082,748.6	-	-	184,737.5	17.16	82.84	-	-	82.39	14.13

* Álcool Motor is the generic name for carburant mixtures which contain alcohol in a proportion which can vary from 5 to 100 percent.

(1) Anhydrous alcohol mixed except for the variation in stocks retained by the gasoline companies. Source: IAA, CODEPLAN-DES, Boletim Estatístico do Álcool (various issues).

(2) Numbers not significant in terms of the estimate used.

Source: IAA Yearbooks, except where noted.

TABLE 48: Engines Converted to Use Alcohol, 1979-1982

		1980												
	1979	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
BRAZIL	4,970	771	847	1,185	1,555	2,080	995	1,403	2,427	2,805	6,368	4,876	3,341	28,653
SÃO PAULO	4,654	458	443	639	818	1,253	597	826	1,255	1,623	3,180	2,443	1,807	15,342

	1981												
	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
BRAZIL	2,824	2,962	2,935	2,361	1,054	757	833	1,388	367	313	195	209	16,198
SÃO PAULO	1,447	1,534	1,445	1,239	630	387	463	905	234	169	98	108	8,659

	1982												
	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
BRAZIL	128	101	120	131	94	99	124	87	97	173	121	178	1,463
SÃO PAULO	99	60	85	79	56	60	68	62	65	75	59	63	841

Source: MIC/STI

TABLE 49: Automobile Production, by Type of Vehicle and Type of Fuel
1979 - 1982

	1 9 7 9				1 9 8 0				1 9 8 1				1 9 8 2			
	GASOLINE	ALCOHOL	DIESEL	TOTAL	GASOLINE	ALCOHOL	DIESEL	TOTAL	GASOLINE	ALCOHOL	DIESEL	TOTAL	GASOLINE	ALCOHOL	DIESEL	TOTAL
Passenger Cars.....	545,798	1,828	-	547,626	450,766	149,940	-	600,706	318,073	87,943	-	406,016	321,341	153,771	-	475,112
Light Trucks for Mixed/Multiple use..	410,923	2,637	319	413,879	282,580	90,788	3,623	376,991	141,784	34,814	39,047	215,645	107,826	69,194	63,611	240,631
Jeeps etc.	5,535	5	230	5,770	5,118	205	308	5,631	2,452	70	334	2,856	2,431	318	351	3,100
Pick-up Trucks.....	38,534	144	16,130	54,808	32,933	13,069	19,632	65,364	28,847	4,868	32,833	66,548	20,227	13,395	50,278	83,900
Large Trucks	2,682	10	90,359	93,051	3,938	14	98,065	102,017	4,695	1,126	70,529	76,350	628	904	45,166	46,698
Buses	5	-	12,827	12,832	-	-	14,465	14,465	1	7	13,385	13,393	-	3	9,817	9,820
T O T A L	1,003,477	4,624	119,865	1,127,966	775,335	254,016	135,823	1,165,174	495,852	128,828	156,128	780,808	452,453	237,585	169,223	859,261

Source: ANFAVEA, Planejamento Econômico e Estatístico.

TABLE 50: Domestic Automobile Sales, by Type of Vehicle and Type of Fuel, 1979-1982

TYPES	1980												
	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
PASSANGER CARS	45,801	42,965	42,428	13,037	41,473	42,910	50,078	51,766	55,026	47,045	43,032	42,727	518,288
Gasoline	45,355	42,272	40,221	12,523	34,870	33,818	43,292	40,451	38,984	21,812	11,424	10,742	375,764
Alcohol	446	693	2,207	514	6,603	9,092	6,786	11,315	16,042	25,233	31,608	31,985	142,524
LIGHT TRUCKS FOR MIXED/ MULTIPLE USE	31,480	34,946	33,747	13,032	27,102	23,823	23,828	28,999	28,510	22,405	17,992	18,875	304,739
Gasoline	30,968	33,578	32,430	12,135	24,109	18,835	16,341	18,481	15,768	7,835	4,031	4,219	218,730
Alcohol	485	1,344	1,294	896	2,970	4,965	7,447	10,484	12,703	14,559	13,916	14,606	85,669
Diesel	27	24	23	1	23	23	40	34	39	11	45	50	340
JEEPS, ETC..	402	413	458	260	157	500	365	393	364	238	205	272	4,027
Gasoline	378	377	427	257	131	471	325	354	309	186	140	218	3,573
Alcohol	12	11	5	-	8	1	5	11	22	45	33	29	182
Diesel	12	25	26	3	18	28	35	28	33	7	32	25	272
PICK-UP TRUCKS	4,861	5,119	5,016	3,114	3,704	4,840	5,149	5,438	6,113	6,134	5,127	5,127	59,742
Gasoline	3,490	3,787	3,562	2,345	1,894	2,908	2,593	2,571	2,755	1,834	1,410	1,501	30,650
Alcohol	62	76	128	606	1,010	906	1,125	1,055	1,368	2,376	1,624	1,927	12,263
Diesel	1,309	1,256	1,326	163	800	1,026	1,431	1,812	1,990	1,924	2,093	1,699	16,829
LARGE TRUCKS	6,696	6,840	7,130	2,796	4,389	6,981	7,631	8,102	7,656	8,880	8,098	6,734	81,933
Gasoline	113	99	17	70	41	29	59	64	33	24	26	8	583
Diesel	6,583	6,741	7,113	2,726	4,348	6,952	7,572	8,038	7,623	8,856	8,072	6,726	81,350
BUSES	614	792	1,024	388	448	1,258	1,234	1,310	1,308	1,249	1,087	820	11,532
Diesel	614	792	1,024	388	448	1,258	1,234	1,310	1,308	1,249	1,087	820	11,532
TOTAL 1979	89,854	91,075	89,803	32,627	77,273	80,312	88,285	96,008	98,977	85,951	75,541	74,555	980,261
Gasoline	80,304	80,113	76,657	27,330	61,045	56,061	62,610	61,921	57,849	31,691	17,031	15,688	629,300
Alcohol 3,120	1,005	2,124	3,634	2,016	10,591	14,964	15,363	22,865	30,135	42,213	47,181	48,547	240,638
Diesel	8,545	8,838	9,512	3,281	5,637	9,287	10,312	11,222	10,993	12,047	11,329	9,320	110,323

Source: ANFAVEA, Planejamento Econômico e Estatístico.

OBS.: Passanger cars include "Passanger Cars" plus "Light Trucks for Mixed"multiple Use".

TABLE 50: Domestic Automobile Sales, by type of Vehicle and type of Fuel - 1979/1982 (Cont.)

TYPES	1981												
	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
PASSANGER CARS	41,351	24,736	20,639	27,585	23,301	26,189	22,736	26,355	29,260	30,377	28,402	33,112	334,043
Gasoline	13,065	10,110	9,818	15,596	16,593	22,312	20,291	23,105	26,649	27,822	26,405	30,570	242,336
Alcohol	28,286	14,626	10,821	11,989	6,708	3,877	2,445	3,250	2,611	2,555	1,997	2,542	91,707
LIGHT TRUCKS FOR MIXED/ MULTIPLE USE	17,752	12,181	8,844	10,474	8,378	10,845	10,671	8,861	9,615	11,081	11,832	12,671	133,205
Gasoline	5,479	4,058	4,237	6,049	5,941	9,581	9,634	7,335	8,300	8,987	9,359	10,316	89,276
Alcohol	12,229	8,082	4,576	4,389	2,387	1,053	676	913	541	1,225	1,536	1,197	38,804
Diesel	44	41	31	36	50	211	361	613	774	869	937	1,158	5,125
JEEPS, etc..	394	191	154	110	88	111	142	84	121	202	125	146	1,876
Gasoline	347	142	111	89	58	74	110	64	101	177	91	128	1,492
Alcohol	27	11	6	13	5	5	12	7	4	2	3	-	95
Diesel	20	38	37	16	25	32	20	13	16	23	31	18	289
PICK-UP TRUCKS	4,771	3,467	3,129	2,901	3,808	3,403	4,860	3,809	4,237	3,845	3,760	4,419	46,409
Gasoline	1,284	661	848	866	842	1,008	1,202	874	983	983	814	923	11,288
Alcohol	1,733	654	486	762	381	176	104	204	290	194	428	224	5,636
Diesel	1,754	2,152	1,795	1,273	2,585	2,219	3,554	2,731	2,964	2,668	2,518	3,272	29,485
LARGE TRUCKS	7,440	7,394	6,740	6,448	5,113	4,738	3,250	4,189	2,996	2,483	2,802	2,345	55,938
Gasoline	4	3	4	4	10	4	1	2	7	7	-	15	61
Alcohol	193	133	127	154	53	63	29	25	21	46	140	74	1,058
Diesel	7,243	7,258	6,609	6,290	5,050	4,671	3,220	4,162	2,968	2,430	2,662	2,256	54,819
BUSES	968	971	964	964	717	1,112	408	1,080	418	552	694	331	9,179
Gasoline	-	-	-	-	-	1	-	-	-	-	-	-	1
Alcohol	-	-	-	7	-	-	-	-	-	-	-	-	7
Diesel	968	971	964	957	717	1,111	408	1,080	418	552	694	331	9,171
TOTAL	72,676	48,940	40,470	48,490	41,405	46,398	42,067	44,378	46,647	48,540	47,615	53,024	580,650
Gasoline	20,179	14,974	15,018	22,604	23,444	32,980	31,238	31,380	36,040	37,976	36,669	41,952	344,454
Alcohol	42,468	23,506	16,016	17,314	9,534	5,174	3,266	4,399	3,467	4,022	4,104	4,037	137,307
Diesel	10,029	10,460	9,436	8,572	8,427	8,244	7,563	8,599	7,140	6,542	6,842	7,035	98,889

TABLE 50: Domestic Automobile Sales, by type of Vehicle and type of Fuel, 1979-1982

TYPES	1982												
	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
PASSANGER CARS	30,236	29,789	35,007	31,264	30,969	34,448	35,341	36,131	35,765	45,098	41,561	46,981	432,590
Gasoline	27,926	27,652	32,254	26,685	25,080	25,077	23,047	22,768	20,437	18,656	14,437	15,608	279,627
Alcohol	2,310	2,137	2,753	4,579	5,889	9,371	12,294	13,363	15,328	26,442	27,124	31,373	152,963
LIGHT TRUCKS FOR MIXED/ MULTIPLE USE	11,476	11,098	12,690	11,110	10,189	11,315	11,595	13,869	12,133	13,745	14,319	18,642	152,181
Gasoline	8,953	8,391	8,739	6,584	6,001	5,981	5,345	5,902	4,469	3,751	3,738	5,474	73,328
Alcohol	1,364	1,437	2,194	3,323	3,609	4,589	5,705	6,590	6,603	9,405	10,109	12,083	67,011
Diesel	1,159	1,270	1,757	1,203	579	745	545	1,377	1,061	589	472	1,085	11,842
JEEPS, etc..	186	182	207	174	198	198	203	220	264	406	178	237	2,653
Gasoline	136	142	138	140	143	148	139	173	196	339	151	166	2,011
Alcohol	10	3	39	8	33	25	42	17	30	43	11	38	299
Diesel	40	37	30	26	22	25	22	30	38	24	16	33	343
PICK-UP TRUCKS	2,756	2,961	4,944	4,466	4,672	5,089	4,562	5,426	4,535	4,811	4,569	5,807	54,598
Gasoline	572	639	1,289	1,069	783	1,095	734	1,253	1,056	661	604	720	10,475
Alcohol	130	115	651	572	891	1,273	1,169	1,337	912	1,678	1,527	2,065	12,320
Diesel	2,054	2,207	3,004	2,825	2,998	2,721	2,659	2,836	2,567	2,472	2,438	3,022	31,803
LARGE TRUCKS	3,111	3,424	4,100	4,412	4,160	4,439	4,016	3,605	3,390	2,698	2,041	1,861	41,257
Gasoline	-	5	1	13	38	4	4	22	6	15	1	12	121
Alcohol	70	58	47	114	52	55	71	61	111	95	49	136	919
Diesel	3,041	3,361	4,052	4,285	4,070	4,380	3,941	3,522	3,273	2,588	1,991	1,713	40,217
BUSES	759	601	751	836	632	844	743	750	707	409	398	615	8,045
Gasoline	-	-	-	-	-	-	-	-	-	-	-	-	-
Alcohol	-	-	-	-	-	-	1	-	-	2	-	-	3
Diesel	759	601	751	836	632	844	742	750	707	407	398	615	8,042
TOTAL	48,524	48,055	51,699	52,262	50,820	56,333	56,460	60,001	56,794	67,167	63,066	74,143	691,324
Gasoline	37,587	36,829	42,421	34,491	32,045	32,305	29,269	30,118	26,164	23,422	18,731	21.480	365,562
Alcohol	3,884	3,750	5,684	8,596	10,474	15,313	19,282	21,368	22,984	37,665	38,820	45,695	233,515
Diesel	7,053	7,476	9,594	9,175	8,301	8,715	7,909	8,515	7,646	6,080	5,315	6,468	92,247

TABLE 51: Relation of Alcohol to Gasoline and Diesel Prices, 1979-1982

DATE	HIDRATED ALCOHOL (Cr$/l)	GASOLINE (Cr$/l)	DIESEL (Cr$/l)	PROPORTION ALCOHOL / GASOLINE	PROPORTION ALCOHOL / DIESEL
05.04.79	6.72	9.60	5.40	0.70	1.24
05.28.79	6.72	10.20	5.80	0.66	1.16
07.30.79	6.72	10.20	8.70	0.66	0.77
09.10.79	6.72	14.30	8.70	0.47	0.77
11.12.79	11.40	14.30	8.70	0.80	1.31
11.26.79	11.40	22.60	12.00	0.50	0.95
03.09.80	11.40	26.00	12.00	0.44	0.95
04.24.80	11.40	28.00	12.50	0.41	0.91
05.19.80	18.20	28.00	12.50	0.65	1.46
05.29.80	18.20	30.00	13.50	0.61	1.35
06.26.80	18.20	34.50	15.00	0.53	1.21
07.31.80	18.20	38.00	15.70	0.48	1.16
09.27.80	24.70	38.00	15.70	0.65	1.57
10.03.80	24.70	45.00	17.30	0.55	1.43
12.04.80	27.50	51.00	20.00	0.54	1.37
02.04.81	32.00	60.00	26.00	0.53	1.23
04.17.81	42.00	66.00	32.50	0.64	1.29
06.28.81	48.00	75.00	42.00	0.64	1.14
10.18.81	52.00	85.00	50.00	0.61	1.04
02.14.82	52.00	104.00	62.00	0.50	0.84
03.01.82	64.00	104.00	62.00	0.61	1.03
05.23.82	73.00	125.00	75.00	0.58	0.97
07.18.82	77.00	132.00	75.00	0.58	1.03
09.16.82	84.00	144.00	84.00	0.58	1.00
12.29.82	98.00	167.00	102.00	0.59	0.96

Source: Petrobrás data.

TABLE 52 : Average Monthly Fuel Consumption of Alcohol Vehicles, 1980 - 1982.

	Average Consumption of Hydrate Alcohol (Liters/Month)		
	1980	1981	1982
January	270	360	270
February	300	290	252
March	410	310	266
April	720	310	273
May	670	300	282
June	400	290	240
July	470	290	284
August	490	113	284
September	520	113	254
October	460	131	276
November	370	111	319
December	360	133	289

Source : ANFAVEA/STI/CNP

TABLE 53: Network of Service Stations for Hydrate Alcohol

	PETROBRÁS	ESSO	SHELL	TEXACO	ATLANTIC	CBPI	DPPI	HUDSON	SABBA	S.PAULO	TOTAL
As of 12.31.1980	1,335	362	1,128	137	127	471	20	1	-	6	3,587
As of 12.31.1981	2,431	1,465	1,972	918	936	1,005	178	16	16	84	9,021
As of 12.31.1982	2,665	1,644	2,152	1,025	1,058	1,136	186	15	21	107	10,009
T O T A L	6,431	3,471	5,252	2,080	2,121	2,612	384	32	37	197	22,617

Source: CNP, apud. CENAL REPORTS.

TABLE 54 : Formal Representation of Interests in the Sugar (and Alcohol) Policy - 1931 - 1980

ORGAN	1931	1931	1933*	1934*	1937*	1938*	1939*	1941	1967	1968	1968	1969	1978
Representation	CEAM	CDPA	CE/IAA	CE/IAA	CE/IAA	CE/IAA	CE/IAA	CE/IAA	CONDEL/IAA	CONDEL	CONDEL	CONDEL	CONDEL
Government	3	4	4	4	4	4	4	5	8	8	8	9	10
Producers (individual)	-	6	4	5	8	4	5	8	4	4	4	4	4
Producers (collective)	-	-	-	-	-	-	-	-	-	1	3	1	1
	Unnumbered Resolution of the Min. Agriculture (08.04.31)	Dec.nº 20,761	D.22,768 art.1º D.22,981 Reg.	Dec.nº 24,749/34	Law nº 458	Dec.nº 634/38	Dec.1831, art.809	Dec.Law 3,855 (Sugar-Cane Production Statute)	Decree 61,777	Decree nº 63,014	Decree nº 63,491	Decree nº 64,034	Decree nº 81,849
Government	M.Agric. M.Finance M.Labor Ind. & Trade	Idem Idem Idem Bank of Brazil	Idem Idem Idem Idem	Idem Idem Idem Idem	Idem Idem Idem Idem	Idem Idem Idem Idem	Idem Idem Idem Idem	Idem Idem Idem Idem M.Transport & Public Works (later M.Transport	Idem Idem Idem Idem Idem M.Interior Affairs M.Planning M.Industry & Trade**	Idem Idem Idem Idem Idem Idem Idem Idem	Idem Idem Idem Idem Idem Idem Idem Idem	Idem Idem Idem Idem Idem Idem Idem Idem M.Foreign Affairs	Idem Idem Idem Idem Idem Idem Idem Idem M.Minas & Energy
Producers (individual)	-	Repres. of the Producers of PE, SE, AL, BA, RJ, SP.	4 Reps. of the Usineiros	4 Repres. of the Usineiros 1 Rep.of the Banquezeiros	5 Repres. of the Usineiros 1 Reps.of the Banquezeiros 2 Reps.of the suppliers	4 Repres of the Usineiros	4 Repres.of the Usineiros 1 Reps.of the suppliers and Banquezeiros	4 Repres.of the Usineiros 3 Reps.of the suppliers 1 Reps.of the Banquezeiros	2 Repres.of the Industrialists*** 2 Reps.of the suppliers***	Idem Idem	Idem Idem	Idem Idem	Idem Idem
Producers (collective)	-	-	-	-	-	-	-	-	-	CNA	Consultative Commission (CNA,CNI, CNC)	CNA	Idem

C.E.A.M. - Commission for Studies on Álcool-Motor
C.D.P.A. - Commission for the Defense of Sugar Production
CE/I.A.A. - Executive Commission of the IAA
CONDEL/IAA - Deliberative Council of the IAA
C.N.A. - National Confederation of Agriculture
C.N.I. - National Confederation of Industry
C.N.C. - National Confederation of Commerce

* As well as the Executive Commission of the IAA, there was also the Consultative Council set up in 1933 (Dec.22789,art.2)and abolished in 1941 (Dec.3855,art.16) composed of representatives of the usineiros not chosen to take part in the Executive Commission,together with representatives of the cane planters, in the proportion of 1 per State with annual production of more than 160,000 tons of cane.

** Decree 61,777/67, art.4, paragraph 1, determines that the President of the IAA will be the representative of the Min.of Ind.and Trade at the Deliberative Council.

*** One representative of the sugar industrialists and one of the sugar-cane suppliers is chosen for each of the sugar-producing regions, North-Northeast and Center-South.

TABLE 55 : Presidents of the Sugar and Alcohol Institute

PRESIDENTIAL ADMINISTRATION	INSTITUTE PRESIDENT	NATIVE OF	REPRESENTATIVE OF	TENURE IN OFFICE
Getúlio Vargas	Leonardo Truda	Rio Grande do Sul	Bank of Brazil	March,1933 - May,1937
	Alberto de Andrade Queiroz (Vice)	NA	Ministry of Finance	December, 1937- May, 1938
	Alexandre Barbosa Lima Sobrinho	Pernambuco	Bank of Brazil	May,1938-March,1946
Eurico Gaspar Dutra	Esperidião Lopes de Barros Júnior	Alagoas	Bank of Brazil	April,1946-May,1948
	Edgar de Goes Monteiro	Alagoas	Bank of Brazil	May,1946-January,1950
	Manuel Neto Carneiro Campelo Júnior	Pernambuco	Bank of Brazil	February,1950 - September,1950
Getúlio Vargas	Fernando Pessoa de Queiroz	Pernambuco	Bank of Brazil	September,1950 - February, 1951
	Silvio Bastos Tavares	Rio de Janeiro	Bank of Brazil	February,1951 - December,1951
	Gileno Dé Carli	Pernambuco	Bank of Brazil	December, 1951 - August, 1954
João Café Filho	José Acioly de Sá (Vice)	NA	Ministry of Labor- Ministry of Finance	August, 1954 - November, 1954
	Carlos de Lima Cavalcanti	Pernambuco	Bank of Brazil	November, 1954 - December, 1955
Juscelino Kubitschek	Amaro Gomes Pedrosa	Pernambuco	Bank of Brazil	December, 1955 - August, 1956
	Epaminondas Moreira do Vale	NA	Bank of Brazil - Ministry of Finance	August, 1956 - January, 1957
	Manoel Gomes Maranhão	Pernambuco	Bank of Brazil	January, 1957 - February, 1961
Janio Quadros	Leandro Maynard Ariel	Sergipe	Bank of Brazil	February, 1961 October, 1961
	Eduardo Rios Filho (Vice)	NA	Ministry of Finance	September, 1961 - October, 1961
João Goulart	Edmundo Passoa Barbosa da Silva	Rio de Janeiro	Bank of Brazil	October, 1961 - September, 1962
	Manoel Gomes Maranhão (Vice)	Pernambuco	Bank of Brazil	September, 1962 - April, 1964
Humberto Castelo Branco	Hildeberto Nunes Sanglard (Interim President)	NA	NA	Abril, 1964 - May, 1964
	Paulo Frederico do Rego Maciel	Pernambuco	Bank of Brazil	May, 1964 - June, 1966
	José Maria Nogueira	Espírito Santo	Ministry of Finance	June, 1966 - April, 1967
Artur da Costa e Silva	Antonio Evaldo Inojosa de Andrade	Alagoas	Ministry of Industry and Trade	April, 1967 - June, 1968
	Francisco Elias da Cotrica	Alagoas	Ministry of Industry and Trade	June, 1968 - December, 1969
Emílio Garrastazu Médici	Francisco Ribeiro da Silva	NA	Ministry of Industry and Trade	January, 1970 - February, 1970
Ernesto Geisel	Álvaro Tavares do Carmo	Rio de Janeiro	Ministry of Industry and Trade	February, 1970 - March, 1979
João Batista Figueiredo	Hugo de Almeida	Paraíba	Ministry of Industry and Trade	March, 1979 - August, 1982
	Confúcio Pamplona	São Paulo	Ministry of Industry and Trade	August, 1982

NA = Non Available.

Source: Hugo P. de Oliveira, Os Presidentes do IAA (Rio de Janeiro: IAA, 1975) and Brasil Acucareiro (Several Issues).

LIST OF ACRONYSMS

LIST OF ACRONYSMS

ABDIB	ASSOCIAÇÃO BRASILEIRA PARA O DESENVOLVIMENTO DAS INDÚSTRIAS DE BASE (Brazilian Association for the Development of the Capital Goods Industry)
ABIMAQ	ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA DE MÁQUINAS E EQUIPAMENTOS (Brazilian Association of Machinery and Equipment Industry)
ABINEE	ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA ELÉTRICA E ELETRÔNICA (Brazilian Association of Electric and Electronic Equipment Industry)
ABIQUIM	ASSOCIAÇÃO BRASILEIRA DAS INDÚSTRIAS QUÍMICAS (Brazilian Association of Chemical Industries)
ABRAVE	ASSOCIAÇÃO BRASILEIRA DOS DISTRIBUIDORES DE VEÍCULOS (Brazilian Association of Car Dealers)
ANFAVEA	ASSOCIAÇÃO NACIONAL DOS FABRICANTES DE VEÍCULOS AUTOMOTORES (National Association of Producers of Self-Powered Vehicles)
APAREM	ASSOCIAÇÃO PAULISTA DE RETÍFICAS DE MOTORES (Association of Car Repair Shops of São Paulo)
BEN	BALANÇO ENERGÉTICO NACIONAL (National Energy Balance)
BNDE	BANCO NACIONAL DE DESENVOLVIMENTO ECONÔMICO (National Bank of Economic Development)
CACEX	CARTEIRA DE COMÉRCIO EXTERIOR (Department of Foreign Trade)
CAPs	CENTROS DE APOIO TECNOLÓGICO (Technological Support Centers)
CDE	CONSELHO DE DESENVOLVIMENTO ECONÔMICO (Economic Development Council)

CDI	CONSELHO DE DESENVOLVIMENTO INDUSTRIAL (Industrial Development Council)
CDPA	COMISSÃO DE DEFESA DA PRODUÇÃO AÇUCAREIRA (Commission for the Defense of Sugar Production)
CEAM	COMISSÃO DE ESTUDOS SOBRE O ÁLCOOL-MOTOR (Commission for Studies on Álcool-Motor)
CENAL	COMISSÃO EXECUTIVA NACIONAL DO ÁLCOOL (National Alcohol Executive Commission)
CIP	CONSELHO INTERMINISTERIAL DE PREÇOS (Interministerial Council on Prices)
CMN	CONSELHO MONETÁRIO NACIONAL (National Monetary Council)
CNA	CONFEDERAÇÃO NACIONAL DA AGRICULTURA (National Confederation of Agriculture)
CNAl	COMISSÃO NACIONAL DO ÁLCOOL (National Alcohol Commission)
CNAL	CONSELHO NACIONAL DO ÁLCOOL (National Alcohol Council)
CNC	CONFEDERAÇÃO NACIONAL DO COMÉRCIO (National Confederation of Trade)
CNE	COMISSÃO NACIONAL DE ENERGIA (National Energy Commission)
CNI	CONFEDERAÇÃO NACIONAL DA INDÚSTRIA (National Confederation of Industry)
CNP	CONSELHO NACIONAL DO PETRÓLEO (National Petroleum Council)
CONAREM	COMISSÃO NACIONAL DE RETÍFICAS DE MOTORES (National Commission of Car Repair Shops)
CONCEX	CONSELHO NACIONAL DE COMÉRCIO EXTERIOR (National Council for Foreign Trade)
CONDEL	CONSELHO DELIBERATIVO DO IAA (IAA's Deliberative Council)

COPERFLU	COOPERATIVA FLUMINENSE DOS PRODUTORES DE AÇÚCAR E ÁLCOOL (Sugar and Alcohol Producers of the State of Rio de Janeiro)
COPERSUCAR	COOPERATIVA CENTRAL DOS PRODUTORES DE AÇÚCAR E ÁLCOOL DO ESTADO DE SÃO PAULO (Central Cooperative of Sugar and Alcohol of the State of São Paulo)
CSE	COMISSÃO SEPLAN DE ENERGIA (SEPLAN Energy Commission)
CTA	CENTRO TECNOLÓGICO DA AERONÁUTICA (Aerospace Technical Center)
DCI	DIÁRIO COMÉRCIO E INDÚSTRIA Newspaper
EMBRATER	EMPRESA BRASILEIRA DE ASSISTÊNCIA TÉCNICA E EXTENSÃO RURAL (Brazilian Enterprise for Technical Assistance and Agricultural Extension Service)
ESP	O ESTADO DE SÃO PAULO Newspaper
FAESP	FEDERAÇÃO DA AGRICULTURA DO ESTADO DE SÃO PAULO (Federation of Agriculture of the State of São Paulo)
FEPLANA	FEDERAÇÃO DOS PLANTADORES DE CANA DO BRASIL (Federation of Sugar-Cane Suppliers)
FME	FUNDO DE MOBILIZAÇÃO ENERGÉTICA (Energy Mobilization Fund)
FSP	FOLHA DE SÃO PAULO Newspaper
FUNAGRI	FUNDO GERAL PARA A AGRICULTURA E INDÚSTRIA (General Fund for Agriculture and Industry)
GERAC	GRUPO EXECUTIVO PARA A RACIONALIZAÇÃO DO USO DE COMBUSTÍVEIS (Executive Group for the Rationalization of the Use of Fuels)
GM	GAZETA MERCANTIL Newspaper
IAA	INSTITUTO DO AÇÚCAR E DO ÁLCOOL (Institute of Sugar and Alcohol)

IBIRD	INTERNATIONAL BANK OF RECONSTRUCTION AND DEVELOPMENT
ICM	IMPOSTO DE CIRCULAÇÃO DE MERCADORIAS (Sales Tax)
INDI	INSTITUTO NACIONAL DE DESENVOLVIMENTO INDUSTRIAL (Industrial Development Institute)
INPI	INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL (National Institute of Industrial Property)
INT	INSTITUTO NACIONAL DE TECNOLOGIA (National Institute of Technology)
IPI	IMPOSTO DE PRODUTOS INDUSTRIALIZADOS (Industrial Products Tax)
ISA	INTERNATIONAL SUGAR AGREEMENT
JB	JORNAL DO BRASIL Newspaper
JC	JORNAL DO COMMERCIO Newspaper
JT	JORNAL DA TARDE Newspaper
MA	MINISTÉRIO DA AGRICULTURA (Ministry of Agriculture)
MIC	MINISTÉRIO DA INDÚSTRIA E DO COMÉRCIO (Ministry of Industry and Trade)
MME	MINISTÉRIO DAS MINAS E ENERGIA (Ministry of Mines and Energy)
NTC	ASSOCIAÇÃO NACIONAL DAS EMPRESAS DE TRANSPORTES DE CARGAS (National Association of Loading Vehicle Firms)
OG	O GLOBO Newspaper
ORTN	OBRIGAÇÕES REAJUSTÁVEIS DO TESOURO NACIONAL (An index of Government bonds adjusted regularly to reflect inflation)

PLANALSUCAR	PROGRAMA NACIONAL DE MELHORAMENTOS DE CANA-DE-AÇÚCAR (National Programa for the Improvement of Sugar Cane)
PME	PROGRAMA DE MOBILIZAÇÃO ENERGÉTICA (Energy Mobilization Program)
PNA	PROGRAMA NACIONAL DO ÁLCOOL (National Alcohol Program)
I PND	PRIMEIRO PLANO NACIONAL DE DESENVOLVIMENTO (First National Development Plan)
II PND	SEGUNDO PLANO NACIONAL DE DESENVOLVIMENTO (Second National Development Plan)
PROÁLCOOL	PROGRAMA NACIONAL DO ÁLCOOL (National Alcohol Program)
RR	RELATÓRIO RESERVADO Newsletter
SEAAI	SERVIÇO ESPECIAL DO ÁLCOOL ANIDRO E INDUSTRIAL (Special Service for Anhydrous and Industrial Alcohol)
SECRRA	SERVIÇO ESPECIAL DE CONTROLE DA REQUISIÇÃO E REDESTILAÇÃO DE AGUARDENTE (Special Service for the Control of Requisition and Redistilling Aguardente)
SEPLAN	SECRETARIA DE PLANEJAMENTO (Ministry of Planning)
SINDIPEÇAS	SINDICATO NACIONAL DA INDÚSTRIA DE COMPONENTES PARA VEÍCULOS AUTOMOTORES (National Syndicate of the Auto-Parts and Vehicle Components Suppliers)
SOPRAL	SOCIEDADE DE PRODUTORES DE AÇÚCAR E ÁLCOOL (Society of Sugar and Alcohol Producers)
STI	SECRETARIA DE TECNOLOGIA INDUSTRIAL (Secretary of Industrial Technology)
SUDAM	SUPERINTENDÊNCIA DE DESENVOLVIMENTO DA AMAZÔNIA (Superintendency of the Amazonia Region Development)

SUDENE	SUPERINTENDÊNCIA DE DESENVOLVIMENTO DO NORDESTE (Superintendency of the Northeast Region Development)
SUMOC	SUPERINTENDÊNCIA DA MOEDA E DO CRÉDITO (Superintendency of Money and Credit)
SUNAB	SUPERINTENDÊNCIA NACIONAL DE ABASTECIMENTO (National Supply Superintendency)
TELESP	COMPANHIA TELEFÔNICA DE SÃO PAULO (Telephone Company of São Paulo)
TI	TRIBUNA DA IMPRENSA Newspaper

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DIÁRIO COMÉRCIO E INDÚSTRIA, 7/3/79. "Técnicos negam corrosão".

_____, 1/31/80. "Bancos poderão financiar PROÁLCOOL".

_____, 3/13/80. "Álcool desgasta menos que a gasolina, diz STI".

_____, 3/29/80. "Preço do carro a álcool será igual ao do movido a gasolina".

_____, 4/9/80. "Financiamento e preço, os problemas do setor da cana".

_____, 4/16/80. "Destilarias de médio porte vão ter créditos especiais".

_____, 5/9/80. "PROÁLCOOL desperta interesse na França".

_____, 3/21-23/81. "Álcool congelado".

FOLHA DE SÃO PAULO, 6/11/78. "PROÁLCOOL tem problemas".

_____, 8/23/78. "Um conselho ...".

_____, 8/24/78. "Futuro pagará bem caro pelo atraso do PROÁLCOOL".

_____, 12/23/78. "O futuro do PROÁLCOOL divide os ministérios".

_____, 1/6/80. "Divergências sobre o álcool".

_____, 2/14/80. "Serpa condena presença das multis na política energética brasileira".

_____, 3/23/80. "Sem direção".

_____, 4/10/80. "Governo autorizará reajuste do álcool".

_____, 6/1/80. "Dúvidas e críticas contra a política oficial de conversão".

_____, 5/11/80. "PROÁLCOOL não vai tão bem".

_____, 6/17/82. "Isenção do IPI de carro a álcool não anima os taxistas".

FOLHA DE SÃO PAULO, 6/18/82. "CONFAZ aprova os incentivos para os táxis a álcool".

GAZETA MERCANTIL, 8/23/73. "Será ampliada este ano a exportação de álcool".

_____, 12/11/73. "MIC estimula produção de álcool combustível".

_____, 6/17/74. "Resolução do IAA fixa novos preços na base já prevista pelo CIP".

_____, 8/22/77. "No encontro do açúcar, maior destaque para o álcool".

_____, 10/12/77. "O dinheiro (lento) do B.B.".

_____, 10/12/77. "Para Lycio de Faria, as metas são só indicativas".

_____, 10/12/77. "Bons negócios para quem produz usinas".

_____, 12/13/78. "Esperanças no PROÁLCOOL".

_____, 12/13/78. "Ueki: exportar álcool, para importar gasolina".

_____, 6/7/79. "As reformulações do CDE para a política do álcool".

_____, 2/15/80. "Penna admite estrangeiros".

_____, 3/18/80. "A PETROBRÁS vai investir no PROÁLCOOL".

_____, 3/19/80. "Reiterada a sugestão".

_____, 3/19/80. "Cals veta o plano tripartite".

_____, 3/20/80. "O avanço da DEDINI no PROÁLCOOL".

_____, 3/20/80. "Grupo mineiro oferece sociedade à PETROBRÁS".

_____, 3/21/80. "COPERFLU aprova recursos da PETROBRÁS no álcool".

GAZETA MERCANTIL, 3/21/80. "Plano triplica o PROÁLCOOL".

_____, 4/8/80. "SHELL e TEXACO querem apenas a distribuição".

_____, 5/7/80. "A polêmica sobre a conversão de motores em São Paulo".

_____, 5/9/80. "Cr$ 44 bilhões destinados ao PROÁLCOOL, diz Camilo Penna".

_____, 6/25/80. "STI rejeita a aditivação".

_____, 6/25/80. "IAA nega 'dumping' nas vendas para clientes norte-americanos".

_____, 7/5/80. "Os dez projetos do BNDE".

_____, 9/26/80. "A sucessão do diesel".

_____, 10/2/80. "CNE eleva preços para não racionar".

_____, 10/4/80. "Técnicos temem o aumento do álcool".

_____, 10/22/80. "Penna garante a oferta do produto hidratado".

_____, 11/3/80. "A produção não é suficiente"

_____, 11/3/80. "Os planos da PETROBRÁS".

_____, 11/7/80. "Multinacionais não podem ter financiamentos".

_____, 11/28/80. "O Governo contém a escalada da indústria".

_____, 11/28/80. "O susto da Guerra provocou o 'boom'".

_____, 12/4/80. "EUA sobretaxam galão exportado pelo Brasil em 40 centavos de dólar".

_____, 2/17/81. "Penna diz que o BIRD recua".

_____, 4/2/81. "Projetos registrados pela CENAL".

_____, 5/23-25/81. "Programa bate recorde ao enquadrar 24 novos projetos de destilaria".

_____, 6/17/81. "PROÁLCOOL terá mais Cr$22 bilhões".

JORNAL DO BRASIL, 7/12/74. "Governo vai liberar cana para o álcool".

_____, 10/30/74. "IAA aumentará preço de venda de cana-de-açúcar".

_____, 11/28/74. "A rica dieta de Campos".

_____, 12/5/74. "Ângelo de Sá vê PETROBRÁS com crédito ilimitado".

_____, 6/19/75. "Auto-suficiência em óleo é um fato para Shigeaki Ueki".

_____, 7/23/75. "Indústria poderá fabricar o carro para usar nova mistura".

_____, 10/23/75. "CNP e PETROBRÁS executam o plano do álcool carburante".

_____, 10/29/75. "Gasolina com álcool exigirá alterações nos motores atuais".

_____, 10/31/75. "Os produtores sugerem mudanças".

_____, 11/1 /75. "Projeto do álcool gera protestos no setor privado".

_____, 12/15/75. "Comissão do Álcool faz. la. reunião".

_____, 12/18/75. "Usineiros temem pelo afastamento do IAA".

_____, 8/9/76. "Banco do Brasil admite paralisação de projetos".

_____, 8/10/76. "Álcool será usado na produção de etileno e não de carburante".

_____, 8/21/76. "Ministério acusa BB pelo atraso do Plano do Álcool".

_____, 9/30/76. "Técnicos duvidam da implantação do Plano Nacional do Álcool".

_____, 10/12/76. "Governo aprova mais três financiamentos a destilarias de álcool".

JORNAL DO BRASIL, 10/28/76. "CDE debate siderurgia e álcool, mas conclusão continua sigilosa".

_____, 1/16/77. "Indústria quer financiamento rápido para usinas de álcool".

_____, 2/11/77. "Usineiros pedem financiamento de 100% do PROÁLCOOL".

_____, 4/24/77. "Programa do Álcool atrasa 3 anos".

_____, 4/28/77. "Banco do Brasil facilita financiamento do PROÁLCOOL".

_____, 5/6/77. "Geisel reduz exportação de açúcar para produzir álcool".

_____, 5/10/77. "CNA enquadra mais 14 projetos no PROÁLCOOL".

_____, 6/8/77. No title.

_____, 8/17/77. "Atalla critica Governo por limitar destilarias de álcool".

_____, 1/24/78. "Destilarias esperam há 3 meses exame da Comissão do Álcool".

_____, 3/24/78. "Pernambuco não tem mercado nem armazém para álcool anidro".

_____, 3/29/78. "CNP diz que não cuida de tancagem".

_____, 4/22/78. "CNP diz que ausência de programação de usina torna difícil distribuir álcool".

_____, 5/29/78. "500 veículos andam apenas com álcool".

_____, 5/29/78. "Presidente do CNP garante escoamento e consumo total de álcool da próxima safra".

_____, 5/19/78. "Maior oferta de álcool carburante leva PETROBRÁS a produzir menos gasolina".

_____, 6/28/78. "Lycio de Faria acha que PETROBRÁS perde com plano de álcool".

JORNAL DO BRASIL, 7/14/78. "PROÁLCOOL tem mais 21 projetos".

_____, 8/8/78. "Empresário afirma ...".

_____, 8/24/78. "Economista afirma ...".

_____, 9/5/78. "A era do álcool já está aí. Masseus automóveis só daqui a dois anos".

_____, 9/24/78. "O que o álcool pode (e não pode) fazer pelo Brasil".

_____, 10/19/78. "Atalla quer...".

_____, 11/12/78. "Governo diz...".

_____, 12/9/78. "Alagoas terá os primeiros postos".

_____, 12/13/78. "Projetos do PROÁLCOOL darão cerca de 5 milhões de litros".

_____, 5/5/79. "Álcool está à venda mas só um carro abastece".

_____, 5/6/79. "Distribuidor privado pode vender álcool".

_____, 5/16/79. "Governo descrê da ALCOOLBRÁS".

_____, 6/3/79. "Garrafão do álcool irá ao CDE na quarta-feira".

_____, 6/4/79. "Belloti acha que só PETROBRÁS pode distribuir álcool".

_____, 6/6/79. "Cals afirma que PETROBRÁS não terá monopólio no programa do álcool".

_____, 6/7/79. "PROÁLCOOL precisará de 5 bilhões de dólares até 1985".

_____, 6/13/79. "MIC estimula fabricação de equipamentos para destilaria".

_____, 6/14/79. "Fazenda é contra monopólio".

_____, 6/15/79. "Produtor de álcool não quer entregar tudo à PETROBRÁS".

JORNAL DO BRASIL, 7/5/79. "Figueiredo diz que petróleo impõe economia de guerra".

_____, 7/17/79. "Governo incentivará carro a álcool taxando mais o comum".

_____, 8/2/79. "Governo define bases para o carro a álcool".

_____, 8/10/79. "CNE aprova ...".

_____, 8/10/79. "Indústria quer fazer só carro a álcool para mercado interno".

_____, 9/4/79. "Falta de tanques pode afetar safra de álcool".

_____, 9/20/79. "Carro em série só virá no final de 80".

_____, 3/19/80. "Camilo admite que PETROBRÁS entre na produção de álcool".

_____, 4/7/80. "Brasil exportou 40 milhões de litros de álcool em três meses".

_____, 4/11/80. "Usineiro dá prazo ao Governo para uma solução definitiva".

_____, 4/30/80. "Açúcar subirá 40% e Kg poderá custar até Cr$ 19".

_____, 5/1/80. "Ometto diz que preço do açúcar e do álcool continuam defasados".

_____, 5/2/80. "ANFAVEA confirma que o preço de veículo vai subir 13,3% dia 12".

_____, 5/4/80. "Produtores de açúcar e álcool do RJ acham aumento insuficiente".

_____, 5/4/80. "Plantadores de cana também reclamam".

_____, 6/29/80. "Plano do carvão continua atrasado".

_____, 9/15/80. "Empresários garantem meta do PROÁLCOOL em 85 já no próximo ano".

JORNAL DO BRASIL, 9/20/80. "Camilo nega capital externo no PROÁLCOOL".

_____, 9/27/80. "Governo já tem planos para fazer racionamento".

_____, 10/20/80. "Penna ameaça punir práticas que afetem crédito do PROÁLCOOL".

_____, 11/5/80. "Prioridade no álcool será para as empresas privadas".

_____, 3/10/81. "Confiança queimada".

_____, 3/30/81. "Governo e empresários buscam mudar a imagem do PROÁLCOOL".

_____, 6/22/81. "Governo avalia hoje os recursos para o PROÁLCOOL em 1981".

_____, 8/28/81. "Usineiro para se retirada de álcool pela PETROBRÁS continuar morosa".

_____, 8/29/81. "Brasil exportará mais álcool para reduzir estoques".

_____, 9/2/81. "Campanha promoverá PROÁLCOOL".

_____, 6/17/82. "Caixa vai financiar em 36 mese carro a álcool para táxi".

_____, 3/26/82. "Caminho Coerente".

_____, 11/11/82. "Sauer acha que o carro a álcool deveria custar mais".

_____, 9/19/83. "Brasil festeja hoje o sucesso da sua ousadia".

_____, 3/30/83. "Álcool sem destino".

_____, 3/8/84. "Usineiros reclamam do preço mas mantêm meta de produção de álcool".

JORNAL DO COMÉRCIO, 11/26/78. "Álcool dimensionou o plantio da cana".

_____, 12/4/78. "Bombeamento de álcool tem processo inédito".

JORNAL DO COMÉRCIO, 3/20/80. "Cals diz que PETROBRÁS não entra no PROÁLCOOL".

_____, 3/22/80. "Planalto dará novo impulso ao PROÁLCOOL".

_____, 3/26/80. "Começa a venda de veículos a álcool".

_____, 3/27/80. "Governo lança carros a álcool em ato simbólico".

_____, 4/17/80. "Serpa foi demitido".

_____, 4/29/80. "Álcool com preço novo".

_____, 5/31/80. "Penna quer aumentar o álcool para desestimular o consumo".

_____, 6/11/80. "Aureliano alerta para o teto e o piso do álcool"

_____, 6/18/80. "STI só admite conversão de motor sob sua norma".

_____, 9/5/80. "Cals defende outra vez multi no álcool".

_____, 9/11/80. "Aureliano desmente Cals sobre as multis no álcool".

_____, 9/19/80. "Aureliano: multis ...".

_____, 9/24/80. "O Governo volta atrás".

_____, 11/3/80. "PETROBRÁS e multis entram no carvão?"

_____, 11/3/80. "Distribuidoras querem a PETROBRÁS fora do PROÁLCOOL".

_____, 11/18/80. "Delfim nega aumento para carro a álcool".

_____, 11/27/80. "Visão inflacionária do PROÁLCOOL".

_____, 1/6/81. "Camilo Penna contesta Delfim sobre PROÁLCOOL".

JORNAL DO COMÉRCIO, 1/15/81. "Sobre preço do álcool".

_____, 1/29/81. "Litro de álcool-motor no Rio custa hoje Cr$ 32,66".

_____, 6/17/81. "BC desmente suspensão".

_____, 1/22/82. "Álcool para a Europa".

_____, 8/4/82. "Táxis mais baratos tem cerimônia no Planalto".

JORNAL DA TARDE, 11/6/75. "O Plano do Álcool ficou para sábado".

_____, 11/7/75. "Gasolina: petróleo + álcool (cana ou mandioca). O Governo não vai aceitar pressões para decidir o Programa Nacional do Álcool".

_____, 10/21/76. "O álcool, para reduzir o consumo de petróleo na indústria".

_____, 11/10/76. "O que falta mesmo é dinheiro para o álcool".

_____, 11/15/76. "O eteno obtido do álcool sai mais caro".

_____11/14/78. "Programa nuclear e política energética".

_____, 12/8/78. "Em estudos ..."

_____, 3/16/79. "A tática para o problema energético: o bom senso".

_____, 5/15/79. "O monopólio do álcool nas mãos da PETROBRÁS".

_____, 6/7/79. "A solução é álcool. Mas por que essa decisão demorou tanto? "

_____, 6/8/79. "O Programa do Álcool entra em nova fase".

_____, 10/15/79. "Produtor começa a duvidar que PROÁLCOOL atinja sua meta".

_____, 3/17/80. "O que há de errado no PROÁLCOOL".

O ESTADO DE SÃO PAULO, 5/29/72. "CIP vai rever taxa de álcool".

_____, 11/5/72. "Álcool é pouco e irregular na gasolina".

_____, 6/15/74. "Há pouco álcool para adicionar na gasolina".

_____, 6/31/74. "Realismo no Ministério de Minas e Energia".

_____, 11/15/74. "Um elogio ao MDB".

_____, 5/12/75. "Definida a fonte de recursos, surgem os projetos do álcool".

_____, 6/28/75. "CTA revela a Geisel pesquisa sobre álcool".

_____, 8/13/75. "Governo definirá política do álcool".

_____, 8/18/75. "CDE articula os estudos para adicionar o álcool à gasolina".

_____, 9/19/75. "Em estudos um fundo do álcool".

_____, 10/19/75. "Álcool: indecisão custa US$ 1,5 milhão/dia".

_____, 10/28/75. "Governo define diretrizes para o álcool carburante".

_____, 11/6/75. "CDE adia novamente definição sobre álcool".

_____, 11/6/75. "O perigo da estatização da comercialização do álcool".

_____, 11/7/75. "O monopólio do álcool é irreversível".

_____, 11/8/75. "Geisel convoca ministros para a decisão do álcool".

_____, 11/9/75. "CNP garantirá compra do álcool anidro".

_____, 11/11/75. "Um grandioso compromisso com o Governo e o País".

O ESTADO DE SÃO PAULO, 11/13/75. "Disputa atrasa a divulgação do texto do álcool".

_____, 7/11/76. "Indústria já pode atender plano de álcool".

_____, 8/11/76. "A fala de Ueki reabre polêmica do uso do álcool".

_____, 8/21/76. "Álcool: preferência à indústria química".

_____, 1/28/77. "Programa do álcool terá todo recurso necessário

_____, 3/13/77. "Programa ainda espera definições".

_____, 4/29/77. "CNA aprova 14 novos projetos de destilarias".

_____, 6/24/77. "O indefinido Plano Nacional de Álcool".

_____, 3/2/78. "Álcool: caem seis projetos já aprovados".

_____, 7/23/78. "O PROÁLCOOL pode ser desacelerado".

_____, 11/18/78. "Fábricas produzirão frota de teste".

_____, 12/23/78. "Bellotti defende um preço subsidiado para o álcool".

_____, 1/14/79. "O próximo Governo ...".

_____, 1/24/79. "PROÁLCOOL precisa ser reformulado, segundo o CNPq".

_____, 3/3/79. "PROÁLCOOL passará para Minas e Energia".

_____, 3/6/79. "Penna e CNA estranham fala de Cals".

_____, 3/7/79. "PROÁLCOOL: secretaria-executiva".

_____, 3/21/79. "Cals anuncia criação de novo modelo energético".

_____, 4/3/79. "Uma missão difícil para o Ministro Camilo Penna".

O ESTADO DE SÃO PAULO, 5/13/79. "As diretrizes para o setor energético".

_____, 4/15/79. "Álcool excedente ...".

_____, 4/24/79. "CTA ditará padrões para motor à álcool".

_____, 5/13/79. "Nova subsidiária: ALCOOLBRÁS".

_____, 5/16/79. "ALCOOLBRÁS, mas sem controle da PETROBRÁS".

_____, 5/19/79. "PETROBRÁS quer incentivo fiscal para álcool".

_____, 5/22/79. "A PETROBRÁS pretende controlar também o álcool".

_____, 5/23/79. "Governo desiste da ALCOOLBRÁS e só vai distribuir".

_____, 6/8/79. "As verdadeiras dimensões do novo programa do álcool".

_____, 7/6/79. "É da ação empresarial que precisamos agora".

_____, 7/7/79. "Álcool, oportunidade para o setor privado".

_____, 7/22/79. "Álcool: STI abandona projeto".

_____, 8/12/79. "Excesso de órgãos atrasa PROÁLCOOL, dizem técnicos".

_____, 10/21/79. "Mário Garnero pretende dinamizar o PROÁLCOOL".

_____, 1/9/80. "O trabalho da CNE e a política energética".

_____, 1/31/80. "Multinacionais poderão participar do PROÁLCOOL".

_____, 2/10/80. "Foi providencial a cautela no Plano do Álcool".

_____, 4/9/80. "Capital externo fora do PROÁLCOOL em 80".

O ESTADO DE SÃO PAULO, 4/11/80. "Metas de Minas Gerais".

_____, 4/11/80. "Os produtores de açúcar e álcool do Brasil manifestam suas preocupações".

_____, 4/16/80. "Serpa prega 'correção de rumo' em quatro setores".

_____, 6/1/80. "Dúvidas e críticas contra a política oficial de conversão".

_____, 6/12/80. "PROÁLCOOL: uma questão da ESG para a PETROBRÁS".

_____, 1/6/81. "O PROÁLCOOL, inflacionário".

_____, 6/16/81. "Suspensos até 2a. ordem empréstimos para o PROÁLCOOL".

_____, 11/11/82. "Sauer explica o aumento diferenciado".

O GLOBO, 4/15/74. "Ueki diz ...".

_____, 11/1/74. "Usineiro acha exagerado preço externo do açúcar".

_____, 10/10/75. "Governo enfrenta os efeitos da crise mundial".

_____, 11/4/75. "Ministério desmente o Decreto divulgado".

_____, 11/6/75. "Produção é indicação para regiões pobres".

_____, 9/16/76. "Velloso: PROÁLCOOL vai ter Cr$ 10 bilhões até 1978".

_____, 11/11/76. "Inojosa: política inadequada prejudica PROÁLCOOL".

_____, 5/6/77. "Ministros mostram situação do Programa".

_____, 1/9/78. "Para produtor, álcool pode substituir até 100% o petróleo".

_____, 6/25/78. "São Paulo produz este ano 65% da safra de álcool".

O GLOBO, 8/23/78. "Belotti: preço da gasolina inviabiliza PROÁLCOOL".

_____, 11/3/78. "Mistura de álcool na gasolina pode ir a 25%".

_____, 11/9/78. "Minidestilarias para o PROÁLCOOL".

_____, 12/16/78. "Ueki afirma que Brasil já está exportando álcool".

_____, 2/5/79. "Circulam no País 725 veículos movidos a etanol".

_____, 4/2/79. "CTA: carro a álcool já não oferece problemas técnicos".

_____, 4/3/79. "Monopólio pode prejudicar PROÁLCOOL, diz empresário".

_____, 4/8/79. "Israel Vargas defende civilização tropical para o Brasil baseada em recursos vegetais".

_____, 4/11/79. "Álcool em algumas áreas já atinge 20%".

_____, 6/4/79. "Álcool: MIC só autoriza adaptação em carro oficial".

_____, 3/19/80. "Cals: PETROBRÁS fica fora do PROÁLCOOL".

_____, 3/21/80. "Para Setúbal, PETROBRÁS não deve produzir álcool".

_____, 4/25/80. "Só para exportação".

_____, 5/5/80. "INTERBRÁS vende álcool ao Japão".

_____, 6/3/80. "Álcool: Aureliano não discute capital externo".

_____, 6/4/80. "Camilo: Figueiredo não criticou o PROÁLCOOL".

_____, 6/8/80. "Alcool: EUA limitarão importação do Brasil".

O GLOBO, 6/16/80. "Álcool para os EUA".

_____, 9/26/80. "MIC quer sustar exportações de álcool e gasolina".

_____, 9/30/80. "As principais sugestões".

_____, 10/13/80. "SECOM prepara campanha para orientar consumo de álcool".

_____, 10/20/80. "Camilo Penna criticou desperdício".

_____, 10/21/80. "Álcool ameaçado".

_____, 10/27/80. "Importação de álcool já preocupa americanos".

_____, 11/25/80. "Álcool deve subir 15% e o litro passa para Cr$ 28,40 este mês".

_____, 4/8/81. "Álcool: conversão ilegal dá cadeia".

_____, 6/17/81. "CENAL confirma: crédito do PROÁLCOOL suspenso".

_____, 11/5/82. "Protestos contra a alta dos carros a álcool".

_____, 6/17/82. "Isenção de ICM para táxi a álcool é debatida hoje".

_____, 10/15/82. "Açúcar estocado pode virar álcool".

_____, no date, "Nos pátios, as destilarias esperam pelos financiamentos".

RELATÓRIO RESERVADO, 6/3-9/74. "Esperando o CIP".

_____, 6/24-30/74. "Crise sem correção".

_____, 10/28-11/3/74. "Açucarocratas".

_____, 12/9-15/74. "Petróleo Político".

_____, 12/9-15/74. "Controle Necessário".

_____, 12/16-21/74. "Depoimento para a história".

_____, 2/17-23/75. "Açúcar vai bem".

RELATÓRIO RESERVADO, 3/3-9/75. "Atrito superado".

_____, 3/17-23/75. "Dolce Vita no açúcar".

_____, 4/14-20/75. "Doce ou amargo?"

_____, 7/1-7/75. "Recuperação do açúcar".

_____, 8/16-22/76. "Surpresa: há falta de cana e de estatísticas".

_____, 9/5-11/76. "Severo afasta empresa estrangeira do Salão".

_____, 9/27-10/13/76. "Destilarias sem recursos".

_____, 10/25-31/76. "Dinheiro existe, mas não será liberado".

_____, 12/20-26/76. "Dúvidas de fim de ano".

_____, 3/14-20/77. "Vitória da ANFAVEA".

_____, 5/30-6/5/77. "Na dependência do açúcar".

_____, 5/15-28/78. "Ângelo Sá impôs redução de velocidade".

_____, 5/29-6/4/78. "Em gestação ...".

_____, 7/3-9/78. "Deslanchou sob pressão da crítica e de Geisel".

_____, 9/25-10/10/78. "Demanda reprimida aumentou as vendas".

_____, 11/20-26/78. "Ganha regulamentação no dia da eleição".

_____, 11/27-12/3/78. "Indústria só começa a produzir em 1980".

_____, 9/10-16/79. "Sem compromissos com o ônibus a álcool".

_____, 2/4-10/80. "Até julho o Governo abre o PROÁLCOOL para as multis".

_____, 5/12-18/80. "Governo acusa 'multis' de retardarem o PROÁLCOOL".

RELATÓRIO RESERVADO, 5/19-25/80. "ANFAVEA obtém abatimento de 50 mil carros".

_____, 5/26-6/1/80. "Só 100 mil barris diários pagam risco das 7 irmãs".

_____, 6/9-15/80. "Aditivo para álcool se parece com nitroglicerina".

_____, 6/16-22/80. "OXITENO explica aditivo com explosivo".

_____, 9/8-14/80. "Procura já justifica 'cobrança por fora'".

_____, 10/6-12/80. "Aureliano queria racionamento. Delfim vetou".

_____, 10/27-11/2/80. "O negócio é outro".

_____, 11/3-9/80. "Mercado paga quanto quiser".

_____, 11/17-23/80. "Oziel critica 'multis'".

_____, 11/24-30/80. "Delfim vetou aumento: montadoras surpresas".

_____, 3/16-22/81. "PROÁLCOOL cresce só 5% em 4 meses".

_____, 5/18-24/81. "PROÁLCOOL continua com poucos amigos".

_____, 3/22-28/82. "A culpa é do carro".

_____, 9/2-8/82. "PETROBRÁS quer gasolina com 25% de álcool".

_____, 9/13-18/82. "CNE quer escoar grande estoque de álcool".

SENHOR, 9/8/82. "Um negócio camarada".

TRIBUNA DA IMPRENSA, 4/14/79. "Carro movido a álcool já bate recordes em testes".

VEJA, 11/19/75. "O plano afinal".

_____, 10/27/76. "Motores à moda brasileira".

VEJA, 11/3/76. "Como conter as dificuldades?"

_____, 6/13/79. "O petróleo da cana".

_____, 9/17/80. "A explosão do álcool".

VISÃO, 7/12/76. "Por que o Programa está atrasado?"

_____, 11/22/76. "Plano do álcool - um ano depois, poucos resultados".

_____, 6/15/81. "Começam os remendos".