

BRAZIL'S BIODIESEL PROGRAM

Rodrigo Augusto Rodrigues¹
José Honório Accarini²

Introduction

Testing and research into fuel derived from vegetable oil began in Brazil during the 1970s. For reasons having to do primarily with the petroleum market, and with factors affecting prices of petroleum derivatives as well as diesel fuel's market share in Brazil's transportation industry, these initiatives fell short of making those fuels a part of the nation's energy mix.

In 2003, new life was breathed into these initiatives by the policies and program support of the Federal Government. These changes were enthusiastically welcomed by all of the various manufacturing, social and political stakeholders in the biodiesel supply chain, and their interest is still growing.

In July of 2003, the President of Brazil called for studies by representatives of the various agencies of the Federal Government for purposes of examining the economic, social and environmental feasibility of biodiesel production and use in Brazil. There followed a series of hearings to which were

¹Masters in Regulatory Economics, University of Brasilia, Adjunct Deputy Director to the Executive Office's Chief of Staff and coordinator for the Interministerial Executive Committee on Biodiesel.

²Masters in Economics, University of São Paulo, Adviser to the Executive Office's Chief of Staff and Member of the Interministerial Executive Committee on Biodiesel.



invited representatives of science and technology institutes, universities, vegetable oil manufacturers, farmers and rural workers, automakers, auto parts producers, state governments and state legislators involved in the topic. Every effort was made to learn about and evaluate international experience in the production and use of biodiesel.

These studies culminated, in December of 2003, in the preparation of a Final Report presenting conclusions on biodiesel's potential for making a positive contribution toward resolving crucial Brazilian issues, such as helping to place family farm owners (small rural producers) on a better footing in society as a whole through job creation and income which would result from their increasing inclusion in the supply chain for this biofuel. This would lessen the disparities among different regions, save on hard currency



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and reduce the nation's dependence on imported oil, while increasing the renewable component of Brazil's energy mix, working towards a better environment and easing the burden of health-related costs by reducing pollution-related illness, especially in the great metropolitan areas.

After considering this broad range of social, economic, environmental, strategic and even geopolitical benefits, the Federal Government promptly turned to the task of defining goals and taking steps toward the introduction of biodiesel into Brazil's energy fuel mix. Hence, on December 6, 2004, Brazil's National Biodiesel Program (PNPB) came into being.

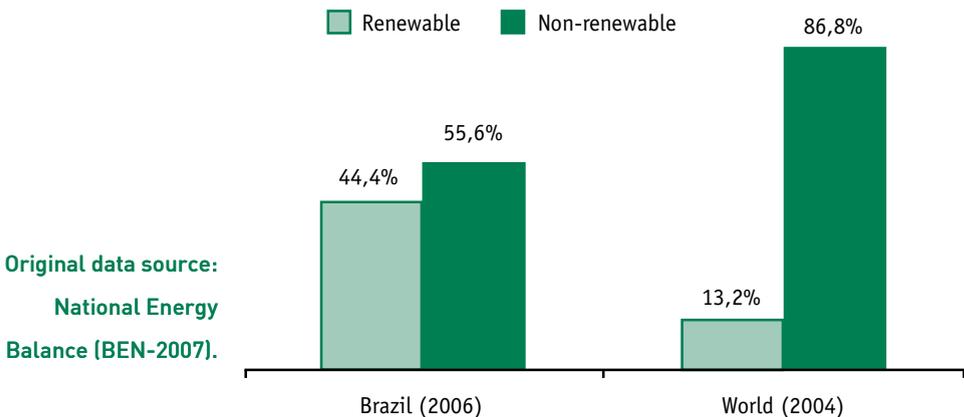
The program called for a number of different studies. Measures were set in motion and actions were implemented with the goal of accommodating Brazil's fuel-related legal and regulatory environment to the addition of biodiesel as a new-

comer. Tax subsidies were designed, through the mechanism of the Social Fuel Stamp, family farms organized, methods of financing created and steps taken to foster technological development using both domestic resources and those arising from international cooperation. Brazil's own biodiesel market was organized around purchase auctions, pivotal to this Program.

Brazil's Energy Mix and Biofuels Market

As shown in Chart 1, Brazil clearly stands out when it comes to the renewable share (hydropower, biomass and ethanol) of the nation's energy mix compared to the global average. Nevertheless, non-renewable sources (55.6%) still predominate, in the form of oil and oil products (38.8%), natural gas (9.5%), coal (5.8%) and uranium (1.5%) and its derivatives.

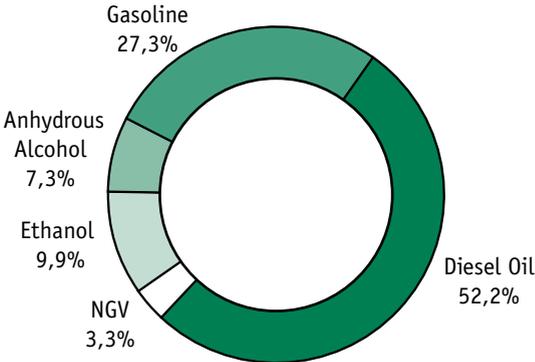
Chart 1 – Renewable and Non-renewable Sources in Energy Mix



Original data source:
National Energy
Balance (BEN-2007).

Upon examining the light and heavy vehicle fuel mix for 2006, shown in Chart 2, the high reliance on diesel oil (52.2%) stands out clearly. In 2004, when the National Biodiesel Program was initiated, the percentage was even higher (about 54%). This was a factor in the introduction of biodiesel as a new fuel to bolster Brazil’s sustainable energy security.

Chart 2 – Vehicle Fuel Mix: Brazil - 2006



Original data source:
Ministry of Mines and Energy (MME)

Chart 2 also shows renewable energy sources at 17.2% of all fuel consumption, with ethanol (9.9%) and anhydrous alcohol (7.3%) – the latter blended with gasoline in ratios ranging from 20% to 25% (E20 to E25). The growing ratios of biodiesel to diesel from petroleum, added to the incremental use of ethanol in flex-fuel vehicles, have gradually raised the renewable fuel share of the vehicle fuel mix. Assuming the same relative distribution found in 2006, the B2 mixture will raise renewable fuels’ share from 17.2% to about 18.2%.

Domestic consumption of diesel oil in Brazil is about 40 billion liters per year. Data for 2005 show that 82.4% is used for transportation, 14.6% consumed in agriculture and about



3% by industry and other sectors. To meet the country's demand, Brazil imports from 6% to 8% of its domestic diesel fuel requirements – 2.4 billion to 3.2 billion liters per year. A 2% blend of biodiesel (B2) would require 800 million liters per year to supply the domestic market. Production requirements of the B5 mixture add up to 2 billion liters annually.

Reasoning and Directives guiding the National Biodiesel Program (PNPB)

As oil becomes scarcer and energy more essential to development, energy security is a strategic purpose of the process, and it must be attained using alternative energy sources. In the short and medium-term, increasing production of fuels from renewable sources is the most viable option, and requires meeting broad sustainability requirements, on the environmental, economic, social, technological and strategic fronts.

Given its soil and climate, Brazil has vast potential for producing biomass, and adding value to these available raw materials offers a sizable relative advantage. Among the many such possibilities, biodiesel is perhaps the most promising because energy demand tends to increase while the world's economy expands.

Within this context, Brazil's government glimpsed the possibilities now becoming reality of bolstering

its energy security while benefiting family farms and small rural producers in the poorer regions of the country, by bringing them into the biodiesel supply chain with environmental and other benefits as well.

This sums up the reasoning behind the Biodiesel Program, and its goals are being attained through tax breaks for companies purchasing oil feedstock produced in the nation's poorest regions. To fit this strategy to a market context, the blending of biodiesel to petroleum-based diesel fuel in gradually increasing proportions was given the force of law.

Brazilian biodiesel fuel is derived from renewable biomass to power compression-ignition internal combustion engines. Regulations provide for other types of power conversion in which it can partially or entirely replace fossil fuels. Hence there is no shortage of possible applications of biodiesel fuel in urban and highway transportation, as well as passenger and cargo shipping, railways, generators and stationary engines.

Brazil's Biodiesel Program was designed to gradually converge on market mechanisms by means of incentives which provide for the inclusion of producers in the poorest regions into the supply chain for this fuel, through incentives based on supply and demand.

Prominent on the demand side is Federal Law No. 11,907 passed January 13, 2005. The law defines biodiesel as a new fuel in Brazil's energy mix, and as of January 2008, requires a 2% biodiesel component blended to 98% diesel oil, known as B2. By January of 2013, the mix requirement will increase to 5% (B5),

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with possibilities for higher blend percentages all the way up to pure biodiesel (B100) by authorization of the Brazilian Petroleum, Gas and Biofuels Regulator (ANP), which is given regulatory and fiscal control, by that same law, over production and sale of biofuels.

Law 11,907/2005 thus creates a captive market for biodiesel in Brazil, while Federal Law No. 11,116 of May 18, 2005 provides for abatement of some or all federal excise taxes on biodiesel, based on the feedstock used to produce it, class of grower-seller, regional origin of the raw material, or a combination of these factors.

The Executive Branch was placed in charge of regulatory enactments for Law 11,116, with the stipulation that to benefit from the tax breaks, biodiesel producers must have a certificate, known as the Social Fuel Stamp, issued by the Agrarian Development Ministry (MDA) to biodiesel producers licensed to manufacture and sell this new fuel, and who meet the following additional requirements:

- a) purchase minimum percentages of feedstock from family-owned farms, ranging from 10% in the North and Midwest to 30% in the South and Southeast regions, all the way to 50% in the Northeast and Semi-Arid Badlands (based on average market shares of small agri-producers in those regions); and
- b) enter into agreements with family farms, concerning prices, schedules and terms of delivery for raw materials, and provide them technical assistance.

A 100% rollback of federal excise taxes on fuels is granted exclusively for biodiesel produced from palm oil (dendê) in the North, or castor oil in the Northeast and Semi-Arid Badlands, provided these oils come from family farms. For oils



produced on other types of farms in those same regions, the maximum federal excise tax abatement is 32%.

Biodiesel produced from feedstock grown on family-owned farms is given preferential treatment in the tax code. Irrespective of the oilseed or region, if the raw material is purchased from these producers, the federal tax abatement comes to 68%.

Another important feature of the tax break approach is that total federal taxes on biodiesel may never supplant taxes on conventional diesel fuel. An agreement entered into by the Federal Government and all of the States in Brazil's Federation in October of 2006, provides that the state value-added tax on biodiesel production and trade may not exceed the rates assessed on petroleum diesel fuel.

Besides the full or partial rollback of federal taxes, companies that have the Social Fuel Stamp may use that certificate to differentiate their biodiesel brand or origin in the marketplace, for the seal signifies that the producer abides by the principles of social responsibility in manufacturing. By these mechanisms, Federal Law 11,116/2005 provided incentives so that the supply of biodiesel would abide by the basic principles underlying the National Biodiesel Program, foster social development and reduce regional disparities by creating employment and income opportunities for some of the poorest industries and regions in Brazil.

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ture biodiesel using a variety of processes and feedstocks, such as castor beans, palm, soybean, peanuts, oilseed radish, cotton, sunflower, jatropha, babassu, animal fat and used oil. The economics of each alternative vary in accordance with Brazil's regional traits.

The Federal Government believes the choice should be left up to the economic actors themselves, but does require that the biodiesel used to meet the legal blending requirements meet physical and chemical specifications determined and rigorously inspected by the federal agency having jurisdiction, the Brazilian Petroleum, Gas and Biofuels Regulator (ANP).

According to the rules of the program, any economic agent desiring to produce and sell biodiesel may do so after obtaining initial authorization from the ANP. Any company benefitting from this authorization must file for a special registry

Biodiesel with distinct productive process: Castor bean, soybean, peanuts, cotton, sunflower, jatropha.







listing with the Treasury Ministry as a biodiesel producer. Companies that qualify for tax breaks intended to foster social and regional development must, in addition, apply at the MDA for a Social FuelStamp.

Background and Current Status of the National Biodiesel Program (PNPB)

By December of 2004, the legal and regulatory provisions of the program were already in place, with another three years to go before the B2 mixture requirement was scheduled to take effect (January of 2008). To stand by and expect the market to organize itself naturally did not seem the better part of wisdom given the uncertainties surrounding prices to be charged of faithful consumers.

It seemed appropriate, then, to bring about conditions whereby competition among sellers could put supplies on a feasible footing, thereby steepening the “learning curve” in the production of this new fuel and in the logistics surrounding its transportation, blending, distribution and commercial sale. This led the Federal Government to organize biodiesel purchase auctions.

The primary purpose of these reverse auctions was to foster development of a domestic biodiesel market and reduce asymmetries in information about costs and pricing in a still incipient market. In tandem with this was a desire to hurry along the social development aspects and reduction of regional economic disparities. The B2 mixture requirement was therefore moved up to January of 2006, but remained contingent upon volumes changing hands at the reverse auctions,

which would only be open to companies having the Social Fuel Stamp.

One should observe, however, that the purchase auctions were intended as a transitional measure, to hasten achievement of the stated purposes and provide farmers and agricultural organizations, industrial production and distribution networks, with a transitional learning phase which would lead into free-market processes among biodiesel producers, distributors and refineries — the medium and long-range outcome the National Biodiesel Program envisioned.

The purchase auctions have played a decisive role in gradually consolidating Brazil's biodiesel market. The extent to which they were attractive to industry can be seen by the excess of supply over demand, shown in Table 1. Another important outcome was the average price reduction between the first and fourth reverse auctions, which came to 9.1% in nominal terms. This shows that the nation's industry has been moving along the learning curve and offering biodiesel for sale at prices growing increasingly competitive with conventional diesel fuel.

The rise in the average price at the fifth reverse auction should not be interpreted as a reversal of that trend, for that reverse auction was held for the specific purpose of offsetting small shortfalls in biodiesel contracted for delivery during earlier auctions. This reduced the number of buyers, that reverse auction was only open to companies already fully operational and having idle capacity with which to promptly offset those shortfalls.

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Table 1 - Summary of Biodiesel Purchase Auctions

Reverse Auction Date	No. of Participants	Volume Offered	Volume Sold	Delivery Timeframe	Average net price of ICMS
		Millions of Liters			(R\$/liter)
11/23/2005	8	92	70	January-December/2006	1.905
03/30/2006	12	315	170	July/2006 - June/2007	1.860
07/11/2006	6	125	50	January-December/2007	1.754
07/11/2006	25	1141	550	January-December/2007	1.747
02/13-14/2007	7	143	45	Immediate	1.862
TOTAL			885	---	---

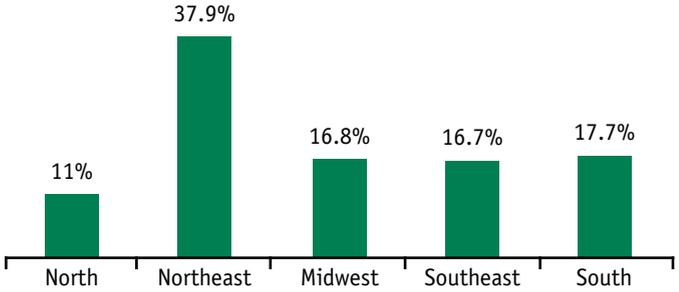
Original data sources:

ANP and MME.

At the five reverse auctions held by the ANP, there were 17 successful purchasers (with 24 industrial plants). These buyers will in turn sell 885 million liters of biodiesel through December, 2007. Producing that total volume will provide employment opportunities for some 210,000 smallholder families.

Chart 3 shows the percentage distribution over the total volume changing hands at all five reverse auctions. The combined share for the two poorest regions in Brazil (North and Northeast) will be 48.9%. Small agri-producers' share in the sales of biodiesel feedstock arranged at these reverse auctions will be 35% of the total (310.5 million liters).

Chart 3 – Regional Distribution of Reverse Auction Sales



Original data source: Agrarian Development Ministry.

Table 2 shows comparative data essential to any analysis of the social and regional impact of biodiesel reverse auction outcomes. They show that of the total volume contracted for, the share coming from the two poorest regions in Brazil (North and Northeast) will be approximately 4.7 times the relative fraction of biodiesel feedstock (cotton, peanut, sunflower, castor bean, soybean and palm oil) these regions produced in 2004, when the National Biodiesel Program began. The same table shows that smallholder families’ share of biodiesel feedstock contracted for at the reverse auctions is nearly 10 times the small agri-producers’ proportional contribution to Brazil’s GDP.

Table 2 - Social and Regional Impact of the 5 Biodiesel Reverse Auctions

North and Northeast Region Shares		Family-Owned Farm Share	
Oilseed Crop Revenue (Data for 2004)	Biodiesel Production (Data for 2006/2007)	Agricultural GDP (Data for 2003)	Biodiesel Feedstock (Data for 2006/2007)
10.3%	48.9%	3.6%	35%

Original data sources: MDA and Brazilian Geographical and Statistical Institute (IBGE).

Even though scarcity of data and timeframes for comparison here are hardly ideal, these indicators nevertheless show that the purchase auctions have done their share toward helping the National Biodiesel Program achieve its primary goals of reducing regional economic disparities and including agri-producer families in the biodiesel supply chain.

BIODIESEL SALES FIGURES FOR BRAZIL ALSO SHOW SIGNIFICANT RESULTS. THE B2 DIESEL BLEND IS ALREADY SOLD AT 5,000 DISTRIBUTION CENTERS OUT OF 35,600 IN THE ENTIRE COUNTRY. AS OF MAY OF 2007, THERE WERE 27 PLANTS LICENSED BY THE ANP TO MANUFACTURE BIODIESEL, WITH A TOTAL INSTALLED CAPACITY OF 1.21 BILLION LITERS PER YEAR. ANOTHER 30 UNITS, WITH AGGREGATE CAPACITY OF 1.74 BILLION LITERS PER YEAR, HAVE ALREADY APPLIED FOR THEIR LICENSES AND SHOULD BEGIN OPERATING BY THE END OF 2007.

Biodiesel sales figures for Brazil also show significant results. The B2 diesel blend is already sold at 5,000 distribution centers out of 35,600 in the entire country. As of May of 2007, there were 27 plants licensed by the ANP to manufacture biodiesel, with a total installed capacity of 1.21 billion liters per year. Another 30 units, with aggregate capacity of 1.74 billion liters per year, have already applied for their licenses and should begin operating by the end of 2007. Plants being built (7) and those at the feasibility study stage (25) add up to an annual manufacturing capacity of some 1.65 billion liters, and are expected to begin operating by the end of 2008.

Taking into account only the 27 units already licensed to manufacture biodiesel, their annual capacity (1.21 billion liters) suffices to provide the volume necessary for the mandatory B2 blend (about 800 million liters per year). If to this we add the 30 units in the final stages of licensing or undergoing expansion, aggregate manufacturing capacity increases to 2.95 billion liters, which is more than sufficient to meet the requirements for the B5 mixture (approximately 2 billion liters/year).



These data clearly show that the timetable could be moved up on the B5 mixture requirements, or even for blends of more than 5%, duly supported by vehicle tests or ANP authorization. Biodiesel exports are another possibility, since projected manufacturing capacity for late 2008 is something like 3.5 billion liters of biodiesel per year.



Closing Comments

Brazil's National Biodiesel Program sets an example of public policy designed and implemented with broad participation in support of the primary actors involved in the supply chain for this renewable fuel. Brazil's biodiesel market is enacted in law and regulated, and also supported by differentiated tax incentives. It is provided with instruments for financing the supply chain, research efforts and technological development in its agricultural and industrial stages (including international cooperation), as well as for testing component parts and engines with the diesel/biodiesel blend in varying proportions, and for the organization of agri-producer families.

At the heart of Brazil's Biodiesel Program is a commitment to provide the most efficient possible protection to the weakest links in the supply chain: family farms and consumers. The Social Fuel Stamp provides differentiated tax incentives to companies processing feedstock produced on family-owned farms and feedstock originated in the neediest parts of the country. At the other end of the chain, physical and chemical specifications together with tough standards for inspection are indispensable if consumers are to have access to quality fuel and become confident supporters of Brazil's policy – unique throughout the world – of strengthening an energy mix which daily grows cleaner, more sustainable and less dependent on oil.

Given the results already achieved and policies put in place by the nation's Biodiesel Program, Brazil is in a position to enlarge and consolidate its leadership position in the production and use of renewable energy resources – especially with its relative advantage through availability and its diversity of soil and climate conditions. Improvements to agricultural methods and use of areas extensively dedicated to cattle production are the primary means Brazil has available to increase energy production from sustainable sources without putting competitive pressure on food supplies or putting a strain on such areas as the Amazon region, where oilseed cultivation for biodiesel manufacturing can be carried out in degraded areas, thereby contributing to their recovery.

It is thus a sustainable development program in the broadest possible sense (environmental, economic, social, technological and strategic), generating agrarian income and employment, reducing economic disparities among regions, saving on hard currency, diversifying sources of energy, benefiting the environment, helping to revitalize local and regional economies and putting human resources in the poorest regions in touch with a booming market.

The outlook for Brazilian biodiesel on international markets is also favorable and promising. This is partly due to the growing demand for biofuels, reinforced by increasing public awareness of the environmental consequences of vehicle emissions and



gains to be had by replacing petroleum products with alternative energy sources. Brazil's diplomatic missions are joining forces in multilateral efforts aimed at creating international markets for biofuels and jointly establishing technical codes and standards for these alternative fuels. Their purpose is to enable the Brazilian government to contribute toward these outcomes, especially in view of Brazil's pioneer efforts in the production and application of renewable fuel resources, with the agricultural potential of its geographic location, the vastness of its territory and the diversity of the nation's soil and climate. The ideal is to make renewable fuels a commodity item, and to enter into bilateral technological cooperation agreements which will contribute toward expanding and consolidating markets for bio-based fuels.



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