BRAZILIAN POLICY OF BIODIESEL: ALTERNATIVE TO MITIGATE EFFECTS OF CLIMATE CHANGE?

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ABSTRACT

Governments influenced the development of bioenergy, particularly liquid biofuels as biodiesel. In 2003, Brazilian Government decided to create Biodiesel Program as a public policy to ensure diversification of renewable energy, improve energy security and reduce environmental impacts. The biofuels are produced from vegetal oil, such as palm oil, soy oil, and castor oil amongst other oil seeds, but are also produced from waste oils and/or waste fats from biogenic origin. Brazilian Government also considers this public policy as promoting social inclusion of family farmers by their engagement in the biodiesel value chain. In this sense, Federal Law 11.097/2005 allows the mix of 2% biodiesel in mineral diesel in some types of engines. After January 2008 this mix has became mandatory and it will have an increase of 5% by 2013.

The aim of this paper is to study Legal Regulatory Framework of Brazilian Policy of Biodiesel highlighting if this kind of fuel can be considered as a "greening fuel" and contribute to mitigate and adapt actions to Climate Change. In order to analyze this policy we will take into account the different forms to produce biodiesel as well as the risks and impacts on deforestation with the increase of soy production, particularly in the North and Central Region in Brazil. In reality if on one hand biodiesel can be considered as a way to diminish air pollution in big cities, as São Paulo or Rio de Janeiro, on the other hand biodiesel is mostly produced by soybean and so the possibility that it stimulates deforestation in both Amazonian Region and Central Region ("Cerrados" - Savanna) must be take into consideration.

Keywords: *Brazilian Policy of Biodiesel, Climate Change, Sustainable Development.*

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1. INTRODUCTION

Climate change, as the result of accumulation of greenhouse gases in the atmosphere due to human activities, mostly from the burning of fossil fuels, is the most important challenge of the 21st Century[3]. Changes in precipitation, leading to floods, droughts, and heat waves, sea level rise are some effects of climate change that will have direct impact in human life and societies. In order to face this global problem, international community started negotiations in 1979 in the First World Climate Conference followed by the establishment of Intergovernmental Panel on Climate Change (IPCC) (1988), a scientific intergovernmental body[4]. In 1992, United Nations Framework Convention on Climate Change (UNFCCC) has been signed and entered into force on 21th March 1994 and its Kyoto Protocol adopted in 1997 entered into force on 16th February 2005 creating an international regime of climate. Under this international regime, climate system is a shared resource whose stability can be affected by emissions of greenhouse gases and governments needs, between other measures, to cooperate to develop mechanisms to adapt and mitigate impacts of climate change. Even if developing countries, like Brazil, do not have according to the Convention and its Protocol quantified emission limitation or reduction obligations of greenhouse gases[5], governments of these countries and so Brazilian government started a number of measures to combat climate change such as the development of biofuels, particularly ethanol and biodiesel[6]. It must be stressed that all countries part of this international regime share the common objective: stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. And we have also something in common, “today we are an oil based civilization that is totally dependent on a resource whose production will soon be falling” (BROWN, 2008, p. 27).

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[3] Some of main sources of greenhouse gases due to human activity in South America include deforestation, modern livestock and agricultural activities, energetic sector based on fossil fuels and industry.

[4] IPCC has been set up by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP). IPCC has been created to provide the decision-makers and others interest on climate change with an objective source of information about climate change.

[5] Under Kyoto Protocol there are no reduction emission obligations to the developing countries for the first period 2008-2012.

[6] CDM Executive Board approved baseline and monitoring methodology AM0047 about production of biodiesel based on waste oil and/or waste fats from biogenic origin or from oil seeds cultivated in dedicated plantations for use as biofuel. This metholody is based on three cases: NM0180 ‘Biolux Benji Biodiesel Beijing Project’, proposed by Biolux Benji Energy and Recycling Co. Ltd. ; NM0228 ‘Agrenco Biodiesel Project in Alta Araguaia’, proposed by Agrenco do Brasil S/A (Anexx I); and NM0233 ‘Palm Methyl Ester Biodiesel Fuel production and use for transportation in Thailand’, proposed by Japan Transport Coop. Avaiable at: <http://cdm.unfccc.int/methodologies/DB/9VAZZNRUOQDQT21XIY3VKJRABETLEE/view.html>. Access: Aug. 20, 2008.

There is no single solution to the energy issue. In the Brazilian case, it's possible to see a renewable diversification of the energy matrix, but the sources of fossil energy, such as oil, coal and natural gas still account about 47%[7]. The sector that most consumes fossil fuels is transport, which accounts almost 50% of the domestic oil consumption. Modal road is responsible for this high consumption: 96% of passengers and 62% of loads in Brazil are moved by diesel vehicles. So, we must reflect about alternative energy for transport system. In other words, we have to find out other kinds of energy sources for this sector. Currently, biodiesel is quoted as an option (BAJAY; BADANHAM, 2005). It's also necessary to deal with the fact that 75% of Brazilian CO_2 emissions "was tied to the Change in Land and Forest use sector and of that total, 90% corresponded to the conversion of forests to other uses, especially agriculture and ranching" (MINISTRY OF EXTERNAL RELATIONS et alii, 2007, p. 57).

The aim of this paper is to study Legal Regulatory Framework of Brazilian Policy of Biodiesel highlighting if this kind of fuel can be considered as a "greening fuel" and contribute to mitigate and adapt actions to Climate Change. In order to analyze this policy we will take into account different forms to produce biodiesel as well as risks and impacts on deforestation with the increase of soy production, particularly in the North and Central Region in Brazil. In reality if on one hand biodiesel can be considered as a way to diminish air pollution in big cities, as São Paulo or Rio de Janeiro, on the other hand biodiesel is mostly produced by soybean and so the possibility that it stimulates deforestation in both Amazonian Region and Central Region ("*Cerrados*" - Savanna)[8] must be take into consideration.

2. BRAZILIAN BIODIESEL: A "GREENING FUEL"?

Biodiesel has been considered a technological alternative for transition between oil civilization and alternative sources of energy civilization. Brazilian Policy of Biodiesel has been developed to promote social inclusion, reduce oil imports and

[7] Official reports affirms that "in 2005, only 54% of the Domestic Energy Supply (DES) of 218.7 million toe (tonne oil equivalent) came from fossil fuels, thus only this fraction contributed to the increase in greenhouse gas concentration in the atmosphere" (MINISTRY OF EXTERNAL RELATIONS et alii, 2007, p. 17)

[8] Cerrado is a vast tropical savanna ecoregion of Brazil. According to the World Wide Fund for Nature (WWF), it is biologically the richest savanna in the world. Avaiable at: <http://www.worldwildlife.org/wildworld/profiles/terrestrial/nt/nt0704_full.html>. Acess: Sept. 1, 2008.

strengthen renewable energy sources in the energy matrix, promoting sustainable development. Meanwhile, it is necessary to proceed with caution and evaluate the implementation of this policy that incorporate biodiesel as a “greening fuel”. Biodiesel is not a miraculous solution, since part of it is composed by fossil diesel[9]. It must also be stressed that Brazilian diesel still contains sulphur, a chemical compound limited in diesel composition in other countries[10]. In reality, it’s necessary to analyze meticulously the origin of “bio” components of this fuel and from which biomass it is produced: waste oils and/or waste fats from biogenic origin[11] or vegetable oils.

In this sense many questions emerge: does this production take into account environmental impacts and risks? Does this policy consider, equally, energetic potentialities, areas of culture, demand for water and regularity of production? In this sense, what are the most profitable feedstocks (palm, soybean, cotton, jatropha, sunflower and castor bean)? Currently, the production of biodiesel has been used as raw material, mainly soybean because of its strong potential of scale production, but isn’t this fact an indicative of a possible impact in terms of destruction of cerrado and amazon biomes with the expansion of production of this crop? And finally we can ask ourselves if this public policy considers the whole cycle of the biodiesel production. In order to try to answer these questions we will examine the guidelines of the Biodiesel National Program as well as the origin of biodiesel’s components.

2.1. Guidelines of National Program for Production and Use of Biodiesel (PNPB)

An Inter-Ministerial Working Group was created in July 2003 with the task of analyzing the viability of biodiesel production and use in the country. In December 2003, their report launched the baseline of the National Program for Production and Use of Biodiesel (PNPB), creating the Biodiesel Inter-Ministerial Executive

[9] Each liter of mineral diesel in Brazil emits about 2.7 kg of CO_2 (LA ROVERE, 2006).

[10] “Brazilian diesel quality is still poor if we have compared with Europe or the US standards. The rate of particulates and sulfur are significantly higher. Two types of diesel are sold in Brazilian market: Metropolitan Diesel and Inland Diesel. The specifications for Metropolitan Diesel are more restrictive than for Inland Diesel. For instance, while rate of sulphur accepted in Metropolitan Diesel is 0,2%, Inland Diesel tolerates 0,35%. The standards for Diesel vehicles emissions in Brazil are based on European standards. Currently, while diesel vehicles in Europe comply with Euro IV standard since 2005, Brazil will adopt this norm only in 2009” (ALMEIDA et al, 2007). For this reason, Federal “Parquet” and Sao Paulo Government are processing Petrobras and National Agency of Petroleum, Natural Gas and Biofuels (ANP) for delaying to create a Law to determine the distribuition of diesel S-50 with less sulphur, reducing the period for adptation to the standard. Avaiable at: <http://www.agenciabrasil.gov.br/noticias/2008/01/29/materia.2008-01-29.7027249679/view>. Acess: Aug. 20, 2008.

[11] Oils and/or fats originate from either vegetable or animal biomass, but not from mineral (fossil) sources.

Commission as the program unit manager. In 2004, Brazilian National Congress drafted a project of law to include biodiesel as a renewable source in the Brazilian energy matrix. This project of law was enacted by Provisional Measure n. 214/2004, subsequently converted on Federal Law n. 11.097/05.

Under this law, biodiesel[12] is a "*biofuel derived from renewable biomass for use in internal combustion engines with compression ignition or, as regulation, for generation of another type of energy, which may partly or fully replace fossil fuels*" (art. 4º). Biomass is defined as the biodegradable fraction of products and waste from agriculture, including vegetable species (feedstock seeds as peanut, sunflower, babassu, palm, castor bean, soybean, piqui, jatropha etc) and animal fat (tallow), forestry and related industries, as well as the biodegradable fraction of industrial and urban waste (sewage and frying oils, for example). So, biodiesel is the addition of the fraction "*bio*" to mineral diesel, by-product of petroleum. It must be stressed that vegetable oil "*in natura*" is not considered fuel and its use is incompatible with current technology of vehicular engines[13].

The political motivation for the National Program for Production and Use of Biodiesel (PNPB) provides the following guidelines: a) increase of jobs, especially for family farmers[14]; b) creation of a competitive market, ensuring quality and supply, from different raw materials use, especially feedstock, in addition to tax incentives; c) increase in exports, gaining more space in the international market; d) and internal and regional development, based on feedstock production, basic raw materials of production respecting biological diversity in Brazil (BRASIL, 2003; BRASIL, 2004).

Brazilian methodology is similar to the one applied in the European Union (EU): gradual addition of percentage derived from biomass to fossil diesel in any part of national territory: 2% until January 2008 (biodiesel B2), 3% from March 2008

[12] Biodiesel is a kind of biofuel that can be produced by transesterification of vegetal or animal oils using one type of alcohol (in general methanol) as alkaline solution and alkaline catalyst. In 2005, Petrobras announced the development of a new refining process wich can produce diesel with biofuel content. This process, named H-Bio, consist of adding vegetal oil in the refining stream (hydro treatment), processing this oil together with mineral oil (ALMEIDA et alii, 2007).

[13] "Biodiesel is not a vegetable oil and should not be used in mixtures above 2% a diesel common, at risk of causing a variety of problems concerning the performance of the engine, block of filters, charring of the jets, hole and fall of the piston rings, drying and breaking of the seals and severe degradation of engine lubricating oil. Other problems are related lubricating oil dillution, difficulty in starting the cold, uneven burning, low thermal efficiency, unpleasant smell of gas discharges and emissions of acrolein, toxic substance emitted from the burning of glycerin contained in vegetable oils. For these reasons are recommended in testing and a more detailed specification of pure biodiesel, to ensure that no problems occur with conventional engines" (MARQUES, 2007).

[14] The government is expecting to create 200.000 new jobs with incentives for biodiesel production by small farmers (BRASIL, 2003; BRASIL, 2004).

(biodiesel B3) [15] and 5% until January 2013 (biodiesel B5). However, the introduction of biodiesel in Brazilian energy matrix is centered on a discourse not only related to fuel supply diversification, but also on social dimension of production. In fact, PNPB strategy is accompanied by a strong argument on the need for social inclusion. Discourses, in truth, as Foucault argues, are based on institutional support[16]. In this sense, Federal Decree 5.297/04 set the "Fuel Social Certificate", to be granted to producers whose buy the raw material of farmers affiliated to the National Program for Family-based Agriculture, in exchange of economic benefits such as tax exemptions (SILVA; DUTRA, 2007). Many parameters to have right to these economic benefits were later defined in Federal Law 11.116 of May 2005: region of planting, feedstock specie adopted and category of production, and also access to cheap financing by the National Bank of Development (BRASIL, 2003; BRASIL, 2004).

2.2. Origin of biodiesel´s components: major feedstoks

As seen, biodiesel is a result of the addition of oil extracted from natural and renewable sources to the mineral diesel. If the objective of this paper is to study the Legal Regulatory Framework of Brazilian Policy of Biodiesel highlighting if this kind of fuel can be considered as a “greening fuel” and contribute to mitigate and adapt actions to Climate Change, so it is necessary to assess, from an environmental standpoint, the properties of biodiesel obtained from vegetable oils and from wasted oil and/or waste fats from biogenic origin.

According to the National Plan of Agroenergy, the alternatives for the Brazilian production of vegetable and residual oils with potential for use for energy purposes are different, which is an advantage for the structuring of the National Program for Production and Use of Biodiesel (PNPB). Brazil is as a tropical country, with continental dimensions, and so the challenge of this public policy is to take into account regional potentialities. There is a possibility of producing biodiesel from

[15] Although the National Policy of Biodiesel had established a target of this addiction of 5% in 2008, the National Council of Energetic Policy (CNPE), trough Resolution n. 2, Mar. 2008, determined the mandatory addiction of 3% of portion ˝bio˝ to diesel fossil, forming the biodiesel.

[16] Foucault argues that the discourse isn't simply what translated struggles or systems of domination, but is that why and for what struggles are made, in other words, the power that we want (FOUCAULT, 2008).

traditional crops such as soybean, peanut, sunflower, castor bean and palm, as well as from new alternatives such jatropha, nabo forrageiro, pequi, buriti and macaúba. It occurs that, although some species have satisfactory results for researches such as pequi, buriti and macaúba, their productions are extractive and not economically viable in the current stage of PNPB. In addition, Brazilian Corporation for Research in Agriculture (EMBRAPA) has not yet completed their study in the field of botanical and agronomic cycles of these species (BRASIL, 2005).

The following table outlines the main features of the feedstocks with potential for production of biodiesel in Brazil:

Table 1: Main features of feedstocks for production of biodiesel.

Plant Species	Harvest (months)	Productivity (t grain/ha . year)	Content in Oil (% m/m)	Yield (t óleo/ha)
Cotton	03	1,8	15	0,270
Peanut	03	1,8	39	0,702
Babassu	12	15,0	06	0,900
Colza	03	1,8	38	0,684
Palm	12	10,0	20	2,000
Sunflower	03	1,6	42	0,672
Castor Bean	03	1,5	50	0,750
Soybean	03	2,2	18	0,396

Source: NATIONAL PLAN OF AGROENERGY (2005) and SANTOS (2007).

On one hand, the diversity of feedstock with potential for production of biodiesel is an advantage, car the supply can be ensured; on the other hand this diversity means that this Brazilian fuel will have different properties, establishing a technical barrier to be overcome. There're also some questions to face: the massive increase in agricultural production of certain crops can produce harmful effects to society, as is the food crisis[17] and negative impacts to the environment, such as the destruction of biomes and the increase of emissions of the greenhouse gases (SANTOS, 2007).

As shown in Table 1, in terms of productivity and income, it is possible to affirm that babassu palm has a strong potential for production. But actually, it is soybean that has been the main source of oil for biodiesel[18]. Also, it should be stressed that although many producers had started their production based on

[17] With the aim of lower the risks of the investments, according to the Government, the new types of feedstock could be cultivated in lands not used today for food production (ALMEIDA et alii, 2007). "The line between the food and energy economies is becoming blurred as the two begin to emerge. As a result, the world price of grains is now moving up toward its oil price equivalent. If the food value of a commodity is less than its fuel value, the market will move it into energy economy" (BROWN, 2008, p. 28).

[18] See Annex I - List of Biodiesel Producers in Brazil.

jatropha, there are no definitve conclusion about negative impacts of this plant species.

Another source of production would be waste oils and/or waste fats from biogenic origin, which are advantageous in terms of cost; but this kind of production is less developed as the production based on crops.

In geographical terms, there're some directives for the production of biodiesel. National Program for Production and Use of Biodiesel (PNPB) and National Plan of Agroenergy consider the relationship between the distribution of best crops and each Brazilian region (BRASIL, 2005):

a) The Northern Region: plantations of palm in Amazon cleared areas, whose amount exceeds 05 (five) million hectares[19], and other native species in isolated communities based on extractive or agro-forestry exploitation. In the States of Tocantins, Rondônia, Pará and Roraima, the option also would be the plantations of palm to produce biodiesel, but on a large scale;

b) The Northeast: the castor bean could be the main source for the production of biodiesel, because it would provide social inclusion in semi-arid, if producers were trained on management techniques. Alternatively, soybean in west of Bahia and in south of Piauí, and also babassu in Maranhão appears as an alternative for this production;

c) The Central-south: although there are researches for other alternatives (peanut, sunflower and castor bean), soybean would still the basis for biodiesel production in the region by its capacity of production already installed. This region has many advantages: climate regularity, extent of lands for agriculture still free, capital and consumer market consolidated.

3. BRAZILIAN REALITY OF BIODIESEL PRODUCTION AND PREVENTION & PRECAUTIONARY PRINCIPLES

At first, different feedstocks used for biodiesel production will be studied, highlighting which regions focus on this production and so knowing the reality of

[19] As the ˝Bureau International des Poids et Mesures˝, a hectare is a unit of area of Metric System equal to 10.000 square meters or one square hectometre (0.1 kilometer, or 100 meters, squared). In the countries that still use the Imperial System (i.e. United States of America and Canada), have a different unit of area, called acre, equivalent to 2.4710538 hectare. Avaiable at: <http://www.bipm.org/en/si/si_brochure/chapter4/table6.html>. Acess: Sept. 3, 2008.

biodiesel production in Brazil. At a second stage, we can ask ourselves if this production follow the National Program for Production and Use of Biodiesel (PNPB) and the National Plan of Agroenergy directives and also if this production is based on prevention and precautionary principles, ensuring not only energy security but also environmental protection and social justice as well as contributing to mitigate and adapting actions to Climate Change.

3.1. Production of biodiesel from feedstocks in different regions of Brazil

Considering official information of biodiesel production obtained from National Program for Production and Use of Biodiesel (PNPB), National Agency of Oil, Natural Gas and Biofuels (ANP), Brazilian Federal Revenue Secretariat (RF) and Ministry of Agrarian Development published in electronic sites[20], as well as secondary data also obtained in electronic sites of the biodiesel producers companies[21]. We have organized these data with a focus on the following categories: producer, place, raw material, daily production capacity, quantity produced, licenses and certificate. These informations are organized at the Annex I - List of Biodiesel Producers in Brazil, and so it was possible to identify the main raw materials used for the production of biodiesel (Table 2), as well as the distribution of producers by geographic region and by State (Table 3).

Table 2: Major raw materials used for the production of biodiesel.

Raw Materials	Utilization (%)
Soybean	67,27
Residual Oil	40,0
Sunflower	30,90
Castor Bean	25,45
Jatropha	23,63
Cotton	21,81
Palm	9,09

[20] These data have been updated until Feb. 2008.
[21] Initially, it's necessary to highlight the fact that we tried to access the results of qualitative and quantitative technical studies made by National Agricultural Research Agency (EMBRAPA) about the main raw material of biodiesel. However, because such information is not available in the homepage of this public company, we also tried to contact with the researchers trough electronic mail, but without success.

Nabo Forrageiro	9,09
Colza	3,63
Babassu	1,81
Microalgae	1,81

Source: Table Annex I – List of Biodiesel Producers in Brazil.

From Table 2, it is possible to affirm that soybean is the actually major raw material adopted for the production of biodiesel, which is not restricted to the center-south of the country, in opposition of the guidelines of the National Plan of Agroenergy, which considers as the best crops for Brazilian north region palm and castor bean in the northeastern one, respectively.

Table 3: Number of producers of biodiesel by geographic regions and States

Geographic Regions	Number of producers	States	Number of producers
Central West	21	Goiás	3
		Mato Grosso	18
North	06	Pará	2
		Rondônia	2
		Tocantins	2
Northeast	07	Bahia	2
		Ceará	2
		Maranhão	1
		Piauí	2
Southeast	14	Minas Gerais	4
		Rio de Janeiro	1
		São Paulo	9
South	07	Paraná	3
		Rio Grande do Sul	4
Total	55		

Source: Table Annex I – List of Biodiesel Producers in Brazil.

Table 3 shows that the largest number of producers of biodiesel is concentrated in the mid-west region, so that 18 are located in Mato Grosso State, which is a part of the Legal Amazon[22]. In other words, the Legal Amazon concentrates 24 of biodiesel producers, which produce this biofuel with feedstock oil produced from raw materials such as soya and jatropha, apart from wasted oil feedstock.

And so National Program of Production and Use of Biodiesel (PNPB) can include family-based agriculture on biodiesel production chain, but actually the part

[22] The Legal Amazon is an area of 61% of Brazilian territory with a total of 5.217.423 km² and cover the States of Amazonas, Amapá, Acre, Mato Grosso, ouest of Maranhão, Pará, Rondônia, Roraima and Tocantins (Federal Law n. 1.806, Jan. 1953, Federal Law n. 5.173, Oct. 1966 and Federal Complementary Law n. 31, Oct. 1977).

"bio" of biodiesel is produced mainly in large farms that allow costs reduction on crops production. For institutional discourse the most important challenge of PNPB is to promote plantation diversity of crops and to reduce cost production of new commercial crops, with a role for family-based agriculture (ALMEIDA et alii, 2007).

It is necessary to stress about biodiesel production based on waste oil and waste fats from biogenic origin that, in the first case, there are 20 producers that apply waste fats from biogenic origin to produce biodiesel,[23] and in the second case of waste oil, we can affirm that statistics are less exact. But we can identify, for instance, some potentialities of local technological innovations that support biodiesel production from used vegetable oil from fried food. In this sense, the Laboratory of Development of Clean Technologies of University of São Paulo in Ribeirão Preto (LADETEL) and the BIODIESELBRASIL initiated a project "Biodiesel in home and schools" that started collecting residual oils of fried food in schools, residences, supermarkets and restaurants for generation of the biodiesel.

3.2. Control of environmental impacts of biodiesel production: prevention & precaution

Facts and studies show that biodiesel made from soybeans may lead to deforestation. There's also a lack of studies concerning environmental impacts of production on a large scale in certain feedstocks, as castor bean and jatropha. Consequently the biodiesel production from feedstock oil extracted from plants species cause concern about probable negative environmental impacts from extensive farming of such species. It is possible to quote the example of Malaysia, the largest world producer of palm oil, which in the search for the absorption of unbridled demand for biodiesel by the European Union, increased by 87% the level of deforestation between 1985 and 2000 (MONBIOT, 2006)[24].

[23] But only 6 employ waste fats to produce biodiesel, the others employ also crops and waste fats. See Annex I - List of Biodiesel Producers.

[24] "In Europe, the emphasis is on producing biodiesel. In 2006, the European Union (EU) produced 1.2 billion gallons of biodiesel from vegetable oil, mostly in Germany and France, and 417 million gallons of ethanol, most of it distilled from grain in France, Spain, and Germany. To meet its goal of obtaining 10 percent of its automotive fuel from plant-based sources, the EU is increasingly turning to palm oil imported from Indonesia and Malaysia, a trend that is leading to the clearing of rainforests for oil palm plantations. The Netherlands, concerned about the impact this could have, is reconsidering its import of palm oil for biodiesel production" (BROWN, 2008).

Thus, three points deserve to be highlighted. First, it is evidenced by data in this research and through reports in the major media of the country (MEDINA, 2006; OLIVEIRA, 2007) that Brazilian biodiesel has been produced mainly from soybeans, despite its low energy efficiency, with the largest number of biodiesel producers located on the Legal Amazon. Out of 24 biodiesel producers in this region, 11 produce biodiesel from soybeans and 04 from other feedstock. It's alleged that this situation occurs because soybean oil has the larger scale production. In that case Brazilian government needs to provide a rapid transition to adjust the objectives pursued by the National Program for Production and Use of Biodiesel (PNPB). Secondly, deforestation in the Amazon returned to grow and the National Institute for Space Research (INPE) indicates that deforestation in the Amazon Region may have reached 7.000 km from August to December 2007, of which 53.7% of deforestation occurred in Mato Grosso, 17.8% in Pará and 16% in Rondônia. These facts show up the expansion of the agricultural frontier on ecosystems as the Cerrado and the Amazon. Finally, it's possible to affirm that there's an intrinsic link between soy production and deforestation in Amazon identified in studies conducted in recent years (MORTON e alii, 2006).

Currently, environmental impacts control of biodiesel production is made through an instrument of command-and-control reasoned on the Brazilian National Environment Policy, which is the environmental licensing[25]. Under the Federal Law n. 11.097/05, that introduced biodiesel in Brazilian energy matrix, National Agency of Oil, Natural Gas and Biofuels (ANP) has jurisdiction to authorize and control activities related to production, import, export, storage, distribution, sale and marketing of biodiesel, overseeing them directly or through agreements with other organs of the Union, States, Federal District and Municipalities. According to ANP Resolution 41/04[26], it is defined as producer of biodiesel the company, cooperative or consortium of companies with permission of the ANP to exercise biodiesel production activity. In order to obtain such authorization, it is necessary for the producer, among other requirements, to submit environmental license, issued by the national environmental authority. Operating biodiesel production, producer has some obligations as: a) gather requirements for quality of products specified in ANP´s

[25] Brazilian law provides that the construction, installation, expansion and operation of establishments that are actual or potential polluters or that uses natural resources must be licensed by the appropriate environmental agency (Federal Law 6.938/81).
[26] This resolution has been established under the Provisional Measure n. 214/2004.

Resolutions; b) sell product accompanied by a certificate of quality according to Brazilian specification for biodiesel in the laboratory itself or outsourced c) send to ANP each month the information on movement of raw materials and products.

We can state that biodiesel has the potential to represent a “greening fuel” if the mentioned issues related to its production are solved. In other words, this can become reality if the producers take into account the cycle of biodiesel production and consumption. Considering the actual scenary of this production based on soybean, ROVERE affirms that it contribute to avoid about 1.3 million tons of CO_2 per year in 2008 (biodiesel B3) and about 3.9 million tons in 2011 (biodiesel B5) (LA ROVERE, 2006). However, this analysis does not consider the impact on change in land and deforestation contributions to Brazilian greenhouses emissions.

There’s also a latent necessity for detailed studies about the environmental impacts of large scale production of both the jatropha as the castor bean, notably in the Legal Amazon, considering the role cycle of production of biodiesel, and, thus, implementing the principles of prevention and precaution enshrined in the Brazilian Constitution of 1988. It is necessary to ask about the reason for such activity, or if the production of biodiesel meets the legitimate goals of building a free, fair society; ensuring sustainable national development and also fighting to eradicate poverty and marginalization, reducing social and regional disparities, in other words, promoting the welfare of all (SILVA, 2004).

CONCLUSION

Even if in official discourse there’s an environmental dimension in National Program for Production and Use of Biodiesel (PNPB), it seems that the whole cycle of this production has not been treated as a part of it. Sachs affirms “[...] *although the replacement of oil derivatives by biofuels contribute in principle to reduce emissions of greenhouse gases, it’s necessary to consider the conditions of production. This may have such negative impacts on environment that the balance of the operation will be negative*” (SACHS, 2007)[27].

[27] Original extract, free traduction: *embora a substituição dos derivados de petróleo por biocombustíveis contribua em princípio para a redução das emissões dos gases de efeito estufa, é necessário atentar às condições de sua produção. Essas podem ter impactos tão negativos sobre o meio ambiente que o saldo da operação seja negativo*” (SACHS, 2007).

So, potential contribution of biodiesel production as a “greening fuel” should be studied carefully. As mentioned before, Brazilian soybean production has expanded to areas recently deforested in the Amazon. If this issue will not be solved, the consequence will be harmful to environment, causing social and economic damage. In that sense, it is necessary to observe that the capability and suitability of raw material for biodiesel production with the socio-environmental characteristics of Brazilian regions, but it has above all to stimulate detailed studies on extensive cultivation of species as jatropha. It is not necessary, therefore, to stop searches or the production of "alternatives" sources of energy, but to learn how to balance development of an alternative energy matrix and environment protection, particularly the social and biodiversity of Amazon and Cerrado. Thus, perhaps the best alternative for biodiesel production is not a single or few feedstocks, but the diversification and especially the use of wasted feedstock oil for its production, such as the frying oil. Diffusion of technological information as well as transparency in this public policy is essential.

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ANNEX I – LIST OF BIODIESEL PRODUCERS IN BRAZIL

PRODUCER*		LOCAL*	RAW MATERIAL	DAILY PRODUCTION CAPACITY*** (litros/m³)	QUANTITY PRODUCED** (m³)				LICENCES		CERTIFICATE
					2005	2006	2007	2008 Feb.	ANP***	RF****	
01	**Archer-Daniels-Midland**	Rondonópolis/MT	soybean palm	565m³	-	-	-	18.043	255, Set. 04, 2007	BP-00023-001/2007	INFO-NL
02	**Agrenco**	Alto Araguaia/MT	soybean tallow	660m³	-	-	-	-	18, Jan. 16, 2008	INFO-NL	IQS
03	**Agropalma**	Belém/PA	palm		510	2.421	3.717	326	INFO-NL	INFO-NL	ISO 9001 ISO 14001 OHSAS 18001
04	**Agrosoja**	Sorriso/MT	soybean, cotton and tallow	80.000L	-	-	35	-	85, May 15, 2007	BP-00018-001/2007	INFO-NL
05	**Amazonbio**	Ji Pará/RO	jatropha	45.000L	-	-	-	-	INFO-IND	INFO-IND	INFO-NL
06	**Ambra**	Varginha/MG	sunflower, nabo forrageiro and castor bean	2.400L	-	-	-	-	173, Jul. 20, 2007	BP-00025-001/2007	INFO-NL
07	**Araguassu**	Porto Alegre do Norte/MT	soybean, cotton, sunflower and castor bean	100m³	-	-	66	02	235, Aug. 28, 2007	BP-00029-001/2007	INFO-NL
08	**Barralcool**	Barra do Bugres/MT	soybean	166,7m³	-	-	12.590	-	336, Dec. 18, 2006	BP-00012-001/2007	Social Fuel
09	**Bertin**	Lins/SP	tallow	333m³	-	-	-	-	157, Jul. 11, 2007	BP-00020-001/2007	INFO-NL
10	**Big Frango**	Rolândia/PR	chicken fat	40.000L	-	-	-	-	19, Jan. 16, 2008	INFO-NL	INFO-NL
11	**Binatural**	Formosa/GO	nabo forrageiro, sunflower and jatropha	84m³	-	-	-	-	17, Jan. 16, 2008	BP-00014-001/2007	Social Fuel
12	**Biobrás**	Cássia/MG	castor bean and jatropha	INFO-NL	-	-	-	-	INFO-IND	BP-00015-001/2007	INFO-NL
13	**Biocamp**	Campo Verde/MT	castor bean, tallow and jatropha	154m³	-	-	-	285	126, Jun. 21, 2006	BP-00026-001/2007	Social Fuel

14	**Biocapital**	Charqueada/SP	soybean, cotton, peanut, sunflower, palm, jatropha and castor bean	824m³	-	454	30.892	9.270	244, Set. 15, 2006	BP-00008-001/2006	Social Fuel
15	**Biolix**	Rolândia/PR	soybean, sunflower and microalga	30m³	26	100	12	-	165, May 17, 2005	BP-00006-001/2006	INFO-NL
16	**Biopar Parecis**	Nova Marilândia/MT	tallowl	36m³	-	-	-	-	405, Nov. 9, 2007	BP-00027-001/2007	INFO-NL
17	**Biopar**	Rolândia/PR	tallow	154m³	-	-	-	-	127, Jun. 21, 2007	BP-00028-001/2007	INFO-NL
18	**Biotins**	Paraíso do Tocantins/TO	tallow, palm and jatropha	27.000L	-	-	-	-	484, Dez. 31, 2007	INFO-NL	INFO-NL
19	**Bioverde (ex-Biopetrosul)**	Taubaté/SP	sunflower and jatropha	267,44m³	-	-	247	1.044	71, Apr. 16, 2007	BP-00017-001/2007	Social Fuel
20	**Brasil Ecoodiesel**	Teresina/PI	castor bean, soybean, cotton and sunflower	2.000L	-	-	-	-	183, May 23, 2005, revoked by order 318, Apr. 12, 2007	INFO-NL	INFO-NL
21	**Brasil Ecodiesel**	Floriano/PI	castor bean, soybean, cotton and sunflower	96.000L	156	28.604	30.474	-	280, Jul. 27, 2005, revoked by order 213, Aug. 18, 2006	BP-00001-003/2006	Social Fuel
22	**Brasil Ecodiesel**	Crateús/CE	castor bean, soybean, cotton and sunflower	360m³	-	-	-	-	292, Oct. 18, 2006	INFO-NL	INFO-NL
23	**Brasil Ecodiesel**	Iraquara/BA	castor bean, soybean, cotton and sunflower	252.000L	-	4.210	66.321	13.897	319, Nov. 23, 2006	BP-00001-004/2006	Social Fuel
24	**Brasil Ecodiesel**	Porto Nacional/TO	mamona, soja, algodão, girassol e pinhão manso	360.000L	-	-	22.773	7.322	84, May. 14, 2007	BP-00001-006/2007	Social Fuel
25	**Brasil Ecodiesel**	Rosário do Sul/RS	castor bean, soybean, cotton, sunflower and jatropha	252m³	-	-	21.577	10.966	111, Jun. 08, 2007	BP-00001-007/2007	Social Fuel
26	**Brasil Ecodiesel**	São Luis/MA	castor bean, soybean, cotton and sunflower	360.000L	-	-	23.509	11.972	76, Apr. 27, 2007	BP-00001-005/2007	Social Fuel
27	**Bsbios**	Passo Fundo/RS	colza	345m³	-	-	13.369	6.455	128, Jun. 21, 2007	BP-00019-001/2007	Social Fuel
28	**Caramuru**	São Simão/GO	soybean, nabo forrageiro, sunflower and jatropha	375.000L	-	-	42.692	15.829	89, May 16, 2007	BP-00016-001/2007	Social Fuel

29	**Cia. Refinadora da Amazônia**	Belém/PA	palm	24.000.000L	-	-	-	-	94, Mar. 31, 2005	BP-00002-001/2005	Social Fuel
30	**CLV**	Colider/MT	soybean and tallow	75m³	-	-	-	-	210, Aug. 08, 2007	BP-00024-001/2007	INFO-NL
31	**Comanche (ex-IBR)**	Simões Filho/BA	Soybean, cotton, tallow, dendê and castor bean	65.000L	-	28	5.454	3.201	406, Nov. 09, 2007	BP-00011-001/2007	Social Fuel
32	**Transportadora Comandolli**	Rondonópolis/MT	feedstocks (in general) and tallow	10m³	-	-	-	-	487, Dec. 18, 2007, but days before was fined by ANP to produce wthout authorization[28]	INFO-NL	INFO-NL
33	**Cooami**	Sorriso/MT	cotton	10.000L	-	-	233	15	234, Aug. 28, 2007	INFO-NL	INFO-NL
34	**Coomisa**	Sapezal/MT	feedstocks (in general) and tallow	12m³	-	-	-	-	486, Dec. 18, 2007	INFO-NL	INFO-NL
35	**Cooperbio**	Lucas do Rio Verde/MT	jatropha	10m³	-	-	977	224	236, Aug. 29, 2007	INFO-NL	Social Fuel
36	**Cooperfeliz**	Feliz Natal/MT	cotton, soybean, tallow and jatropha	10m³	-	-	-	45	485, Dec. 28, 2007	INFO-NL	INFO-NL
37	**Dhaymers**	Taboão da Serra/SP	soybean, babassu, castor bean and tallow	26m³	-	-	-	-	307, Nov. 10, 2006	INFO-NL	INFO-NL
38	**Fertibom**	Catanduva/SP	jatropha and tallow	40.000L	-	362	4.546	-	402, Oct. 27, 2005, revoked by order 245, Sept. 14, 2007	BP-00005-001/2006	Social Fuel
39	**Fiagril**	Lucas do Rio Verde/MT	soybean and tallow	410.000L	-	-	-	5.301	257, Sept. 12, 2007	BP-00022-001/2007	Social Fuel
40	**Frigol**	Lençóis Paulistas/SP	tallow	40.000L	-	-	-	-	156, Jul. 12, 2007	INFO-NL	INFO-NL
41	**Fusermann (Refinaria Nacional de Petróleo Vegetal Ltda.)**	Barbacena/MG	jatropha, nabo forrageiro, sunflower and soybean	30m³	-	-	-	-	350, Dec. 22, 2006	BP-00009-001/2007	INFO-NL
42	**Granol**	Anápolis/GO	soybean and nabo forrageiro	407.000L	-	10.108	67.946	19.525	173, Jun. 30, 2006, revoked by order 351, Dec. 22, 2006	BP-00007-002/2006	Social Fuel

[28] Ministério Público do Estado de Mato Grosso, dez. 2007. Disponível: <http://www.mp.mt.gov.br/noticias.php?IDCanal=OTE=&IDSubCanal=Mjk=&view=NDMyMQ>. Acesso: 08 mai. 2008.

43	**Granol**	Cachoeira do Sul/RS	soybean	409.000L	-	-	-	-	391, Nov. 06, 2007	BP-00007-003/2007	Social Fuel
44	**Granol**	Campinas/SP	soybean	300.000L	-	20.435	-	-	158, Jun. 27, 2006, revoked by order 394, Nov.11, 2007	BP-00007-001/2006	Social Fuel
45	**Innovatti**	Mairinque/SP	soybean	30.000L	-	-	-	-	196, Aug. 1, 2007	INFO-NL	INFO-NL
46	**KGB**	Sinop/MT	soybean	05m³	-	-	-	-	133, Jul. 27, 2007	INFO-NL	INFO-NL
47	**Nutec (Fundação Núcleo de Tecnologia Industrial do Ceará)**	Fortaleza/CE	castor bean	2.400L	-	02	-	-	335, Sept. 08, 2005	BP-00004-001/2005	INFO-NL
48	**Oleoplan**	Veranópolis/RS	soybean	327m³	-	-	7.770	10.899	57, Mar. 21, 2007	BP-00013-001/2007	Social Fuel
49	**Ouro Verde**	Rolim de Moura/RO	tallow	17.000L	-	-	99	32	52, Mar. 14, 2007	BP-00021-001/2007	INFO-NL
50	**Ponte di Ferro**	Rio de Janeiro/RJ	tallow	163m³	-	-	-	-	45, Mar. 07, 2007	BP-00010-002/2007	Social Fuel *suspended*[29]
51	**Ponte di Ferro**	Taubaté/SP	soybean and sunflower	90m³	-	-	-	-	321, Nov. 23, 2006	BP-00010-001/2007	Social Fuel
52	**Renobras**	Dom Aquino/MT	Soybean	20.000L	-	13	-	-	403, Oct. 27, 2005	403, de 27 out. 2005	Social Fuel, fined by the Departament of Finance of Mato Grosso State to sell biodiesel directly to consumers, what is forbiden[30]
53	**Soyminas**	Cássia/MG	castor bean, colza, nabo forrageiro and sunflower	40m³	44	311	138	-	78, Mar. 18, 2005	BP-00003-001/2005	Social Fuel
54	**Usibio**	Sinop/MT	feedstocks (in general) and tallow	20.000L	-	-	34	-	90, May 17, 2007	BP-00030-001/2007	INFO-NL
55	**Vermoehlen**	Rondonópolis/MT	feedstocks (in general) and tallow	10m³	-	-	-	-	457, Dec. 12, 2007	INFO-NL	INFO-NL

[29] MDA, Apr. 16th 2008. Avaiable at: <http://www.mda.gov.br/portal/index/show/index/cod/134/codinterno/16716>. Acess: Mai. 08, 2008.
[30] National Pole of Biofuels – ESALQ/USP, Oct. 30 2006. Avaiable at: < http://www.polobio.esalq.usp.br/noticias-visualizar.php?Id=452>. Acess: Mai. 08, 2008.

Legend and Sources:

INFO-NL = information not located.

* Source: http://www.anp.gov.br/biocombustiveis/capacidade_plantas.asp, updat. Apr. 2008.

** Source: http://www.anp.gov.br/doc/dados_estatisticos/Producao_de_biodiesel_m3.xls, updat. Feb. 2008.

*** Source: http://www.biodiesel.gov.br/, updat. out. 2005; http://www.anp.gov.br/doc/petroleo/AutorizacoesBiodiesel.doc, updat. 30 Jan. 2008.

**** Source: http://www.receita.gov.br/PessoaJuridica/Biodiesel/ProdutoresImpotAutorizados.htm, updat. Oct. 2007.