

European Directives Sustainability of Biofuels and Brazilian Market, Panorama Biodiesel

Mariana Bittar
Universidade Federal do Rio de Janeiro-PRH
Brazil

Claudia Morgado, Victor Esteves, and Ofélia Araujo
Federal University of Rio de Janeiro
Brazil

Abstract

The search for renewable energy sources has been intensifying. Biofuels have been proposed from oilseeds and oilcakes, which have already been incorporated into countries' energy mixes. But the European Union has raised questions about the actual contribution of these to GHG reduction and also has expressed concern over the competition with land for food production. European directives, the main one being Directive no. 2009/28/CE, encourage the use of bioenergy, reaffirming that commitment beyond 2020. These new policies require verification of technical standards from the beginning of the production chain, for example, the use of land with low biodiversity and raw materials that do not compromise food production, so as to reduce GHG emissions by 35%, to 50%. They also cover the abolition of forced and child labor and protection of union rights, equal rights and wages for both sexes and other issues. Thus, countries with the resources for alternative production already developed, such as Brazil, have struggled to establish themselves in the European market. To solve this problem, the industrial processing sustainability criteria must be carefully analyzed. In this respect, this paper is going to investigate and survey sustainability guidance in the international market for biofuels, emphasizing biodiesel.

Keywords

Management, biofuels, sustainability, European Directives, biodiesel.

1. Introduction

In the current socioeconomic and environmental situation, the search for renewable energy sources has been intensifying. The aims are to find workable techniques to reduce the climatic effects of burning fossil fuels by producing less polluting fuels from renewable sources. The main sources proposed to produce of these biofuels are oilseeds and their byproducts (such as oilcakes). In this scenario, countries have been adopting policies to increase the share of renewable fuels in their energy mixes combined with commitments on the sustainability of their production.

Germany, China and the United States are the leading countries in terms of investment in this sector, allocating roughly US\$ 50 billion, US\$ 41 billion and US\$ 25 billion per year, respectively (Sampaio, 2013). Besides these, according to the REN21, over a hundred countries have established targets and sought investments to promote greater use of biofuels.

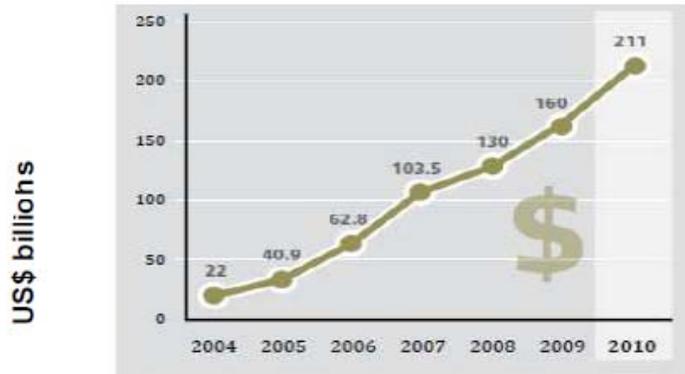


Figure 1: New global investment in renewable energy (REN21, 2011).

However, questions have increasingly been raised about the real sustainability of biofuels, considering the environmental costs from their production to use by end consumers. In Europe, local producers and environmentalists have been pressuring governments to impose barriers on the importation of products that, although from renewable sources, involve activities in their production chain that can harm the environment, generate competition with land use for food and/or imperil human rights (Tangermann, 2008; Petersen, 2008; Valor, 2008).

For this reason, the European Union has established policies for the use of biofuels in the transportation sector that include regulations and certification mechanisms covering the sector from production to end consumer as well as socioeconomic aspects, requiring that the entire chain be considered sustainable. The chief policy instrument in this respect is Directive 2009/28/EC.

Figure 2 shows the share of renewable fuels in the European energy mix, illustrating the importance of the European market for renewable energies.

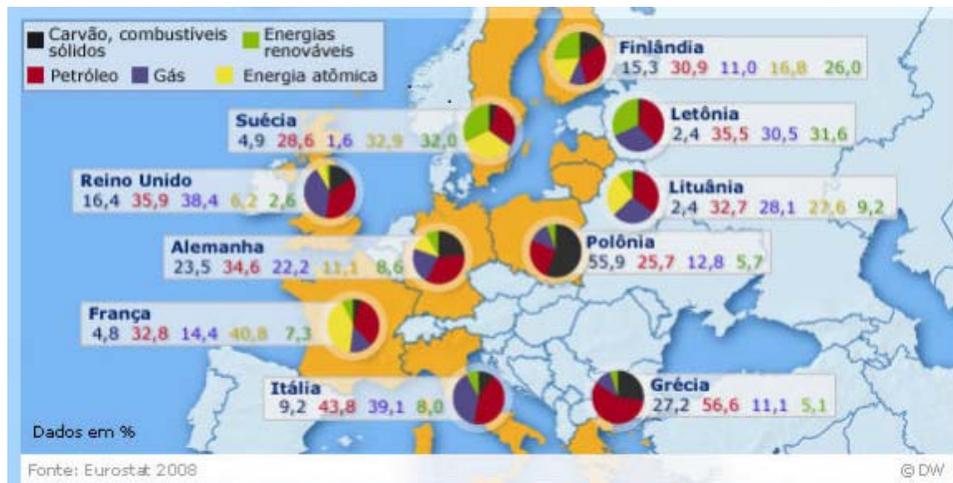


Figure 2: European energy consumption in percentage.

Some movements and initiatives have been occurring throughout the world addressing the three pillars of sustainability: environmental, social and economic (Pope et al., 2004). The Vision 2050 report published by the World Business Council for Sustainable Development (WBCSD), Rio+20 (United Nations Conference on Sustainable Development), an event that reaffirmed Eco-92, and other initiatives mark the current global scenario, prioritizing truly sustainable by evaluating the progress achieved, gaps in implementing policies and new and emerging challenges (UN, 2012).

Brazil can be a global leader in strategies for production of biofuels from renewable sources and for study and development of this market, because the country was the pioneer in the use of biofuels (specifically the use of

ethanol from sugarcane as passenger car fuel, starting in the late 1980s). Therefore, Brazil, a developing country with plentiful sources to supply energy, can be a leading contributor to meet the requirements stipulated by the various directives and other policies of developed countries.

But despite mastery of the production of biofuels from processes that are already structured, Brazil has been facing certain difficulties to supply the European market, because of the barriers that have been erected to the importation of raw materials and finished fuels, in an attempt to encourage use of local resources.

Overcoming these barriers requires satisfying certain criteria and indicators. But there is no standardization of such sustainability requirements, so this article establish a relation between European sustainability directives for biofuels and the Brazilian market, with focus on biodiesel among other fuels.

The environmental management area (ISO 14001), commitment to social responsibility (NBR 16001) and questions of health, safety and the environment (OHSAS 18001 and CCPS) are based on European protocols and help in the proper interpretation of those relation, to promote production of biofuels committed to sustainability.

2. Sustainability

Sustainability is generally conceptually defined as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*” That definition of sustainable development was established by the World Commission on Environment and Development – WCED, better known as the Brundtland Commission, created by the United Nations in 1987. Hopwood (2005, cited in Garcez & Vianna, 2009) addresses the theme as a relationship between human knowledge and nature. In turn, Sachs (2002, cited in Garcez & Vianna, 2009) prefers to expand the concept of sustainability beyond environmental considerations, through seven dimensions, which he says are necessary, namely the territorial, social, cultural, ecological, environmental, economic and political [Garcez & Vianna]. However, many authors in the international literature have examined the theme “sustainable development” in more simplified form, based on three main points, the so-called triple bottom line (TBL): environmental, social and economic. In relation to these, there are many opinions. For example, while Lehtonen (2009) states that the social dimension has been neglected, Buchholz (2009) affirms it is controversial.

Bringing such academic questions to the world of business, in 1998 the World Business Council for Sustainable Development (WBCSD) defined corporate social responsibility (CSR) as “the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local community and society at large” (FGV, 2008a).

Companies are thus faced with the need to comply with increasingly strict legislation and pressures from socio-environmental organizations, while maintaining competitiveness for survival in a world demanding increasing production (Said, 2008). There are some initiatives to help businesses improve their environmental, social and economic responsibility by incorporating new practices, based on global indicators. The main ones are the Global Reporting Initiative (GRI) and the Ethos Institute, but the data gathered and reports prepared are confidential (Institute Ethos, 2012).

3. Sustainability of biofuels

The development of biofuels is mainly a response to the environmental and economic pillars, based on the interest in energy sources from renewable raw materials. The main sources of energy worldwide are still fossil fuels, mainly oil, natural gas and coal. However, due to the high level of pollutants emitted and the resulting negative climatic effects, particularly global warming, countries are increasingly trying to incorporate biofuels in their energy mixes. The emissions from burning of fuels from renewable sources are offset through the carbon balance by the growth of the plants used as raw material, thus reducing the net amount of pollutant emissions (Amaral & Kloss, 2012).

However, around 1% (14 million hectares) of arable land in the world is being used to grow crops to produce biofuels, generating a 1% “bio” yield in the European fuels scenario (European Commission, 2004). To reach 100% “bio” in this scenario would have a severe impact on food production and human living space, as well as placing a heavy burden on water for irrigation and reducing biodiversity in the planted areas. For this reason, there is a need for balance between use of fuels from different energy sources (renewable and nonrenewable), for environmental, strategic and economic questions.

Table 1: World consumption of liquid fuels - by origin - 2008-2035
(in millions of barrels per day).

Origin	2008	2015	2020	2025	2030	2035
Conventional Fuels	81,7	87,2	89,8	93,6	96,5	99,1
Extraheavy Oil	0,7	0,8	1,1	1,2	1,4	1,5
Oil sands	1,5	2,3	2,9	3,5	4,1	4,8
Coal-to-liquids (CTL)	0,2	0,3	0,5	0,8	1,3	1,7
Gas-to-liquids (GTL)	0,1	0,3	0,3	0,3	0,3	0,3
Shale oil	0,0	0,0	0,0	0,0	0,1	0,1
Biofuel	1,5	2,4	3,0	3,8	4,4	4,7
World Total	85,7	93,3	97,6	103,2	108,1	112,2

Fonte: US DOE International Energy Outlook (2011).

Specifically on the effect of shifting farmland from growing food to crops for producing biofuels and clearing new land for this purpose, the magazine Science in 2008 carried two articles questioning the bottom-line environmental benefits of biofuels. Timothy Searchinger, in “Use of U.S. Croplands for Biofuels Increases Greenhouse Gases through Emissions from Land Use Change”, argued the emissions from plowing and clearing new land should be counted in the carbon balance, stating that the production of ethanol from corn causes a 93% increase in GHG emissions, while the corresponding figure is 50% for cellulosic ethanol. In the other article, “Land Clearing and the Biofuel Carbon Debt”, researchers from the Nature Conservancy and University of Minnesota argued that biofuels could aggravate the current climate situation, due to the “carbon debts” from the loss of vegetation from planetary ecosystems.

However, the models used in those studies were quickly discredited for not producing practical results, because they did not consider a sufficiently large number of variables, generating disparities and tendentious findings, besides not considering the potential gains from the use of degraded pasturelands.

Besides having environmentally favorable conditions, biofuels must be economically feasible, because otherwise their production will not be sustainable in a fiercely competitive energy market. In this respect, Brennan & Owende (2010) define certain conditions for biofuels to be technically and economically viable, namely that they must be less expensive than fossil fuels, demand low use of additional land, promote sequestration of polluting gases and not place an unsustainable burden on water resources.

Based on all the above, there is a huge and problematic range of questions about the sustainability of biofuels, prompting efforts to find improved techniques to increase productivity of fuels from renewable sources. Specific criteria have been prepared to certify the sustainability of these fuels, through metrics and indicators, involving the efforts of governments and NGOs. Among many, this paper examines European Directive 2009/28/EC, which besides structuring the basic requirements to establish the sustainability of biofuels from their production, has had the greatest effect on Brazilian production, by creating barriers to their importation by European countries, particularly affecting Brazilian biodiesel. Because of the promise of this fuel, the Brazilian government has been encouraging its production for domestic consumption, but the lack of export markets poses a limitation on the growth of the biodiesel industry.

4. The international biodiesel market

Biofuels are not a recent idea. Indeed, biofuel, in the form of firewood, was mankind’s first energy source. Even since the Industrial Revolution and the shift to fossil fuels, biofuels such as ethanol have been widely used in certain situations, such as in the Second World War due to shortages of petroleum. More recently, in the 1970s, due to the oil price shock some countries implemented programs to produce alternative fuels. Brazil was the pioneer in this respect, through its “Pro-Alcohol” program. The United States has also explored that option, making large investments in research and development of ethanol, mainly using corn as the raw material. In the specific case of biodiesel, it was first developed in around 1900 by Rudolf Diesel, made from vegetable oil, but this process was not widely disseminated and the technology was very primitive, making its cost prohibitive in comparison with ethanol, not to mention mineral diesel.

At present, the biofuel market is much more developed and better structured. Countries with large energy demands, such as the United States, Japan and most members of the European Union, have been promoting this sector to

mitigate the effects of the emission of greenhouse gases (GHGs) from the transportation sector, as well as to reduce dependence on imported oil. The reduction of CO₂ emissions is the main factor in evaluating the benefits of biofuels (Suurs & Hekkert, 2006).

In the case of biodiesel, its main advantage is that it can be produced from a wide range of vegetable oils, including used oils. The biodiesel market has been gaining size and attracting increasing investments as governments have mandated its blending with mineral diesel in proportions ranging from 5 to 30%, which requires little or no adaptation of engines, besides promoting research to adapt engines to burn pure biodiesel (European Commission – EC, 2004). According to one study, the cost of a reduction of one metric ton (tons) of CO₂ equivalent emissions is around £200-250 in the case of biodiesel and £400-500 for bioethanol (Kampman et al., 2003). Besides this, there are various other promising options, called second-generation or advanced biofuels, which can be produced by gasification of a wide range of biomass materials (wood, grasses, agricultural wastes) followed by processing in a catalytic converter, such as the Fischer-Tropsch process, generating pure biodiesel (Laak et al., 2007).

The evolution of production processes has resulted in a virtuous circle, attracting more investments in R&D and policies to promote further innovation in the use of biodiesel. There is even a social network to support its production (Suurs & Hekkert, 2006).

Table 2: Global production of biodiesel - major countries and world total - 2003-2011 (mil m3).

Country	2003	2004	2005	2006	2007	2008	2009	2010	2011
EUA	76	95	424	848	1.893	2.616	2.063	1.192	3.352
Germany	813	1.176	1.897	3.025	3.284	3.203	2.885	3.251	3.102
Argentina	0	0	25	49	205	1.091	1.426	2.102	2.761
Brasil	0	0	1	69	402	1.164	1.608	2.397	2.673
France	406	395	559	844	991	2.063	2.226	2.170	2.023
Indonesia	0	0	0	0	227	364	455	682	1.250
Thailand	0	0	0	23	57	455	648	739	830
Spain	7	15	83	113	191	235	976	1.051	636
Italy	310	364	450	508	413	676	838	802	489
Others	93	248	631	1.070	1.563	2.407	3.117	6.346	7.526
World Total	1.704	2.292	4.069	6.548	9.225	14.273	16.241	20.734	24.642

Fontes: ANP (2012), European Biodiesel Board (2012), National Biodiesel Board (2012), U.S. Energy Information Administration (2012) e Oil World (2012).

Table 3: Balance supply and demand for vegetable oils in the EU and their uses - 2008-2011 (in thousand tons).

Item	2008	2009	2010	2011
Production	17.563	18.633	20.183	19.770
Imports	13.097	12.911	12.459	12.181
Exports	267	340	291	362
Domestic Offers	30.393	31.204	32.351	31.589
Food Industry	21.080	20.900	21.060	21.030
Energy Production	7.890	9.110	9.910	8.920
Total	28.970	30.010	30.970	29.950

Fonte: Oil World (2012).

5. The Brazilian biodiesel market

Brazil has a highly favorable market in relation to biofuels. Globally the trade in biofuels depends basically on exports of bioethanol from the United States and Brazil and from Argentina in the case of biodiesel. On the import side, the most relevant markets are the United States and the European Union in the case of ethanol and the European block for biodiesel (Furlan, 2012). However, that panorama is superficial, because besides biodiesel itself, there is commerce in oilseeds and vegetable oils, which are the base for making biodiesel, mainly in the European Union. That block stands out among the main importers, because its energy mix, particularly for transportation, is structured with large participation of diesel, in which the target is to reach 10% addition of biodiesel by 2020 (Directive 2003/30/EC). Besides this, it has a deficit of local production of oilseeds and other materials to meet energy, food and industrial demand. The table below shows the imports in this respect, in which imports of oilseeds are accounted for by their oil equivalent factor, e.g., each 1,000 Kg of soybeans is equivalent to 180 Kg of soy oil (Amaral & Kloss, 2012).

These figures are favorable to Brazil, whose exports mainly go to the European market. Currently, in Brazil, Portugal and other countries, soybeans are the main raw material to produce biodiesel. The Portuguese company Iberol, for example, has been investing to expand production of biodiesel made from soybeans imported from Brazil. In fact, 20% of Brazil's soybean output is now used to produce biodiesel (AliceWeb). Table 4 shows the main importers of Brazilian soybeans, showing the importance of the European market.

Table 4: Export data from the Brazilian platform AliceWeb (22/07/2013).

EXPORTS	01/2008 until 05/2013	US\$ FOB	Weight (kg)	Quantity
Europa	Soybean oil, crude	685.978.393	638.096.433	638.100
	Refined soya oil	243.340.234.630	551.179.476.058	55.885.734.002
	Refined soybean oil (barrel <= 5l)	243.340.234.630	551.179.476.058	55.885.734.002
EUA (c/P. Rico)	Soybean oil, crude	59.433	38.750	39
	Refined soya oil	125.019.696.359	133.270.617.846	133.270.617.846
	Refined soybean oil (barrel <= 5l)		190.610	193
China	Soybean oil, crude	3.884.316.572	3.754.082.872	3.754.087
	Refined soya oil	183.322.757.512	996.536.243.976	79.534.103.789
	Refined soybean oil (barrel <= 5l)		996.536.243.976	79.534.103.789
Mercosul	Soybean oil, crude	13.082.495	12.271.767	16.473
	Refined soya oil	0	0	0
	Refined soybean oil (barrel <= 5l)		57.226.997	79.665

To encourage domestic consumption of biodiesel, in 2005 the Brazilian government created the National Program for Production and Use of Biodiesel (PNPB), according to which for the first three years the blending of up to 2% biodiesel with mineral diesel was voluntary, after which it became mandatory (in January 2008), with the minimum mixture rising to 5% in 2010. The model for sale under the PNPB is different than in other countries, through a system of auctions conducted by the National Petroleum, Natural Gas and Biofuels Agency (ANP), which establishes a series of social requirements that must be satisfied for sale. The main one is the nationality of origin of the raw material used. Another factor is the existence of the Social Fuel Seal, a "legal instrument created by the Ministry of Agrarian Development that determines the acquisition of raw materials from family farmers, the supply of inputs and investments in rural technical assistance to producers that have a Declaration of Eligibility for the National Program to Fortify Family Farming – PRONAF" (ANP, 2013).

However, despite this positive scenario for the Brazilian biodiesel market and the various programs to promote it, the socio-environmental value of this product has been questioned, mainly by environmental groups and influential scientists in Europe, urging analysis of the entire productive chain. Since the issuance of European Directive 2009/28/EC, Brazil has been facing certain difficulties to establish itself as a supplier of the European market, because of the barriers created by this directive to the importation of raw materials or energy resources from the country despite its longstanding leadership as a global producer of biofuels.

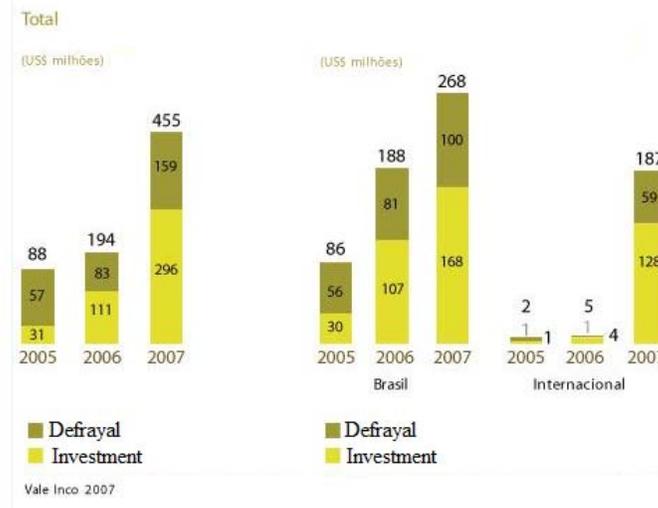


Figure 3: National Overview Biodiesel

6. European directives

As stated, many questions have been raised about the socio-environmental benefits of biofuels in the European Union. Due to the bloc’s political and economic weight, these concerns must be addressed by countries that produce biofuels. These questions mainly refer to the real extent of the reduction of greenhouse gases, competition with land use for food production and issues of rural development and sustainable production.

In response to these questions, the EU has established certain directives, whose requirements must be satisfied for incorporation of biofuels in the member countries’ energy mixes. As reflected in the publications *Verde Energia para o Futuro: fontes renováveis de energia* [Green Energy for the future: renewable sources of energy, COM (96) 576 final] and *Livro branco sobre as Energias Renováveis* [White Paper on Renewable Energy][COM (97) 599 final], the European Parliament and Council endorsed the “Climate action and renewable energy package” in December 2008, leading to the approval in April 2009 of the Renewable Energy Directive (RED) 2009/28/EC and the Fuel Quality Directive (FQD) 2009/30/EC. Among the stated aims according to Directive 2009/28/EC is “promotion of the use of biofuels or other renewable fuels for transport.” That directive also reaffirmed the commitments beyond 2010, with the goal of obtaining 20% of energy from renewable sources by 2020.

Directive 2009/28/EC imposes the satisfaction of technical standards, such as that production cannot threaten biodiversity or compromise production of food, thus raising the environmental sustainability requirements for importation of biofuels and materials to produce them to the European market.

Therefore, to satisfy the European policy on reduction of GHG emissions with respect to biofuels, analysis of the two directives – RED (2009/ 28/EC) and FQD (2009/30/EC) – is fundamental.

Among the points presented in these directives, the most relevant are presented in the next topics.

6.1 Reduction of GHG emissions

According to Directive 2009/28/EC, “The greenhouse gas emission saving from the use of biofuels taken into account for the purposes referred to in paragraph 1 shall be at least 35%. With effect from 1 January 2017, the greenhouse gas emission saving from the use of biofuels taken into account for the purposes referred to in paragraph 1 shall be at least 50%. From 1 January 2018 that greenhouse gas emissions saving shall be at least 60% for biofuels produced in installations in which production has started on or after 1 January 2017” (EC, 2009).

To address questions regarding the arbitrariness of the percentages used, Annex V of that directive establishes the calculation of GHG emissions avoided by different biofuels, indicating default values, considering the productive process and raw materials. The directive applies to all productive forms and all biofuels, regardless of the raw material.

6.2 Preservation of biodiversity of land used to grow raw materials

Biofuels may not be produced from raw materials obtained from land that is rich in biodiversity, defined in Directive 2009/28/EC as:

“land that had one of the following statuses in or after January 2008, whether or not the land continues to have that status: a) primary forest and other wooded land; b) areas designated: i) by law or by the relevant competent authority for nature protection purposes, or ii) for the protection of rare, threatened or endangered ecosystems or species recognized by international agreements or included in lists drawn up by intergovernmental organizations or the International Union for the Conservation of Nature; c) highly biodiversity grassland that is: i) natural, namely grassland that would remain grassland in the absence of human intervention and which maintains the natural species composition and ecological characteristics and processes, or ii) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and which is species-rich and not degraded, unless evidence is provided that the harvesting of the raw material is necessary to preserve its grassland status.”

The Commission establishes the criteria and geographic limits to determine the grassland that falls under letter “c” (EC, 2009).

Brazil has similar provisions, established as part of the national policy on allocation of Legal Reserves and Permanent Preservation Areas. Brazil also has the National System for Conservation Units and Indigenous Areas (SNUC), which can be equated with the European rules on grasslands subject to high loss of native biodiversity and planted grassland, because the definition of these areas is carried out by the Brazilian government through the SNUC.

6.3 Low carbon content of land planted with raw material for biofuels

On this question, Directive 2009/28/EC stipulates that biofuels may not be produced from land with high carbon content, defined as land that in January 2008 had one of the following statuses and no longer has such status: “a) wetlands (...); b) continuously forested areas, namely land spanning more than one hectare with trees higher than five meters and a canopy cover of more than 30%, or trees able to reach those thresholds in situ; c) land spanning more than one hectare with trees higher than five meters and a canopy cover of between 10% and 30%, or trees able to reach those thresholds in situ (...)”.

In this respect, Brazil could implement a national system for verification of conversion of land use, through geoprocessing and remote sensing, in which the National Aerospace Studies Institute (INPE) would act together with the National Rural Property Registration System (SNCR), operated by the National Institute of Settlement and Agrarian Reform INCRA). Such a coordinated effort would allow precisely measuring compliance with the parameters specified by the European Commission. However, the legality of these requirements in Brazil might be doubtful, thus requiring legislative changes, based on the need to comply with EC rules to gain access to that market (Amaral & Kloss, 2012).

6.4 Land use rights

Biofuels may not be produced from “raw material obtained from land that was peat land in January 2008, unless evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil” (EC, 2009).

6.5 Labor and unionization rights

Besides the above commitments, the EC must ascertain whether the productive conditions are in line with the Cartagena Protocol on Biosafety and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. The Commission is also required to report to the European Parliament regarding ratification and implementation by countries supplying biofuels and raw materials for those fuels with the following conventions of the International Labor Organization (ILO):

- Forced Labor Convention (No. 29).
- Freedom of Association and Protection of the Right to Organize Convention (No. 87).
- Right to Organize and Collective Bargaining Convention (No. 98).
- Equal Remuneration Convention (No. 100).
- Abolition of Forced Labor Convention (No. 105).

- Discrimination (Employment and Occupation) Convention (No. 111).
- Minimum Age Convention (No. 138).
- Worst Forms of Child Labor Convention (No. 182).

Eight “voluntary” structures recognized by the EU are available in the market. Besides these, the RED supposedly allows the establishment of agreements between governmental authorities to promote equivalence of certain laws, to enable compliance with the European sustainability requirements. However, according to Emerson Coraiola Kloss (2012), former head of the Division of New and Renewable Energy Resources of the Ministry of Foreign Relations, “So far, however, the EU has not been inclined to accept this route, despite having received requests in this sense, such as from the United States. In practice, therefore, private agents are restricted to those certification schemes.”

The Global Bioenergy Partnership (GBEP) has reached some conclusions on that document, which are supported by various reports, such as N 73 of WG 4 of the ISO Project Committee 248, which states that “In light of discussions on the issue and considering the state of the science on quantifying possible indirect land-use change (ILUC) impacts of bioenergy, it has not yet been possible to include an indicator on ILUC. GBEP notes that further work is required to improve our understanding of and ability to measure indirect effects of bioenergy such as ILUC and indirect impacts on prices of agricultural commodities. GBEP will continue to work in order to consolidate and discuss the implications of the current science on these indirect effects, develop a transparent, science-based framework for their measurement, and identify and discuss options for policy responses to mitigate potential negative and promote potential positive indirect effects of bioenergy.”

The European Commission has not yet expressed a conclusive position on the theme, which generates uncertainties in the market dynamics. In this respect, the Commission only has publicly suggested some options:

- Not take any action and wait for new scientific advances on the theme.
- Increase the requirements for minimum GHG reductions.
- Introduce additional sustainability criteria for some categories of biofuels.
- Attribute a quantity of GHG emissions to biofuels based on the indirect impact on estimate land use.

There are still many points that need improving within the European perspective, especially to facilitate the diffusion of sustainable development in many countries that produce biofuels, and also to give greater freedom for them to sell their products, to achieve the expectations in relation to emissions. Besides this, the productive and logistics structure of biofuels still needs to advance technically and economically to have greater space and visibility in the global market. In relation to Brazil, the European directives act as a hindrance to the country’s exports of biofuels and raw materials. This article contains some observations, together with analyses and suggestions, to help acceptance of Brazilian energy products in Europe. But there is much more to be considered in this respect.

7. Conclusion

In recent years the market for fuels from renewable sources, and thus for raw materials to produce them, has undergone relevant transformations, due to the crisis of 2008, the discoveries of new petroleum and natural gas reserves in Brazil (offshore subsalt deposits), and many due to European directives that establish certain barriers to Brazilian exports of these fuels and raw materials. Brazil has an urgent need to satisfy the requirements of these directives, because the EU is currently the largest importer of Brazilian biofuels, and will possibly continue to be in the future. Therefore, the construction of a system of sustainability indicators suitable to Brazilian reality is important to allow continued growth of Brazil’s production of biofuels, something that the country’s geography and climate favor.

There is also a need for continues investments in research and development of new technologies, construction of infrastructure and improvement of logistics, to develop productive processes that respect the three pillars of sustainability (environmental, social and economic). In the international sphere, there is a need to reduce multipolar bureaucracy, so that biofuels, mainly biodiesel, can gain greater presence in the world energy mix.

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Biography

Mariana Bittar I am final year student of Bioprocess Engineering at the School of Chemistry, Federal University of Rio de Janeiro. Two years ago do undergraduate research in air biofuel with biodiesel. Throughout this period I developed and computational laboratory work. I work in the Environmental Engineering Program at the Petroleum Industry, Gas and Biofuels - PRH41 - ANP / MCTI the Polytechnic School and School of Chemistry, UFRJ. I have personal profile determined and very committed professional, willing to new functions that allow me to reach new steps of knowledge. I have great interest in the field of Management and Environmental Security.