BIODIESEL IN BRAZIL

Investment

Definition:

Biofuels are substances derived from renewable biomass, such as biodiesel and ethanol. More than 42% of the power and 13% of the fuel consumed in transportation in Brazil are renewable.

Brazilian Overview

More than 42% of the power and 13% of the fuel consumed in transportation in Brazil are renewable. Only 13.2% of the power worldwide originates from renewable sources.

When producing and consuming power, a Brazilian citizen emits, on average, 4 times less CO2 than a European citizen, 9 times less than an American citizen, and 3 times less than a Chinese citizen.
As a global pioneer in the use of biofuels, Brazil has reached a status which is desired by several countries that seek renewable sources of energy as strategic alternatives to oil.

Ethanol fuel

Ethanol fuel may be produced from several vegetable sources. Sugarcane is the one which offers more energy advantages.
Currently, Brazil produces 1st generation ethanol from sugarcane, as well as 2nd generation ethanol from sugarcane bagasse and straw. By 2020, the country will be able to start using corn as feedstock for ethanol production.
Automobiles running in Brazil use two categories of ethanol: hydrous and anhydrous. Hydrous ethanol is used directly in engines designed for such purposes or in engines with flex-fuel technology. Anhydrous ethanol is blended to gasoline, without prejudice to gasoline engines, in variable proportions, according to the legal terms.

Biodiesel

Biodiesel can be produced from animal fats and plant species such as soybean, palm, sunflower, babassu, groundnut, castor bean and jatropha. In Brazil, soybeans are the main feedstock. Animal fat is the source of about 20% of the biodiesel produced in the country. Cotton and cooking oil are also significant sources for the production of this biofuel.

In order to turn vegetable or animal fat into a fuel compatible with diesel engines, it must go through a chemical process called transesterification. The process is carried out by more than 60 biodiesel plants authorized by the ANP in the Brazilian territory. The final product must comply with the physical and chemical specifications established by the National Agency of Petroleum

In Brazil, biodiesel in its pure form (B100) is compulsorily added to fossil diesel in proportions that increase according to the law in force.

The Regulatory Agency – ANP

The Brazilian National Agency of Petroleum, Natural Gas and Biofuels is the regulating organization for the activities within the oil, natural gas and biofuels industry in Brazil. The federal agency, which reports to the Ministry of Mines and Energy, runs the national policy for the sector, focusing on the assurance of fuel supply and the interest of consumers.

Evolution of Biofuels In Brazil

As a global pioneer in the use of biofuels, Brazil has reached a status which is desired by several countries that seek renewable sources of energy as strategic alternatives to oil.

1974 - Brazil establishes the Pro álcool (the National Ethanol Program)

1977 - Addition of 4,5% anhydrous ethanol to gasoline

1979 - Addition of 15% anhydrous ethanol to gasoline

1983 - Hydrous ethanol-powered cars amount to more than 90% of the total sales

1985 - Ratio of anhydrous ethanol to gasoline reaches 22%

1990s - Ratio of anhydrous ethanol to gasoline between 20% and 25%

2003 - First cars powered by flex-fuel technology (ethanol and gasoline)

2005 - Beggining of the Brazilian National Biodiesel Program - Expansion of the ANP's duties

2008 - Mandatory addition of biodiesel (B2) to fossil diesel

2010 - Mandatory ratio of biodiesel rises: B5

2011 - Law 12490 - The ANP undertakes regulation of ethanol

2014 - Mandatory ratio of biodiesel rises: B6 as of July; B7 as of November. The ratio of anhydrous ethanol added to gasoline rises to 27,5%

Benefits For The Environment

The massive use of ethanol is regarded as one of the main mechanisms to reduce greenhouse gases, as it significantly decreases the carbon dioxide (CO2) emissions. Part of the CO2 emitted by vehicles running on ethanol is reabsorbed by sugarcane plantations in the photosynthesis process.

When compared to fossil diesel, biodiesel also has environmental benefits. The burning of biodiesel may result in the emission of, on average, 48% less carbon monoxide; 47% less particulate matter (which penetrates the lungs); and 67% less hydrocarbon. As these percentages vary according to the amount of B100 added to fossil diesel, the reductions occur proportionally.

Biodiesel Auctions

The ANP is also responsible for promoting the biodiesel auctions, in which diesel oil producers and importers acquire biodiesel to compose the diesel/biodiesel blend in the current legal rate. The auction is mandatory for producers and importers with market share above 1%. The acquired biodiesel is sold to distributors who blend it with the fossil diesel.

The auctions, a system established by the Brazilian National Energy Policy Council, have been held since 2005 in order to ensure the availability of biodiesel in quantity sufficient to compose the blend as set forth by law. In the early years, the auctions stimulated the then arising biodiesel producing sector and, at the same time, encouraged the introduction of new entrepreneurs in the activity.

Historical

In December 2004 saw the launch of the Regulatory which established the legal conditions for the introduction of biodiesel into the Brazilian energy matrix of liquid fuels. The Regulatory was structured considering the diversity of available vegetal oils in the country, the security of supply, quality, competitiveness compared to other fuels and a policy of social inclusion.

In January 2005 was then published Law 11097 that established the compulsory addition of a minimum percentage of biodiesel to all diesel fuel sold to consumers (except for the marine diesel), anywhere in the Brazilian territory, and this percentage was mandatory initially set to 2% (B2) and currently is at 5% (B5).

From 2008 to 2011, the sale of biodiesel has grown from 1.1 million cubic meters (m^3) to 2.6 million m^3 (B5), and in September 2011, Brazil also won the position as the largest consumer of biodiesel world and currently the country is the second largest producer in the world and expected to surpass Germany in biodiesel production, becoming the largest producer of this type of fuel.

Currently the Government is considering the new Regulatory, providing a gradual increase in the percentage of mandatory blending of biodiesel with regular diesel until it reaches the value of 10% (B10) in 2020, representing an annual production of more than six million m^3 biodiesel per year.
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Currently 83% of all biodiesel produced in Brazil stems of soybean oil, 13% by sebum and / or animal fat, and the remaining 5% comes from various oils, such as sunflower oil, castor oil, cotton, palm oil, among others. Therefore it is expected that the price of biodiesel is strongly tied to the price of soybean oil.

Thus currently are required approximately 9.2 million tons of grain, or nearly 3.2 million hectares of planted area. Whereas Brazil today cultivates more than 24.2 million hectares of soybeans, there is still much room for growth in biodiesel production using only the raw material existing in addition to the actual increase in productivity through improved plant genetics and more refined techniques of cultivation that is driving productivity by at least 1.2% for year.

The motivation for the use of soybeans, the crop most produced in Brazil, is the value of byproducts, as this is an oilseed that produces less oil per hectare. The pound of soybean meal, for example, is proportionately equal to their own soybean (considering weight loss by oil extraction). The same can be said of the hydrolyzed protein and lecithin can also be extracted from soya and having a high added value on the market. The result is that the soybean oil, although having small yield per hectare is produced practically free, becoming the sub product of the bran and proteins, which causes in this case have a reversal of values.

Therefore the use of soybean oil is a result of demand - always growing - by more bran and protein, the raw material for animal feed that feeds the chicken, pig and cattle confined, producers of meat, eggs and milk, whose demand do not stop to increase as a result of economic growth and per capita income, especially in emerging countries.

For the state of Bahia / Brazil the annual production of soybeans is approximately three million tones with an average yield of 3000 kg / ha, totaling a total planted area of over 1000 hectares, located primarily in the western region of the state. This production would be theoretically sufficient to produce approximately 650 million liters of soybean oil or the equivalent amount of biodiesel.

The western of Bahia has been highlighted by increasing development of modern agribusiness, with strong business presence with own investment capacity, supply chain grain-vegetable for an oil industry structured and competitive, with the largest grain producing of the state, highlighting the culture using irrigation as soybeans, corn and cotton.

Currently, considering the up righting of soybean oil for biodiesel production, this agribusiness as a whole, revolves annually something like $ 3.5 billion from the sale of biodiesel and nearly the same amount by selling bran soybean. So we're talking about a business with an annual turnover of more than $ 7 billion.

Currently, the main technologies of biodiesel plants operating in Brazil are licensed by multinationals IRON CROWN (American), WESTFALIA (German), DESMET-Ballestra (French) and LURGI (German), whose technologies are usually in continuous process plants and very automated.

All these technologies, with some variations, have in common the main operating conditions to effect the trans esterification reaction in two stages, usually by methyl route, soybean oil as feedstock, biodiesel washing with water for their purification (elimination of methanol and residual glycerin), two distillation columns for the recovery of methanol used in excess and of water used in the washing of biodiesel, glycerin resulting from this process with a high content of water, methanol and salts (sulfates or phosphates) and, in some cases, an aqueous stream contaminated with oils, methanol and glycerin to be handled for disposal as effluent.

The investment in a new factory with an annual production capacity of 200 thousand tons of biodiesel in contracts for the installation type "turn-key" is approximately $ 70 million, as the plant to produce biodiesel from Cargill entered into operation start in set/12 using soybean oil and methanol as starting materials. Cargill sells and processes soybeans and other grains and oilseeds, and is one of the leading exporters and processors of the commodity of Brazil (together with ADM and Bunge).

HABITARE TECHNOLOGY

The **HABITARE TECHNOLOGY** is a technology company that develops works in Research and Development of new products / processes as well as the optimization of existing processes, with extensive proven experience over twenty years in work undertaken for clients in the Petrochemical Complex in Camaçari / Bahia.

We started studying the process of biodiesel production in mid-2008 and we make several laboratory tests to optimize the existing conventional industrial processes, with the objective of increasing the conversion rates of the oil to biodiesel (near 99%), reducing the generation of effluents generated in the process (not using water to purify the biodiesel), recovery higher than 98% anhydrous methanol used in excess in the trans esterification process, with low energy costs, and as a way of adding value to the process, recovering the generated glycerin, to be marketed with a purity exceeding of 98%.

In this work we arrive at a process, tested in pilot plant, which reached all the intended goals, which today is already consolidated technologically. So our goal now is to carry this process in an industrial plant, capable of producing something like 200 million liters of biodiesel per year, to be deployed in the region of Barreiras / Bahia / Brazil (or adjacent to).

The raw material we intend to use is the soybean oil of the same region, agricultural border with more than enough resources for our project. Our intention is to begin this production by purchasing soybean oil from Bunge and / or Cargill, and in the future verticalize the production of soybean oil, settling a processing plant for soybean seed adjoining the plant biodiesel, which will provide a substantial aggregation of resources to the process.

Our preliminary assessment is that this project will have a deployment cost for the biodiesel plant, something like $ 40 million (compared with values exceeding $ 60 million for projects such as "Turn-key" business). The additional investments needed to verticalize the production of soybean oil (along with lecithin, hydrolyzed protein and bran), processing 4000 tons / day of soybeans or 216 tons / year of oil, will be on the order of $ 60 million (compared with values exceeding $ 80 million for projects such as "Turn-key" business).

The profitability of a biodiesel plant of 200 million liters of biodiesel per year at full capacity, buying up soybean oil from third parties is approximately 5% with an Internal Rate of Return (in ten year) of 36%. Taking up the verticalization production of soybean oil, these values increase, respectively, to 14% and 80%. This represents an increase in the annual cash generation of $ 15 million to as much as $ 40 million (out of all revenue generated by the soybean extraction plant).

In this evaluation is not considered the commercialization of glycerin, which can be obtained in technical grade, with a offered of something like 15 thousand tons / year, an average sale price of $ 0.90 per kilo, which represent an additional Cash Generation for this project, of plus approximately $ 5 million annually.

So we are currently seeking investors who are interested in this project, and in a first step we are riding the biodiesel plant ($ 40 million), for to be deployed in the future, the plant of extraction of soybean oil ($ 60 million). The project will be fully installed with own resources (from the investors) and / or long-term financing (up to the limit of teen years) from the Brazilian development banks (up to the limit of 80% of resources).

Our counterparts to this project are:

- The ground for the deployment of industrial project (oil extraction and biodiesel from soybeans);
- Political support from the Brazilian government for obtaining all necessary permits to implement the project;
- Own technology, engineering project with monitoring and installation of industrial plants;
- Ensuring operation of industrial plants according to the indexes of the project;
- Warranty purchase the raw material (soybean oil in the first stage and soybean seed in the second);
- Preparation of the economic-financial project for fundraising along the Brazilian development banks, mortgage guarantees necessary, and the monitoring of the entire process until its release, if also opt for these resources.