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## 17. Biofuels: A change in paradigms already underway

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### 17.1. The global situation

The mass use of fossil fuels has had a hand in driving and speeding up the development of the world economy. Global demand for energy has been increasing during the 20th century, with oil being one of its main components. However, while mankind continues to grow population-wise and in terms of energy needs, geologists are warning that the supply of fossil fuels will decrease, starting with oil and natural gas<sup>1</sup>. Likewise, climatologists warn of the unprecedented increase detected in the concentration of gasses due to their combustion, which could be causing an unpredictable alteration in the atmosphere's climatic balance.

Thus, and according to data provided by AEREN (Spanish Association for the Study of Energy Resources) in spite of the fact that at the current rate of consumption there is enough oil for around 40 years, the most imminent challenge facing society lies in peaking global oil production and then heading towards an output decrease.

The impending exhaustion of fossil resources, within a context of growing demands for energy with no short-term alternatives, may lead to shortages in the international markets and higher prices.

As this input is vital to the development of industry and trade, this increase in prices will trigger greater production costs that will affect the consumer price index and, in turn, consumption of all countries, which places several factors, such as the financial system's balance and the changes in social indices, at risk.

One of the energy alternatives to reduce oil consumption has been found in the use of biofuels.

The most widely used and developed biofuels are bioethanol and biodiesel.

- Bioethanol, also referred to as biomass ethanol, which is obtained from corn, sorghum, sugar cane or beetroot. Brazil is the main producer of bioethanol (45% world production); the US accounts for 44%, China for 6%, the European Union for 3%, India for 1% and the remaining countries for 1%.
- Biodiesel is manufactured using vegetable oils that either has or has not already been used. In this case, rapeseed, canola, soy or jatropha tend to be used, grown for this purpose. The main biodiesel producer in the world is Germany, concentrating 63% of production. France is next, accounting for 17%, the US for 10%, Italy for 7% and Austria for 3%<sup>2</sup>. Although the increase in bioenergy production and access to it is just one of the possible answers to the climatic change and the challenges in terms of energy safety, several features have turned it into a very interesting option:
  - From an environmental contribution standpoint, biofuels is a product with low contaminating gas emissions, it is biodegradable and comes from a renewable resource.
  - From an energy standpoint, biodiesel is the only alternative fuel that can be used directly in diesel engines without requiring any sort of transformation, as it has properties similar to those of diesel oil.
  - From an economic standpoint, the benefits lie in the possibility of this type of industry's vertical integration, involving the creation of the raw material through to the sale of not only the main product, but also its by products.

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<sup>1</sup> AEREN (Spanish Association for the Study of Energy Resources)

<sup>2</sup> Source: Wikipedia contributors. Biocombustible [online]. Wikipedia, La enciclopedia libre, 2007 [inquiry date: October 1, 2007. Available at <<http://es.wikipedia.org/w/index.php?title=Biocombustible&toldid=11723850>>.

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## 17.2. Prospects of current competitive regions case studies: Brazil and Argentina

It should be mentioned that both Brazil and Argentina are in excellent conditions to produce biofuels and compete in the sector, not only at the regional level, but also internationally.

Argentina is at the initial stage of exploration and investment, while Brazil's development plan in this area is far more advanced.

Brazil was one of the pioneer countries on adoptions of renewable energy sources. When the petroleum crisis struck, the country implanted the "Proálcool" program to structure the ethanol production system. According to a Japan Bank for International Cooperation (JBIC) study, in 2006, forty years after the beginning of the project, 40% of all cars in the country used ethanol as fuel, and Brazil has now become one of the main bioethanol exporters worldwide.

Recently, as part of a set of measures to fight global warming, Brazil has been stimulating the use of biofuels, such as ethanol and biodiesel. These measures are also based on the government policies to create jobs in less developed areas, helping to diminish regional inequalities. In addition, the government seeks cooperation between public and private sectors to attract even more private investments to the renewable energies' sector. As part of these measures, the Brazilian government has been investing in infrastructure on specific areas and creating tax benefits for private investments on such region to promote social development and income improvement.

Expecting a large increase in internal and external demand for renewable energy, the Brazilian government has been promoting, through federal programs on a Pluriannual Plan, the development of a biofuels chain, aiming at an increase in production areas and stimulating the use of biofuels by consumers.

In summary, Brazil is focusing on 2 main areas of renewable bioenergy: sugarcane ethanol and biodiesel.

Ethanol related program emphasizes on research and jobs increase, in order to establish a stable and economically feasible supply structure. Main action plans are: eliminate restrictions of sugarcane production, increase sugarcane potential, environmental care, integration with production chain, new methods and products development for biomass, financing instruments for new plants, financing instruments for plantation, agriculture and industrial research and taxes advantages. Currently, refineries are obliged to add 25% of ethanol to the gasoline that goes to market.

Regarding biodiesel, government is focusing on: increase of oil production per square feet of land, enhance quality and feasibility of biodiesel production with ethanol, increase of residues use with feedstock, technology development to increase value of residues and sub products, technology development aiming energy auto sufficiency of plants located in remote areas. Legislation obliges<sup>3</sup> that every liter of diesel sold must contain 2% of biodiesel, beginning in 2008. This percentage should increase to 5% in 2013 or even earlier. This accounts for a demand of on million cubic meters per year in 2008 and 2.4 million cubic meters in 2013, according to MME (Ministry of Mines and Energy).

Although Argentina is at an early stage, its position is ideal for attracting investments aimed at biofuel production.

Argentina has different ecosystems that enable it to grow a large variety of crops and which give the country a great deal of flexibility when it comes to supplying the biofuel industry.

Argentina also boasts a fully developed exporting agricultural structure, based on its key strength factor: huge expanses of land fit for developing traditional and nontraditional crops, these being the main input required in the manufacture of biofuels. Argentina is the world's main flour and soybean oil exporting country, and the second-largest exporter of corn<sup>4</sup>.

It is also worth noting the importance of having an alternative energy resource to rely on, especially knowing that diesel oil accounts for an average of two thirds of the fuel consumption matrix, a number that may continue to rise, as most production machinery is being contemplated for use in the reconversion of soybean oil into biodiesel.

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3 Lei do Biodiesel (Biodiesel Law) (11.097/05).

4 Argentine Department of Agriculture, Livestock, Fisheries, and Food

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In Argentina, biofuel is regulated by Law 26,093, which sets forth that as from 2010, all gasoline and gasoil sold will be required to contain five percent of bioethanol and biodiesel, respectively. This represents a captive demand for 2010 in regard to both bioethanol and biodiesel, of 180,000 and 637,000 tons, respectively<sup>5</sup>. In the latter case, this potential demand implies the installation of 10 to 15 new production plants.

For the moment, the effects of the law have already begun taking shape. YPF recently presented a Premium diesel, Gasoilbio YPF, with a biofuel additive. There are also six concrete undertakings at an industrial scale that are in progress. Five of them belong to large cereal producers such as AGD/Bunge, Vincentín or Cargill. But it is estimated that Latin America is in a position to install around 100 new factories in the next three years, and it would be logical for Argentina to be considerably involved in this process, in addition to the abovementioned advantages, considering that the current value of land is low in relation to other parts of the world (not only Europe, but also neighboring countries), and high future profits look promising once the activity is in full swing.

### 17.3. The sector's main challenges

The key to placing countries in the lead when it comes to energetic change lies in creating a society prone to innovation and change. That would require coherent long-term planning of the transition and adjustment that takes into account the complexity of bringing about the change in a market-based world economy such as the one we are currently living in. From both Argentina's and Brazil's point of view, the most imminent challenges include the following:

#### Argentina's challenges:

As mentioned before, Argentina is at an exploration and investment incentive stage and therefore needs to make decisions on many issues inherent to the as yet undeveloped market. These issues refer to the supply of raw materials, foreign policy, quality, legal certainty and predictability, access to financing facilities, technology and the environment.

**Supply of raw materials.** The need to speed up research and development of new events that will facilitate the diversification of raw material sources, within a framework of sustainable agriculture, minimizing competition with food requirements, is extremely clear. According to data provided by Greenpeace, the dramatic increase in biofuels will raise corn, oilseed and wheat prices by between 11% and 26% by 2010, and each 1% increase in the price of basic foods adds 16 million people around the world who lose food security.

**Foreign policy.** International trade currently survives with market imperfections, such as subsidies, tariffs and para-tariff barriers. But the most immediate challenge lies in finding systems that will enable this product to be economically viable, regardless of what happens with oil prices. One solution would be to apply variable subsidies. Additionally, we must not leave out the fact that the following year the European Union's Generalized System of Preferences expires, a system whereby payment of the import tariff levied on Argentine biodiesel is exempted.

**Quality.** It is essential to coordinate actions in foreign policy matters, in order to better position ourselves in current and future negotiations in relation to certification requirements imposed by the European Union.

**Legal certainty and predictability.** Although Biofuels Law 26.093/06 was passed in May 2006, with the Administrative Order 109/2007 being issued in February 2007, there are still a great deal of issues to review. It is increasingly necessary to ensure a context of legal and tax certainty and predictability, as well as the utmost transparency in the Government's oversight duties, so as to provide an incentive for risky investments in order to atomize the offer, making it easier for a large number of players to join in the business, mainly agricultural producers and livestock farmers, which will be conducive to enabling SME's (small and medium-sized enterprises) to become involved in the business.

**Access to financing.** The Kyoto Protocol finances investment granting carbon credits to those who manage to reduce CO2 emissions. The Argentine Government has undertaken to support all biodiesel production projects but the ways of accessing these credits have not yet been clearly defined. The provinces are developing financing alternatives on a regional level with the support of the IADB (Inter American Development Bank), but as yet there is no action on a nation-wide level that aims to pave the way towards obtaining funds for undertakings of these dimensions.

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<sup>5</sup> Unión Industrial Argentina / Debilidades y Desafíos Tecnológicos del sector productivo./ Biocombustible

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**Technology.** There is great uncertainty as to whether the emergence of new technologies for the production of biofuels will render the plants designed to work with current technology obsolete. This factor delays decisions by investors.

**Environmental Matters.** The actual impact the use of biofuels will have on the environment is still not known for certain. Some specialists of the University of Buenos Aires hold that the apparent decrease in greenhouse gas emissions do not take into account the fact that the oil industry may turn to the manufacture of new agrochemicals and fertilizers, which would lead to an increased land overuse and pressure on the biodiversity of species .

#### **Brazil's challenges:**

As mentioned above, Brazil is at the height of developing and exploiting bioenergy; therefore, the challenges it faces are related to its objective of achieving growth continuity, ever striving to strengthen its position as one of the world's main biofuel producers. These challenges come in the form of access to financing and the adjustment of the products outflow logistics.

**Logistics and Supply Chain.** Demand for renewable energy is growing at unprecedented rates, requiring significant investments throughout the entire supply chain, driven by competing government incentive mechanisms. Relevant investments in infrastructure are required, such as transport and logistics, to allow a structured development of the sector.

**Credit Lines.** For governments, one of the key issues is to continue supporting projects through financial incentives such as tariffs and tax incentives. Additionally, the support of financial institutions is also vital to the sector development, including specific credit lines and alternative leverage options.

As Brazil and the World become more conscious about environment and global heating, clean energy becomes more important everyday. In that sense, government efforts are very important to increase private initiative participation in that sector. It is also very important that banks and other financial institutions create financing mechanisms to leverage such projects.

It is important to highlight that, although several efforts are being carried out by several financial institutions, the process of obtaining a large amount of financing for projects of such size is still long and time consuming in Brazil. Not to mention the high interest rates and the long list of requirements entrepreneurs must comply in order to be eligible for those financings.

## **17.4. Conclusions**

The need for large expanses of land available for growing crops of the raw materials required in the production of biofuels, places countries that are traditional growers of these materials in a highly competitive position when it comes to satisfying the growing demand for investments in this regard. This change of paradigm could shift the focal point of economic growth from industrialized countries to developing countries. Thus, linking the demand for energy to agriculture would lead to an increase in the demand for all inputs and agricultural production factors for the different uses.

Basically, the market of basic materials required for bioenergy offers a new opportunity and rapid growth for agricultural producers and may contribute considerably to their increase in revenues, as well as support a growth in the economy of every country.

Brazil is one of the greatest developers of renewable energy in Latin America and Argentina could achieve this standard if they managed to emulate their effort and keep up the level of work in an effective manner. In this way, both could become key players in the solution to the energy crisis. The future depends on the actions carried out by each government in terms of economic, political and financing matters to convert this opportunity into tangible reality.