

BIOCARBURANTS IN SPAIN. AN INDUSTRIAL SECTOR ON THE INCREASE

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This paper deals with some of the policies which, over the last few years, have fostered the production and use of biocarburants in Spain; as such, it touches on the following facets: progress in production capacity; progress in consumption of bioethanol and biodiesel; location of industrial plants, both in operation, under construction or only planned. Finally, the case of Abengoa Bioenergy is presented: one of the main producers of biocarburants worldwide.

1. DEFINING BIOCOMBUSTIBLE AND BIOCARBURANT

The *Spanish Dictionary of Energy* defines biocombustible as solid, liquid or gaseous fuel obtained from biomass, while the word biocarburant is restricted to the liquid fuel obtained from the same product. As such, biomass is a renewable form of energy which incorporates a variety of resources: farming and forest refuse, biodegradable byproducts, industrial waste, etc., as well as those specifically grown for the purpose in farms or forests.

Bioethanol is a kind of alcohol obtained from the distillery of the carbohydrates (glycides, sugar and starch) extracted from organic matter, mainly from cereals (maize, wheat, barley and rye) or from grown products with a high concentration of sugar (like sugar beets or canes). Bioethanol is then mixed at different concentration levels and yields less contaminating biocombustibles, such as petrol E5, E10 and E85, respectively having 5%, 10% or 85% of this alcohol.

A similar process applies to biodiesel, although, in this case, part of the diesel is replaced by vegetable oils extracted from oleaginous grows: palms, soya or sorghum.

2. NATIONAL POLICIES TO FOSTER THE CONSUMPTION OF BIOCARBURANTS

Spanish legislation has followed the steps of Europe, which has systematically acted as the driving force behind the increasing use of biocarburants. In fact, from the mid-1990s different laws and regulations have been passed and enforced with the aim of favouring their production and use.

As such, on May, 8th 2003 the European Parliament and Commission issued the *Guidelines to promote the use of biocarburants and renewable fuels in transport*. They basically aim at encouraging state members to replace petrol and diesel-fuel with renewable carburants in means of transport. They also have additional objectives such as complying with international agreements regarding climate change, securing supplies in rational environmental conditions, and promoting renewable energies. The *Guidelines* enforce member states to see that a minimum proportion of biocarburants and other renewable fuels are commercialized and to establish a national target to that effect. The stated value regarding such aims is 5.75%, which has been estimated on the basis of the energetic contents contained in all petrol and diesel-fuel put into each country's market up to December, 10th 2010.

A *Plan to promote the use of renewable energy* was endorsed by the Spanish Government in December 1999. The plan anticipated the likely consumption of renewable energy for the period 2000-2010, and established some of the measures and financial means to ensure that these objectives were attained. Additionally, it included the necessary incentives to boost the use of this type of energy.

Another *Law on social, tax and administrative measures* (52/2002) allows the government to tax biocarburants at the rate of zero euros per 1000 litres until December, 31st 2012. Such a special rate is only applied to the volume of biocarburants, disregarding other products they are mixed with.

The *Law on measures for a economic reform* (39/2003) also grants industries a 10% cut from the total amount due for taxes, provided that they have invested in systems, installations or equipment to treat oil, farming and forest products and transform them into biocarburants.

A *Plan to develop renewable energies, 2005-2010* was endorsed in August 2005. Incidentally, it evinces that, regarding biocarburants, by late 2004 an estimated 45.6% of the aims established at the above-mentioned *Plan to promote the use of renewable energy for 2010* had been achieved. In 2005, with 45.6% accomplished and an industrial sector already on the increase, a further boost was given when the *Guidelines 2003/30* were issued by the European Commission, to the extent that the target for 2010 was then raised to 2.2 million tons.

Finally, a *Decree to establish the means to promote the use of biocarburants and renewable fuels in transport* was issued by the Spanish Ministry of Trade, Tourism and Industry (ITC/2877&2008) in October 2008. This is expected to help reach the 7% of all petrol and diesel fuels put into the market by 2011.

3. OUTPUT CAPACITY

In December 2007, there were 27 plants in Spain producing biodiesel, with a global capacity to produce 815,190 metric tons; additionally, there were four plants developing bioethanol with a capacity of 456,000 metric tons. The former are located in Castille, Andalusia, Catalonia, Valencia and Navarre; while the latter are in Galicia, Castille-Leon, Castille and Murcia.

In the period 2008-2010, nine new plants to produce biodiesel are to be built, in addition to extending some of those already existing. The goal is to have a total installed capacity of 2.5 million tons in 2008, 5 million tons in 2009 and 7 million tons in 2010, provided that all projects

are really accomplished. However, there are no plans to build new plants developing bioethanol until 2010, when two new ones will be raised, with a capacity to yield 100,000 metric tons.

4. ABENGOA BIOENERGY, A EUROPEAN LEADER PRODUCING BIOETHANOL

As a technological industry, Abengoa is well-established in more than 70 countries. One of its basic objectives is to implement innovative solutions that may promote sustainable developments in the fields of infrastructures, energy and environment. Abengoa Bioenergy is one business group of the main firm, which has become the first producer of bioethanol in Europe, holding industrial plants in the USA and Brazil as well.

Abengoa maintains three production plants in Spain: Ecocarburantes Españoles, based in Cartagena (Murcia), Bioetanol Galicia in Teixeiro (Galicia) and Biocarburantes Castilla y León, located in Babilafuente (Salamanca): they have a respective installed capacity of 150, 176 and 200 million litres. Energy is supplied to the three bioethanol-producing plants by cogeneration plants, which yield a total of 77 megawatts. Such amount is enough for them to be self-sufficient regarding electricity and even to be able to export the surpluses. Electricity is generated by means of a gas-propelled turbine.

5. CONCLUSIONS

Transport accounts for the consumption of more than 30% of energy in the European Union and, as a result, it is responsible for the corresponding emissions of CO₂. For this reason, the EU keeps contending, from the early 2000s, that increasing the use of biocarburants is necessary to reduce the general dependency on imported forms of energy. Furthermore, these measures can have a great impact upon the market of fuels for transport, with important effects in the medium and long term.

In May 2003, a new regulation to promote the use of biocarburants and renewable fuel in transport was issued. It has become the starting point for a number of new measures, which tend to establish realistic targets for consumption and intend to encourage the use of biocarburants.

In Spain, plans to promote renewable energies have also led to the setting of new producing plants. Nevertheless, the government did not adopt conclusive measures until early 2007, when a new legislation established annual targets regarding the marketing of biocarburants and renewable fuel for the period 2008-2010.

Over the last years, some of the large plants producing bioethanol have exported an important part of their outlet; however, in 2007 exports diminished when new plants were launched in the consuming countries. On top of it, the rising prices of cereals in 2008 have also had an impact on the process.

Plants producing biodiesel, lately introduced, are undergoing an unfair competition due to the import of products subsidized by the USA. Nevertheless, the situation has encouraged this group to keep working in this direction. In the period 2006-2007 the producing capacity has doubled, to the point of reaching 815,190 metric tons in late 2007. The figure is, however, low compared to an expected growth of seven million tons, to be produced by the 67 plants working together in the period 2008-2010.

In Spain, this industrial sector can count on innovative companies, with years of international experience behind and, as a result, with many chances of business abroad. The example afforded by Abengoa Bioenergy is outstanding: both as a European leader in the production of bioethanol and as responsible for many ongoing projects which will surely expand its production capacity.