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First Generation Biofuels Gain Credibility- Next Generation Projects

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Report Highlights:

In April 2010, France's Environment and Energy Agency released a report on the life cycle analysis of first generation biofuels, which concluded that they are significant benefits in terms of green house gas emission savings and energy balance. This report, mandated by the Government of France under the recent environmental legislation, seriously weakens France's political and societal concerns for biofuels that has been observed in the past few years. France has traditionally favored biofuels development through a number of political incentives, which in turn, have made itself European Union's second largest biofuel producer. Additionally, new second-generation biofuel pilot projects and a third-generation biofuel research project were announced March 2010.

Executive Summary:

From 1993 to 2007, the Government of France (GOF) built efficient national incentives in favor of biofuels production and consumption. As a result, France became the European Union's (EU) second largest producer and consumer of biofuels after Germany. However, when food riots were observed in various parts of the world, which emphasized food and non-food competition, and stronger ecological forces in the French Government, the biofuel industry faced growing societal and political concerns over their perceived negative impacts on food prices and availability, while their positive environmental impact was questioned.

France's environmental forum, Grenelle for the Environment, prepared in 2007 and 2008 after a large number of round tables, which included over [200 commitments](#) of the various stakeholders involved and voted on as law in 2009 and 2010 (known as Grenelle 1 and Grenelle 2). The commitments are grouped in four main categories, which address climate change, conserving natural biodiversity, conserving health and environment while stimulating the economy, and creating an ecologic democracy.

The development of renewable energy is favored in the commitments, as a tool to address climate change, but the role of first generation biofuels is clearly questioned, and a report by the French Energy and Environment Agency (ADEME) was ordered by the GOF in Commitment No. 58 on "an exhaustive and contradictory expertise of the ecology and energy balance of first generation biofuels." Commitment No. 59 favors second generation biofuels, and more specifically to intensify research and development and accelerate industrial pilot projects.

Interestingly, the life-cycle analysis report by ADEME was released March 2010, when a number of observers noticed that the magic of the Grenelle process had vanished, due to the current tough economic situation for the farm industry, the GOF appears less idealistic and more realistic in the first months of 2010 than it had been since 2007. For example, the project of imposing a "carbon tax" on stakeholders proportionate to their carbon dioxide (CO₂) emission was abandoned, while it had been a high priority in the agenda. In March, the French President Nicolas Sarkozy stated at the annual international farm show in Paris that "enough of environmental constraints on farm producers," which put an end to a long series of environmental obligations French farmers felt to have been imposed on since the Grenelle commitments, including reduction in pesticide use, water access restriction, lack of access to biotechnology, strict environmental certification for farms, and incentives for organic production that conventional producers perceived as unfair to themselves. At the same time, second-generation biofuel projects are now pilot industrial projects, mainly conducted by the first-generation biofuel industry, while third-generation research programs were announced just this month by the French Atomic Research Center.

General Information:

ADEME Validates the Positive Impact on the Environment of First Generation Biofuels

- [New findings reported on first generation biofuels life cycle analysis](#)

Based on the “Grenelle” commitments, ADEME, the French Ministry of Ecology and Sustainable Development (MEEDDM), and the French Ministry of Agriculture, Food and Fisheries (MAAP) launched a study of the life-cycle analysis of first generation biofuels in 2009. The French contribution to the European Commission regarding international certification will be based on this study. The study was conducted by an independent consulting group, and the report entitled “[Life Cycle Analysis for First Generation Biofuels Used in France.](#)” was released in April 2010. This report concluded that biodiesel and bioethanol currently produced in France have green house gas (GHG) emission balance more favorable for the environment than corresponding fossil fuels (diesel and gasoline), without taking into account land use changes resulting from biofuel crop production. Direct and indirect land use change will be studied by ADEME in a future report.

The report estimated that the reduction in GHG emissions ranged from 60 to 80 percent with oilseed-based biodiesel, 90 percent for waste-derived biodiesel, 50 to 70 percent for bioethanol when directly mixed with gasoline, and 25 to 50 percent for bioethanol mixed in the form of ethyl tertio butyl ester (ETBE) with gasoline. Note: 1 metric ton (MT) of ETBE is made with 0.47 MT of ethanol and 0.53 MT of isobutylene. Overall, ADEME concluded that the current use of biofuels in France generates savings of 5.4 million MT CO₂ emissions This includes a 2.5 MT CO₂ equivalent savings per MT of rapeseed-based biodiesel, and a 2.7 MT CO₂ equivalent savings per MT of bioethanol.

In addition, biofuels energy balance was calculated in the study. The energy balance measures the quantity of renewable energy produced by a biofuel relative to the quantity of fossil energy necessary to producing this biofuel. For example, when the energy balance of sugarcane-based bioethanol is 5.5, it means for 1 Mega Joule (MJ) of fossil energy necessary to produce this type of bioethanol, 5.5 MJ of renewable energy can be produced.

Energy Balance of Bioethanol Produced in France Relative to that of Gasoline

Fuel	Energy Balance
Corn-, Wheat-, or Sugarbeet-Based Bioethanol	1.7
Corn, wheat, or sugar beet based bioethanol when mixed with gasoline in the form of ETBE	1
Gasoline	0.82

Energy Balance of Biodiesel Produced in France Relative to that of Diesel

Fuel	Energy Balance
Rapeseed Methyl Ester	2.2

Recycled Oil-Based Ester	4.2
Diesel	0.8

The report indicated that biodiesel is more environmental-friendly than bioethanol, both in terms of GHG emission savings and energy balance. Biodiesel is the main biofuel produced and used in France, with 2.3 million MT estimated to be produced and consumed in 2009. The bulk of biodiesel produced in France consists of rapeseed methyl ester. There are industrial projects to process recycled oil-based biodiesel, which, according to the report, has higher energy balance and higher GHG emission savings, but there is currently no significant commercial production as of date. Also, France is a major producer of bioethanol, with 636,000 MT produced and consumed in 2009. Sugarbeet and wheat are the main feedstocks used to process bioethanol. However, most of bioethanol used in France is in the form of ETBE, which appears less favorable to the environment, based on the reports' findings, both in terms of energy balance and GHG emissions, than bioethanol mixed as such with gasoline.

- Support by the French Ministry of Agriculture to first generation biofuels is reaffirmed

Based on this report, MAAP recently stated that biofuels were the main solution to reduce GHG emissions in transportation, and that first generation biofuels produced in France represented a credible and serious alternative to fossil energies, available and adapted to the automobile industry. MAAP confirmed France's national target of 7 percent incorporation rate of biofuels into fossil fuels for transportation in 2010. Over the past years, national objectives of biofuels incorporation were set annually and increased from 3 percent in 2007 to 5.75 percent in 2008, 6.25 percent in 2009 and 7 percent in 2010. No percentage is set for future years. In 2020, biofuels will be part of the 10 percent European target for use of renewable energies (see the 2009/28/EC [Renewable Energy Directive](#)). The ways to increase incorporation rates higher than 7 percent include developing higher-than-average rates like E85 (gasoline containing 85 percent of bioethanol) and B10 (diesel containing 10 percent biodiesel), and starting the industrial phase of second-generation projects that are currently pilot projects. France's national incorporation objectives for biofuels are the basis for an environmental tax, General Tax on Polluting Activities (TGAP), imposed on distributors when the incorporation of biofuels they practice is lower than the objective set.

Finally, France imposes a reduced mineral tax, "Domestic Tax on Consumption" (TIC) imposed on limited quantities on biodiesel and bioethanol. Tax rate and quantities are revised (and reduced) annually by the French Government. In 2010, they are 11 euros per hectoliter of biodiesel, and 18 euros per hectoliter of bioethanol; in 2011, this is expected to decline to 8 and 14 euros per hectoliter, respectively. The quantities are distributed in a tender system administered by the GOF to plants

located in France and in European Member States close to France's borders (Germany, Italy, Spain, and Belgium, for biofuels marketed in France.

Second Generation Projects: Pilot Projects on Track, and European Research Program Coordination by French Research Institute

As in various parts of the world, including the United States, France is conducting research on future-generation biofuel. Both the European Renewable Energy Directive and the Grenelle favor research and development (R&D) of second generation biofuels. The biofuels industry is currently exploring the following two categories of second-generation projects in France:

- Biological process to produce ethanol from various biomass resources (straw, wood, whole plants) through enzymatic fermentation: The "Futurol" pilot project was launched in 2009 (see GAIN report [FR8012](#), dated July 2008), with a budget of 74 million euros, funded by farmers, cooperatives, public and private research organizations. It is located in the technology cluster in the Champagne region.
- Thermochemical process (Biomass to Liquid, or BTL) through high temperature gaseification of biomass to produce biodiesel and kerosene: The "Bio-T-fuel" pilot project was announced in March 2010, with a budget of 112 million euros, funded by ADEME, the oilseeds industry, the petroleum group Total, public research centers and local authorities. It is located in the Picardie region, north of Paris. Another BTL project was announced by the French nuclear research center (CEA) and industrial partners in eastern France, where hydrogen will be introduced, consisting of a world premiere.

The French National Research Institute in Agriculture (INRA) announced in March 2010, that it is coordinating a European research program called [BIOCORE](#) (for Biocommodity Refinery). It is a 20 million euro, four year program where private companies, universities, and public research entities collaborate. BIOCORE's objectives are to design and analyze the industrial feasibility of a biorefinery converting agricultural and forestry waste into second generation biofuels, bioethanol, and synthetic chemical molecules to process thermoplastic polymers (including PVC and polyesters). Feedstocks used will consist of crop residues (mainly straw) and forestry wastes.

Third Generation Research Program

In May 2010, CEA, the French nuclear research center, released an [announcement on its new research program on third generation biofuels](#). CEA has conducted research programs since 2005 on hydrogen production by organisms, and since 2007 on organisms' capacity to synthesize carbon components rich in energy and useable as biofuels. For 2010 through 2013, under the GOF-CEA target contract

(Contrat d'Objectifs), CEA will aim to develop biofuels production by microorganisms (including algae), continuing research programs started in 2007, with a two-fold budget. Thus, multidisciplinary projects will be coordinated, including chemistry, physics, biology, genomics, and biodiversity.

Related Report:

[EU-27 Annual Biofuels Report, June 2009](#)