BIOFUELS

Closer to an Alternative Energy Source?

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Social and environmental concerns, a liquidity crisis and cheap oil – what does it all mean?

Sustainability

>> The past few months have seen unprecedented turmoil in worldwide financial markets. With the global economy in a recession and the decreased price of oil, many may be wondering what the future holds for biofuels. Prior to these global changes, social and environmental concerns about biofuels production were casting a shadow over their initial promise to address the dual concerns of fuel security and global warming. Biofuels are in a position to demonstrate their sustainability credentials to consumers as well as the capital markets. Biofuels make up an increasing share of global fuel sales. To continue along a strong growth curve, biofuels will have to overcome investor concerns about the financial viability as well as address social and environmental concerns.

Key Facts

- Advantages of sugarcane-based ethanol include its energy balance, reduced greenhouse gases and the fact that residual sugarcane waste can generate energy.
- Sugarcane productions does not compete with food production.

Calming investor nerves

Is there enough liquidity in the market and the political will to continue funding renewable energy projects? Many commercial banks are hesitant to lend to each other, so it seems hard to fathom how any projects will get off the ground in 2009. It will take time, however, for financing to rebound for biofuels and other renewable energy products, but that time will be sooner rather than later.

Investors can take some comfort in the example of Brazil's 30-plus years of successful sugarcane-based ethanol projects. These projects have been able to combine technical and economic feasibility with the political will necessary to foster their introduction.

There are several advantages to sugarcane-based ethanol when compared with other biofuels, including its energy balance, reduced greenhouse gas (GHG) emissions

and the fact that residual sugarcane waste can generate energy. It takes about US$300 million and between one and three years for a sugarcane-based ethanol project to come online and start generating cash flow when compared with the time and money required for a similar gasoline refinery.

In addition, sugar is not considered a primary food source, like other potential biofuel crops such as corn and wheat. This eliminates concerns some investors and governments may have in supporting biofuel production that may compete with food production.

However, investors should consider the following when examining the viability of potential sugarcane-based ethanol projects:

- *Agricultural development* – Ethanol projects have an agricultural as well as industrial component, which is sometimes overlooked. Agricultural development can be more complex and volatile because of climate and pest-related issues.
- *Land and food availability* – If the project is competing with food crops for land use, this may raise important social issues.
- *Water supply* – Even the most efficient Brazilian irrigation systems take 476 gal (1,800 L) of water to produce one tonne of cane – securing a sustainable water supply is paramount.

A sustainable approach

A number of schemes are under way to address the sustainability of biofuels, including, roundtables, independent studies, regulatory reporting of carbon and sustainability performance as well as the development of international sustainability standards – all of which are still in the early stages of development. The main sustainability criteria in most of the proposed schemes are:

- ensuring food safety;
- reducing GHG emissions;
- conserving soil and biodiversity;
- enabling sustainable water use;
- protecting air quality; and
- protecting workers and property rights.

To avoid competing and potentially conflicting sustainability standards, a single globally accepted sustainability approach is needed to simplify the global trade in biofuels and their feedstocks. Without such a recognized standard, policymakers will find it challenging to reach their carbon emission reduction targets.

Mandatory sustainability?

Implementing a mandatory sustainability verification system would be an effective tool to prevent the production of biofuels, which harm the environment or those that have no genuine net contribution to GHG reductions. The European Union is taking global leadership in embarking on the pathway to a low-carbon economy and is setting mandatory requirements for sustainable development of the

RUNNING ON

The Move to

Petrobras Biocombustível, a recently formed branch of Petrobras, is managing all of the company's biofuel production projects, including biodiesel and ethanol.

By Judy Maksoud, Executive Editor, *E&P*

Petrobras Biocombustível intends to be the domestic biodiesel production leader in Brazil. As one of its primary objectives, the company will also pursue international business. According to Petrobras, the creation of this new company reflects its commitment to biofuels, a business segment in which it expects to invest US$1.5 billion through 2012.

Petrobras Biocombustível operates the Candeias biodiesel plant (inaugurated in late July 2008) and also is in charge of the Quixadá plant as well as a third facility, called Montes Claros, which began operations in January 2009 with a capacity to produce 15 million gal (57 million L) of biodiesel per year. Total biodiesel production from these plants is expected to reach 45 million gal (170 million L) per year.

In mid-September 2008, Petrobras Biocombustível announced plans to construct a fourth biodiesel plant. The new unit, which is scheduled to go online in 2011 or 2012, will be capable of producing 79 million gal (300 million L) per year, according to the company. The goal, company representatives said, is to achieve a domestic production level of 1.3 billion gal (4.75 billion L) of ethanol by 2012.

The first ethanol project, Bioenergetic Complexes (CBios), calls on Brazil's Itarumã Participações to implement a complex in the municipality of Itarumã, in Goiás, with annual production capacity of 53 million gal (200 million L) of ethanol. Japan's Mitsui is a partner in the project, which Alan Kardec, president of Petrobras Biocombustível, announced at Rio Oil & Gas in September 2008. "While national companies have the expertise, the foreign ones will guarantee the market," Kardec said. "We are speeding the partnership process up to become faster and leaner."

Another alternative fuel project was announced in early October 2008, when Petrobras and Portugal's state-owned Galp Energia signed an investment agreement to create a joint venture that will develop a biofuel production and marketing project.

According to Petrobras, the agreement foresees the production of 600,000 tons of vegetable oil per year in Brazil, which will be used to produce 500,000 tons of second-generation biodiesel per year. Half of this volume will be produced in Portugal, and the product will be marketed in Europe, primarily in the Iberian market.

SUGAR:
Sugarcane-Based Ethanol

Additional new projects will be defined in the launch of Petrobras' new 2009/2020 strategic plan. Projects in the plan will include those in deepwater and the newly discovered sub-salt fields. Many others will include the production and export of ethanol, a product Petrobas refers to as the "green effect of Brazilian exports."

Ethanol has long been a big business in Brazil. Petrobras manufactured ethanol for use in automobiles in 1979, and today more than half of the cars in the country use ethanol. At present, 85% of the company's production is used domestically, but that is about to change.

"The future is brilliant as far as ethanol is concerned," said Fernando Cunha, director of business partnership for Petrobras biofuels, who spoke with journalists at a press conference during the Biofuels Houston Summit III, organized by the Brazil-Texas Chamber of Commerce and the Brazilian Oil, Gas and Biofuels Institute in October 2008.

Asia is opening up, Cunha said, not only for transportation, but also for energy, and the United States also will be a key consumer.

"The United States is going to need overseas ethanol, no doubt about it," Cunha said. "We believe the United States is going to be a big buyer for sugar-based ethanol."

The demand for ethanol in the United States will lead not only to commercial agreements, but also to technology transfer. Cunha sees an opportunity for exporting the expertise the company has been honing for the past several decades.

José Sergio Gabrielli de Azevedo, president and chief executive officer of Petrobras, discussed the company's performance and perspectives regarding ethanol at a luncheon presentation during the summit.

He explained some of the advantages Petrobras has identified in manufacturing and marketing ethanol created from sugarcane. The breakeven price for sugarcane, the feedstock used to make ethanol in Brazil, is lower than maize or mixed feedstock, which are used in other parts of the world. Furthermore, as the price per barrel of oil increases, opportunities expand for biofuels, unconventional oil and enhanced oil recovery technology, and new frontiers open, he said.

What is particularly appealing about sugarcane-based ethanol is that the cost per gallon compares favorably with the cost of gasoline. In addition, sugarcane ethanol provides the best payback time ratio for carbon emission. As the search for hydrocarbon alternatives continues, fuels like ethanol will become significantly more important, Gabrielli said.

Petrobras allocates 1% of gross sales to finance new technologies and is among the top companies in the world in terms of investing in research and development. ■

biofuel industry. On Dec.17, 2008, the European Parliament adopted the Renewable Energy Directive, which promotes the use of energy from sustainable renewable sources. An important element in the agreement is the amount of GHG biofuels use will eventually create. A stepwise approach will be implemented from minimum 35% to 60% for new producers after 2017. In addition, Member States will have to report on social and environmental consequences as well.

Other regions also should adopt a similar mandatory sustainability framework. Only a global approach will prevent leakages into the worldwide trade of biofuels and the concerning agricultural raw materials. Similar sustainability requirements also should be extended to other industries using the same agricultural raw materials.

The voluntary alternative

In the shorter term, only a voluntary sustainability certification system is feasible on a global scale. Such systems can only be successful if they are widely accepted, recognized and implemented throughout the biofuel supply chain. Companies in the chain have a key role to play to support these certification programs.

Today, public opinion is becoming more sceptical where biofuels are concerned, with significant sections of the population blaming them for increased deforestation and rising food prices. A concern is that the population may be investing in fuel security at the expense of food security.

Biofuels, which have undue impact on the environment or compete with food crops, are losing their political support base as they have been revealed as unsustainable. If this continues, it will slow down further development in the biofuel industry.

The path forward

First-generation biofuels are perhaps not a panacea to global warming, but with a proper sustainability certification scheme – as an individual, national or a global system – it is possible to prove that biofuels will reduce GHG emissions, create new agricultural outlets, reduce energy dependence and contribute to the production of low-carbon fuels.

While national governments, the private sector and the public can take bold measures to promote the sustainable production of renewable energies, such as biofuels, it will take a concerted international response, and certification scheme, to push the biofuels forward on a sustainable path. ■

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