

A new wave of investment will transform sugars and cellulosic carbohydrates into hydrocarbon fuels

Brazil: The Bossa Nova of biofuels

Shell, BP, Bunge, LS9, Dow and Amyris are collectively investing more than \$20 billion (€16 billion) into advanced, sustainable biofuels in Brazil. This new relationship between Brazilian, US and EU public and private industries is kicking off a new era in international biofuels investment.

The next wave

Bossa Nova – meaning the new wave, mixing oil traditions with new trends – is an evolutionary art form. In the case of the agri-fuels business, Brazil's new wave of advanced, sustainable biofuels investments represents a heady mixture of sugars and cellulosic carbohydrates into ethanol and hydrocarbon fuels, renewable diesel, biochemicals, biobutanol, biopolymers, and advanced, low-carbon drop-in replacement fuels.

For more than 30 years, Brazil has lead the world in sustainable biofuels production. And at the dawn of a new decade, Brazil is emerging as a world leader in advanced, sustainable biofuels investments, along with new technologies from private sector partners in the US and EU. In 2010, Brazil's progress in private sector biofuels investment is charging ahead, while EU and US government policies are effectively reducing ethanol biofuels targets due to political uncertainty and slower growth related to cellulosic biofuel feedstock production economics.

Sustainable policies matter

Based on US, EU and UN sustainability government policy

standards, Brazil's sugarcane ethanol is environmentally, economically, and politically achievable today. Paradoxically, using the same sustainability criteria, cellulosic biofuels in the US and the EU are not yet economically achievable in substantial volumes.

As the US and EU governments continue to debate sustainability criteria, the Obama's US EPA administration has already scaled back 2010 cellulosic biofuels targets during an election year, as ethanol subsidies and tax credit benefits are challenged by the imminent arrival of the E10 blend wall in the US. This uncertain policy environment in the US and EU has private investors looking to greener pastures, and entering into a new dance mixing emerging technologies and sustainable feedstocks with Brazil.

Investment trends

US/EU/UN sustainability criteria have ironically lead to positive investment outcomes in Brazil during a challenging economic recession world-wide. Sustainable sugars lead the charge. During this time, a consolidation among Brazil's sugarcane production facilities and conglomerates lead to favourable terms for first generation sugar cane ethanol acquisitions, and attractive conditions for next-generation, integrated cellulosic biorefineries. These reasons explain the new wave of investments in Brazil, where Shell and BP have entered into to multi-billion dollar

ventures (Shell-Cosan JV at \$12 billion, BP's \$8 billion through 2015) heralding this new trend of emerging markets technology-feedstock ventures.

US and the EU dance with Brazil

Another wave of next-generation renewable drop-in fuel companies Amyris, LS9, Solazyme and Dupont are also investing in and partnering with Brazil's sugarcane fermentation biorefineries. Why? Because their emerging technologies from cellulosic microbes (yeast, algae, fungus and bacteria) can use the same ethanol fermentation facilities in the US corn belt and in Brazil's sugarcane belt to produce bio-crude, green diesel, petrol and biojet.

The simplicity is astounding. Here's the big idea. Take an existing, stranded ethanol factory or conglomerate. Buy it for a substantial discount. Start with cheap sugar. Drop in a new Amyris, LS9, Solazyme, Gevo, Solazyme or Cobalt microbe/bug in the same fermentation vat and what do you get? An integrated biorefinery that can use cheap, sustainable sugars to produce renewable diesel, aviation fuel, and biobutanol – fuels that are compatible with existing petroleum pipelines, storage, petrol stations, and vehicle engines today.

In the near future, these fermentation-based biorefineries will be able to convert multiple inputs from cellulosic sugars- bagasse, switchgrass, wood chips, municipal solid waste, and glycerin – into a diverse set of

outputs, including renewable diesel, aviation fuel, bio-crude oil, biochemicals and biopolymers with significant GHG reductions and carbon emissions compared to petrochemical hydrocarbons.

Integrated biorefineries in sight

The future benefits of these integrated cellulosic biorefineries, especially in Brazil, will demonstrate leadership, proof of concept, and much-needed economic certainty that is challenged by US and EU cellulosic biofuels economics, mandates and markets today. This will benefit the other big emerging markets of China and India as the dance progresses.

Long before the Olympics arrive in Rio in 2017, Brazil's leadership in sustainable biofuels, coupled with advanced technologies from US and EU industry partners, will illuminate evolutionary pathways in achieving successfully integrated, diversified, biorefineries. In particular, India, the world's second largest sugar producer, and the world's most populated nation, is most likely to benefit from this progress along with China and other key emerging market nations interested in attracting increased investment and emerging technologies for sustainable growth. ●

For more information:

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