

Biofuels *India*

Sustainable Fuel for the Energy and Transport Sector

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EDITORIAL

Algal Biofuels

by Sudhir Singhal, Senior Advisor (Energy and Environment), WII

What does algae signify for bio-energy? Is it the future of biofuels? The subject has been of intensive discussion for long. Algae's potential, at least in theory, is remarkable. A decade ago, after the 1978 – 1996 algae program of the U.S. Government, it was concluded that 'it would not be a potential in the near future'. Now it is different. According to US DOE algae may be able to produce 100 times oil per acre than soybeans. But what is the cost of doing it and at what price?

Let's look at some current information and have a feel of the future directions in this rapidly evolving area. *Biofuels Digest* is projecting that algal biofuels capacity will reach 1 billion gallons by 2014 based on an analysis of price and capacity projections from leading companies in the field. Algae producers are targeting to reach a wholesale cost of US\$1.30 per gallon, and a capacity of 1.62 billion gallons by 2014. This is based on a review of 30 major algae biofuels companies including PetroAlgae, Algenol, Solazyme, Aurora Biofuels, Sapphire Energy, PetroSun and Sotix. 39% of this capacity is expected to be built in the US. 33 percent of this 2014 capacity is projected to use a closed system photo- bioreactor (PBR) process, and remaining 67 percent the open-pond "raceway" systems. Algae biomass yields are projected in the 24 – 53 tonnes per acre per year for the open-pond system. Apparently, cultivating algae, though not easy, is no longer a distant dream. Most countries and an overwhelming number of research centres from academia and industry are now in its favour and consider it entirely doable. Industry investments have already begun. We take a brief look at some developments.

University of Texas researchers have been promoting their 3000 strain collection of algae species, and feel that the only challenge with algae is the 'price'. It needs to come down from the "current \$10". Scripps Research Institute researchers state that to cure America of its 200 billion gallon a year oil addiction, algae is the answer. Stephen Mayfield of SRI, Steve Kay, Dean of Biological Sciences Division of UCSD, and, Gregory Mitchell of the Scripps Institution of Oceanography, who are some of the leading algae researchers today, support this view. "Algae should have the same subsidies as corn" says the industry.

In view of the developments, the National Algae Association has been formed in the US. It is to convene a networking forum in Texas on July 17. An Algae Biomass Organization has

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also been formed. Three new Algae Research Centres have recently been founded. These are the Midwest Research Institute in Missouri, focusing on the practical issues of process engineering and life cycle cost analyses in algae production; the Centre for Integrated Algal Research, focusing on optimizing algal strains for biofuel production and CO₂ remediation; and, another centre in India engaged in developing algae as a nutraceutical ingredient, initially targeting the high value Omega – 3 fatty acids, and thus drawing attention to deriving other high value chemicals. Research on offshore farms is in progress in several countries including Japan, Ireland and Argentina. Meanwhile, “making algal biodiesel at home” enthusiasts have also sprung up, giving information on all aspects of cultivating algae, scaling up, building a fresh / salt water aquarium, building an algae green house, algae bioreactors, harvesting and oil extraction, etc.

Solzyme has also announced a novel non-photosynthetic process for algae that reduces batch time to 5 days from 6-8 weeks, by feeding sugars to the algae to stimulate growth, and claims possible yields of 10,000 gallons per acre. The US DOE has announced a grant of US\$ 50 million to accelerate demonstration of algal biofuels.

Where does this and other similar information take us? Apparently we see progress of a kind which is not easy to dispute. The least we can now do is to look at this mass of information dispassionately and draw our own conclusions. It will be of help if this can be done without delay in order to reap possible benefits early enough. Algae and its oil lead not only to biodiesel but to a host of products including jet fuel, gas, cattle feed, and even gasoline. I feel it is interesting enough for a country to heed the trend.

California Kicks Corn-based Ethanol to the Curb, Welcomes Futuristic Biofuels

In a painful and potentially devastating development for the corn-based ethanol industry in the US, the California Air Resource Board (CARB) has passed a *new low-carbon fuel standard* for fuel producers across the country. The new standard rules that corn-based ethanol rates even below petroleum in terms of emissions.

CARB approved the first of its kind standard that measures the direct and indirect impacts of the fuel used over its entire lifecycle, right from its extraction (crude oil) to its combustion.

The new fuel standard penalizes corn-ethanol as it takes into account the indirect land use effects of growing corn for ethanol production. The regulation concludes that such a practice leads to burning grasslands and forests elsewhere to avail land for growing corn for edible consumption.

Opposing the development, the pro-ethanol lobby has termed the standard “unfair” and “discriminatory”. Gen. Wesley Clarke of Growth Energy says CARB had failed to account for carbon-intensive effects of U.S. military forces protecting oil reserves in the Middle East.

Protests notwithstanding, the low-carbon fuel standard is slated to come into effect in January 2011.



Not if CARB has its way

What this potentially leads to is a complete ban on the use of corn-ethanol in California. If other states follow suit, the industry would be thrown into a major crisis. Firms like Pacific Ethanol could well be pushed into bankruptcy. It's ironic then that the ruling should invoke an element of *schadenfreude* for the cellulosic ethanol industry, which incidentally is safely within CARB's standards. Brazil in particular, with its successful sugarcane based ethanol program stands to gain enormously from the new standard as it brings forward an opportunity for it to export its ethanol to the US. But don't expect the corn-ethanol producers to give up the fight as yet.

Reference: <http://industry.bnet.com/energy/10001155/california-kicks-corn-based-ethanol-to-the-curb-welcomes-futuristic-biofuels/>

India's Biofuels Policy: A Much Needed Step Forward

The National Biofuels Policy has perhaps been one of the most awaited policies for the country. With raging worldwide debates over the issues of social and environmental impacts, GHG emissions, indirect land usage for feedstock production and biodiversity offsets, expectations from the Biofuels policy have also increased substantially. Although a lot of action has already been taken by different central ministries and state governments, the absence of a well-defined policy is still evident across various sectors. This brief note attempts to capture the initiatives undertaken by different government ministries to promote the production of biofuels in the country, highlights some of the concerns voiced within opposition circles and concludes with the probable reasons for the delay in formulating the policy.

India's Biofuels Program and the involvement of government agencies

The Ministry of New and Renewable Energy (MNRE) had initially proposed the composition of a National Biofuels Development Board (NBDB) "to foster use of clean fuel in the country". The provision however was opposed on the plea that it would not be feasible for such a high level board, similar to the Cabinet Committee with representatives from seven ministries, to meet frequently to take up issues in the biofuel sector. Instead, the Planning Commission suggested the creation of the National Biofuels Coordination Committee (NBCC) chaired by the Prime Minister, which was given the go-ahead by the cabinet.

The draft biofuels policy calls for scrapping of taxes and duties on biodiesel and for a declared goods status to be conferred upon biodiesel and bio-ethanol. A declared goods status would mean that the two would attract uniform central sales tax or VAT rather than varied sales tax rates as currently prevalent in different parts of India. The Biofuels Steering Committee would be chaired by the Cabinet Secretary, which along with the NBCC, would be serviced by the Ministry of New and Renewable Energy.

Although MNRE is in charge of formulating the National Biofuels Policy, several central ministries have also pitched in and have provided the required support for growth of the Indian biofuels industry.



India's transition towards a greener economy hinges heavily upon the soundness of the national biofuels policy

The Ministry of Rural Development (MoRD) in 2005-06 provided financial support to nine states for the production of nearly 180 million seedlings of *Jatropha* and *Pongamia*. In 2006 the Indian Council of Agricultural Research (ICAR) identified a *Jatropha* variety – SDAUJ 1 – which has seeds with a particularly high (49.2 per cent) oil content. These seeds could be used for commercial cultivation in semi-arid and arid regions.

Furthermore, an exercise is currently underway at the Department of Biotechnology (DBT) to discover which varieties of *Jatropha* are best suited for biodiesel production. DBT has raised 22.48 lakh plants under controlled conditions at different places and has initiated R&D projects for the identification of superior varieties of high yield oil seeds.

The Ministry of Agriculture, through National Oil Seeds and Vegetable Oils Development (NOVOD) Board, is promoting *Jatropha* and *Pongamia* under the Scheme of Integrated Development of Tree borne oil seeds. NOVOD Board has identified elite planting material of *Jatropha* and *Pongamia* under their R&D program and has preserved the germ plasm. Besides, NOVOD Board has sanctioned model plantation of *Jatropha* in 1,445 hectare and

Karanja in 55 hectare during 2007-08. NOVOD Board along with agricultural universities is undertaking research to assess plantation and intercropping techniques to improve seed oil yields.

The biofuels program in India offers promising opportunities to create additional scope of income generation for the rural population and also to intensify land use by greening the countryside. But the actual result would depend on the nature and the implementation mechanism of the policy. It is important to note that the future of biofuels in India hinges on the economic sustainability of plantation. The assumption that oil-bearing trees like *Jatropha* would give good yields even on dry and wastelands without inputs like irrigation, fertilizer and pesticides has fallen considerably short of expectations. In the present scenario, there has been limited involvement from private farmers and corporate investors. The prime reason behind this limited involvement is the fact that biofuels is not yet competitive with conventional petro-diesel at the current market price.

Some concerns regarding the Policy

Debates on the merits and demerits of the Biofuels policy are growing and changing rapidly. Serious concerns such as the ability of biofuels to mitigate climate change effectively, the role of biofuels in the recent food price hikes and the social and environmental impacts of commercial production of biofuels have been voiced within different circles. Some concerns raised on the draft biofuels policy are presented in this section.

■ Debates on cultivation of biofuels and use of common property resources

It has been criticized that extreme dependence on wastelands would actually rob the economically marginalized and poor rural community from access to their common property resources. The land may seem to be 'wasted' and 'barren' to outsiders but in reality it provides sustenance for millions of poor and marginalized rural people. Most of these wastelands are classified as common property resources (CPRs) and are used as grazing ground for the village cattle. In fact, research on CPRs reveal that resources like common grazing ground play a vital role in the

lives of these marginalized communities and facilitates by providing a wide variety of commodities like food, fuel wood, fodder thatching material for house roofing etc., especially during emergencies.

The land may seem to be 'wasted' and 'barren' to outsiders but in reality it provides sustenance for millions of poor and marginalized rural people.

■ Dependence on mono-crops for feedstock

It has also been highlighted that the reliance on just one or two crops as the primary source of feedstock for biofuels poses a higher risk of scarcity in biofuels supply owing to crop failure due to potential droughts or pest attacks. This is especially critical in cases where cultivation is to be undertaken on marginal lands with little or no variable inputs.

Therefore there is an urgent requirement for scientific research and development to be directed towards development of a wide variety of crops and technologies that are suited to the diverse socio-economic and environmental conditions existing in different climatic zones within India. At the same time clear-cut policies like mandated renewable fuel standards, minimum support prices for biofuel crops etc. need to be rigorously undertaken by scientists and extension agencies. This would provide adequate incentives for industry and agriculturists to undertake the necessary investments for deployment of such technologies.

Social resistance against the intended National Policy on Biofuels has already gathered momentum. In February 2008, the Civil Society Group in India wrote an open letter to MNRE demanding that the Policy draft be made public. The letter highlights issues like rising food prices, use of common property resources without involvement of the local community, increasing

corporatization of the biofuels sector followed by 'land grabbing' exercise, and also increasing use of government schemes for production of biofuels. The letter primarily requests for a more pro-people based energy policy.

Inter-ministrial overlap and subsequent delays

India's failure to agree to a biodiesel policy so far has forced firms to shelve expansion plans, putting it way behind energy-hungry rivals like China in the drive to greener fuels. An example of the discouraging ramifications is the fact that the delay has left edible oil processing companies, which have built capacity to turn 1.2 million tonnes of *Jatropha* into biodiesel, in the lurch and \$227 million poorer.

There are multiple reasons for this delay:

One of the probable reasons for the delay could be that several government ministries are involved in promoting biofuels, and there are occasions where responsibilities overlap. "Even though the GoM, chaired by Mr. Sharad Pawar had cleared the biofuels policy while rejecting the proposal for "demonstration projects", the Prime Minister has referred it back to the Pawar panel for a relook.

The "demonstration project" – entailing plantation of *Jatropha* and *Pongamia* on five lakh hectares of waste, degraded and marginal land under rainfed conditions — would help fill the knowledge gap on how viable the idea was, since it is seen as having a big potential to reduce the dependence on oil imports.

Another possible reason is that there is no unanimity across the ministries over the issue of subsidy. Some ministries are in favour of subsidy for the sector as it is in nascent stage but the Finance Ministry seems to be opposed to the idea (Business World, February 14th 2008) "The Biofuel Development Association of India (BDAI) is openly unhappy at the delays, particularly the indecision over government subsidies."

It is however expected that the nation's biofuels policy will soon see the light of day. It is hoped that the policy will get the necessary approvals and that it will succeed in mitigating the myriad concerns voiced from across the country.

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Courtesy: Nilanjan Ghose
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Image Source: <http://www.carmotor.cz/>

Algal Biodiesel: Potential and Problems

Projections for oil requirement in India by 2020 suggest that the demand will increase from around 100 Million Metric Tons (MMT) in 2001 to about 300 MMT by 2017 (The Energy and Resources Institute Estimates for National Energy Map for India: Technology Vision Document 2030 (internet)). The requirement for High Speed diesel and light diesel alone will be approximately 113 MMT by 2017. The role that renewable resources will play in the transportation industry, for in situ electricity generation and in carbon sequestration will be an important part of the overall strategy required to meet this demand.

A major initiative has been under-taken in India for the development of biofuels from higher plants: *Jatropha*, *Mahua*, and *Pongamia*. Algae also produce lipids which may be converted to fuel molecules.

Single celled micro-algae have high photosynthetic efficiencies of about 10% under optimal growth conditions, higher than the crop plant average of 8-9%. Fast growth rates of one generation or more per 24-hr day resulting in several harvests per year, ability to use wastewater and flue gas for growth and warm ambient temperatures throughout the year are strong recommendations for growth of an algal biofuels industry in India. The several, very different eco-zones in this country should result in a rich diversity of oil producing strains and an important consideration is that the water used for their growth can be recycled.

However, not all algae store lipid, and species that do accumulate triacylglycerols, do so under specific growth conditions and for short periods of time. Therefore, polar membrane lipids which represent about 20% of dry weight biomass, and the fatty acids which make up these lipids are important in extracted algal lipids.

Polar lipids have two acyl chains and the terminal carbon on the glycerol backbone carries a polar head group. Triacylglycerols have 3 carbon chains on the



Biodiesel from Algae – A future full of possibilities

glycerol backbone which will produce 30% more fatty acid per gram of lipid extracted. All oil seeds store triacylglycerols.

Field trials of small and medium scale production of algal biomass report results for 9g/m²/day production rates to 30g/m²/day. Three cases are discussed keeping in view growth conditions known to enhance or control production of lipid. Benemann (1994) in the US has done a cost-accounting for wild-type strains producing fuel and concluded that a 12 hectare pond would be required to generate 1 MW of electricity, provided that the algae had a productivity of around 50g/m²/day. Biotechnology leading to development of highproducing algal strains is very briefly mentioned.

High growth rates and near-continuous harvesting which is possible with algae makes them a very important alternative energy resource for biodiesel. Successful development of site specific technologies is the challenge that has to be met to convert possibility into reality.

Courtesy: Dr Aditi Pant

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(Paper presented at the 6th International Biofuels Conference, organized by Winrock International India March 4-5, 2009, New Delhi)

Image Source: <http://www.coremediagroup.org/>

Indian Biodiesel Industry Awaits Clarity on Benefits from Duty Cut

The finance minister has graciously announced a reduction in custom duties on blended and imported biodiesel to help the Indian biofuels industry on its way forward.

The reductions amount to a 5 point decrease in custom duties on biodiesel – down from 7.5 % to 2.5 %. Also, excise duties are no longer due on high-speed diesel oil (HSDO) blended with up to 20% biodiesel.

The reactions to the directive however have been at best, lukewarm.

Firstly, the industry is seeking more clarity on the exact modalities of the tax cut. Experts say that while fossil fuels attract excise duty, biodiesel does not. So a degree of clarity is essential on if blended biodiesel will invite any amount of tax.

The second issue is more complex. Although India's estimated biodiesel production capacity stands at about 200,000 tonnes per annum, most of the production facilities are lying idle.



Pressing silence – Biodiesel factories in India face acute shortage of feedstock

The reason - commercial biodiesel producers in the country rely on Jatropha seeds, non-edible oil waste and animal or fish fat for fuel production. But the negligible availability of these feedstock has led to dismal outputs of biodiesel.

Says an industry analyst, "The existing Jatropha plantations are at a very initial stage of growth. The total Jatropha plantation area in the country is presently estimated to be at around 450,000 hectares and, of

this, over 70 per cent are new plantations and would mature in the next four years."

So for the country's existing biodiesel producers, the reduced custom duties don't bring any cheer at all.

It's hardly surprising to note that the producers are already exploring opportunities abroad. Groups like Emami Biotech and Hazel Mercantile have acquired 10,000 to 25,000 hectares in Africa for cultivating Jatropha plantations.

Incidentally, Emami's 300 tonne per day biodiesel plant at Haldia lies idle.

In October 2005, the Ministry of Petroleum and Natural Gas had announced a biodiesel purchase policy. The policy required oil companies to purchase and blend biodiesel with high-speed diesel oil (HSDO) at a 5 % blending ratio. 20 procurement centers across the country had been earmarked for purchasing biodiesel from producers.

Experts however are concerned that the economics of producing biodiesel is what is eating away at the industry. Producing one liter of biodiesel today costs significantly higher than the government pre-determined price of Rs. 26.5 per liter. Several factors contribute to the deviation. As a result, the biodiesel sale counters stand deserted.

But sporadic efforts are being made to revive the industry. One such example is the initiative taken by the Biodiesel Association of India (BAI), which in a letter to the finance ministry has sought concessions in custom duties to be extended to feedstock (free fatty acid and non-edible oils) imports as well. It hopes the move will help the country's idle biodiesel plants get back on track.

One only hopes the issue is addressed in time to check the flight of producers headed offshore.

Reference: <http://www.business-standard.com/india/news/biodiesel-sector-waits-for-claritybenefitsduty-cut/363357/>
Image Source: <http://image32.webshots.com/>

European Commission Slaps Duties on US Biodiesel

In a setback to the already struggling US biofuels industry, the European Commission has slapped controversial five year anti-dumping and countervailing duties on biodiesel imported from the United States.



Go away! – troubled times for US biodiesel exports

The duties came into effect from July 12, 2009 and range from €68.6 (\$97) to €198 (\$282) per tonne of imports.

Defending the directive, the European Biodiesel Board (EBB) complained that the EU market was being flooded with heavily subsidised US imports. “For more than two years, US biodiesel has been sold in the

European market at a substantial discount, at an even lower prices than the vegetable oil raw materials purchased by the EU industry for producing biodiesel”.

The EBB further observed that the heavily subsidized US biodiesel was threatening the viability of European producers. It issued a statement to the effect that “Without the definitive measures adopted today, the unfair US exports would have jeopardized the viability of the EU biodiesel industry and its future investments”.

With EU member nations targeting a 10% increase in the use of renewable energy by 2020, ensuring a robust market for the European biodiesel manufacturers would only seem like the obvious step to take. But that’s from Europe’s point of view.

The directive could not have come at a worse time for the US biodiesel producers. The recent fraying of trade relations between the United States and Europe only makes matters worse. US poultry and hormone-treated beef being shipped into Europe have also been restricted which has strained relations between the two trading blocks.

Reference: <http://www.ebb-eu.org/media.php>

NBB Not Amused, Demands a Revised EC Directive

Issuing a strongly worded criticism of the European Commission’s directive, Manning Feraci, Vice President of Federal Affairs for the National Biodiesel Board (NBB) issued the following statement:

“This is a flawed decision. The imposition of provisional duties is nothing more than a politically expedient effort to appease the protectionist whims of the European biodiesel industry and is inconsistent with the European Union’s (EU) World Trade Organization (WTO) obligations. This sets a dangerous precedent for global commerce.”

Citing unfair practices, Feraci stated that “to comply with WTO rules, the EC must prove that harm is being caused to the EU industry before duties are imposed. This simply is not the case, and the EC has data before it which clearly demonstrates that the European

biodiesel industry has not been harmed by US competition. In fact, some EU companies have fared quite well. For those that have not, it is factors unrelated to US competition – bad business models, high feedstock costs, and detrimental EU member state policies – that are to blame.”

The response leaves no room for doubt as to what the NBB and the American biofuels industry thinks of the EC’s directive. Feraci however added that “Hopefully, the EC will take more time to fully consider the evidence before it renders a final decision later this year that is consistent with the facts and the EU’s WTO obligations.”

Reference: http://www.biodiesel.org/resources/pressreleases/gen/20090312_eu_decision.pdf

US Offers \$790M to Next-Gen Biofuels



The message is loud and clear

The biofuels industry in the US received a significant shot-in-the-arm with the Obama administration announcing a \$790 million stimulus package to promote advancements in next-generation biofuels. The news comes as a re-confirmation of the administration's commitment towards mainstreaming clean energy alternatives.

The stimulus package extends generous assistance to the country's biofuels industry by allocating \$130 million for Research & Development, \$176 million to support commercial-scale refineries and a whopping \$480 million to help pilot & demonstration scale refineries get off the ground.

What the announcement immediately does is that it makes EPA's target – having 36 billion barrels of biofuels blended into gasoline by 2022 – look that much more attainable.

Industry players have greeted the announcement with a strain of cautious optimism, but have welcomed the news nevertheless. Many organizations that work with the development of cellulosic ethanol (and other non-corn based biofuels) have had to face non-committal responses and rejections in securing adequate

financing from investors. The key factors identified were the lack of liquidity in the market and the uncertainty shrouding the future of the "it's a first of its kind" technology.

Says James Imbler, CEO of Zeachem, a cellulosic ethanol developer based in Colorado, "For the industry to develop, you've got to have clarity for investors. The government coming out and reaffirming that number is important because people would otherwise get nervous that the new administration would come in and throw out what the previous administration did".

Arnold Klann, CEO of BlueFire Ethanol Fuels echoes the sentiment. "By having the government step in to guarantee the market for the first-of-its-kind technology, some are going to succeed and some are going to fail, but at least it will show the pathway to getting there".



The package provides for greater financial assistance for the algal biofuels industry

The package also provides for the exciting new field of algal biofuels. It includes a \$50 million share to establish an algal biofuels consortium to accelerate the demonstration of the technology.

And in taking the initiative a step further, a new policy advancement group comprising the heads of the US Environmental Protection Agency (EPA), Department of Energy and the US Department of Agriculture will be formed to draw up policy directives that help shape a positive future for the US biofuels industry.

But the real significance of the announcement lies not in the amount it sanctions, but in its stimulus towards weaning the US biofuels industry away from its

dependence on corn based ethanol. This sector has ignited a fair amount of criticism owing to scathing reports which suggest that corn based ethanols guzzle enormous amounts of water, besides contributing to rising food prices. Reports state that by taking away from food supply, corn based ethanol resulted in a 0.5 – 0.8% rise in food prices in 2008.

Little surprise then that the stimulus package has garnered appreciative nods from across the country. As Imbler summarizes it, "They did something concrete

by putting the money out there, and they're dealing with the policy side by helping to cut through the bureaucracy." That and the growing pressure within the country to produce its own fuel should bring about a rather exciting period for biofuels in the United States.

Reference: <http://cleantech.com/news/4429/us-offers-790m-next-gen-biofuels-me>

Image Source:

1. <http://4.bp.blogspot.com/>
2. <http://www.floridaaquaculture.com/>

German Second Generation Biofuels Plant to Start in 2010

The concern over rising food prices on account of food crops being used for producing biofuels is not restricted to the US alone. Europe, and specially Germany seems to be taking a pro-active stance in addressing the issue. It recently announced that its first biofuels plant, based completely on second generation biofuels, could commence commercial production as early as 2010.

Michael Deutmeyer, Chief Executive of Choren Biomass said that the plant would use new sources of biomass such as wood chips, straw, hay, grass and vegetable waste as raw materials. The objective of the plant would be to opt for low grade biomass instead of relying on crops such as grain, rapeseed oil and palm oil.

The plant, under construction in Freiberg, South Germany, is expected to produce nearly 15,000 tonnes of Biomass-to-Liquid (BTL) fuels. The primary source of raw material is intended to be wood based waste. With good reason too, as the waste biomass sector has been identified as one with immense potential and possibilities. This rings true even more so for countries further down south like Brazil and India that have enormous biomass resources.

Deutmeyer further shared Choren's goal of setting up a 200,000 tonne capacity second generation BTL facility in eastern Germany, but said that it would only proceed after it had tested the level of government assistance in the offing for second generation biofuels.

Referring to Germany's targets in cutting GHG emissions, Choren expressed a desire to know if there



Waiting to go liquid - wood chips outside a storehouse

was a directive on the cards that would mandate compulsory blending of biofuels with fossil fuels in the country, or if a feed-in tariff structure would be affected that would help promote healthy competition between first and second generation biofuel producers.

Either way, Choren with its waste biomass BTL facility has stepped in as, what some would term, a "path-breaker", leading the way for other similar ventures to take root in the rest of Europe.

Keeping in mind our own commitments towards cutting GHG emissions, India too could benefit from such developments being brought into the country. A welcome first step would be for both policy makers and green industrialists to show active interest in the possibilities.

Reference: <http://in.reuters.com/article/oilRpt/id/INL128019920090701?sp=true>

Image Source: <http://www.nwtf.org/>

NASA Takes a Crack at Algal Biofuels

Scientists at NASA's Ames Research Center (ARC) are reported to be working on a rather unique technology of producing biofuels from algae, a technology that could possibly help in the commercial production of aviation fuel while it cleans up tonnes of sewage.



Your time has come – Algae will soon treat sewage water

Pet named OMEGA, short for "Offshore Membrane Enclosures for Growing Algae", the technology is about promoting algal growth in plastic bags filled with wastewater. The catch is, the plastic required can not be your ordinary grocery-shopping grade polymer. It has to be a highly advanced grade of material that allows for inflow of CO₂ into the bag for the algae to feed upon, while allowing oxygen and fresh water to

exit the enclosure. But as with all things NASA, the technology does not fall short of its share of ingenuity. The project teams wants the technology to go functional while floating on ocean waters. That, NASA explains, is because the perpetual motion of the ocean waves would keep the layers of algae well mixed. This is important as a static environment would quickly lead to the topmost layer of algae cutting off sunlight for the layers beneath it.

OMEGA aims to achieve four benefits out of the exercise. It would help treat wastewater, generate algal biofuels for certain applications and allow the used algae to be utilized as a fertilizer, besides doing its bit for carbon sequestration.

The challenges that remain are the identification of the right quality of plastic suitable for the job, which is easier thought of than done, and the correct strategy to float these bags out into the oceans.

But if NASA does find its way around the obstacles and showcases OMEGA's replication potential, this could well be the beginning of a whole new chapter in algal biofuels. And a one that does not eat into water meant for agricultural consumption.

Reference: <http://industry.bnet.com/energy/10001262/nasa-takes-a-crack-at-algal-biofuel/>

Image Source: <http://www.goodcleantech.com/>

USDA Launches Phase One of Cellulosic Ethanol Program

The US Department of Agriculture (USDA) recently announced federal incentives payment schemes for farmers and land owners of the country to promote harvesting, collection, storage and delivery of renewable biomass to biomass refineries.

The incentives are part of USDA's Biomass Crop Assistance Programme (BCAP). The program covers biomass such as corn stalks, corncobs and wood chips.

The financial assistance will be to the tune of up to \$45 (€32) per tonne of biomass for ensuring proper harvesting, storage and hauling of biomass materials

to facilities that produce heat, power, bio based products or biofuels such as cellulosic ethanol.

The idea is to introduce an incentive mechanism for the farming community to be a part of the growing cellulosic ethanol program in the country. Wood chips and corn stalks, previously considered to be of little value, will now power the production of second generation biofuels in the United States.

Reference: http://www.biofuels-news.com/industry_news.php?item_id=956

First Ever Biodiesel Trans-Continental Jet Flight



The BioJet in full flight

You've heard of commercial airlines go the biofuels way. Virgin Atlantic did it. So did Air New Zealand and JAL. Boeing and Airbus both endorse the shift.

But one seems to overlook the fact that theirs were "test flights" – meaning minute quantities of biofuel over very short distances. Virgin's for instance lasted only an hour and 20 minutes with only 20% of one engine's power coming from the alternative.

Not so however for a rather significant flight that took place November last year.

Green Flight International, a pioneer in the adoption of biofuels into aviation, successfully conducted the first ever 100% biodiesel powered transcontinental flight across the United States. The aircraft used for the event was an old Czechoslovakian L-29 military aircraft that flew 2,486 miles from Reno, Nevada to Leesburg, Florida in just over 11 hours.

The flight was powered by 100% biodiesel for over 70% of the flight time (a distance of 1,776 miles), while it flew the rest on a 50:50 blend of biodiesel and standard jet fuel, only to compare performance data and demonstrate the capability of blending biofuels with existing jet fuel supplies. The flight altitude ranged between 13,000 and 17,000 feet.

If that doesn't sound ground-breaking enough,

consider this: The Federal Aviation Administration (FAA), the apex body that oversees aviation in the United States, was so impressed by the demonstration that it has already expressed an interest in using Green Flight International's biofuels test program as a template to assess future generations of aviation fuels. That means algal biofuels in particular will receive specialized attention in the months to come.

And as you contemplate the future of biofuels in aviation, Green Flight International is in the works for another record breaking "biofueled" flight. Watch this space for more updates.



Proud pilots— Chief pilot Carol Sugars and GFI Chief Douglas Rodante

Reference: <http://www.greenflightinternational.com/pr.htm>
Image Source: <http://www.greenflightinternational.com/>

Student Transportation of Canada Grows “Green” School Bus Fleet

Keeping its sync with the rest of the automotive sector, School Transportation of Canada (STC) has announced the expansion of its fleet of “green school buses” to more than 900 biofuel powered vehicles. The fleet will be operational within the city of Ontario, Canada.

The expansion marks a remarkable seven fold increase in STC’s fleet size and a multi-fold decrease in its carbon footprint. According to Chris Harwood, Senior Vice President of Operations, the strategy “increases long-term benefits to the environment and Ontario communities”.

Harwood reasons that “Cleaner biofuels along with the adoption of anti-idling policies and excellent driver training has greatly reduced our children’s exposure to diesel particulates.”

STC is also reported to have profited from the reduced



Canadian school buses turn environment friendly

maintenance cost for its spanking new fleet as it claims that using biofuels leads to lower wear and tear for the fleet’s engines.

Reference: <http://www.newswire.ca/en/releases/archive/July2009/07/c4350.html>

Image Source: <http://www.coloradofleetsolutions.com/>

Seattle Halts Soy-based Biodiesel Purchase, Looks for Greener Fuel

In an interesting twist however, just across the border, the city of Seattle has temporarily suspended the purchase of soy-based biodiesel for its fleet of fire engines and pick-up trucks. Concerns have been cited about the apparent green quotient of the fuel when it comes to GHG emissions and its overall environmental impact.



Waste grease from food production could be much greener than soy-based biodiesel

The development comes in response to an EPA report that criticizes the environmental impact of corn and soy for biodiesel production.

But Brenda Bauer, Director of Seattle’s Fleets and Facilities Department said the city is exploring the option of using waste grease – generated from food production – to substitute Seattle’s fuel consumption.

She said the department was “looking for a fuel source that had good greenhouse gas profile”, and that ultimately it was not going to be petroleum.

“Using locally produced waste grease-biodiesel could be more environmentally friendly than other options”, she added. “It’s definitely something that would otherwise go in a landfill”.

Reference: http://www.seattlepi.com/local/407384_fuel19.html

Image Source: <http://www.roadtransport.com/>

Biofuels could be the future for London Buses and Cabs

And across the pond, London's flamboyant mayor Boris Johnson recently announced a progressive new scheme that converts tonnes of waste food into fuel for the city's buses and taxis.

The plan is named the "Foodwaste to Fuel plan" and the idea is to ensure that the three million tonnes of organic waste generated by London's restaurants, hotels and food producers each year do not end up into



A thing of the past

incinerators and landfills, but are instead converted into biogas by anaerobic digestion. The city has earmarked a healthy £31 million to see the scheme off to a good start.

And a good start it is. The plan has already garnered commercial support with big names like Sainsbury Supermarkets and Heathrow Airport signing up as key partners. The plan will be supervised by London's Waste and Recycling Board.

As Mayor Johnson points out, "Whilst we can all take steps to throw less food away in the first place, it is extraordinary that we are losing this resource by simply chucking it out." And Johnson is bullish. If all goes to plan, London will get five new biofuel plants up and running before the Summer Olympics in 2012.

An ambitious plan that, but let's hope it does fare well. There's enough talk of "Food vs. Fuel" already. "Food for Fuel" would be a rather welcome change.

Reference: <http://www.jamblemag.com/blog/374-bio-fuel-could-be-the-future-for-london-buses.html>

Image Source: <http://www.tunbridgewells.gov.uk/>

EPA Publishes RFS 2, Extends Feedback Period

The US Environment Protection Agency (EPA) released its much awaited Second Stage of Renewable Fuel Standard (RFS2) with aims of strengthening the country's progress towards alternative fuels.

The proposed rule comes in response to the mandates outlined by the Energy Independence and Security Act (EISA). First laid out in 2005, EISA has since reassessed its targets and now expects the use of 36 billion barrels of renewable fuel in the US by 2020 – up from its initial target of 7.5 billion gallons by 2012.

The RFS2 effectively lays down a nationwide strategy to realize EISA's targets. It now identifies four unique categories of alternative fuel with each getting its very own set of standards and mandates.

Each fuel must now meet stringent carbon emission thresholds. RFS2 will also ensure that the fuel is manufactured only from feedstock that answers to EPA's definition of renewable biomass.

Anticipating a deluge of feedback, EPA had sanctioned a 60-day comment period to allow suggestions, reservations and objections to be sent in before the



Carbon heavy gasoline is steadily losing ground with EPA coming down hard on vehicular emissions

rule was finalized. Initially open till July 27, the period has now been extended to September 25. So far the agency has received in excess of 1,200 comments.

To access more information on RFS2, visit: www.epa.gov/otaq/renewablefuels/index.htm

References: http://ethanolproducer.com/article.jsp?article_id=5824

http://ethanolproducer.com/article.jsp?article_id=5796

Image Source: <http://img.timeinc.net/>

Upcoming International Conferences

2nd Algae Biofuel Summit 2009

September 8-10, 2009

New Delhi, India

Organizer: Growdiesel Climate Care Council

Venue: National Agriculture Science
Complex, New Delhi, India

For further information contact:

info@growdieselevents.com

info@algaebiofuelsummit.com

<http://www.algaebiofuelsummit.com/>

From Crude Oil to Biofuels – Trends Impacting Global Fuels

September 9-10, 2009

Rio de Janeiro, Brazil

Organizer: Hart Energy Conferences

Venue: Hotel Sofitel
Copacabana, Rio de Janeiro, Brazil

For further information contact:

lcarter@hartenergy.com

gpieper@hartenergy.com

<http://www.informz.net/>

Biofuel Supply Chain Summit 2009

September 15-16, 2009

Ghent, Belgium

Organizer: VIBevents

Venue: International Convention Center
Ghent, Belgium

For further information contact:

melissafuentes@spgmedia.com

<http://www.vibenergy-events.com/biofuels/register.htm>

Next Generation Biofuels Markets

September 28-30, 2009

Amsterdam, The Netherlands

Organizer: Green Power Conferences

Venue: NH Grand Hotel Krasnapolsky
Amsterdam, The Netherlands

For further information contact:

info@greenpowerconferences.com

<http://www2.greenpowerconferences.co.uk/>

Algae Biomass Summit

October 7-9, 2009

San Diego, California

Organizer: Algal Biomass Organization

Venue: Marriot San Diego Hotel & Marina
San Diego, California, USA

For further information contact:

info@algalbiomass.org

<http://www.algalbiomass.org/events/>

European Biofuels Expo and Conference 2009

October 8-10, 2009

Stoneleigh Park, Warwickshire, United Kingdom

Organizer: Renewable Energy Association

Venue: Stoneleigh Park
Warwickshire, UK

For further information contact:

<http://www.ebec.co.uk/>

http://www.ebec.co.uk/conference_registration.php

Biofuels 2009, 4th Annual Meeting

October 27-29, 2009

Budapest, Hungary

Organizer: World Refining Association

Venue: Hilton Budapest WestEnd
Budapest, Hungary

For further information contact:

g.favaron@theenergyexchange.co.uk

<http://www.wraconferences.com/>

7th Annual National Biodiesel Conference & Expo

February 7-10, 2010

Grapevine, USA

Organizer: National Biodiesel Board

Venue: Gaylord Texan
Grapevine, Texas, USA

For further information contact:

nbb@kinsleymeetings.com

<http://www.biodieselconference.org/>

7th International Biofuels Conference

Converting Vision into an Action Plan

February 11-12, 2010; Hotel Le Meridien, Janpath, New Delhi

The Conference

Winrock International India is organizing the **7th International Biofuels Conference on February 11-12, 2009 at Hotel Le Meridien, New Delhi**, in partnership with Indian Oil Corporation Ltd. The conference will have presentations by key policy makers, industry leaders and other important stakeholders from India and will bring together specialists from across the globe, who, through their deliberations, will attempt to address the concerns related to biofuels and will assist in charting a plan for the future application of this renewable energy.

Themes the Conference will address

- International Policy Experiences
- Feedstock Management, Issues and Concerns
- Bio-crops and food security
- Next Generation Biofuels
- Biofuels and Rural Development: Opportunities and Threats
- Sustainability issues
- Biofuels and the Transport sector

Registration Fee

The registration fee for the conference are

	INR	USD
For payments made by Oct 15, 2009	6,300	225
For payments made after Oct 15, 2009	7,000	250

Special discount for student participants

Students can avail of a special registration fee of INR 1,000. To qualify for this, students must submit a copy of the valid student ID card. The original ID card should be shown during registration at the Conference.

Payment for registration can be done through cheque / demand draft in favour of Winrock International India, payable at New Delhi. You can also register online at www.winrockindia.org.

For additional information on sponsorship, advertisements and participation please contact:

Mr Arvind Reddy, Conference Convenor

Winrock International India, 788 Udyog Vihar – Phase V, Gurgaon – 122 001, India

Tel: 91-124-430 3868; Fax: 91-124-430 3862; Email: arvind@winrockindia.org

Call for papers

Original and innovative papers in English are invited on topics related to the themes mentioned. Selection of papers will be based on the originality of the information, its innovativeness and relevance to the themes. Selected papers will be published in the Conference Proceedings.

Deadlines:

- September 15, 2009 : Submission of abstracts
- October 15, 2009 : Notification of acceptance
- November 30, 2009 : Submission of full papers
- January 05, 2010 : Submission of presentations

Abstract Format: Abstract length should not be more than 250 words.

Please send in your abstracts to Ms Monalisa Sen
Email: monalisa@winrockindia.org

Register before
October 15, 2009
to avail 10% early
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