Bioenergy BUSINESS
Markets and finance for biomass and biofuels
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NEWS

FEATURES

DATA

BioFields plans $850m Mexican project to make ethanol directly from algae

Mexican firm BioFields is to build an $850m plant using technology developed by Algenol of the US to produce ethanol directly from algae.

The project will involve building a modular plant with an eventual production capacity of 1bn gallons (3.8bn litres)/year, starting with an initial annual capacity of 100m gallons followed by three 300m gallon stages, said Algenol. Ethanol should begin flowing commercially next year.

"The ethanol will be at least $1/gallon [$0.26/litre] cheaper than alternatives," said US-based Algenol, which declined to give more details.

As the process involves algae consuming the greenhouse gas carbon dioxide (CO_2), the company said that it expected a large eventual income from the sale of carbon credits: "We think it's going to be major."

Algenol would not confirm a report that BioFields has paid $100m to license the Algenol technology, for use by its subsidiary Sonora Fields.

Most attempts to use algae as a biofuel feedstock involve squeezing oil from algae and turning it into biodiesel. Algenol says that it has "enhanced" algae to boost the normally small amounts of ethanol produced naturally by the organisms. Unmodified algae would be killed by the high levels of ethanol, said the company.

It claims that its algae can produce ethanol at the annual rate of 6,000 gallons/acre (14,820 litres/hectare), which is much greater than the ethanol production from crops such as maize (340–360 gallons/acre) and sugar cane (870 gallons/acre). "We anticipate achieving 10,000 gallons/acre/year by the end of 2008," it said.

The Algenol system involves mixing algae with nutrient yeast, typically yeasts used in making bread or beer, in closed bioreactors and feeding the mixture CO_2 and salt water, with the system producing clean water. The algae have a 28-day life, it said, and then can be used in fertilisers.

The 40,000 hectare Mexican project will use CO_2 stripped from natural gas at an adjacent natural gas plant. Each 60–70 gallons of ethanol requires one tonne of CO_2, said Algenol.

It said that its process produces eight units of energy for each energy unit required for production, far more than ethanol made from maize but in line with the net energy balance for some ethanol made from sugar cane, although the latter requires more land than the Algenol system, said the company.

Maryland-based Algenol does not plan to build ethanol plants itself, but to set up projects similar to that with BioFields.

Borer threatens sugar cane in Brazil

A new pest is spreading alarm among Brazil's sugar cane producers and ethanol firms and could cause losses of up to R$400m ($250m) just in São Paulo state, according to the sugar cane technology organisation Centro de Tecnologia Canavieira (CTC).

Until this year, the giant cane borer (*Telchin licus*) was a problem just in Brazil's north-eastern cane fields, which account for 14% of Brazilian production of sugar cane, much of which is turned into ethanol.

Now the worm, which eats the inner part of the plant, has become a menace to São Paulo, which produces 60% of Brazil's sugar cane.

In July 2007, a team from CTC found the insect larva for the first time in an area of about 1,400 hectares at Limeira, 150km from the state's capital São Paulo.

Although the giant cane borer has been known in the north-east since 1927, it has not been possible to develop an efficient control tool. There is no chemical insecticide that kill the worm, because it stays below the ground inside the roots. Biological controls such as wasps, which are used by farmers to control other kinds of borers, do not have any effect.

As Tadeu Andrade, research and development director of CTC explains, north-eastern cane growers "learn to live with this pest". There, growers pay workers to find borers manually, paying by the worm; an approach now being used in São Paulo.

CTC is studying the biological cycle of *Telchin licus* to develop controls. Andrade highlights two concerns. First, the insect affects every kind of cane planted. Second, the life cycle is long and it is difficult to identify the worm at an early stage.

Andrade said: "For now there is nothing to do besides keeping your eyes open at the plantations."

« **THE REASONS FOR THE CRISIS** are many and cannot be solely ascribed, as some do, to a simple trade-off between biofuels and agriculture. »

Ban K-moon, UN Secretary General

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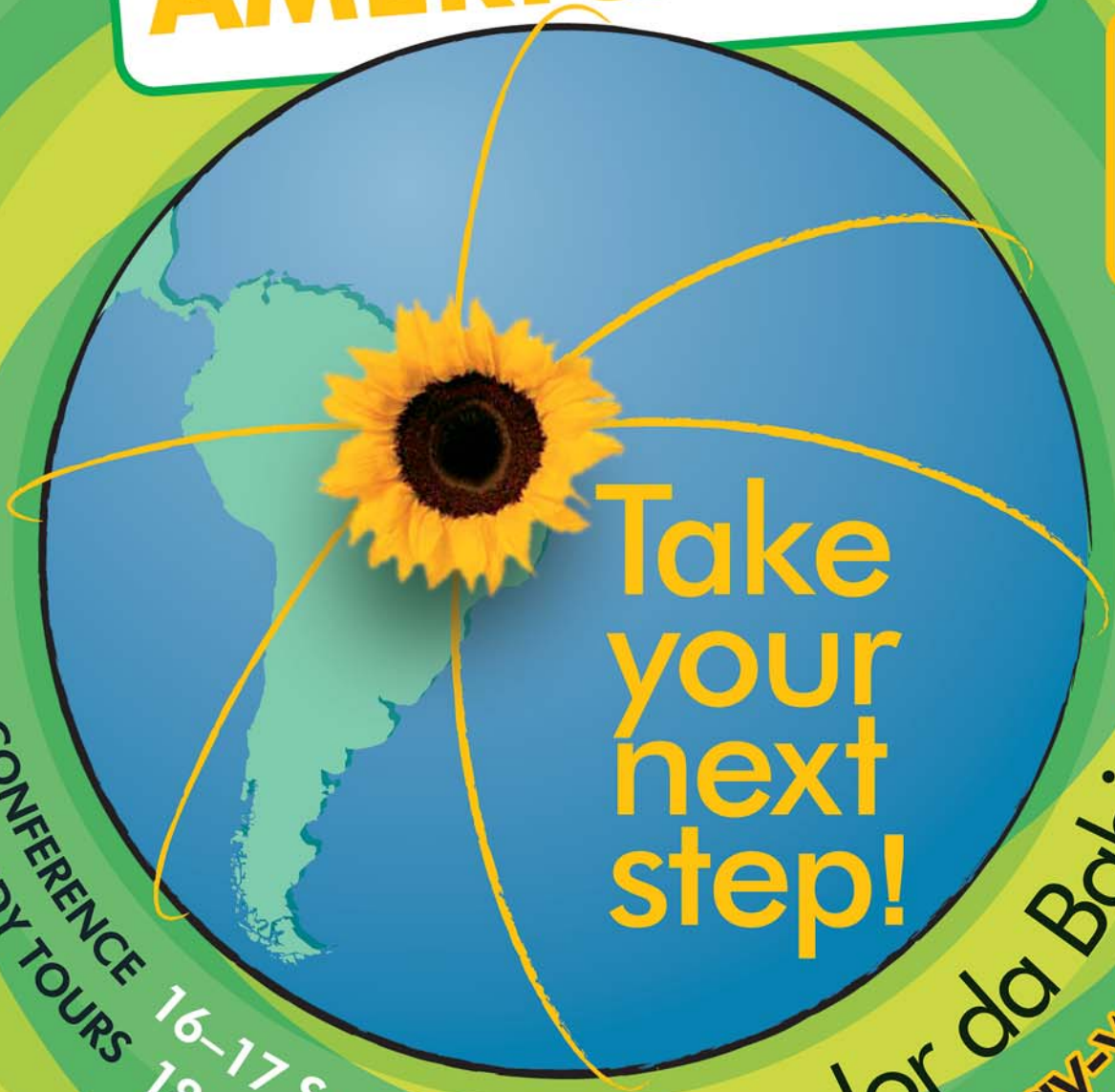

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Growth in European consumption of biofuels slows, says report

Biofuel consumption continued to increase in the European Union (EU) last year, but more slowly than seen in the year before, according to the latest figures from the European Commission-supported EurObserv'ER.

In energy terms (tonnes of oil equivalent or toe), biofuel consumption increased by 37.4% in 2007 (+2.1m toe) compared with an 86.9% increase (+2.6m toe) the previous year.

Total biodiesel consumption in the EU increased from 4.1m toe in 2006 to 5.8m toe in 2007 (+41.7%). Ethanol consumption, whether mixed with petrol or transformed into the fuel additive ETBE, increased by 33.8% from 0.9m toe to 1.2m toe.

EurObserv'ER said that growth was slowed by factors such as cheap imports from the US and higher domestic taxes, while ethanol profit margins have been cut by higher prices for cereals used as feedstocks and cheap imports from countries such as Brazil, South Africa and the Ukraine.

Last year, Germany remained the leading European market for biofuels for transportation, with its sales of more than 4m toe accounting for more than half of EU biofuels consumption.

According to Germany's ministry of the environment, the country consumed nearly 3m toe of biodiesel (3.3m tonnes), more than 0.25m toe of vegetable oil (752,207t) and more than 290,000 toe of ethanol (459,710t), said EurObserv'ER.

German consumption increased by 15.2% (in equivalent energy) in 2007, but biodiesel consumption increased by 16.8% while ethanol consumption decreased by 3.8%. The changes reflected the factors affecting much of the biofuels sector around Europe, including the bigger market for biodiesel than for ethanol and by the large price rises for the cereals used as ethanol feedstock.

Estimated transportation biofuels consumption in largest markets in European Union in 2007 (tonnes oil equivalent)

	Ethanol	Biodiesel	Other*	Total
Germany	293,078	2,957,463	752,207	4,002,748
France	272,937	1,161,277	0	1,434,215
Austria	21,883	367,140	0	389,023
Spain	112,640	260,580	0	373,220
UK	78,030	270,660	0	348,690
Sweden	181,649	99,602	na	281,251
Portugal	0	158.853	0	158,853
Italy	0	139,350	0	139,350
Bulgaria	66,160	46,336	0	112,496
Poland	85,200	15,480	0	100,680

** vegetable oil and biogas; na = not available. Source: EurObserv'ER 2008*

European Commission may act against biodiesel from US

The European Union (EU) has launched anti-subsidy and anti-dumping investigations into imports of biodiesel from the US following two complaints by the European Biodiesel Board (EBB) trade association (see *Bioenergy Business* May 2008, page 4).

The EBB claims that the EU biodiesel industry has been damaged unfairly by imports from the US, where biodiesel produced in that country or elsewhere can be blended with just a drop of mineral diesel (to form B99 fuel) to receive a $1/gallon ($0.26/litre) blending subsidy, before being shipped to the EU where it undercuts biodiesel produced there. The US subsidy amounts to $264/m^3 ($300/t or €200/t), said the EBB.

"For more than one year, B99 blends have been sold in the European market as 'pure biodiesel' and at a substantial discount (over €120–180/t), in some cases at a lower price than the raw materials purchased by the EU industry for producing biodiesel," it added. Imports of biodiesel from the US increased from about 7,000t in 2005 to about 1m tonnes in 2007.

The EBB called for countervailing measures "in a reasonable timeframe. In the absence of such measures, the situation of the EU biodiesel industry would become even more critical than it is at present".

However, the organisation's US equivalent, the National Biodiesel Board (NBB), rejected the EBB claims. Manning Feraci, the vice-president of federal affairs, said: "The allegations of harm levelled by the European biodiesel industry in these trade complaints are baseless."

He said that the European biodiesel industry is not being harmed by US competition: "High feedstock costs, changes to EU member policies – and in some cases – poor business practices are the true issues facing European biodiesel producers."

The NBB said that it might launch its own trade complaint against the EU's "trade barriers that provide preferential treatment to European biodiesel producers".

The Commission will present its provisional findings for approval by EU member states by 13 March next year.

Suncor to double capacity at Ontario ethanol plant

Suncor Energy is investing C$120m ($118m) to double the ethanol production capacity of its St Clair facility in Ontario.

The plant is already the largest in Canada, at 200m litres/year, and the investment will boost the capacity to 400m litres/year. It uses maize as the feedstock, 75–80% of which is sourced from the province of Ontario, said spokesman Jason Vaillant.

He said that the firm was close to awarding the contract to build the expansion, which is scheduled to be commissioned in late 2009.

Most of the ethanol produced at the site is blended with petrol and sold through Suncor's network of 300 filling stations. The expansion of the facility will mean some ethanol could be sold to other retailers, Vaillant said. Ontario has mandated that gasoline must contain 5% ethanol, rising to 10% in 2010.

Meanwhile, Suncor is also planning a commercial facility in Colorado for producing cellulosic ethanol and other products from wood residues. It has partnered with Lignol Energy, a Vancouver-based firm that has the rights to a production technology originally developed by engineering group GE, and others.

In January, the US Department of Energy offered $30m to towards the project, which will use a solvent-based pre-treatment to turn hard and soft wood residues into ethanol and other products (see *Bioenergy Business* February 2008, page 13).

Cosan unveils Uniduto export pipeline details

Brazilian partners have costed a 400km ethanol export pipeline they plan to build at R$1.6bn ($1bn), according to one of the partners, sugar and ethanol company Cosan.

The Uniduto pipeline, being promoted by sugar and ethanol firms Cosan, Copersucar and Crystalsev, will run from Ribeirão Preto to Santos, Brazil's biggest port. It is scheduled to begin operating in 2012 and carry up to 14bn litres/year of ethanol, said Cosan vice-president Paulo Diniz.

The three partners are investing R$60m in the project design. There are four other ethanol pipeline projects in Brazil; two by the state-owned oil company Petrobras, one by ethanol company Brenco and another by Paraná state ethanol producers.

Neste builds further €670m of renewable biodiesel capacity

Finnish company Neste Oil is to spend €670m ($1bn) building a plant at the Dutch port of Rotterdam to produce up to 800,000t/year of its renewable diesel NExBTL from vegetable oils and animal fats from 2011.

The company is already building a €550m, 800,000t/year NExBTL plant in Singapore, with much of the output expected to be exported to Europe after production begins at the end of 2010. It has an existing plant in Porvoo, Finland producing up to 170,000t/year of the fuel from a mix of palm oil, rapeseed oil and animal fat and expects to complete a same-sized second unit alongside next year.

NExBTL processes oils and fats into synthetic diesel. Neste claims that the fuel outperforms conventional biodiesels and "offers 40–60% lower greenhouse gas emissions over its entire lifecycle compared to conventional fossil diesel. NExBTL also reduces tailpipe emissions and contributes to better air quality." (see *Bioenergy Business* March 2008, page 14).

By 2020, Neste aims to be using only non-food raw materials for renewable fuel production and has a related research and development programme with more than 20 universities and research institutions, including work on non-food vegetable oil, wood-based materials and algae.

Construction of the Rotterdam plant will begin immediately, using, as on the Singapore project, Technip of Italy as main contractor. Air Liquide will supply hydrogen for operation of the plant.

"Rotterdam is Europe's largest centre of petroleum products and chemicals production and offers a wide range of dedicated services, as well as port facilities – all of which makes Rotterdam an ideal location for a NExBTL plant," said Neste's chief executive Risto Rinne.

"Commercial-scale" algae-based biofuels plant planned for Israel

A US and an Israeli firm are collaborating to build a 4m litres/year biofuels plant in Israel that uses algae as its feedstock.

The plant will use oil-rich algae strains developed by Tel Aviv-based Seambiotic, which has developed a process that uses the flue gas from Israeli Electric Corporation's coal-fired power station near Ashkelon, Israel, to cultivate algae in open ponds.

The algae will be converted into ethanol and biodiesel using a process and plant developed by Inventure Chemical, a firm based in Seattle, Washington. Chief executive Mark Tegan said the pilot facility, located close to Seambiotic's ponds at the Ashkelon power plant, is expected to cost about $1.25m and should be running in the first half of 2009.

Seambiotic will also invest $10m to create a 5 hectare algae pond, producing 1t/day of dry algae, according to Ami Ben-Amotz, the firm's chief adviser. Seambiotic's pilot facility currently produces about 20kg/day.

Inventure has already built a batch processing plant in Seattle capable of producing up to 200,000 litres/year of biofuels. The Israeli plant "will be [our] second plant and the first continuous algae-to-fuel processing facility in the world making what might be considered commercial quantities", Tegan said.

The two firms have been working together since 2006. "Seambiotic is one of a very limited number of credible producers of algae that are producing algae and not just press releases," Tegan noted.

Inventure is in the final stages of closing its second round of private financing, in which it expects to raise around $7.5m.

Association set up for algae interests

Businesses, academics and scientists in the US have set up the Algal Biomass Organisation (ABO) to boost the development of algae as a biomass for conversion into fuels.

The non-profit ABO's steering committee includes representatives of the aircraft maker Boeing and the A2BE Carbon Capture company.

"Boeing recognises that algae biomass holds tremendous potential for use as jet fuel and it fits into our plan to guide aviation toward commercially viable and sustainable fuel sources – fuels with substantially smaller greenhouse gas footprints that do not compete with food or require unacceptable quantities of land and fresh water resources," said Billy Glover, Boeing Commercial Airplanes' managing director for environmental strategy and co-chair of the ABO steering committee.

The formation of the ABO follows the interest shown in the area by the 400 people who attended a biomass algae conference last November, said the organisation. It will hold a follow-up annual conference in Seattle on 23–24 October.

"As one of the fastest-growing and most productive plants in the world, the unique characteristics of algae enable them to be developed for a number of uses," said the ABO.

Algae do not require fresh water to thrive and can be used to clean wastewater and to absorb greenhouse gases such as carbon dioxide, nitrogen oxides and sulphur dioxide, said the ABO.

The organisation's website is www.algalbiomass.org.

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Biofuels escape censure at UN food crisis summit

This month's United Nations (UN) food summit in Rome produced little of substance on biofuels, despite concerns worldwide that the growing production of biofuels may be taking food from the mouths of the poor.

Disagreements over the links between biofuels and food resulted in little more on the topic than the conclusion that "in-depth studies are necessary to ensure that production and use of biofuels is sustainable".

The final document from Rome added: "We are further convinced of the desirability of exchanging experiences on biofuels technologies, norms and regulations."

In response, leaders of biofuel trade associations in Europe and North America "welcomed the thoughtful approach world leaders took in assessing biofuels' role in the current world food crisis".

The Canadian Renewable Fuels Association, the European Bioethanol Fuel Association and the Renewable Fuels Association, which speaks for the US ethanol sector, said: "Faced with record high oil prices and a variety of other challenges to the ready and equitable supply of food to all peoples, it is now time to move toward sustainable solutions."

The three cited a claim by Henrietta Fore, administrator of the US Agency for International Development, that the costs of transportation now consume half of its food budget.

"The growing recognition that increased use of biofuels is helping world economies address the dire impacts of record oil prices by reducing oil consumption [by more than] 1m barrels of oil a day and by lessening global warming emissions is also welcome," added the associations.

Mariann Fischer Boel, agriculture and rural development commissioner in the European Commission, the executive arm of the European Union (EU), said sustainability criteria are "a key feature of the Commission's proposal for a Renewable Energy Directive, covering greenhouse gas, biodiversity and land-use impacts.

US utility taps $450m solar–biomass power plants

Pacific Gas and Electric (PG&E) is to buy the output from two solar thermal–biomass hybrid power plants, under development at a cost of $450m.

The California-based utility will buy a total of 700GWh/year for 20 years from two 53.4MW plants being built by San Joaquin Solar, 80%-owned by Portugal-based Martifer Renewables Electricity and 20% by Clean Energy Ventures of California.

Located near Coalinga, California, the plants will combine Luz solar thermal trough technology and biomass to power steam turbines to produce electricity.

The plants – due to begin operating in 2011 – will each use 250,000 tons (227,000t) of biomass annually, in the form of locally-produced agricultural waste, green wastes and livestock manure.

The parties did not disclose the terms of the transaction, although a PG&E spokeswoman confirmed that the utility will be buying the full net output from the plants.

"This is the first such solar thermal–biofuel hybrid project PG&E has entered into and the only one we are aware of," said the spokeswoman.

The power purchases are part of PG&E's efforts – mandated by California law – to source 20% of its electricity from renewables by 2010. The company has entered into contracts for 2,500MW of renewable power since 2002, it said, and expects to hit 14% in 2008.

Germany's CropEnergies buys Ryssen of France

German ethanol producer CropEnergies is to take over French alcohol producer Ryssen Alcools for an undisclosed sum, to give it another 100,000m^3/year of ethanol capacity.

Ryssen dries raw alcohol for the fuel sector and last year increased its drying capacity from 30,000m^3/year to 100,000m^3/year. Ryssen also purifies up to 80,000m^3/year of raw alcohol for the drinks, chemicals, cosmetics and other markets.

CropEnergies is expanding its existing ethanol production capacity from 260,000m^3/year to 360,000m^3/year at Zeitz in Germany and expects to commission a 300,000m^3/year plant at Wanze in Belgium by the end of the year.

Both CropEnergies and Ryssen are owned by German group Südzucker, which claims to be Europe's biggest sugar producer, with a 24% share of the European Union's sugar quota. The ownership of Ryssen is through Südzucker's Saint Louis Sucre subsidiary.

CropEnergies has long intended to take over Ryssen, for which it is paying the market rate of "less than half the annual revenue" of the company, which was €60m ($93m) in the year to the end of February.

CropEnergies already has a French subsidiary with a 20,000m^3 storage tank farm, near Ryssen in the port of Dunkirk.

In the year to the end of February, the German firm's revenue increased by 27% to €186.8m from the year before, and net profit by 80.4% to €20.2m from €11.2m.

EVENTS

28–30 AUG Forest Bioenergy Fuel Supply Chains 2008
Venue: Jyväskylä, Finland
Organiser: Finnish Bioindustries
E-mail: bioenergy@finbio.fi
Website: www.bioforest.finbioenergy.fi

15–17 SEPT Cleantech Forum XVIII
Venue: Washington DC, US
Organiser: Cleantech Network
Tel: +1 810 224 4310
Fax: +1 810 355 3024
E-mail: eventadmin@cleantech.com
Website: www.cleantech.com

17–19 SEPT Algae Biofuel Summit 2008
Venue: Delhi, India
Organiser: Growdiesel Climate Care Council
Tel: +91 11 65803335
Fax: +91 11 42404335
E-mail: algaebiofuelsummit2008@gmail.com
Website: www.astaxanthin.in

18–19 SEPT Biofuels: Maritime Trade & Transport
Venue: London, UK
Organiser: Navigate Conferences
Tel: +44 20 7369 1650/6
Fax: +44 20 7369 1684
E-mail: cholt@navigatepr.com
Website: www.navigatepr.com

18–20 SEPT Driving Sustainability 2008
Venue: Reykjavik, Iceland
Organiser: FTO Sustainable Solutions
Tel: +354 577 3200
Fax: +354 540 1601
E-mail: info@driving.is
Website: http://driving.is

23–24 SEPT BiomassWorld 2008
Venue: Beijing, China
Organiser: Centre for Management Technology
Tel: +65 6345 7322/6346 9132
Fax: +65 6345 5928
E-mail: cynthia@cmtsp.com.sg

27–29 OCT Global Biogas Congress
Venue: Brussels, Belgium
Organiser: Agra Conferences
Tel: +44 20 7017 7499
Fax: +44 20 7017 7596
E-mail: conferences@agra-net.com
Website: www.agra-net.com/biogas

28–30 OCT Biofuels 2008
Venue: Berlin, Germany
Organiser: World Refining Association
Tel: +44 20 7067 1800
E-mail: c.taylor@theenergyexchange.co.uk

3–6 NOV FO Licht's World Ethanol 2008
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IN BRIEF

SYNTHETIC DIESEL ON THE WAY

A company has been set up by Norwegian firms Norske, Viken, Allskog, Mjøsen and Statskog to build a prototype plant for the production of synthetic diesel from woody biomass, at Norske Skog Follum in Norway. The Xynergo company is expected to build a full-scale unit by 2015, following the opening of the prototype plant at the end of 2010. Such facilities could produce 15% of the annual Norwegian diesel consumption for road transportation, said Norske.

CASH FOR UK BIOMASS SUPPLY

Farmers, foresters and biomass producers in England can apply for up to £200,000 ($396,000) each under the government's new Bio-energy Infrastructure Scheme to support firms supplying biomass fuel for use in heat and electricity generation. The scheme does not cover wood from secondary processing, wood that has been chemically treated or painted, oilseed rape to be used to produce heat and electricity, biomass for processing into transport fuels or animal waste.

FIBREGEN RAISES £1.6M

Biomass-to-energy company FibreGen of the UK, formerly Libra Natural Resources, has raised £1.6m ($3.2m) before expenses by placing of 5.3m new ordinary £0.03 shares at £0.30 each. The board of the company also agreed to subscribe for an additional £100,000 worth of shares. Some of the money raised will go towards the $8m development costs of a planned wood pellet production plant on the same site as its US wood chip unit in Louisa County, Virginia. It is negotiating bonds for the remainder of the funding.

GASIFICATION FOR FRANCE

Gaz de France subsidiary Cofathe is to build a €30m ($47m) cogeneration plant at the Savoie site of French paper maker Cascades that will export its electricity to the national grid. The plant is expected to reduce the coated boxboard mill's carbon dioxide emissions by 7,500t/year after it opens in 2010. The plant is expected to be France's first wood gasification unit. Cascades has started up a new biomass-fuelled cogeneration plant costing €2m.

RAVEN SELLS CELLULOSIC FUEL

Raven Biofuels International has agreed to sell ethanol from a proposed cellulosic ethanol plant, in the US state of Washington, to marketing company Eco-Energy of Tennessee for 10 years. Eco already has over 1bn gallons/year of ethanol under contract in North America.

PETROTEC OPENS NEW CAPACITY

German biodiesel producer Petrotec has begun full production at a new 100,000t/year plant in the port of Emden. The new plant cost €23m ($72m). The company also has an 85,000t/year plant in Borken. Both plants make biodiesel from used cooking oil, using the company's own technology.

AMERICAS

ASTM biodiesel standards clear way for use of higher blends

The US biodiesel industry forecast greater acceptance of its fuel by vehicle makers and the public, following approval of three standards for biodiesel.

The standards organisation ASTM International approved the specifications after more than five years of research and balloting of ASTM fuel experts.

The three standards cover: a revised specification for 100% biodiesel or B100 (ASTM D6751); blends containing up to 5% biodiesel (B5) (ASTM D975); and a new specification for B6–B20 blends for on- and off- road diesel vehicles.

Some car makers have claimed that the lack of a specification for B20 was the main hurdle preventing their full-scale acceptance of B20 use in their vehicles, said the National Biodiesel Board (NBB), which represents the US biodiesel sector.

Most vehicle and engine manufacturers in the US have accepted at least B5, with some such as Caterpillar, Cummins and John Deere already accepting B20 or higher blends.

Steve Howell, chairman of the ASTM Biodiesel Task Force, said: "The new ASTM specifications for B6–B20 blends will aid engine manufacturers in their engine design and testing processes to optimise the performance of vehicles running on biodiesel. The new specifications will also help ensure that only the highest quality biodiesel blends are made available to consumers at the retail pump."

Vehicle maker Chrysler has worked with the ASTM task force on the B20 specification and has supported fleet use of B20 in its Dodge Ram diesel pickups since January 2006. Chrysler safety and regulatory spokesman Max Gates said: "This action by the ASTM committee is a milestone in our nation's effort to expand the role of renewable fuels, including biodiesel."

Fibrowatt chooses North Carolina site for $190m poultry litter-fuelled power plant

Fibrowatt has chosen a second site in North Carolina for a power plant fuelled by poultry litter and expects to pick a third site in the US state within about three months.

The second plant, designed to produce 40MW of electricity, will be built in Surry country near Elkin, in the west of North Carolina, and will cost $190m, said vice-president of environmental and public affairs Terry Walmsley. Construction will take two years. The funding has yet to be finalised.

Last month, Fibrowatt announced a plan to build a 55MW plant in Sampson County in the east of the state, at not much more than the cost of the 40MW plant, said Walmsley.

The Pennsylvania-based company is also evaluating sites in Moore, Montgomery and Stanly counties in central North Carolina for a third plant that will probably also be rated at 55MW. "It's out current expectation that the central plant will be like the eastern plant," said Walmsley.

He said that the state is a large chicken and turkey producer with about 5,000 sites. In 2005, according to latest figures cited by Fibrowatt, North Carolina was the third-largest poultry-growing state in the US, with the 40m turkeys, 2.5bn eggs and 735m chickens produced accounting for more than a third of its agricultural commodities sold.

"We see a market in North Carolina for three plants," said Walmsley. The company has been considering projects in the state for about two and a half years after being approached by the state, he said.

Poultry litter in the US is normally regarded as a low-nutrient fertiliser. Fibrowatt said that its plants will provide an alternative use and "should have a positive impact on the region's soil and water resources."

REG adds 35m gallons/year of biodiesel capacity

US company Renewable Energy Group (REG) is taking over a 35m gallons/year (132m litres/year) biodiesel plant and a fuel terminal in return for a cash investment by investment fund-owned US Biodiesel Group (USBG).

A month ago, REG took over management of a 45m gallons/year biodiesel plant under construction in Danville, Illinois, after providing a $21.7m convertible loan for the purchase of the plant by Blackhawk Biodiesel (see *Bioenergy Business* May 2008, page 6).

USBG is owned by US Renewables Group (USRG), a private equity fund focused on renewable power and fuels projects.

"USBG's 35m gallons/year biodiesel production facility near Houston, Texas and a liquid storage terminal location in California will offer REG access to strategic locations with deepwater, pipeline and rail accessibility," said REG chairman and chief executive Jeff Stroburg. "Integrating additional infrastructure into our production network will aid in REG's continued growth as we distribute high quality biodiesel through petroleum infrastructure nationwide."

REG had seven biodiesel production plants with a combined capacity of more than 220m gallons/year.

Wisconsin utility offers to offset emissions from co-firing plant

US utility Wisconsin Power & Light has offered further greenhouse gas reduction measures if its regulator approves a $1.2bn power plant that would burn biomass along with coal.

It offered to retire an old 76MW coal-fired power plant, add more wind power, increase energy efficiency by 50% and double the proportion of biomass it will burn at the new plant to 20% within five years. The moves would mean a net reduction in greenhouse gas emissions.

The company wants to build a 300MW unit fired by coal and biomass, such as switchgrass, waste wood and maize waste, at its Nelson Dewey coal-fired plant in Cassville, Wisconsin. If the Public Service Commission of Wisconsin approves, by its deadline of mid-December, the utility hopes to complete the $1.2bn power plant by 2013.

It would spend $500–600m on the other measures, including 200MW of wind power capacity in addition to a previously-announced 300MW by the end of 2010.

The wind turbines and biomass would let the company meet the state's Renewable Portfolio Standard, which requires 10% of the electricity produced by utilities to be from renewable sources by 2015.

The company expects to pay for the investments over up to seven years by increasing electricity tariffs by 5–6%/year.

Allegro sells biodiesel plant to management

US firm Allegro Biodiesel plans to sell its 12m gallons (45.4m litres)/year biodiesel refinery to a management-led team, after claiming that prices for soya bean feedstock made production unprofitable.

Consolidated Energy Holdings (CEH) will buy Allegro's subsidiary Vanguard Synfuels, which owns the refinery in Pollock in Louisiana, for $1,000 and assumption of $2.9m of senior secured debt and all employment agreements for employees of Allegro and Vanguard.

An Allegro escrow account containing $1.7m in cash and $1.1m in Allegro shares will be split between the parties.

CEH's founders include Darrell Dubroc and Tim Collins, who are currently directors of Allegro. Many CEH members sold their interests in Vanguard to Allegro in September 2006.

The parties will settle some claims Allegro has made against the escrow account, which was set up in September 2006 on Vanguard's takeover.

The proposed sale of Vanguard will release cash and shares to Allegro and the former members – $151,628 and 124,961 shares and $201,129 and 126,250 shares respectively. That will leave $1.3m in cash and 860,000 shares in escrow. If the parties have not settled the remaining claims by 15 July, there will be a binding arbitration by 30 September.

Allegro said that, after the sale, it will have no operations but will remain a publicly-traded company, with cash, a $1m equity investment in Community Power Corporation, a $250,000 note receivable from CPC and its remaining claims on the escrow account.

Coskata seeks further $50m for cellulosic work

Cellulosic ethanol developer Coskata plans to raise about $50m in a third round of equity financing.

The US company said that it began work on raising the finance a fortnight ago and that the round is likely to close in August or September.

In January, US car giant GM took an undisclosed stake in Coskata.

The developer aims to produce ethanol at less than $1/gallon ($0.26/litre) from a wide variety of feedstocks, including tyres and plant waste. That would make the fuel competitive with transportation fuel now made in the US from maize.

Coskata's process involves gasifying material, fermenting the synthetic gas into a liquid using proprietary micro-organisms and separating out the ethanol.

Coskata said about its latest fund-raising: "Coskata's Series C round will fund the remaining capital expenditures and all operating expenses for Coskata's commercial demonstration plant, along with other Coskata corporate expenses."

The company – founded in 2006 with venture capital backing from Khosla Ventures – plans to open a commercial demonstration plant in 2011. The plant will have capacity of 50–100m gallons/year (189–379m litres/year). It has already built a pilot plant.

Meanwhile, another US cellulosic ethanol project has been hit by the withdrawal of one of the developers. Alico, a Florida-based land management company, said: "Alico's management and board of directors determined that the risks associated therewith outweighed any reasonably anticipated benefits for Alico."

The company has been chosen by the US Department of Energy and by Florida for potential grants and loan assistance for the project and, over the past year, it has been working with New Planet Energy, which is continuing the work, said Alico.

Venture capital backs non-food biofuel sector, says Frost & Sullivan

The food v fuel issue is "a big concern" for biofuel investors and venture capitalists in particular are focusing on "second-generation" projects that will use non-food feedstocks, according to a study by Frost & Sullivan.

By 2012, current developments should make such ethanol production in North America profitable if ethanol sells for $2.50/gallon ($0.66/litre) – which is about the current US blending price. Plants will break-even at $2.10/gallon, said Frost & Sullivan analyst Shrikanth S.

"All the venture capital companies were confident that they would meet the challenges," he said about the difficulties associated with using materials such as wood, straw and algae as feedstocks. "Their thoughts are based on very strong fundamentals."

The India-based analyst expects that stock market flotations will produce large rewards for investors if biofuel technologies now under development prove a commercial success: "They will make a huge gain."

He said that asset management investors are concerned about the uncertainties in the North American biofuels sectors, related to factors including import tariffs, taxation and feedstock supplies and prices.

A reduction in US import tariffs on biofuels, perhaps implemented if the US enters a recession, could mean domestic producers facing cheap imports, "adding to the woes of the US industry".

Currently, high feedstock prices make investments in ethanol or biodiesel capacity uneconomic, he said. "Between September 2006 and February 2008, corn [maize] prices rose by 83.6% and soya bean oil prices increased by 135%."

That price volatility and the unpredictability of profit margins have made first-generation biofuels less attractive to market participants and investors, concludes Frost & Sullivan's *The North American Biofuels Market: Investment Analysis* report.

The market's revenue totalled $10bn in 2007 and should reach $18.5bn in 2012. By then, biofuels are expected to account for 15.2bn gallons (57.6bn litres) of the total transportation fuels used in the US, up from 9bn gallons this year.

Frost & Sullivan said that the North American biofuels market has an expected compound annual growth rate (CAGR) of 13.2% in 2007–12. The biodiesel segment, which was worth $1.1bn in 2007, has an expected CAGR of 29.3% and the ethanol sector a CAGR of 10.5%.

IN BRIEF

BIODIESEL PROJECT SCRAPPED

North Prairie Productions of the US has cancelled a 45m gallons/year (170m litres/year) biodiesel plant being built near Evansville, Wisconsin, claiming that high commodity prices would make the output unprofitable. Construction was stopped last November. North Prairie said that $30m was now needed to restart the project. It said that it would return about half of investors' equity in the next few months.

NOVA REPORTS $11.7M LOSS

US biodiesel company Nova Biosource Fuels unveiled an $11.7m net loss on revenue of $8.8m in the six months to the end of April. In the quarter to the end of April, the net loss was $6.4m on revenue of $6.9m There was no biodiesel revenue in the comparable periods last year, as sales began in late September 2007 with the acquisition of a refinery in Clinton, Iowa.

DAIRYLAND BUYS POWER

US utility Dairyland Power Co-operative has agreed to buy all of the output from a 40MW power plant, to be fuelled by waste wood, that a subsidiary of DTE Energy Services plans to open in Cassville, Wisconsin. Approval has been sought for the project, at an existing power plant, with electricity expected to flow on 1 June 2010.

DYNAMIC GETS BOND APPROVAL

The Louisiana State Bond Commission in the US has approved $100m of tax-free Gulf Opportunity Zone bonds to fund a synthetic fuels plant that Dynamic Fuels plans to build in Geismar, Louisiana. The bonds were introduced to help rebuild economies hit by hurricanes Katrina and Rita. Dynamic is a joint venture by technology firm Syntroleum and Tyson Foods to convert low-grade inedible fats and greases into fuel. The 75m gallons/year (283m litres/year) plant is expected to cost $150m.

PURE NOW GROWING JATROPHA

Peru-based Pure Biofuels said that it has established a jatropha nursery that will produce 360,000 plants within two months, before rising to 1m plants/month. It claimed that oil will be produced from the plants within a year for use as feedstock for a 52.5 gallons/year (98.9m litres/year) biodiesel refinery, at Callao Port near Lima. Pure expects full biodiesel production to begin within three months. By 2015, it said that 80% of its feedstock will be from its own jatropha plantation.

BIOMASS PLAN FOR BATTERSEA

A heat and power plant running on renewable fuels such as waste and biofuels could be built in the shell of the redundant power station in Battersea, central London under a £4bn ($7.9bn) redevelopment plan for the site, proposed by Real Estate Opportunities. The company said that it would spend £150m saving Sir Giles Gilbert Scott's 1930s power station.

EUROPE

RWE buys into process for turning biomass into coal replacement

The renewable energy arm of German utility RWE has taken a 25% stake in a Dutch firm that has developed a process for turning biomass into pellets that can be burned instead of coal in power stations.

RWE Innogy is funding the undisclosed cost of the stake in Topell, its first venture capital investment, from a €50m ($77.3m) budget that it has for spending this year on young technology companies.

Topell plans to open, next year in the Netherlands, its first commercial plant for production of its "biocoal" pellets. It uses torrefaction, or low-temperature pyrolysis, to turn organic materials into pellets.

RWE said that the process can handle "even comparatively difficult biomass", such as roots and switchgrass. "Compared with conventional wood pellets, biocoal pellets have a significantly higher energy density and better incineration properties."

Torrefaction, a process also used in roasting coffee beans, can produce material with properties similar to those of coal, easing its use as a fuel for co-firing with coal (see *Bioenergy Business* May 2008, page 11).

"The production process guarantees high flexibility with regard to the raw material used; it is therefore unnecessary to draw on foodstuffs," said RWE. "Biocoal is also easy to transport. For co-firing with conventional coal, no further infrastructure measures, eg separate storage or crushing, are required."

Fritz Vahrenholt, RWE Innogy chief executive, said: "We have secured access at a very early stage to a technology that effectively reduces carbon dioxide emissions in conventional power plants and the associated financial burdens. Once a successful test run of the first commercial plant has been completed, we therefore plan to expand production."

German biodiesel maker Gate faces restructuring

German biodiesel maker Gate looks set to have a new owner as a result of a planned restructuring of its Swiss majority owner Fortune Management.

Investment company Fortune said that Gate, of which it owns 65%, would be transferred to a trust in which bondholders and owners of other loan notes with a face value of €103m would take an interest.

The consultancy Alvarez & Marsal would then restructure Gate, which has a 220,000t/year biodiesel plant with a 500,000t/year seed crushing plant at Wittenberg and a 60,000t/year biodiesel plant at Halle.

In April, the Austrian firm Biodiesel Enns, in which Gate held a 51% stake, went into insolvency after running out of money (see *Bioenergy Business* April 2008, page 4).

All three plants have been running at about half of their capacity recently.

The proposed trust will also hold most of Fortune's wealth management operations, 40m common shares of Fortune, a €45m bond and €5m of preference shares.

Fortune has blamed its woes on the poor market for biodiesel in Germany in particular coupled with declines in financial markets.

In an extended weather metaphor, chief executive René Müller told shareholders: "In February the first drops of rain could be felt, although no clouds were visible just yet."

Several hedge funds controlled 35–40% of Fortune's shares."In a very short timeframe, about 40% of all [Fortune Management] shares were dumped into the market regardless of any consequences," said Müller. "The stock price dropped to a year-low of €0.35, representing a loss of 91.9%."

A US prospectus to raise about $250m was dropped because of "the expressed threats of the bondholders", said Müller.

Constraints hamper biomass energy in Europe, says study

The European biomass market has the potential to contribute significantly to meeting renewable energy targets, but must overcome significant barriers such as high capital costs, quality concerns and image problems, according to research firm Frost & Sullivan.

A report by the London-based company said: "Soaring oil prices, combined with the lack of secure supplies of oil and natural gas, have heightened the benefit of producing power locally.

"A balanced energy portfolio, with renewable, distributed generation coupled with the benefits of cogeneration [of heat and electricity], is essential for a healthy energy market in Europe. These trends will underline the case for biomass-based energy generation."

It says that 15–20% of combustion in some European countries, including Finland and Sweden, is from biomass, accounting for 5% of total energy use.

Frost & Sullivan ranked the top drivers of the biomass market in the next seven years as: first, security of supply, expected to have a high impact; second, environmental concerns and regulation, expected to have a high impact for four years then a medium impact; and, third, direct financial incentives, are expected to have a medium impact.

The report predicts that, in the next few years, cogeneration applications will attract the most investment.

Dalkia picks up 122MW of French combined heat and power projects

French energy company Dalkia is to build three biomass-fired combined heat and power (CHP) plants, with a total generation capacity of 122MW.

The projects were awarded under a French government scheme to back projects with a combined capacity of 300MW.

Dalkia said that, thanks to its expertise at procuring biomass fuel, especially waste wood, it "is strongly positioned to win biomass supply and plant operation and maintenance contracts for the other selected projects". It said that it runs nearly 150 heating plants, with a total generation capacity of 817MW, on up to 1m tonnes/year of biomass.

For the three CHP projects that it has been awarded, the company will build the plants, supply them with 830,000t/year of biomass fuel and operate them for 20 years.

The steam produced will be sold to industrial users and the electricity sold to the publicly-controlled utility Electricité de France (EDF). Dalkia is a joint subsidiary of Veolia Environnement and EDF.

The largest of the plants will be a 69MW unit at Facture, in the Gironde region. In Tavaux, near Dole in the French Alps, Dalkia will build a 30MW plant for chemical and plastics manufacturer Solvay at a cost of €67m ($104m). Also, as part of a project led by Champagne Céréales, a 22MW plant will power the agri-food factories of Chamtor and Cristanol in Champagne-Ardennes.

The Solvay plant, to be opened in 2010, will cut CO_2 emissions from the Tavaux site by 20% by producing 30MW of electricity and 30t/hour of steam. Half of the biomass will be from waste material and the rest will be lopped-off branches from forestry operations.

Court clears way for 350MW wood chip power plant in Wales

Prenergy Power is pressing ahead with its plan to build Europe's largest biomass power plant in the UK after the High Court rejected complaints from objectors that the plant would damage local air quality.

The £400m, 350MW plant, to be built in Port Talbot in Wales, received planning permission from the local authority in April 2007 and government approval in November 2007. Prenergy claims that it will be the largest single baseload renewable energy project in Europe. It is expected to consume around 2.5m tonnes of wood chips annually from domestic and overseas sources.

"We are satisfied with the outcome of the judicial review," said Prenergy in a statement. "We will now progress our plans to create this sustainable energy plant that will help Wales meet its renewable energy targets, as well as providing a substantial number of new jobs."

The objectors – Port Talbot Residents against Power Stations – had applied to the High Court in London for a judicial review of the Prenergy plant on the grounds that the town already regularly fails to meet European Union air quality health standards.

Special planning rules which should apply to areas of poor air quality were not applied in this case, they argued.

Prenergy countered that its modelling shows that the plant's impact on air quality will be insignificant.

The company, formerly known as Global Wood Holdings, is owned by a group of power and energy professionals, with about one-third of the equity owned by Italian venture capital company Clessidra Capital Partners.

EOP breaks out black ink for final quarter results

German company EOP Biodiesel is expected to break even in its fourth quarter to the end of June thanks to increased prices for biodiesel and stable raw material prices.

Earlier this month, the company revealed a 150% year-on-year increase in revenue in its third quarter to the end of March, to €26.7m ($41.8m) from €10.7m a year before. Its earnings before interest and taxation (Ebit) worsened to a €2.1m loss from a €1.7m loss.

However, stable costs for raw materials, including the rapeseed oil that it mainly uses as biodiesel feedstock, as well as rising biodiesel prices, helped to put the company in to the black in March and April.

"Should the current constellation of raw material and selling prices stay stable, we will break even in the fourth quarter of our financial year," said chief financial officer Karl-Wilhelm Giersberg.

In the nine months to the end of March, EOP's revenue totalled €67.7m compared with €29.7m a year before; a 128% increase. The Ebit was a loss of €4.3m compared with a €600,000 loss in the same period a year before. The previous year the company received investment grants, noted EOP.

The opening last month of a direct railway connection at EOP's Pritzwalk plant will cut transport costs significantly, it said, with turn-around speed also likely to be increased. "With the help of the direct railway connection we can now make full use of the 130,000t production capacity per annum in the coming financial year," said chief executive Sven Schön.

EOP has been trying to establish itself as a supplier of biodiesel to mineral oil firms for blending with mineral diesel to form B5 (5% biodiesel/95% diesel).

4Energy raises €22m in flotation

Belgian company 4Energy Invest raised €22m ($34.4m) in a flotation on the Euronext Brussels exchange, valuing the biomass power developer at €78.2m.

The company had hoped to raise up to €28.8m, €18–20m of which was earmarked for new projects.

A total of 3,872,000 shares, including 10% over-allotment, were allocated at €6.25 each, with 17.3% being sold to the public and the other 82.7% to institutional investors.

4Energy aims to develop embedded power generating plants fuelled by biomass. The company has spent €13.7m to nearly double the capacity of its €25m cogeneration site at Amel in Belgium. The original capacity was a net 7.6MW of electricity and 10MW of heat from a wood-fuelled installation and from a diesel engine-powered plant running on biofuel made from vegetable oils.

Nearby wood-working companies supply 40–45% of the waste wood fuel and buy back heat, with the electricity output sold into the grid. The company is also developing cogeneration projects in Ham, Belgium and in Pontrilas near Hereford in the UK.

In the first quarter of 2008, the company's revenue was €1.9m and earnings before interest and taxation €400,000.

IN BRIEF

PELLET DISTRIBUTOR GETS $4M

American Biomass, which distributes wood pellets and biomass fuels for residential heating in the US, has raised $4m of funding, led by the venture capital firm .406 Ventures. American Biomass was founded in 2006 and manages distribution networks across the US, linking more than 25 wood pellet manufactures and 50 carriers. It has consumer retail and wholesale internet sale sites. In March .406 raised $167m of capital.

GASIFICATION PAIR COLLABORATE

US engineering contractor Fagen and biomass gasification technology developer Frontline BioEnergy are to collaborate on marketing and building gasification systems. Frontline said that its process can convert a wide variety of plant matter, including wood residues and maize cobs, into a clean gas that can be used like natural gas. The two are targeting industrial firms such as ethanol producers, food processors and wood and paper mills.

NO FOOD EFFECT, SAYS US

The departments of agriculture and energy have told a US Senate committee that increased ethanol and biodiesel consumption accounted for only 4–5% of the total increase in retail food prices in the US in the first four months of this year. The all-food consumer price index increased by 4.8% over the period. The farm prices of commodities account for about a fifth of US retail food costs, said the departments.

FUEL CELL FIRM'S LOSS INCREASES

US firm FuelCell Energy, which makes power plants running on biogas and other fuels, reported a net loss of $45.5m in the six months to the end of April, on revenue of $46.7m. In the same period a year before, it made a $38.8m loss on revenue of $18.2m. At the end of April, FuelCell said that it had orders, including long-term service agreements, of $134.7m. Total cash and investments were $121.7m.

CONTROLS FOR CHINESE BIOMASS

GE of the US is providing distributed controls equipment for 50 biomass-fuelled power stations being built in China by Wuhan Kaidi Electric Power Engineering. The plants will run on rice husks, straw and animal manure, said GE. each of the 50 plants will have two 12MW units. The first plant is scheduled to begin commercial operation at the end of August and the rest by December 2010.

AE INVESTS IN ARGENTINA

AE Biofuels plans to build a 75m gallons/year (284m litres/year) biodiesel plant near Rosario in Argentina with a 10% stake to be held by DS Group. The plant's 250,000 tons/year (226,800t/year) of feedstock will be soya bean oil. The plant will also produce up to 25,000 tons of glycerin each year. De Smet Engineers & Contractors, a DS subsidiary, will build the plant, for planned completion late next year. No project cost was revealed.

ASIA

New Zealand biofuel mandate gets rejig but implementation still in doubt

A parliamentary select committee has watered down the New Zealand government's proposed biofuels legislation on the back of fears that the intended mandate could be environmentally damaging.

The biofuel content of transportation fuel is now expected to start at 0.5% this year and rise by 0.5% steps to 2.5% in 2012, instead of starting at 0.53% and rising to 3.4%.

"This change means a much smoother rate of increase to the obligation and, according to submitters, will reduce costs and improve the chances of biofuels being produced in New Zealand," claimed energy minister David Parker. However, it is not certain that the amended biofuels bill will be passed.

The Local Government and Environment Select Committee also recommended that the mandate take effect on 1 October, rather than next month as originally planned.

The committee also asked for sustainability rules, that will require biofuels to emit significantly less greenhouse gas over their life cycle than fossil fuels, to not compete with food production and to not reduce indigenous biodiversity or adversely affect land with high conservation values. Biofuels made from sugar cane and oilseeds are exempted from the food competition clause.

Green Party co-leader Jeanette Fitzsimons reportedly called the sustainability clauses "the strictest in the world", with biofuels having to produce at least 35% less carbon dioxide than petroleum fuels. The bill now requires annual reporting by oil companies against the sustainability principles.

The government must specify measures to achieve the sustainability principles by 30 June 2009. The opposition National Party, which opposes the legislation, called the introduction of a sales mandate before sustainability rules "madness".

National's environment spokesman Nick Smith said: "The overwhelming evidence is that the introduction of biofuels is doing more harm than good." The 2.5% target would cost NZ$240m ($182m)/year, he said, based on fuel suppliers' estimates.

Van der Horst ties up feedstock and biodiesel offtake deals for Malaysia

Singapore-based Van der Horst Energy said that it has reached initial agreements for the supply of jatropha oil as biodiesel feedstock and for sale of 80% of the output of a biodiesel plant in Malaysia.

It has said previously that it would open a S$40m ($29m), 200,000t/year biodiesel plant in Singapore by the end of the year, with a second similar plant opening in 2011.

Late last month, it said that it planned to acquire 51% of Resi, a Taiwan company that makes biofuel production and biomass gasification equipment, by issuing shares to the owners.

It also plans to buy for cash 70% of a new Cayman Island company that will own Econergy Samoa (ESCL), which will sell such equipment. ESCL has four orders totalling $78m, said Van der Horst. Resi owns 18% of Econergy Taiwan, for which Resi is building a 100,000t/year biodiesel refinery in Taiwan.

Van der Horst's proposed biodiesel deal involves Integra Marketing handling 80% of the biodiesel from a proposed refinery in Johor in Malaysia, for an initial five years.

The feedstock deal would see Bio Energy Plantations (BEP) supplying jatropha oil to Van der Horst and the two companies developing a 6,000 hectare jatropha plantation in India.

RedOx and Mitsubishi agree waste-to-ethanol collaboration

RedOx Biofuels has signed a memorandum of understanding with Mitsubishi, to collaborate on commercialisation of its waste-to-ethanol technology.

The agreement was signed on 18 June. The Norwich, UK-based subsidiary of Applied Intellectual Capital (AIC) is developing an "electrochemical" process to break down waste feedstocks into sugars. Initially, under the agreement, Mitsubishi is to supply the technology to ferment the sugars into ethanol.

The firm is working on the use of rice straw as a feedstock – this by-product is not of use to farmers for animal feed or to spread on agricultural land, RedOx Biofuels chief executive Kim Ogaard-Nielson said.

In the longer term, the collaboration with Mitsubishi could turn to other feedstocks and "other fuels and products that are today derived from petrochemical origin", he added.

Ogaard-Nielson said that the technology is at the demonstration stage and the firm hopes to have a pilot phase up and running with Mitsubishi by the end of 2009.

RedOx says that its Metal Mediated Reduction Oxidation synthesis technology can make ethanol, other biofuels and high-value chemicals. The company was formed last November and has operations in the UK and the US.

AIC was listed on London's Alternative Investment Market (Aim) in January 2007.

ICM promises better use of maize in ethanol plants

Ethanol engineering firm ICM said that it should begin producing high-quality human food and animal feed – as well as ethanol – from a single plant within about a year.

The US company, whose processing technology is used in about half of the ethanol plants in the US, is installing the final stages of the technology at Lifeline Foods in St Joseph, Missouri. Lifeline is a joint venture by ICM and 700 farmers, which produces grits, used to make snacks.

If successful, the new technology could boost profits at ethanol plants by making better use of the components in maize, which is the main feedstock for US ethanol. It could also reduce the consumption of fossil fuels, enzymes and water, but ICM has not revealed capital or running costs for the technology, which it says it could retrofit.

ICM's chief executive and president, Dave Vander Griend, said that the company can separate maize kernels into endosperm, germ and fibre (or bran) to allow production of food and feed products and a fuel source for ethanol plants.

The endosperm contains most of the starch in the maize kernel and can be used to produce ethanol, said Vander Griend. "We use the fibre as a biomass fuel for the plant because it is the lowest value," he added.

Oil can be removed from the germ for sale to the maize oil market and protein also removed for use in the human feed chain, leaving fibre that can used as feedstock for production of further ethanol.

"That protein is a very amino acid-balanced protein. It is a very healthy protein," according to Vander Griend. He suggested one use as a dietary supplement.

Also, solubles in the grain can be turned into animal feed, he said. "We are doing a single-cell protein project on the solubles, the syrup portion of the plant."

Currently, Lifeline is separating maize into three parts, but is turning endosperm into grits. ICM is now installing a single-cell protein line and is working on the oil recovery stage.

"We hope to have all the things commercially running at Lifeline by, probably, [mid 2009]," said Vander Griend.

Harvard will genetically engineer cellulosic ethanol bug for SunEthanol

Researchers at Harvard Medical School in the US are to develop new strains of a natural bacterium that the SunEthanol company plans to use to convert cellulose into ethanol.

SunEthanol is developing the Q Microbe – which was discovered near a reservoir in Central Massachusetts – to produce ethanol from a range of biomass, including switchgrass, maize residues, wheat straw, sugar cane bagasse and wood pulp.

Replacing petrol with ethanol fermented from sugar that is released when cellulose is broken down by the microbe would cut greenhouse gas emissions by at least 90%, claims SunEthanol. Currently, most ethanol is produced using enzymes to convert starch.

Under the deal with SunEthanol, the Harvard researchers aim to produce genetically modified strains that could deliver higher yields of ethanol than the native source, "a critical step in creating an economically-viable alternative to the production of ethanol from [maize]", according to Harvard. The research will be led by George Church, a genetics professor at the medical school and director of the Center for Computational Genetics.

SunEthanol will have an option to license strains created under the partnership for its patented ethanol production process.

Recently, the US Department of Energy awarded SunEthanol a third research grant within a year, worth $100,000.

The latest grant is for a nine-month, Small Business Innovation Research project by SunEthanol, Texas A&M University and the University of Massachusetts Amherst.

Ethanol co-product could have non-animal feed use

Researchers in the US could be opening a further source of income for ethanol producers by identifying another possible market for one of the fuel's co-products.

The distiller's dried grain with solubles (DDGS), left after grain such as maize has been processed to produce ethanol, could be used as a non-petroleum-based filler in plastics, according to preliminary studies. DDGS is usually sold as an animal feed.

Scientists in the Agricultural Research Service (ARS) of the US Department of Agriculture and collaborators are now conducting further tests, which could lead to new bio-based products.

DDGS has a high fibre content and a molecular structure suitable for binding, which make it a possible filler in plastics, according to ARS agricultural engineer Kurt Rosentrater, based in Brookings in South Dakota, which worked with Robert Tatara, a professor in the department of technology at Northern Illinois University's College of Engineering and Engineering Technology.

Clay, talc, glass, paper and metals are commonly used as fillers in plastics to increase strength, but bio-based fillers such as bamboo, kenaf, maize waste, soya bean hulls and chicken feathers are now being considered as alternatives. Both DDGS and distiller's dried grains are candidates for use as bio-fillers, according to the researchers.

The researchers compressed moulded blends of DDGS (up to 90% of the mix) and phenolic plastic resin and found that DDGS concentrations in the range 25–50% worked best as fillers. The findings have been published in the *Journal of Polymers and the Environment*.

Follow-up tests are under way, as the initial study yielded only limited data on the physical properties of the various blends.

Ethanol plant provides CO_2 for carbon-capture trial

An ethanol production plant in the US is to be the source of the carbon dioxide (CO_2) to be used in a four-year study into permanent storage of the greenhouse gas deep underground, rather than letting it enter the atmosphere.

Over four years, the Mid-west Regional Carbon Sequestration Partnership (MRCSP) plans to inject about 1m tons (900,000t) of CO_2 from The Andersons Marathon Ethanol plant in Greenville, Ohio into the Mount Simon Sandstone, more than 1,000m below the surface.

The Andersons Marathon Ethanol is a joint venture of grain and ethanol company The Andersons and Marathon Petroleum. The Greenville plant began operating in February. It can produce 110m gallons/year (416m litres/year) of ethanol and 350,000t/year (317m tonnes/year) of dried distillers' grain animal feed.

The CO_2 from the plant will be compressed to reduce the storage volume needed before being injected into sandstone or other porous layers with an overlying, dense cap rock or seal that prevents the CO_2 from filtering back to the surface.

The Mount Simon Sandstone stretches across much of the US mid-west and could store more than 100 years of CO_2 emissions from major point sources in the region, said the Battelle Memorial Institute, which is leading the project. The US Department of Energy (DoE) has awarded $61m for this third phase of the MRCSP's work, which began in 2003. The MRCSP, which has more than 35 members, will contribute $32m.

The MRCSP is one of seven such partnerships in the DoE's Regional Carbon Sequestration Partnership.

Ethanol sector proving strong rival to oil giant

Brazil's state-owned oil company Petrobras is facing vigorous challenges from sugar and biofuel companies, says **Rodrigo Squizato**

This year could be considered a historical moment for the Brazilian fuel sector. First, ethanol sales in the country have surpassed petrol sales. Second, the state-owned oil company Petrobras faces a real challenger in the fuel market for the first time since president Getúlio Vargas created it in 1953.

The same forces behind these two milestones are also changing how the five centuries-old sugar industry manages itself and is regarded. The sector is looking to boost its traditional role of commodities supplier and is eager to increase the number of products that it sells and to expand its role in the market.

At mid-May, there were more than 200 companies operating 386 mills in Brazil producing sugar and/or ethanol.

Figure 1: Brazil's biggest sugar and ethanol producers, 2007

Rank	Group	Sugar cane harvested (m tonnes)	Sugar produced (m tonnes)	Ethanol produced (m^3)		
				Anhydrous	Hydrous	Total
1	Cosan	36.60	3.20	707,424	558,405	1,265,829
2	Crystalsev	26.30	1.70	490,238	669,865	1,160,103
3	Grupo Tereos	11.30	1.10	144,157	164,195	309,072
4	Louis Dreyfus	10.20	0.73	205,437	163,218	368,655
5	Carlos Lyra	10.00	0.95	193,342	83,779	277,121
6	Grupo São Martinh	9.30	0.68	211,868	181,662	393,530
7	Tércio Wanderley	8.70	0.72	239,012	80,355	319,367
8	Zillo Lorezetti	8.30	0.60	244,982	157,029	402,011
9	Alto Alegre	8.20	0.81	139,156	64,422	203,578
10	Usaçúcar	7.30	0.84	22,106	119,123	141,229
11	Grupo Irmãos Biag	7.00	0.31	209,340	216,980	426,320
12	Virgolino de Oliveir	6.20	0.38	153,366	151,917	305,283
13	João Lyra	6.20	0.37	100,713	192,053	292,766
14	Nova América	5.50	0.41	156,593	80,462	237,055
15	Itamarati	5.10	0.28	110,557	119,444	230,001
16	José Pessoa	5.00	0.26	123,673	137,875	261,548
17	Grupo Farias	5.00	0.28	123,691	99,011	222,702
18	Abengoa Bioenergi	4.70	0.42	12,342	91,057	103,399
19	Cerrdinho	4.50	0.38	43,036	113,182	156,218
20	Colorado	4.50	0.36	90,490	90,764	181,254
21	Equipav	4.40	0.28	154,590	59,371	213,961
22	Colombo	4.40	0.38	0	158,165	158,165
23	Infinity Bioenergy	3.70	0.15	48,385	143,648	192,033
24	Virálcool	3.70	0.24	79,048	95,224	174,272
25	Vale do Verdão	3.50	0.15	93,494	66,791	160,285
Total		**209.80**	**16.00**	**4,097,040**	**4,058,717**	**8,155,757**
Total Brazil		**428.00**	**30.00**	**8,298,000**	**9,556,000**	**17,854,000**
Top groups' share, %		*49.0*	*53.0*	*49.0*	*42.0*	*46.0*

Source: União dos Produtores de Bioenergia

Two companies lead the pack; Cosan and Crystalsev, according to the União dos Produtores de Bioenergia association of bioenergy producers. However, the two together account for only 14% of the ethanol market.

The strategy adopted by each is very different, apart from increasing their production capacity. As far as it is possible to see, Cosan is playing the oil majors' game. The company, which is based in Piracicaba, 150km from São Paulo, is making huge investments in logistics. This year it took control of ExxonMobil's operations in Brazil, announced the creation of an ethanol pipeline in partnership with Crystalsev and Copersucar and bought 49% of Teaçu, one of the biggest and most modern sugar ports in Brazil, from Nova América, another big sugar and ethanol company.

Esso, as the ExxonMobil arm is branded in Brazil, was bought for $826m in cash plus $128m of net debt. Esso has a 7.2% fuel distribution market share and is in fifth position in the market, controlling 9.7% of the petrol market and 9% of the pure ethanol market in the richest region of the country, the south-east. In Brazil, all petrol is E25 (ie 25% anhydrous ethanol and 75% petrol). Most Cosan mills are also located in the south-east.

With the acquisition, Cosan became the first true challenger of Petrobras in the country and kicked off the first real battle anywhere in the world between an oil company and a bioenergy producer. Despite the huge differences in size between the two companies, Cosan is the first company with a good hand to play against Petrobras. That hand is ethanol and is powerful because the fuel is now cheaper and increasingly more important to the domestic market than petrol.

Since its foundation in 1953, Petrobras has not had a real competitor, most of the time because it held a legal monopoly in oil. Since the 1990s, it has not held a legal monopoly but it is a *de facto* monopoly refiner.

None of the other two, private refiners in the country could compete in any real sense with the state-owned oil company. One of the two, Ipiranga, was bought by Petrobras last year. The other, Manguinhos, stopped operating in September 2005.

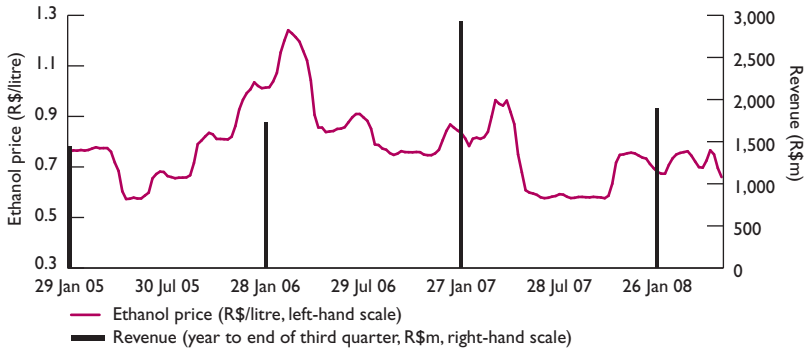
The acquisition of one and the halt in activities of the other could be linked to the Petrobras policy of holding down prices, although theoretically prices are free to float in Brazil. For, despite the rising price of oil, petrol and diesel prices were only increased, for the first time in more than two years, in the first quarter of this year.

However, in the ethanol market, things happen in a very different way. The wave of investments in new mills has pushed prices down, despite the increasing number of flex-fuel vehicles able to run on a variable mix of petrol and ethanol. Such vehicles today represent almost 90% of new petrol-run car sales.

19 MILLS, NOT A SINGLE WELL

Last year, Cosan produced 707m litres of anhydrous ethanol and 558m litres of hydrous ethanol, the kind that is sold pure

Figure 2: Cosan financial performance against ethanol price



Note: Cosan's third quarter is linked to the sugar cane growing season and ends on 31 January
Sources: Cepea/University of São Paulo and Cosan

at service stations. Based on those numbers, Cosan will be able to supply three times the amount of anhydrous and the same amount of hydrous ethanol sold by Esso last year in Brazil.

Following Cosan's announcement that it bought its 19th mill (Benálcool in São Paulo state) this year, it will probably have an even greater stockpile to push into the market this year.

The president of the National Fuel Retailers Association, Paulo Miranda Soares, welcomed Cosan's debut in the fuel retailing market. "It will increase competition, which is good for the market and consumers," he said.

Since Petrobras bought Ipiranga, retailers and distributors have been afraid of its overwhelming power. After the state-owned company became interested in ExxonMobil's assets, the announcement that Cosan had become the purchaser came as a relief for the market.

Alisio Vaz, vice-president of Sindicom, a fuel distributors association that has Exxon and Petrobas among its members, also welcomed Cosan's entry into the retail market: "It will be interesting for oil companies to see how an ethanol company works and the other way around". It could also be the beginning of the end of a bitter relationship between Petrobras and the sugar cane industry.

Sindicom has reported alleged tax fraud in the ethanol industry for years. Until the first half of last year, it was widely believed that about 40% of all ethanol sold in Brazil benefited from some kind of tax fraud or fuel adulteration.

One scam that combines both is based on "wet-ethanol" and involves mills selling anhydrous ethanol to distributors that mix it with water. The operation benefits from the lower tax on anhydrous ethanol than on hydrous ethanol.

However, since last year new laws have improved market conditions and today there is less fraud in the sector.

The Uniduto pipeline project is another response to Petrobras, which had earlier announced its own ethanol pipeline. Last year, Cosan's chairman, Rubens Ometto, said about Petrobras' pipeline that "if Petrobras has the logistics, it will have control of the sector and this we don't want". Most of Cosan's moves – including the Esso acquisition – have been aimed at guaranteeing control of distribution channels.

Uniduto is a much smaller pipeline project than that of Petrobras and will cover just the heart of today's sugar cane production. It will run 300km from Ribeirão Preto, known as the sugar cane capital, to a port yet to be announced on the Atlantic coast. A pipeline branch will end in Conchas, a railway crossroads connected to Tietê waterway. Another branch will connect this small city to the west of São Paulo state and Mato Grosso do Sul, two regions where several new mills are being constructed.

With Teaçu port, Cosan should be interested only in raising its sugar export capacity, but the investment could help the company to send ethanol overseas, noted an insider in the negotiations. Cosan was already a neighbour of Teaçu. Before the deal, Nova América and Cosan could load two ships at the same time. Together they will have space to dock one more ship.

While Cosan was arming itself against Petrobras, it teamed up with a former opponent that since last year has been pursuing a new strategy. In February 2007, André Biagi managed to block a hostile takeover attempt by Ometto to control Santa Elisa, the flagship mill of Biagi's family.

After that, Santa Elisa merged with Vale do Rosário and four smaller mills to form Santelisa Vale, the second-largest ethanol group in Brazil after Ometto's. The products of this group are sold by Crystalsev, a trading company also controlled by Biagi's family. One year after the end of the battle for Santa Elisa, they teamed up together to launch Uniduto.

STRATEGY INVOLVES PARTNERSHIPS

If Cosan is tracking the oil majors' strategy, Santelisa and Crystalsev are playing the Silicon Valley game: innovation and partnership.

Just after Santelisa Vale emerged, it teamed up with Goldman Sachs, Carlyle/Riverstone, Global Foods, DiMaio Ahmad and Discovery to invest R$2.2bn ($1.4bn) to build four mills.

Santelisa also established a partnership with cotton producer Maeda to build two mills. In April, they sold 50% of Tropical Bioenergy to BP for R$100m.

However, it was Crystalsev that developed the most innovative set of deals. Last year it announced a partnership with Dow Chemical to build a mill to make plastic from ethanol in Minas Gerais state.

The partners aim to begin operations at the new plant in 2011. It is planned to make about 350,000t/year of polyethylene from ethanol. The two companies have not disclosed the amount of investment and have yet to decide where to build the plant.

In April, Crystalsev announced a joint venture with US-based Amyris Biotechnologies. The two companies aim to make diesel and petrol from sugar. They want to begin operations in Campinas (100km from São Paulo) in 2010.

For some observers, Crystalsev has not so much taken the market a step forward, but has launched the future. The technology director of the sugar cane technology organisation Centro de Tecnologia Canavieira (CTC), Tadeu Andrade, says that with the two partnerships Crystalsev has set up an ethanol-based chemistry company with Dow and a sugar-based chemistry industry with Amyris. "This is the future of the industry. Sugar cane mills will become the base for a wide range of industries," says Andrade, although it is important to note that Santelisa Vale is associated with CTC.

If Andrade is correct and Crystalsev manages to succeed with its two partners, Petrobras will face more challenges. Crystalsev will became not only a challenger in the petrol market as other mills, led by Cosan, have already done. New companies could provide real competition for the oil giant in a wide range of products including diesel, plastics and even fertilisers.

Although the state-owned company is developing its own technologies and strategies for bioenergy and biomass it is far behind the fast-paced companies that are redefining the industry approach.

Nevertheless, Petrobras has life in it yet. The company has discovered huge oil fields and has deep pockets to turn the tables when needed. The first victims in this increasingly complex and expensive business were, and will continue to be small mills that do not have the capital even to enter the game.

Rules could hit plans in South

Rich states want biofuels to meet sustainability criteria, but that could undermine investments in poor countries, reports **Vic Wyman**

Andrew Turay is confident that from 2011, up to 100m litres/year of ethanol could be flowing into the European Union (EU) from a production plant being planned by Addax Bioenergy in Sierra Leone. Turay, the project manager, claims that the firm, a division of the Swiss energy group Addax & Oryx, is close to securing the $200m needed for the project, with interest from organisations including the World Bank.

Addax has already started leasing land, at $5/hectare, and plans to expand the initial 26,000 hectares needed to 200,000, says Turay.

Such projects tick many boxes for those concerned about poverty and development in poor countries; investment, jobs, development of infrastructure, more energy security and the earning of foreign exchange, for example.

They may also tick boxes in the rich world, including the European Union (EU), which wants climate-friendly renewables to provide 10% of its transportation energy by 2020. For example, ethanol made from sugar cane grown in tropical and sub-tropical countries is likely to be cheaper and more energy efficient than ethanol made from crops grown in Europe.

The result could be heavy investment in biomass and biofuels in developing countries. "Biofuels present a huge opportunity to kick-start Africa's neglected agriculture sector," says Turay. He claims that concerns about energy crops displacing food crops are misplaced (see panel).

"We need investment," says Manfredi Caltagirone, of Italy's environment, land and sea ministry and a representative of the Global Bioenergy Partnership (GBEP), which was set up by the rich G8 + G5 countries to push biofuel sustainability. "We need people to make a profit from agriculture in developing countries."

POSSIBLE PROTECTIONISM

However, the prospects of a thriving international trade in biofuels could be derailed by requirements for biomass and biofuels to be produced sustainably and to social norms such as labour standards. Many see such criteria as protectionism.

A possible limit on the water content of biofuels imported into the EU, for example, would put a dampener on tropical and semi-tropical countries' industries, because the local climates and the long export shipping distances could make it difficult to meet such a standard.

Many governments and organisations are drawing up sustainability rules, with the GBEP's Task Force on Sustainability holding its first meeting in Rio de Janeiro as *Bioenergy Business* went to press, for example.

A parallel GBEP task force, co-chaired by the US and the United Nations Foundation, aims to produce within a few months a draft framework for use when developing methodologies for determining greenhouse gas emissions associated with biofuels.

The EU's Parliament is scheduled to vote on an environmental committee report, drafted by member of parliament Anders Wijkman, on 7 July. "I very much welcome the potential of southern countries," said Wijkman. "Provided they can meet sustainability criteria I think we should welcome imports."

EU sustainability rules are not assured. Early next year will see elections for a new Parliament followed later in the year by a new European Commission, the EU executive arm that has put forward the sustainability criteria. "We need something in place, otherwise the whole process will have to be done with the new parliament," said Wijkman.

He wants a "very, very cautious approach" to sustainability: "We shouldn't have a binding target without sustainability criteria."

WIDESPREAD DISAGREEMENT

Helena Paul, co-director of London-based not-for-profit public interest research organisation EcoNexus, which analyses science and technology developments (see opposite page), says: "It's a real shame to have a target that causes change without sustainability criteria in place. The challenge of monitoring biofuels is immense."

She points out that the animal feed byproducts from biofuel production are likely to have a big effect on economies and sustainability: "I think this is a major issue that doesn't come up enough."

Wijkman also points to uncertainty about the future contribution of "second-generation" biofuels: "That is one reason why I suggest less ambitious binding targets [than 10%]."

He is also one of many critics of the Commission for proposing that use of biofuels should reduce greenhouse gas emissions by only 35% compared with fossil fuels. "In my opinion that's too unambitious. I am asking for 50%," he says.

He also urges more caution on greenhouse gas emissions from change of land-use to grow energy crops. "I don't think you can come up with a [land-use] methodology now that will anticipate industrial land use. I call for regular reviews."

Turay says that many people are worried that biofuels from the South will be denied access to the EU: "These are the things that keep us awake," he says. "We want to see the EU become a little more open. We believe that free-trade agreements are key to African biofuel opportunities."

He says that African investments need a secure and predictable market. "Investments in Africa are risky," he says. "Don't shut the door on us again!"

He also warns that if EU criteria, for example, are too tough, the Chinese will invest and take the fuel with little concern about sustainability: "It's not a threat; it's a reality."

NO FOOD V FUEL CONFLICT IN AFRICA, SAYS DEVELOPER

Investment in biofuels in Africa does not need to displace food production, claims Andrew Turay, project manager of Addax Bioenergy. The continent can supply all of the proposed European Union renewable transportation energy target of 10% by 2020, he says: "We can deliver all of it if we are given the opportunity."

He says that the target, plus a wider use of biofuels, could equate to 25m m^3/year of biofuels, which could be grown on 4.2m hectares of land (assuming 80t/year of sugar cane from each hectare, with 75 litres of ethanol from each tonne, leading to an ethanol yield of 6m^3/hectare).

Just 1.4m hectares could supply a third of the EU market, or 8m m^3. Brazil, says Turay, produced 21m m^3 of ethanol from 3.4m hectares in 2007.

Africa's 750m hectares of land includes 166m suitable for growing sugar cane without irrigation, he says, with millions of hectares of degraded, ill-exploited arable or pasture land. "There is ample land. We have the land; it is not a problem."

Sustainability proposals will not help the poor

Proposed standards and certification schemes are unlikely to prevent the boom in biofuels causing social damage, warns **Helena Paul**

Although biofuels cannot compete without the government incentives, targets and subsidies that are being used to create a new market in the fuels, it is clear that these measures are already hitting the global South.

The measures, including the proposed European Union (EU) target of renewables providing 10% of transportation fuels by 2020, are contributing to land seizure, speculation and rising land prices in Africa, Asia and South America. They are also leading to the displacement of food crops and the expulsion of vital food producers from the land.

Both agricultural and forest biodiversity, already under threat from climate change and industrial agriculture, are being affected by an emerging industry that has not proven that it can meaningfully address the problems of climate-changing emissions. Farmers are being driven off the land into urban slums, where they cease to be food producers and add to the rising numbers of those who need to be fed.

As long as targets are being discussed, the signal to governments and commercial interests is loud and clear: produce biofuels for export to rich countries.

Standards and certification schemes are proposed as a way to address these issues. However, when have certification systems, particularly when voluntary, worked successfully in the past, especially in the global South?

With EU target proposals already causing rapid and irreversible changes, it is hard to believe that EU certification rules, which are still being developed, can really address the issues, especially on the scale required. This is especially troubling in view of the fact that the usefulness of current agrofuels is under increasing question.

The Organisation for Economic Co-operation and Development (OECD) notes that "enforcement and chain-of-custody control could prove to be an enormous challenge, as recent experiences with the certification of wood products has shown. ... Though theoretically possible, reliance on certification schemes to ensure the sustainable production of biofuels is not a realistic safeguard.[1]"

LIMITS TO CERTIFICATION

Large-scale production of biofuels will have macro-level impacts, which cannot be addressed by applying criteria to individual producers. "Displacement" and increased food prices are key issues.

Displacement means that when existing agricultural land is used for agrofuels, whatever is currently being produced will be displaced to new areas, for example forests or small, diverse agricultural systems. Price shifts in commodity markets influence the price of land and also correlate with land-use change. For example, changing world prices for soya have been shown to correlate with Amazon deforestation[2].

There are major obstacles to the development of effective standards and criteria:

- There is strong disagreement about greenhouse gas balance values for biofuels and recent work on land-use change casts serious doubt on earlier optimistic assessments[3].
- Large actors are better able to deal with the administrative burden of certification than small producers. They also have more power and opportunities to influence the setting of the criteria and a greater capacity to find and exploit loopholes.
- Producers and traders would be able to benefit from the credibility of certification in certified markets, while possibly continuing to engage in bad practices in uncertified markets.
- The credibility of certification depends a lot on which system is used:
  - "track and trace" follows a product through the whole chain from beginning to end. This is very difficult to apply to commodities traded between countries and companies as the products may be mixed during transport and processed with products from elsewhere;
  - "book and claim" involves tradable certificates. A buyer of certified goods gets the credit, but once the goods are mixed with others they could end up anywhere. Such a system is cheaper than track and trace but more open to fraud. The more credible a system, the higher the costs, so decreasing its competitiveness.
- The challenge of verification and monitoring is massive: different players have different access to legal processes and local communities may be difficult to contact and monitor. There may also be corruption, repression and patronage and communities may be caught between working in very poor conditions or having no work, if mechanisation becomes more viable. If certifiers are chosen and paid directly by the companies they assess, there will be conflicts of interest, but how are costs to be paid and by whom?
- Governments, corporations, non-governmental organisations, experts and local communities may have very different interests as well as different degrees of influence. They also have divergent approaches, typically to consultation and participation. In many countries, human rights violations are already linked to the production of sugar cane, soya and palm oil and "sustainability" claims have already met opposition.
- Defining the stakeholders is complex. Should local communities affected both directly and indirectly be included? How does one deal with divisions between communities that are benefiting from projects and those that are not? It is easy

1 *Biofuels: is the cure worse than the disease?* Discussion paper for Round Table on Sustainable Development at Organisation for Economic Co-operation and Development. September 2007. www.oecd.org/findDocument/0,3354,en_39315735_39313128_1_119684_1_1_1,00.html

2 *Cropland expansion changes deforestation dynamics in the southern Brazilian Amazon*. Douglas Mortan *et al.* September 2006. Proceedings of the National Academy of Sciences of the US. www.pnas.org/cgi/content/abstract/0606377103v1?ck=nck

3 'Use of US croplands for biofuels increases greenhouse gases through emissions from land-use change'. Searchinger *et al.* and *Land clearing and the biofuel carbon debt*. Fargione *et al.* Both *Science*, 7 February 2008

JATROPHA AND PALM OIL EXPANSION IS A THREAT

Jatropha is being strongly promoted for bioenergy and, according to proponents, can grow in marginal areas, needs little water and is poisonous, so cannot compete with food production. Yet the appropriation of land for its large-scale cultivation is already generating conflicts in Africa and Asia. It competes with food production by displacing food crops, thus intensifying competition for land.

Also, in Tanzania, European companies have been buying good, well-watered land, where jatropha grows better than on poor land. The drive for high yields will displace farmers and marginalise food production to dry regions. According to a local non-governmental organisation: "We could use jatropha oil for cooking and lighting, but we need to develop it in our own way, at our own pace."

Likewise in Indonesia, oil palm has long been produced for food and cosmetics, among other uses. Yet bioenergy demand is providing a new stimulus, with large areas of forest being destroyed. It is very difficult for local people to counter the external forces.

According to bioenergy proponents, small farmers who own their own land can earn an independent livelihood from biofuel crops, particularly from jatropha and oil palm, which cannot currently be harvested mechanically.

However, efforts to develop dwarf oil palm that matures earlier are partly aimed at mechanising harvesting, which would deprive smallholders of a role. In the Brazilian sugar industry, wages and conditions are reduced by the threat of mechanisation.

Jatropha and oil palm take many years to reach maturity and yield a crop. Smallholders who sign multi-year contracts with companies, as appears to be the case in Zambia, are offered initial loans, repayable on harvesting, and have to pay many fees and costs as well.

They are easily caught in debt traps and have little or no influence over the price they are paid, as well as perhaps being forced to buy goods at prices set by the companies.

Smallholders are vulnerable to all the traditional problems of the small producer faced with a large, well-organised company that dominates the local infrastructure. This pattern has been well established in the cases of oil palm and sugar cane; it is in danger of being repeated with jatropha.

In such ways, large monocultures threaten to impose "agriculture without people". This threat has many sources: political-economic inequalities, the tendency for centralisation for economies of scale, market pressures for standard products, etc. Moreover, governments face pressures to expand export industries to service debts.

to claim in the abstract that all actors must be involved, but that may be very difficult.

☐ As biofuels are going to be blended with other biofuels and with mineral fuels, the consumer will have no means of exercising choice.

META-STANDARDS MUDDLE

EU-focused sustainability initiatives favour the meta-standard approach, in which existing or planned labels and existing or emerging certification initiatives like the Forest Stewardship Council (FSC), the Roundtable on Sustainable Palm Oil and the Round Table on Responsible Soy could be approved as the meta-standard.

If FSC certification, for example, were accepted, FSC-labelled biomass could be approved, provided a greenhouse gas calculation were carried out.

However, there are serious questions about the effectiveness of all these initiatives and about the balance of participation between stakeholders and their influence. To use these initiatives to develop a meta-standard is at least premature and could simply incorporate all the problems they already face within their own regions and sectors.

MARGINAL LANDS NOT SO MARGINAL

There is much talk of growing biofuel feedstocks on so-called marginal lands, which may be unsuitable for agriculture through poor soils, gradient or lack of water. However, such land may be collective or common land, used by nomadic herdsmen or pastoralists or by the poor, including women and old people[4].

The classification of lands as marginal, underused, empty, neglected or waste land may be determined more by political priorities than by the state of the land. Such land may be important for biodiversity and has been described as a reserve for germplasm for future crop breeding.

Marginal land users often have no rights, yet may understand better than anyone else how to use such land sustainably to provide valuable additions to the diet or at difficult times. Women often depend on marginal land because they do not have the same rights as men to land, money and other assets.

In Tanzania, for example, small farmers are being cleared from the Kisarawe district, where rainfall and soils are adequate for food production, for jatropha. Even if they are paid compensation as promised, it will be difficult for them to find equivalent land elsewhere as so much of the rest of the country is extremely arid. (see panel).

Major projects on marginal land may also be misguided. It is often claimed that jatropha flourishes on poor soils with little water, but it is now becoming clear that jatropha is far more productive on better soils with more water.

TRADE RULES ARE NO EXCUSE

Many cite the World Trade Organisation (WTO) as a major obstacle to certification. Voluntary certification is allowed under WTO rules, but only if there is free competition among different labels and if no measures are taken to inhibit trade in non-certified goods.

Mandatory certification (setting social and environmental standards) could well face a challenge from producer countries. The OECD says that "even if the certification requirements would apply to all countries and to domestic production in a similar way, the measure might still be found against by a WTO dispute panel on the grounds of having a disproportionate impact on trade"[5].

However, the countries working on standards (the UK, the Netherlands and Germany) are all WTO members and therefore set its rules.

The legal situation is far from clear and much remains up for negotiation, but WTO rules do give members the right to discriminate in favour of other public policy objectives such as protection of the environment and conservation of natural resources. Yet rather than exploring these possibilities, WTO rules are being used as an excuse for weak certification proposals.

The development of sustainability criteria for agrofuels is a big challenge, even without considering whether the fuels offer any solution to energy problems. Criteria need to be complex enough to address the issues, yet not so complex as to be inoperable. As we do not yet understand what sustainable production would involve, we lack benchmarks.

Agrofuels are already causing huge land-use changes at unprecedented speed and we do not have relevant experience to apply. Issues of local participation are very complex and may encounter serious resistance from governments, or be undermined by commercial interests.

Above all, with serious questions being asked about the impacts of industrial agriculture[6] it is vital to avoid any risk that certification may help to greenwash a massive expansion of industrial monocultures in the name of addressing climate change but under pressure to use economies of scale.

Such an outcome would be at the expense of rural communities, small farmers and local food production, to say nothing of biodiversity and the climate.

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4 *Agrofuels – towards a reality check in nine key areas.* EcoNexus. www.econexus.info/pdf/Agrofuels.pdf

5 Ibid. 1

6 Plenary reports. April 2008. International Assessment of Agricultural Knowledge, Science and Technology for Development. www.agassessment.org/index.cfm?Page=IAASTD%20Reports&ItemID=2713

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Biogas developer Schmack optimistic after change in German renewables law

German company Schmack Biogas said that the sort of biogas plants which it supplies and operates itself should now become more attractive investments following proposed changes to the country's renewable energies act, EEG.

Management board vice-chairman Ulrich Schmack said: "On the one hand, these measures will make the utilisation of biogas more efficient and economical. On the other hand, biogas plants will become an attractive investment again."

The changes, including increases in the basic tariff paid for renewable energy and bonuses for co-generation and renewables, along with new gas grid access regulations, "will support the feeding of biomethane into the natural gas grid," he said.

The EEG amendment also foresees the introduction of a "liquid manure bonus", which will strongly promote the use of liquid manure in small plants, said the company, which has just warned that it is likely to reveal a weak performance over this financial year. The share price of about €10 ($15.7), as *Bioenergy Business* went to press, is a third of the price at the start of the year.

The vice-president welcomed the special bonus for plants running on liquid manure but added: "It would have been desirable, however, to calculate the bonus on the basis of the energy content of the liquid manure actually utilised, to actively support maximum efficiency of the biogas plants."

Also, the company expects to benefit from special bonus payments being introduced for advanced biogas technology. The amended act is expected to be passed in October and to take effect on 1 January 2009.

World Bioenergy Total Return Index (Biox)

Main component companies of Biox

Company	Country	Weighting (%)
Archer Daniels Midland	US	23.4
Bunge	US	20.6
Cosan	Brazil	8.9
Schmack Biogas	Germany	7.9
VeraSun Energy	US	7.6

At 31 March 2008

The World Bioenergy Total Return Index (Biox) covers nine large listed companies active in bioenergy. It was launched in November 2006 by the bank Société Générale, Dow Jones Indexes and Sustainable Asset Management. A certificate of the index is listed on Euwax in Stuttgart and on the Frankfurt Stock Exchange.

Brazil's ethanol exports will boom this year to meet US demand, says Unica

Higher than expected ethanol demand from the US, after floods affected the maize fields there, prompted Brazil's centre-south sugar cane industry association União da Industria da Cana-de-açúcar (Unica) to raise its ethanol export estimate for 2008 from 3.9bn litres to between 4.5bn and 5bn litres.

Sugar cane is the main feedstock for ethanol production in Brazil and maize the main feedstock in the US.

The demand for Brazilian ethanol led to a spike in the domestic price of hydrous ethanol in the week ended 20 June. The average biofuel price was 6% higher than in the previous week, closing at R$0.6773 ($0.4207)/litre.

This shows that Brazilian ethanol is competitive with US product within the $2.50–2.90/gallon ($0.66–0.77/litre) range. On 10 June, ethanol contracts for July at the Chicago Mercantile Exchange closed at $2.50/gallon. One week later they closed 20% higher at $2.89/gallon.

Conditions would be even better for Brazilian mills, if the real was not increasing its value against the dollar. Since the beginning of the year the value of the real has risen by 9%.

On the back of the increase in American demand for ethanol in June, overseas sales this year by Brazil's ethanol industry so far are 16% higher than a year before. According to the agriculture ministry, Brazil exported 1.2m tonnes of ethanol (hydrous and anhydrous) from January to May. However, in the five first months of the year the average price was 2.4% lower (in dollar terms) than last year.

Brazil should have a record sugar cane crop this year, although rains above the average are hurting productivity and the giant cane borer has become a real threat in the sugar cane fields (see page 1).

The most recent crop analysis by Unica shows that, until the beginning of June, the centre-south region of Brazil harvested 5.19% more sugar cane than last year, but the sugar yield was 1.15% lower.

The floods in the US resulted in ethanol and maize (corn) operations halting production, although the Renewable Fuels Association president Bob Dinneen and others have cautioned that the long-term impact of the flooding on maize and ethanol production was still unclear, until fields dried out and the extent of re-planting was known.

"While it is far too early to fully assess the impact of the flooding, it is clear that this unprecedented event will likely cause already high grain prices to remain elevated, further putting strain on industries that rely on corn and other crops,," said Dinneen.

However, he said that last year's record US maize crop and this year's anticipated increases in worldwide grain production are likely to moderate price increases and rejected any calls for a lowering of US biofuel targets. "Knee-jerk reactions to this unprecedented weather event would do even more harm to the nation against the backdrop of the current oil and economic crises it faces," he said.

In mid-June, maize prices in the US for the July 2009 crop hit a record $8/bushel ($315/t), with old-crop also hitting a record above $7.

Late in June, 9% of the maize crop in Iowa, a big producer of the grain and of ethanol, was flooded and 8% of the soya bean crop. Oil from soya beans is the main feedstock for biodiesel in the US. That equates to 470,000 hectares of maize and 309,000 hectares of soya beans.

As the floodwaters rose, the latest World Agricultural Supply and Demand Estimates (WASDE) of the US government projected maize supplies in 2008–09 at 340m bushels lower than its previous month's forecast. However, lower projected 2007–08 exports pointed to a 50m bushel increase in stocks at the start of the season, it said.

WASDE said that any reduction in US maize production is likely to be only partly offset by increased production in China and the Philippines and increased maize and barley production in Russia and Ukraine.

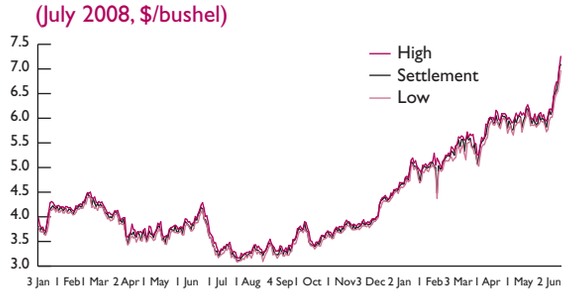
WASDE figures show a rising proportion of maize being used for the production of ethanol in the US, rather than for food (see Table 1).

Table 1: Maize crop used for ethanol in US

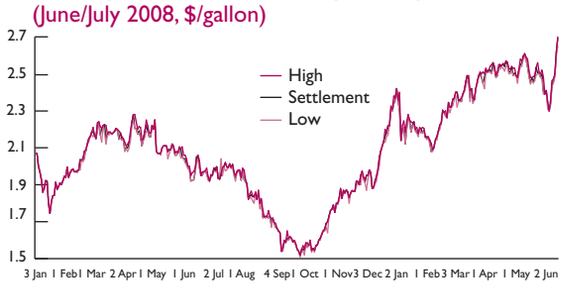
	Maize production (m bushels)	Ethanol usage (m bushels)	Ethanol usage/ production (%)	Farm price ($/bushel)
2006–07	10,535	2,117	20	3.04
2007–08	13,074	3,000	23	4.25–4.45
2008–09 – May	12,125	4,000	33	5.00–6.00
2008–09 – June	11,735	4,000	34	5.30–6.30

1 bushel = 0.03t. Source: World Agricultural Supply and Demand Estimates, US Department of Agriculture

Chicago Board of Trade (CBOT) corn (maize)
(July 2008, $/bushel)

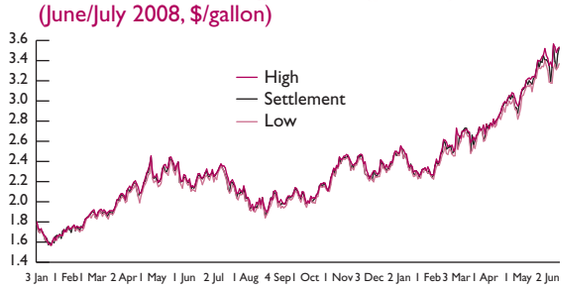


Chicago Board of Trade (CBOT) ethanol
(June/July 2008, $/gallon)



Crude palm oil futures (FCPO) Bursa Malaysia
(June/July 2008, M$/t)

RBOB* unleaded gasoline (petrol)
(June/July 2008, $/gallon)



** reformulated regular gasoline blendstock*

Data supplied by Globalview (www.globalviewsoftware.com), apart from FCPO (Bursa Malaysia)

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