Commercializing Conventional and Advanced Liquid Biofuels from Biomass

Task 39
IEA Bioenergy

Inside This Issue

From the Task

By Jim McMillan, Jack Saddler and Susan van Dyk

IEA Bioenergy Task 39 (Liquid Biofuels) will be participating in IEA Bioenergy's "end-of-triennium" conference that will be held in Berlin, 27-29 October, 2015 (http://ieabioenergy2015.org/). Several of the leading companies producing or using advanced biofuels (Boeing, UPM Biofuels, SkyNRG, Biochemtex) will be speaking in the Task 39 organized ***Progress in the development and use of advanced liquid biofuels*** session of the conference. Task 39 will also be holding its next business meeting in Berlin in association with the conference.

This issue of the IEA Bioenergy Task 39 newsletter summarizes some of the network's recent work and highlights biofuels developments of interest to the larger liquid biofuels stakeholder community.

During the past four months, Task 39 colleagues have made good progress on several of our commissioned reports while developing the work plans for the next triennium (2016-2018). A major activity has been the updating of the Task's earlier algal biofuels report, *Current Status and Potential for Algal Biofuels Production*, which was originally published in 2010 (available on the Task's website). Once reviewed by the Executive Committee, the final, updated report should be available by the end of the year. Task 39 has also been updating its database on advanced biofuel pilot, demonstration and commercial facilities (http://demoplants.bioenergy2020.eu/), highlighting several of the commercial, advanced biofuel facilities that have been built in Italy, Brazil and the US. Good progress is being made in two other areas of, 1) Advanced Biofuels for Advanced Engines and 2) Comparison of Leading LCA Models used to assess greenhouse gas (GHG) emissions of conventional and advanced biofuels pathways.

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Although the overall biofuels area has encountered significant economic and financing challenges over recent months as a result of low oil prices, positive developments continue to occur in the aviation biofuels sector. Fulcrum Bioenergy, (who had previously received a significant investment including a 10-year offtake agreement from Cathay Pacific), received a further $30 million investment from United Airlines. United has also negotiated a long-term supply agreement with Fulcrum and, subject to availability, has the opportunity to purchase at least 90 million gallons of sustainable aviation fuel a year for a minimum of 10 years, provided the biojet fuel price is cost competitive with fossil-derived (conventional) jet fuel. Fulcrum will produce biojet via the gasification of municipal solid waste followed by Fischer-Tropsch synthesis. Construction of Fulcrum's Sierra Biofuels facility near Reno, Nevada, USA, is projected to commence in late 2015, with biojet produced at commercial levels by 2017.

United Airlines has also agreed to purchase 15 million gallons of sustainable biojet fuel from AltAir Fuels when production at their Los Angeles facility commences. AltAir will use Honeywell UOP's technology to convert non-food oilcrops and farm waste feedstocks to biojet fuel. Red Rock Biofuels has also agreed to supply Fedex with approximately 3 million gallons of renewable biojet fuel per year, to be produced from woody biomass via gasification followed by Fischer-Tropsch synthesis. Alaska Airlines is also supporting biojet fuel development by teaming up with the USDA funded Northwest Advanced Renewables Alliance (NARA) consortium to make 1000 gallons of biojet fuel that will allow a demonstration flight to be carried out next year. This biojet fuel will be derived from iso-butanol (produced using Gevo's technology) using forest residues as the biomass feedstock. The iso-butanol will subsequently be upgraded to biojet via the Alcohol-to-Jet (ATJ) upgrading pathway.

In other aviation biofuels-related news, Boeing and Japanese aviation industry stakeholders have developed a five-year roadmap to develop biojet fuels by 2020 in time for the 2020 Olympic and Paralympic games taking place in Tokyo. The US EPA also announced that it is working with the International Civil Aviation Organisation (ICAO) to develop regulations for GHG emissions from aviation, although this process is expected to take a number of years to complete.

We welcome your feedback. Please direct your comments to Susan van Dyk

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A recent report by Insight Energy on "Biofuels for Aviation" highlights the potential dramatic increase in emissions from aviation in the EU as the industry keeps growing, should no action be taken. According to the report's calculations, the EU will require 85 Mtoe of biojet fuel by 2050 to achieve a 50% reduction in aviation-related emissions.

It has also been a busy few months for the renewable diesel sector, with UPS entering into agreements with Neste, REG and Solazyme to purchase 46 million gallons of renewable diesel biofuels over the next three years. Although the cellulosic-ethanol sector has been relatively quiet over the last few months, the Costa Pinto cellulosic ethanol facility in Brazil, which uses Iogen's conversion technology on sugarcane bagasse feedstock, was officially opened. Following close behind, DuPont's cellulosic ethanol facility in Nevada, Iowa, is projected to open by the end of the year. DuPont has also announced a licensing agreement with New Tianlong Industry in China's Jilin Province that seeks to develop China's largest cellulosic ethanol production facility.

On the policy front, the US EPA announced their proposed 2014-2016 Renewable Volume Obligations (RVO) for various biofuel categories. The public comment period is now closed and the final announcement of RVO amounts will be made in November 2015. The proposed reduction in the RVO for conventional starch ethanol was one of the topics that elicited significant comments and discussion. A subsequent analysis conducted by the University of Illinois at Chicago's Energy Resources Center (ERC) indicated that the reduction in corn ethanol volumes could increase transportation-related GHG emissions equivalent to putting 1 million new cars on the road. (Read more). However, biodiesel, renewable diesel and cellulosic biofuels producers in the US should benefit from a two-year extension of tax credits approved by the Senate Finance Committee but not yet approved by the Senate.

As readers of past issues know, the major feature of each Task newsletter is a more in-depth article on biofuels developments in one of Task 39's participating member countries. This Newsletter features an update on activities in New Zealand. We thank Ian Suckling and his colleagues for providing an informative report on biofuels developments in New Zealand.

As always, we appreciate your feedback. Please send us any ideas on how we might increase the value of these Task 39 newsletters. We hope to hear from you via email or get your feedback and suggestions in October at the upcoming IEA Bioenergy Conference 2015 meeting in Berlin (http://ieabioenergy2015.org/).

Jim, Jack and Susan

Opportunities for biofuels in New Zealand

Ian Suckling, Scion, Rotorua, New Zealand

With contributions from**: Dr Paul Bennett, Dr Rupert Craggs, Dr Ferran de Miguel Mercader, Prof. Mohammed Farid, Peter Hall, Prof. Shusheng Pang, Dr Mathew Stott and Dr Kirk Torr.**

Introduction

New Zealand is a geographically-isolated country with a land area of 269,190 km^2 (between that of Italy and the United Kingdom), but with a comparatively small population (4.47 M). It has a temperate climate, with an export-focussed economy highly dependent on agriculture, particularly dairy products, meat, wood and wood products, fruit and seafood.

Consumer energy demand in New Zealand in 2014 was 573 PJ, dominated by oil (44%) and electricity (25%) (Fig. 1) [1]. Of particular note:

- Almost all of New Zealand's fossil oil is imported, mainly (80%) to meet the country's transport fuel needs. There are however also significant exports of unrefined crude oil (30% of total oil consumption) as these sweet crudes are not processed at New Zealand's only oil refinery. Per-capita use of transport fuels is relatively high due to the country's low population density and the nature of the economy.
- A total of 80% of New Zealand's electricity was generated from renewable resources in 2014, mainly using hydro (57%), geothermal (16%) and wind (5%). New Zealand is on track to meet the country's target of 90% renewable electricity by 2025.
- Bioenergy, mainly as woody biomass, is used primarily in the wood processing sector as a source of process heat, but a portion is also burnt to heat private homes.

The largest opportunity for increased use of bioenergy in New Zealand is therefore as a replacement for imported fossil transport fuels, particularly diesel and aviation fuels where there are no current replacements for liquid fuels. There are also significant shorter-term opportunities to increase the use of bioenergy for commercial and industrial heat.

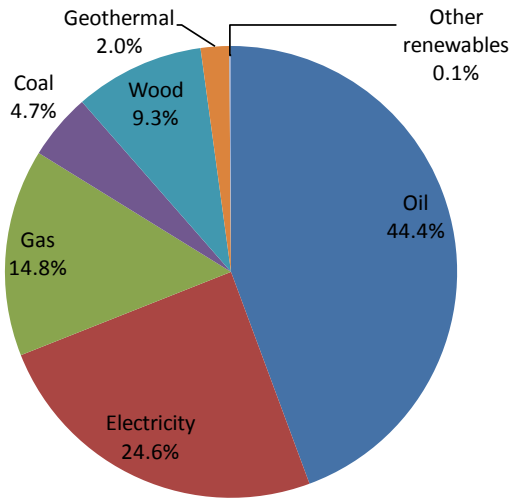

Figure 1. Consumer energy use in New Zealand in 2014 [1].

Bioenergy Feedstock Options

Wood from plantation forests is the largest biomass resource in New Zealand and also the one with the most potential to expand to allow large-scale biofuels production [2]. While existing residual biomass resources offer an attractive and potentially low-cost feedstock for biofuel production, they could only ever provide 6% of the country's total transport fuel demand, meaning purpose-grown feedstocks would be required for high levels of biofuels implementation [3].

New Zealand could sustainably supply all its transport fuel demand by 2030 from forests grown on lower productivity land [5]. There is 9.2 million ha of hill country that is either marginal land, or low to moderate productivity hill country grazing, and converting just 30% of this land to forests would be sufficient to meet the country's total transport fuel

demand while still retaining the higher-value flat land for food production. Such large-scale forestry for bioenergy will also have significant economic and environmental benefits.

New Zealand already has a well-established plantation forest estate and wood processing industry, providing a strong base to grow a future biofuel and biochemicals industry [4]. The forest estate, totalling approximately 1.73 million hectares, is composed largely of radiata pine (*Pinus radiata*, ~90%, grown on a rotation of 25-30 years) and Douglas-fir (6%, 40-45 year rotation).

New Zealand Bioenergy Strategy

The New Zealand Bioenergy Strategy, developed jointly by the New Zealand forestry and bioenergy sectors, envisions bioenergy supplying more than 25% of the country's consumer energy needs by 2040, including 30% of the country's transport fuels (Table 1) [6]. Plantation forests are seen to be the main feedstock for this expansion, building on the strong existing forestry sector, although biofuels from agricultural sourced materials, algae and municipal and industrial process residues will also be important.

A preliminary macro-economic analysis of the scenario proposed in the NZ Bioenergy Strategy has provided support for a *prima facie* case that expansion of the bioenergy sector has the potential to yield significant positive economic, environmental and social benefits for the country [7]. These benefits are significantly greater if co-products are also produced.

Table 1. Impact of implementation of the NZ Bioenergy Strategy [6,7].

Year	**Biofuels**	**Biofuels plus co-products**[a]
Bioenergy sector production (PJ)	162.3	
GHG savings (CO_2-e, m tonnes)	10.8	
Difference from Business-as-usual		
GDP (2010 $b)	6.09[b]	6.30
Trade balance (2010 $m)	1,942	2,037
Employment (000s)	27[c]	28

[a] Assumes an additional export revenue equal to 10% of bioenergy production.
[b] New Zealand's GDP in the year to December 2014 was $240 billion.
[c] Approximately 1.1% of national employment.

Support for Biofuel Production

New Zealand currently provides only limited Government incentives to encourage biofuel implementation, with neither a mandate nor any target for biofuel use in place. This may change in the future, depending on the political climate and greenhouse gas (GHG) reduction targets. Currently, fuel ethanol (including imported bioethanol) is exempt from excise duty, providing some incentive for its use in transport fuels. On top of this, the New Zealand Emissions Trading Scheme zero-rates the biofuel component of any transport fuel. In practice the latter has had little impact, due to the low prices for carbon (NZ Units) and the fact that only half of the emissions from transport fuels incur a carbon price. The New Zealand Energy Strategy, which sets the strategic direction for the energy sector, recognises biomass as a resource having considerable potential, and indicates that the Government will encourage biomass-to-energy developments [8].

Greenhouse Gas Emissions

New Zealand's GHG emissions are dominated by emissions from the agricultural (48%) and energy (39%) sectors (Fig. 2) [9]. The high proportion of emissions from the agricultural sector, mostly as methane and nitrous oxide, reflects the country's high level of agricultural production. In spite of improvements in emissions intensity, New Zealand's total greenhouse gas emissions (81 Mt CO_2-e in 2013) have increased by 21.3% over 1990 levels, while energy sector emissions have grown by 32%. This has been largely driven by strong economic and population growth.

Liquid fuel combustion emissions, driven by the transport sector, have increased by 50% over 1990 levels and are now responsible for over 55% of the total energy sector emissions [10]. Liquid transport biofuels therefore represent one of the few options to significantly reduce the country's emissions, as New Zealand already has a high proportion of renewable electricity, a growing population and almost half the country's emissions come from agriculture where ways to significantly reduce emissions without reducing production are not yet available.

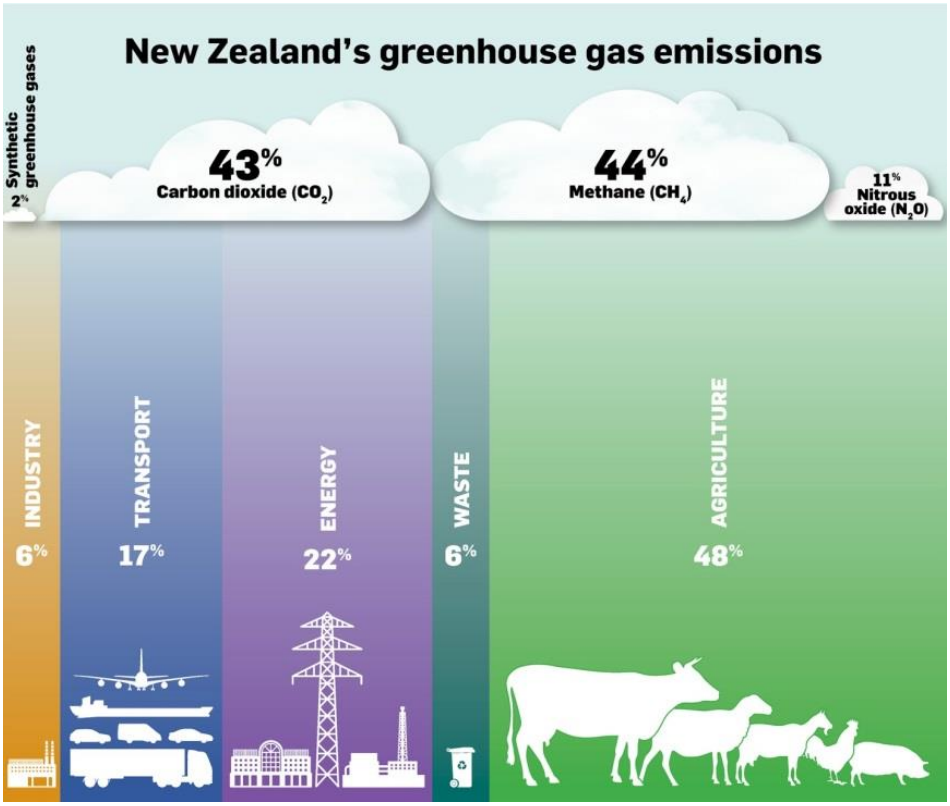

Figure 2. New Zealand's greenhouse gas emissions for 2013 [11].
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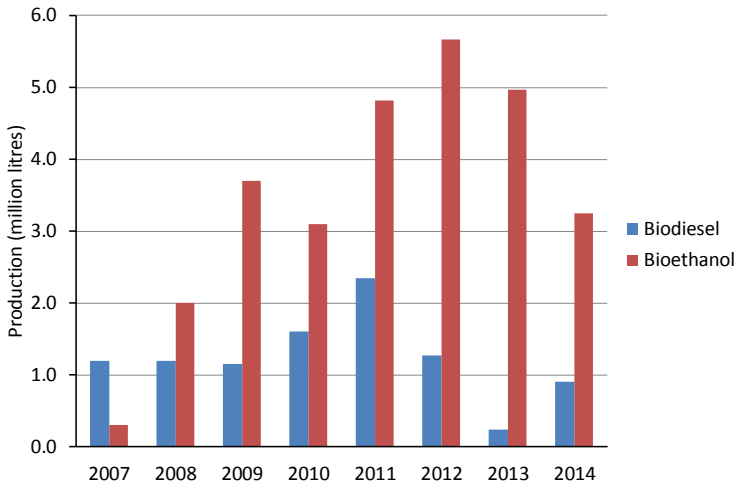
Conventional Biofuel Production

The production of conventional biofuels is already well established in New Zealand. However, biofuel use remains low compared to many other countries **(<0.1% of total transportation energy)**, reflecting the low level of Government incentives. An estimated 4.2 million litres of conventional biofuels were produced in New Zealand in 2014, mainly as ethanol from whey and biodiesel from tallow and used cooking oils (Figure 3) [1]. Total biofuel consumption was 5.7 M litres in 2014, including imports of a further 1.5 million litres of bioethanol.



Biodiesel production levels still remain well below those reached when the biodiesel grants scheme was in place, but have increased over 2013 levels. The largest current domestic producer is Green Fuels, which produces biodiesel from recycled vegetable oil [12]. Biodiesel production is set to rise further next year, with fuel distributor Z Energy constructing a 20 million litre per year plant to produce biodiesel (B100) from tallow (a by-product of the meat industry) for sale to commercial customers. It has been estimated that New Zealand produces sufficient tallow to produce up to around 5% of the country's diesel fuel needs [13].

Figure 3. Biofuel production in New Zealand. Adapted from ref. [1].

Bioethanol is currently produced by Anchor Ethanol Ltd at three dairy factories by fermentation of whey, a cheese by-product [14]. Interestingly, a local brewery has developed a process to strip ethanol from the yeast slurry, a by-product of the beer brewing process, and then distill it to produce bioethanol. This bioethanol, available in quite limited amounts, is blended with fossil petroleum to create a transport fuel marketed as "DB Export Brewtroleum" [15].

Research and Development Activity

A number of New Zealand universities and research institutes are actively involved in biofuels research as summarised below.

The **University of Auckland's** biofuels research has focussed mainly on the conversion of waste products into biofuels, including [16]:

- Upgrading of low-grade tallow and used vegetable oil to esterify the free fatty acid impurities with glycerol, making them easier to convert into biodiesel
- Development of a fast reactor for biodiesel production, capable of reducing the reaction time to a few seconds
- Production of oil and chemicals by pyrolysis of waste plastic, including using microwave pyrolysis.

The **University of Canterbury's** research has focussed on the development of thermochemical technologies to convert woody biomass to liquid biofuels [17]. This has included work on steam gasification of biomass, including development of a 100 kWth dual fluidised bed gasifier, two lab-scale reactors for removal of tars and gas contaminants from biomass gasification producer gas and construction of a micro-channel Fischer-Tropsch (FT) reactor for synthesis of liquid fuels from wood-derived producer gas. More recent research has focussed on producing high grade liquid fuels by biomass pretreatment followed by fast pyrolysis.

GNS Science is the leading earth sciences provider in New Zealand. GNS specialises in the enrichment and isolation of novel microorganisms from New Zealand's geothermal areas. Since 2007, they have focused on bioprospecting for novel cellulolytic and thermotolerant bacteria and enzymes that could be used to increase the rate of cellulose degradation, and improve biofuel production [18].

One option to produce algal biomass for use as a biofuel feedstock, potentially already economically viable today, is to grow and harvest algae produced as part of the operation of wastewater treatment pond systems. Over the last 20 years the **National Institute of Water and Atmospheric Research** (NIWA) has maintained a research program involving laboratory, pilot-scale and full-scale studies to address the major issues limiting the widespread application of wastewater algae production and biofuel conversion [19]. **NIWA** is currently operating a demonstration enhanced pond system containing two full-scale 1 ha high rate algal ponds (HRAP), and including the largest wastewater treatment HRAPs augmented with CO_2 addition in the world (Figure 4). This system will enable actual measurement of the hydrodynamics of hectare-scale ponds, demonstrate the performance improvements with CO_2 addition and provide large quantities of algal biomass for further algal biofuels research, currently being conducted in collaboration with The University of Auckland.

Figure 4. NIWA's demonstration-scale high rate algal pond system at Cambridge.

Scion is a Government-owned research institute, focussed on improving the international competitiveness of the New Zealand forest industry and building a stronger biobased economy. This includes a range of bioenergy and biorefinery research and development activities across the whole value chain from resource establishment through to product development. Areas of focus include [20]:

- Biochemical routes for converting softwoods to biofuels and chemicals, focussing particularly on pretreatment, saccharification and fermentation of the resultant sugars to biochemicals and bioplastics
- Thermochemical technologies for converting wood to liquid fuels and chemicals
- Wood-based biorefinery co-products – extractives, lignin and hemicelluloses
- Woody biomass feedstock supply and growing plantation forests for energy production
- Defining the best options for biofuel deployment in New Zealand
- Opportunities to integrate bioenergy production into existing wood processing sites, including synergies between geothermal energy and wood processing. In this case Scion is collaborating with the University of Waikato and GNS Science.

Commercial Developments

LanzaTech, founded in 2005 in New Zealand, has developed a gaseous feedstock-based fermentation process to take carbon-rich waste gases (containing carbon monoxide, carbon dioxide and/or hydrogen) from sources like steel mill chimneys and convert them into biofuels like ethanol or green chemicals like 2,3-butanediol [21]. They have successfully scaled up their gas feedstock fermentation process from the laboratory through a pilot plant at the Glenbrook Steel Mill south of Auckland, on to two pre-commercial scale demonstration plants (100,000 gal/yr ethanol) in China, and are now looking to build their first commercial-scale ethanol plant in China. The company has recently relocated to Chicago in the United States.

Alternative Energy Solutions has a demonstration pyrolysis plant which turns waste wood into bio-oil and biochar [22]. This company proposes building small bio-oil plants near to where waste wood is produced, cutting transport costs and providing distributed power for rural and provincial communities. **CarbonScape** [23] has developed a technology that uses microwave heating of waste biomass such as sawdust to produce activated carbon products suitable for adsorbent applications or steel-making, together with a bio-oil targeted towards end uses such as heating

and higher value pharmaceutical and cosmetic products. Christchurch company **Solvent Rescue Ltd** [24] has developed processes for producing crude oils via hydrothermal liquefaction of a range of biomass sources including fresh water algae, wood, wool-scouring waste and treated wood waste after first removing the wood treatment chemicals (copper, chrome and arsenic) [25].

Newsprint manufacturer **Norske Skog** and fuel distributor **Z Energy** have recently completed their Stump to Pump study to determine the technical and commercial feasibility of establishing a business in New Zealand to convert forest waste into a sustainable liquid transport fuel biofuels [26]. The partners concluded that sufficient forestry residues exist to support such an industry and that a technically feasible path exists to convert forestry residues to liquid fuels. However, they have put this project on hold until economic conditions for it are more favourable.

References

1. Ministry of Business, Innovation and Employment,. *Energy in New Zealand 2015*. 2015; Available from: http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/energy-in-new-zealand/Energy-in-New-Zealand-2015.pdf.
2. P. Hall, *Bioenergy options for New Zealand: Key findings from five studies.* Wiley Interdisciplinary Reviews: Energy and Environment, 2013. 2: p. 587-601.
3. P. Hall, J. Gifford, S. Saggar, D. Giltrap, V. Forgie, R. Renquist, S. Huebeck, et al. *Bioenergy options for New Zealand. A situation analysis of biomass resources and conversion technologies*. 2007. Available on request from http://www.scionresearch.com/general/publications/reports/environmental-issues.
4. New Zealand Forest Owners Association and Ministry of Primary Industries. *New Zealand plantation forest industry. Facts and figures*. 2013; Available from: http://www.nzfoa.org.nz/images/stories/pdfs/foa_facts_figures_2013.pdf.
5. P. Hall and M. Jack, *Bioenergy options for New Zealand - Analysis of large-scale bioenergy from forestry*. 2009, Scion. Available on request from http://www.scionresearch.com/general/publications/reports/environmental-issues.
6. Bioenergy Association of New Zealand, Forest Owners Association, New Zealand Farm Forestry Association, New Zealand Institute of Forestry, NZBio, Forest Industry Contractors Association, and Future Forests Research, *New Zealand Bioenergy Strategy*. 2010, Bioenergy Association of New Zealand. Available from: http://www.bioenergy.org.nz/resource/nz-bioenergy-strategy
7. G. Nana, J. Boshier, and A. Generosa. *Preliminary analysis of the economic impact of the New Zealand Bioenergy Strategy Report for Bioenergy Association of New Zealand* 2011; Available from: http://www.bioenergy.org.nz/resource/occasional-paper-16-preliminary-analysis-economic-impact-nz-bioenergy-strategy
8. Ministry of Economic Development. *Developing our energy potential. New Zealand energy strategy 2011-2021 and New Zealand energy efficiency and conservation strategy 2011-2016*. 2011; Available from: http://www.med.govt.nz/sectors-industries/energy/pdf-docs-library/energy-strategies/nz-energy-strategy-lr.pdf.
9. Ministry for the Environment. *New Zealand's greenhouse gas inventory 1990-2013 Snapshot April 2015*. 2015; Available from: http://www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990%E2%80%932013-snapshot.
10. Ministry of Business, Innovation and Employment. *Energy greenhouse gas emissions*. 2015; Available from: http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/energy-greenhouse-gas-emissions/energy-greenhouse-gas-emissions-2014.pdf.
11. Ministry for the Environment. *New Zealand's Climate Change Target*. 2015; Available from: http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/climate-change-consultation-document.pdf.
12. http://www.greenfuels.co.nz/
13. http://www.transport.govt.nz/ourwork/climatechange/biofuels/
14. https://www.fonterra.com/nz/en/About/Our+Companies/Anchor+Ethanol+Ltd
15. http://gull.nz/fuel/db-export-brewtroleum/
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23. http://carbonscape.com/
24. http://www.solventrescue.co.nz/
25. https://www.mfe.govt.nz/sites/default/files/media/Bathurst%20Chris%2004290.pdf
26. Norske Skog Tasman/Z Energy stump to pump project. Final report. 2014; Available from: http://www.mpi.govt.nz/document-vault/4975

In the News

Reports and Research

(May) NREL report on E15 and infrastructure compatibility shows the majority of installed fuel tanks across the United States can are suitable for storing E15. (Read more) (Full report)

(May) A report from the Pew Charitable Trusts looks at renewable energy investments in emerging markets, with Peru, Thailand, Vietnam, Kenya and the Ukraine in the top 5 for biofuels investment. (Read more) (full report)

(July) The United Nations Food and Agricultural Organization (UN FAO) and the Organization for Economic Co-operation and Development (OECD) published a new agricultural outlook, predicting that ethanol and biodiesel use will continue to grow over the next decade, although at a slower pace. (Read full report here)

(August) Insight Energy published a report "Biofuels for Aviation", finding that in the absence of action, emissions from EU-28 aviation will grow from 151 Mt to 405 Mt of CO_2 by 2050. This represents a 167% increase from 2005 levels. To achieve a target of 50% reduction in emissions below 2005 levels, an average annual growth rate in biofuels of approximately 13% is required starting in 2020. This translates into the production of 85 Mtoe of biojet fuel in 2050, representing 77% of projected aviation energy demand in 2050. (Full report here)

(August) The US Department of Agriculture filed GAIN reports for the European Union, Canada and Indonesia that provide an overview of these countries' and region's liquid biofuel industries. (Full reports: EU; Canada; Indonesia)

(August) The US EIA published their Short-term Energy Outlook, projecting that US ethanol production will remain near current levels for 2015 and 2016. (Read more) (Access report here)

Policy and Regulatory Developments

(May) The US EPA published its proposed renewable fuels volume obligation standards for 2014, 2015, and 2016. The volumes, as widely expected, include substantial reductions from the statutory standards in the original 2007 Energy Independence & Security Act. (Read more) EPA intends to take final action on this proposal by November 30, 2015.

(June) The US Environmental Protection Agency (EPA) is working with the International Civil Aviation Organization to develop regulations for aviation-related GHG emissions. (Read more) (EPA announcement here)

(June) Iowa introduced a tax exemption of 3 cents per gallon for blends of at least 11% biodiesel. (Read more)

(July) UN FAO Director General Jose Graziano da Silva wrote an analysis in an Ethiopian newspaper promoting the need to produce both food and fuel, calling the alleged competition between the two a "false dichotomy". (Read more)

(July) The United States Senate Finance Committee passed a tax extenders package that includes two-year extensions of tax credits for biodiesel, renewable diesel and cellulosic biofuels. The next step for the legislation is consideration by the full Senate. (Read more)

(July) Spain's government announced a plan to reach 8.5% blending of biofuels by 2020, a level that falls short of the EU RED's 10% mandate. (Read more)

(July) EU Ministers officially approved new rules to address indirect land use change (ILUC) impacts associated with biofuels. The new rules enable Member States to introduce national sub-targets for advanced biofuels and obligate the European Commission to provide a methodological basis for identifying low-ILUC risk biofuels. The package also introduces a range of multiple counting factors for advanced biofuels and renewable electricity. (Read more)

(August) USDA Secretary Tom Vilsack announced $63 million in loans and grants for 264 renewable energy and energy efficiency projects nationwide that USDA is supporting through its Rural Energy for America Program. (Read more)

(August) India announced an E10 blending mandate starting in October. (Read more)

(August) In Thailand, a new B7 mandate came into effect in August. (Read more)

(August) Low oil prices are forcing South Africa to change its biofuels policy subsidy system. (Read more)

Industry News

(June 3) Alaska Airlines is teaming up with the Northwest Advanced Renewables Alliance (NARA) to advance production and use of alternative biojet fuel made from forest residuals. Gevo will provide isobutanol made from wood waste, which will then be converted to biojet fuel by the NARA team and its many partners. Alaska Airlines intends to fly a demonstration flight next year using 1,000 gallons of this alternative aviation biofuel. (Read more)

(June) In California, United Airlines announced that AltAir Fuels will begin regularly scheduled deliveries of sustainable biojet fuel to United Airlines LAX operations this year. United will purchase up to 15 million gallons of sustainable aviation biofuel from AltAir over a three-year period, with the option to purchase more. (Read more)

(June) United Airlines invested $30 million in Fulcrum Bioenergy, Inc., and will have the option to directly participate in Fulcrum's waste-to-jet fuel plants across North America. United will also have the opportunity to purchase 90 million gallons per year of Fulcrum's cost-competitive, sustainable jet fuel under long-term offtake agreements, subject to availability. This represents the biggest strategic partnership in the biofuels and aviation industries and Fulcrum's second direct investment by an airline (Cathay Pacific has previously invested). (Read more)

(July) San Francisco's mayor announced that the city will phase out petroleum diesel use in the municipal fleet and replace it with renewable diesel by the end of this year. (Read more)

(July) In the US, renewable biofuels company Red Rock Biofuels says it will produce approximately 3 million gallons a year of renewable jet fuel for FedEx. Red Rock's first biorefinery, funded in part by a $70 million (€63.7 million) Title III DPA grant from the US Departments of Agriculture, Energy and Navy, is scheduled to break ground later this year in Lakeview, Oregon, and will convert approximately 140,000 tonnes of woody biomass into 15 million gallons per year of renewable jet, diesel and naphtha biofuels. (Read more)

(July) Portugal-based IncBio, an engineering company specialising in fully automated industrial ultrasonic biodiesel plants, has secured an agreement to design and build a 75,000 tonne per year biodiesel plant for Biocosta Green Energy in Santa Marta, Colombia. The facility will produce biodiesel directly from crude palm oil blended with palm acid oil and palm fatty acid distillate (PFAD) up to a total of 25% FFA. (Read more)

(July) DuPont and Jilin Province New Tianlong Industry (NTL) have a licensing agreement to begin developing China's largest cellulosic ethanol manufacturing plant, to be located in Siping City, Jilin Province, China. (Read more)

(July) Boeing and Japanese aviation industry stakeholders have charted a course to develop sustainable aviation biofuel for flights during the 2020 Olympic and Paralympic Games in Tokyo. The Initiatives for Next Generation Aviation Fuels (INAF) – a consortium of 46 organisations including Boeing, All Nippon Airways (ANA), Japan Airlines, Nippon Cargo Airlines, Japan's government and the University of Tokyo – laid out a five-year 'roadmap' to develop biofuel by 2020 as a way to reduce aviation's environmental footprint. (Read more)

(July) Carbon recycling company LanzaTech has entered into a letter of intent with steel and mining company ArcelorMittal, and Primetals Technologies, a technology and service provider to the iron and steel industry, for the

construction of Europe's first-ever commercial scale production facility to produce bioethanol from waste gases generated during steelmaking. (Read more)

(July) Green3Power won an award to build a $175 Million renewable energy facility to convert waste into ultra-low sulfur synthetic green No. 2 diesel fuel using G3P's exclusively licensed gasification technology and Fischer-Tropsch synthesis. (Read more)

(July) UPS has agreed to purchase up to 46 million gallons of renewable fuels over the next three years from Neste, REG and Solazyme, which will make UPS one of the largest users of renewable diesel in the world. (Read more)

(July 27) Bank of America (BoA) pledged to increase its low carbon environmental business from $50 billion to $125 billion (appr. €45 billion to €112.5 billion) by 2025 through lending, investing, capital raising, advisory services, and developing financing solutions for clients around the world. (Read more)

(July 27) Brazilian President Dilma Rousseff launched commercialization of Iogen's cellulosic ethanol technology at the July 22 official opening of Raízen`s newly expanded Costa Pinto sugar cane mill in Piracicaba, São Paulo, Brazil. (Read more)

(July 31) The U.S. Department of Energy announced it is soliciting applications for up to $4 billion in loan guarantees to support renewable energy and energy efficiency projects located in the U.S. that avoid, reduce, or sequester greenhouse gases, including projects to produce drop-in biofuels. (Read more)

(August 4) The use of biofuels in the EU increased by 6.1% in 2014. Biodiesel represented 79.7% of biofuels consumption, and bioethanol 19.1%, on an energy content basis. (Read more)

(August 12) In Florida, Alliance BioEnergy Plus Inc. announced it has entered into a non-exclusive development agreement with Renewable Resources Development of America LLC for the construction and operation of up to 56 cellulose conversion plants both domestically and abroad utilizing the company's licensed, patented CTS technology. (Read more) The CTS (cellulose to sugars) technology is a patented dry, mechanical/chemical process for producing sugars from cellulosic feedstocks. (more here) The first commercial CTS plant is to be located in central Georgia, with construction expected to break ground later this year.

(August 17) Propel Fuels in California has increased their renewable diesel sales 15X since replacing their B20 blend with 100% renewable diesel (Diesel HPR), sourced from Neste (98% NEXBTL diesel), that meets the standard for ultra-low sulfur diesel. (Read more)

(August 17) In Indonesia, Golden Agri Resources is set to invest $150 million in two biodiesel facilities that could be online by next year. (Read more)

(August 17) Chinese ethanol imports for the first half of 2015 were double those in 2014. (Read more)
(August 23) In Iowa, Renewable Energy Group (REG) completed its acquisition of Imperium Renewables' assets, paying $15.0 million in cash and issuing 1.675 million shares of REG common stock in exchange for substantially all of Imperium's assets, including its 100-million gallon per year nameplate biodiesel refinery and terminal at the Port of Grays Harbor, WA. (Read more)

(August 24) In July, consumption of hydrous ethanol in Brazil increased by 53% compared with July 2014. (Read more)

(August 24) Gevo and Butamax entered into a worldwide patent cross-licencing and settlement agreement, ending their patent dispute and accelerating development of a competitive supply of bio-based isobutanol. (Read more)

Upcoming Meetings & Conferences

Advanced Biofuels – For Aviation, Maritime and Land Transport
16-17 September, Stockholm, Sweden
5th International Conference on Lignocellulosic Ethanol (ICLE) 2015
15-17 September, Brussels, Belgium
8th Biofuels International Conference
22-24 September, Porto, Portugal
Drop-In Biofuels: International Conference on Microbial Hydrocarbon Production
25-27 October, Frankfurt/Main, Germany
National Advanced Biofuels Conference & Expo.
26-28 October, Omaha, Nebraska, USA
IEA Bioenergy Conference 2015
27-28 October, Berlin, Germany
Recent Advances in Fermentation Technology
8-11 November, Clearwater Beach, Florida, USA
AIChE Annual Meeting 2015
8-13 November, Salt Lake City, Utah, USA
Congress on Biorefineries 2015
23-25 November, Concepcion, Chile

For more events visit www.task39.org

IEA Bioenergy Task 39 Meetings

The following is an abbreviated tentative schedule of Task 39 events and meetings planned over the next 9 months. Please contact us for more detailed information:

- 2015 October 25-28 Berlin: Formal Task 39 business meeting (Oct. 25, 26) and presentations at the "end of triennium" IEA Bioenergy Conference 2015 (Oct. 27-28).