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## New Zealand

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## New Zealand Biofuel Report

### Report Categories:

Bio-Fuels

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### Report Highlights:

Given New Zealand's forestry resource, it has significant potential to develop cellulosic biofuels. The New Zealand Government has prioritized the commercial development of cellulosic biofuels and has focused research and development funding on achieving this goal. New Zealand's topography is predominantly hilly or mountainous, which limits its capacity to grow first generation biofuel crops. Existing ethanol production is primarily from whey, a byproduct of the dairy industry, and biodiesel production is from tallow, a byproduct of the livestock industry.

### General Information:

### Author Defined:

### Situation and Outlook

Recent studies by Scion, a forestry crown research institute, show that New Zealand has the capacity to produce

sufficient forest-based woody biomass on marginal lands to replace most of its oil-based transport fuels. Much of Scion's research focuses on lignocellulosics and it has several programs underway in advancing lignocellulosic biofuels as a commercially viable fuel.

A major initiative is the New Zealand Lignocellulosic Biofuel Initiative (NZLBI), which aims to develop a bioethanol pilot plant based on New Zealand's softwood feedstock. NZLBI is a partnership that involves two crown research institutes, Scion and AgResearch, a leading pulp and paper producer Carter Holt Harvey, and a U.S.-based specialty enzyme company, Verenium Incorporated. AgResearch and Scion are also working with numerous other U.S. partners including ArborGen, Oakride Laboratory, Sandia and Lawrence Livermore National Laboratory.

In talks in Washington DC in May 2009, New Zealand Government representatives proposed developing a joint research program between New Zealand and the United States to expedite the deployment of cellulosic liquid biofuels. The next meeting of the United States – New Zealand Science and Technology Cooperation Agreement is scheduled to be held in New Zealand in December 2009. New Zealand has suggested holding a parallel summit on biofuels to initiate a joint research program.

In May 2009, the New Zealand Government announced a NZ \$36 million grant program for biodiesel production to help kick start the industry. The program will make grants available to domestic biodiesel producers selling their product for a range of end uses. Under the first year, the program will provide grants of up to NZ \$9 million, up to NZ \$12 million in the second year, and up to NZ \$15 million in the third year at a maximum rate of 42.5 cents per liter of biodiesel. Some biodiesel is already produced in New Zealand from waste cooking oil, tallow and rapeseed. It is used for vehicles, fishing fleets and boilers.

The announcement follows a decision by the new National-led Government to rescind legislation, passed in February 2007 by the former Labour-led Government, which would have required oil companies to blend a minimum percentage of their gasoline and diesel with biofuels. In December 2008, the new Minister of Energy, Gerry Brownlee, a member of the new National-led Government, announced that he had tabled a bill in Parliament that would repeal the requirement. One of the primary reasons given for dropping the sales obligation was the inability to guarantee the sustainability of biofuels, especially those that might be imported. There is ongoing work in New Zealand to develop a sustainability standard for biofuels.

The grants, which will commence at the beginning July 2009, will be available for domestically produced biodiesel sold to New Zealand consumers. In order to qualify for the grant, biodiesel producers must produce a biodiesel product that meets the government's fuel quality specifications that apply to all engine fuels. However the feedstock materials may be imported and, at this stage, there are no rules or regulations regarding the sustainability of imported or local feedstocks under the new biodiesel grant scheme.

According to industry analysts, biodiesel production and utilization in New Zealand will result in an estimated 50 to 90% reduction in greenhouse gas emissions relative to conventional diesel fuel.

The Energy Efficiency and Conservation Authority (EECA) is developing a voluntary biofuel reporting scheme which should be operational by December 2009 and is encouraging as many biofuel producers as possible to participate in the scheme.

The Ministry of Transport (MoT) has been testing cars/vehicles of various makes/ages to determine what blends of biofuels are compatible and under what conditions. This testing has focused on ethanol corrosion of fuel line components and corrosion of aluminum alloy engine components. New Zealand has a relatively aged fleet compared to many northern hemisphere or western countries which comprises a large number of pre-used imports from Japan.

## **Size of biofuel market**

The size of the transport fuel market in New Zealand is approximately 6.3 billion liters. This includes approximately

3.4 billion liters of petrol and 2.9 billion liters of diesel. Total biofuel usage in New Zealand is in the region of 6 to 8 million liters per annum. Two major fuel distributors are now retailing bio-ethanol and bio-diesel blends, of which, approximately 80% is ethanol.

Biofuel blends were not commercially available in New Zealand until August 2007 when Gull Petroleum started offering E10 (10% ethanol and 90% gasoline). In addition to Gull Petroleum, Mobil is now distributing bio-fuels through ten sites, with its biofuels reportedly sourced from Chile. Mobil is also sourcing tallow-based biodiesel domestically and running a trial selling B5 at two sites on the North Island. While still small, the market is growing fairly rapidly.

## Overview of biofuel companies

In response to growing, seven producers formed the New Zealand Biofuels Manufacturers Association (NZBMA) in 2008. The members of the group are Argent Energy New Zealand, Biodiesel New Zealand, Biodiesel Oils NZ, Ecodiesel, Biodiesel Australasia, Flo-Dry Engineering and Aquaflow Bionomic.

Biodiesel NZ Ltd. is a wholly owned subsidiary of Solid Energy, which is the state-owned coal mining company based in Christchurch on the South Island. It produces biofuels from used vegetable oil collected from restaurants and food processors throughout the country and from locally grown oilseed rape crops (OSR). It produces approximately 20,000 liters per week, nearly all from used cooking oil, but the company has upgraded its OSR handling facilities and is currently expanding plant capacity. Their long term objective is to ramp up production to **70 million liters** per annum by 2011. Some industry observers question the profitability of OSR given current diesel prices. However, it is generally believed that OSR is a high quality feed stock that, when blended with tallow based biodiesel, will lower the cloud point temperature making the fuel more cold tolerant. [An independent report](#), by CRL Energy, shows that biodiesel from locally grown OSR is sustainable, emitting around 50% less carbon dioxide over its life cycle than mineral diesel.

BioDiesel Oils NZ Ltd., which produces tallow based biodiesel at a pilot plant in Auckland, had planned to build a commercial plant in the Waikato but has shelved the project. The pilot plant had been used to trial several feedstocks and develop the processes involved. The company is now looking at the potential for exporting the process.

Ecodiesel Ltd., an Auckland-based company, still operates a pilot plant using tallow as the feedstock. Last year, it announced intentions to build a commercial-sized factory. The factory hasn't been completed yet but the company says the plant will be finished by the end of the year. They have been running a trial with NZ Rail (the National rail freight coy) using B5 diesel.

Anchor Ethanol, a subsidiary of the dairy cooperative Fonterra, is producing ethanol from whey, which it sells to Gull, a fuel distribution company. However, supply is limited because of the ability to achieve higher returns using whey as a beverage ingredient or as an ingredient for pharmaceuticals. Anchor Ethanol has a production facility on the North Island, and the E10 blends are distributed to 35 Gull fuel outlets in the upper North Island.

## Biofuel research

New Zealand's topography is predominantly hilly or mountainous, which limits its capacity to grow first generation bio-fuels crops without displacing either food production crops or dairy land. However, New Zealand has a range of bioenergy options available that could provide a meaningful contribution to the nation's energy future, the most significant of which is woody biomass from purpose-grown forests. In New Zealand, it is generally thought that biomass from forests, including purpose grown forests, present fewer environmental concerns than intensive cropping of arable land as forests do not require intensive fertilization, irrigation or cause nutrient rich run-off.

Currently, all of the available biomass residues combined would only meet about 10% of New Zealand's energy demand. However, according to Scion's Bio Energy Options report, there is the potential for New Zealand to meet its liquid fuel demand by growing medium- to long-rotation forests in steep hill country terrain that not well suited to agricultural production or livestock grazing. Reportedly New Zealand has at least 830,000 hectares of marginal, low producing pasture land (mostly hilly terrain) that could be cost effectively used for forestry. Some estimates put the available land area as high as 3.0 million hectares. A forest estate of approximately 2.5 to 2.7 million hectares could meet most of New Zealand's liquid fuel demand, which many believe is achievable based on the amount of marginal and lower quality grazing land available. However, additional research is required on a range of conversion technologies to improve their economic viability. Scion has active engagement with several U.S. partners. (Browse to <http://www.scionresearch.com/bioenergy+report.aspx> for the full report).

LanzaTech, a New Zealand based biotechnology research and development company, has been working to develop a technology to use microbes to convert carbon monoxide and other industrial gases into ethanol. It is also developing technology for gasification of biomass then via fermentation to make ethanol. Lanzatech is reportedly working with Range Fuels in Colorado.

Research into the use of algae as feedstock is ongoing at NIWA, a crown research institute, and Aquaflow Bionomics, a privately owned commercial company. Marlborough's Aquaflow Bionomics claims to be the first in the world to commercially produce bio-diesel from algae sourced from sewage ponds.

Oilseed crops are being evaluated in the Lincoln University Biodiesel Program.

Among the temperate exotic species being evaluated are: Brassica juncea (brown mustard); Camelina sativa (false flax); Euphorbia lathyris (Caper spurge); Limnanthus alba (meadowfoam); Echium plantagineum E. vulgare (Pattersons Curse, Viper's bugloss); and Thlaspi arvense (penny cress). A native species Euphorbia gluaca (sea spurge) is also being assessed for its potential.

The Center for Energy Research was established at Massey University in 1996 and has amassed 25 plus years of energy research focusing primarily in the areas of bio-energy and biofuels; energy, climate and development; energy efficiency; energy planning; greenhouse gas mitigation; hydrogen-energy; and renewable and distributed energy. There are research collaborations with the following institutions: CSIRO, EECA, FAO, IEA, IPCC, IPHE, IEA/LBNL (US DOE), ITS/STEPS (UC DAVIS), Murdoch U., NERI, RMI, SEI-US, and WREN.

Pure Power Global, an Asian-based company with interests in New Zealand, is looking to develop a second generation ligno-chemical process using short rotation using willows as the feedstock. The willows would be grown on marginal but flat or gently rolling land in order to be machine harvested.

Taharoa C Block, a Maori company, is aiming to develop a biofuel production business using miscanthus grass as the feedstock. It hopes to partner with a specialist lingo-cellulosic to bio-fuel producer to build a facility. At the moment it has 30,000 Miscanthus plants in a greenhouse in New Zealand.

### **Energy Development Island Nations (EDIN) Project**

The United States and New Zealand have joined forces in the EDIN project, an initiative to further the development of energy efficient and renewable energy technologies on island nations and territories. The initiative is intended to enhance global energy security and address global climate change through the promotion of clean, renewable, sustainable energy technologies. The goal of EDIN is to achieve deployment of the maximum amount of renewable energy and energy efficiency possible for specific, measurable clean energy targets, such as providing 70 percent of primary energy from clean energy sources within one generation. EDIN partners will also work to facilitate the dissemination of clean energy technologies to less-developed island nations and territories. Additional information is available from the [Office of Energy Efficiency and Renewable Energy](#).

### **Appendix One: Useful Websites**

**Biodiesel Grants Announcement**

<http://www.beehive.govt.nz/release/budget+2009+gerry+brownlee+-+biodiesel+boost>  
<http://www.thebioenergysite.com/news/3751/biodiesel-boost-announced-by-government>

**Bio Energy Association of NZ**

<http://www.bioenergy.org.nz/>

**Biodiesel Grants Scheme**

<http://www.eeca.govt.nz/node/3056>

**Bioenergy Options Report**

<http://www.scionresearch.com/bioenergy+report.aspx>