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Bio-Fuels

Bio-Fuel Developments in New Zealand

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Approved by:
Laura G. Scandurra
U.S. Embassy

Prepared by:
David E.Lee-Jones

Report Highlights:
In February 2007, the New Zealand Government announced the Biofuels Bill, which sets biofuel sales obligations for oil companies. The sales obligations require New Zealand's oil companies to combine biofuels, both ethanol and biodiesel, with petrol and diesel to make up 3.4 percent of their sales by 2012. Oil companies will likely initially satisfy their sales obligations with imported biofuels. However, some biofuel producers operating in New Zealand are expanding their capacity. At this stage, most biofuels in New Zealand are made from by-products of the meat and dairy industries.

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Table of Contents:

Executive Summary

In February 2007, the New Zealand Government announced the Biofuels Bill, which implements sales obligations for biofuels. These obligations require biofuels - both ethanol and biodiesel - to make up 3.4 percent of fuel companies' sales by the year 2012. The obligation scheme was to have taken effect in April 2008, however, it has been delayed until July 2008 to give oil companies adequate time to adjust to the new requirements. The bill includes a clause that enables environmental sustainability standards to be introduced to ensure that only sustainable biofuels count toward the biofuel sales obligation.

Currently, there are four companies in New Zealand producing biofuels in relatively small quantities. Three of the companies have announced plans to ramp up production to a more significant commercial scale. However, this will take time and it is likely that the oil companies will initially, and over the medium term, import most of the required quantities, which will create opportunities to export biofuels to New Zealand.

The transport sector accounts for 40 percent of carbon dioxide emissions in New Zealand. To come to grips with the heavy emissions of greenhouse gases aircraft produce, Air New Zealand, which is majority owned by the New Zealand Government, is planning the world's first airline flight using biofuel. The airline says the flight could take place by late 2008 or early 2009.

Gull was the first oil company in New Zealand to launch the first commercially available biofuel for New Zealand motorists. Gull's FORCE 10 fuel is a blend of 10 percent bioethanol, which is produced at Anchor Ethanol, a subsidiary of Fonterra, at their Reporoa distillery. The fuel is then blended at Gull's Mount Maunganui terminal.

Energy security is a high priority issue among APEC members and promoting the production and use of biofuels is seen as one way of ensuring energy security. New Zealand is involved with the biofuels task force within APEC, which is developing quality specifications for biodiesel and biofuel blends.

New Zealand experts are also involved with sustainable energy initiatives in the Pacific region. One such initiative is working with the Vanuatu Government on a project to use copra from coconut trees to produce biodiesel.

Government Mandated Sales Obligations

In February 2007, the New Zealand Government announced the Biofuels Bill, which implements sales obligations for bio-fuels. These sales obligations apply to firms that first purchase or obtain petrol or diesel from a New Zealand manufacturer or that import petrol or diesel directly from overseas, such as BP, Caltex, Gull Petroleum, Mobil and Shell.

The obligations require a percentage of the petrol and diesel sold to be biofuels. As shown in the table below, the requirement will begin at 0.53 percent in 2008 and increase to 3.4 percent by the year 2012.

The sales obligation was to have commenced in April 2008, however, it has been delayed until July 2008 in order to have the legislation and regulations completed and in place, and to give companies adequate time to adjust to the new scheme. To ensure that companies meet the obligation, there will be financial penalties for non-compliance. The New Zealand Ministry of Economic Development will administer the obligations.

Mandatory Sales Targets for All Fuel Sales in New Zealand

Year	2008 [1]	2009	2010	2011	2012
Obligation percentage [2]	0.53	1.06	1.67	3.35	3.4

[1] 2008 will be a partial year: July 1, 2008 to December 31, 2008. All other years are calendar years.
[2] The obligation percentage is a percentage of the previous year's fuel sales.

Industry and government contacts report that New Zealand oil companies will most likely rely on imported ethanol or biodiesel to satisfy their sales obligations - at least initially. It is likely that New Zealand oil companies will source the cheapest possible biofuel to satisfy the sales obligation. At the moment, it would appear that palm oil from Southeast Asia or sugar cane ethanol from Brazil are the top candidates for import unless the proposed legislation precludes some feed stocks on a sustainability basis.

Ethanol has no excise tax when imported or manufactured in New Zealand, unlike mineral fuels which are taxed at NZD 0.42 cents per liter (USD 0.33cents).

Sustainability Issues

The New Zealand Government has set a goal of becoming an environmentally sustainable country. One of the major initiatives is the development of the New Zealand Energy Strategy, which sets out the vision for a sustainable energy system for New Zealand within which renewable energy plays a critical role. As one of the suite of policy initiatives in the New Zealand Energy Strategy, the Government is committed to encouraging the uptake of biofuels as an alternative transport fuel.

The discussion document that the New Zealand Government circulated on the Biofuels Bill in late 2007 touched on sustainability noting that "the Government is keen to see that only sustainably produced bio-fuels are supplied to the New Zealand market, so as not to create a new environmental problem as we fix another. There are legitimate concerns that some

biofuel production causes the destruction of rainforests, causing greenhouse gas emissions and the loss of biodiversity, or competes unduly with food production." However, the actual proposed standards were silent on which feed stocks were acceptable from a carbon balance and sustainability point of view. The New Zealand Green Party has since introduced an amendment to the Biofuel Bill that, through the introduction of a sustainability standard, requires biofuels to demonstrate that they do not impact on the food supply and/or the environment. The amendment is currently before the house and should be taken up by the Parliamentary Select Committee in April 2008. The issues around deforestation are expected to be reasonably easy to define. The line is more difficult to draw around what constitutes undue competition with food production. Sugar conversion to ethanol, for example, is seen by most people to be acceptable, but some grain and seed-based biofuels are less so.

One of the concerns raised in the New Zealand parliament is the ability of New Zealand companies to source sustainably produced biofuels. A concern expressed in New Zealand is that much of the biofuel being produced is barely carbon neutral, or in some cases, carbon positive, and is having negative impacts on the environment such as the destruction of rainforests and animal habitats.

Quality Standards

Officials are now developing recommendations for the amendment of the Petroleum Products Specifications Regulations to cover biodiesel and ethanol quality. The regulations are expected to be in force by the middle of 2008. Where appropriate, biofuels will be required to be labeled so that consumers are suitably informed.

Overview of the Biofuel Industry in New Zealand

There are four companies producing biofuels in New Zealand but taken together, they are still not producing enough fuel to satisfy the mandated sales obligations. The four companies are Anchor Ethanol, BioDiesel Oils NZ Ltd., Ecodiesel Ltd., and Biodiesel New Zealand Ltd.

Anchor Ethanol, a subsidiary of Fonterra, is producing ethanol from whey. However, most of its production is exported either as a beverage ingredient or as an ingredient for pharmaceuticals.

BioDiesel Oils NZ Ltd. produces biodiesel from tallow at a pilot plant in Auckland. The company is building a new plant in the Waikato area of the North Island with the capacity to produce 60 million liters of biodiesel per year. It is expected that the plant will use 60,000 tons of tallow per year. The company has also announced plans to build a second plant of a similar size somewhere in the South Island. The company expects to sell biodiesel to New Zealand's major oil companies and potentially plans to export to Australia and Europe.

Ecodiesel Limited, an Auckland-based company, is building a factory with an initial capacity to produce up to 20 million liters of biodiesel per year. It will use tallow as its feedstock. Production is expected to increase to 40 million liters by the end of 2009. Ecodiesel's process for producing bio-fuel reportedly requires less heat and less fossil fuel than other plants of similar scale.

BioDiesel New Zealand Ltd., a subsidiary of the state-owned enterprise Solid Energy Ltd., is currently producing biodiesel from waste vegetable oils but hopes to ultimately produce biodiesel from rape seed oil. At the moment, it has plantings of 1,200 hectares of canola, which it hopes to expand to at least 5,000 to 6,000 hectares.

New Zealand's meat processing industry is estimated to produce approximately 140,000 tons of tallow each year. Approximately 20,000 tons is used domestically and 120,000 tons is exported. The majority of the exported tallow is bound for China where it is used in pharmaceuticals. Australian and New Zealand tallow is reportedly favored by the Chinese because it has BSE-free status. Tallow prices have doubled in the last twelve months to NZD 1,000 per ton FOB but BioDiesel Oils NZ Ltd. believes they can still make a profit at this price. If the processors that are using tallow as a feedstock produce to their capacity, they will virtually use all the tallow that is produced in New Zealand.

According to the Institute for Resource Efficient and Sustainable Systems, biodiesel made from tallow has the lowest environmental footprint or Sustainable Process Index (SPI) of any biodiesel. However, an issue with the use of tallow as a feedstock is the "cloud point temperature". For example, with B100 made from tallow, the paraffin constituents starts to precipitate out as a wax forming cloud (known as "hazing up") at around 15° C, versus B100 made from vegetable oil, which has a cloud point temperature of 0° C. If enough paraffin precipitates, filters or injectors could be blocked. While the manufacturers of tallow based biodiesel don't believe that this will be a problem for 5 to 10% blends, one New Zealand oil company is still not yet convinced of its reliability and wants to see more testing done before they incorporate a tallow based biodiesel in their fuel. This particular oil company is likely to import ethanol initially to satisfy its sales obligation.

For every thousand liters of biodiesel produced, one ton of tallow and approximately 300 kilograms of methanol is needed in the manufacture. Methanol is a product made from fossil fuels so it has a carbon dioxide loading effect. Alternative products to methanol are available but not used at present.

Current Fuel Usage in New Zealand and Estimated Quantities of Bio-Fuels Needed To Satisfy the Sales Obligations

	Total Transport Fuel	Petrol	Diesel
Estimated Annual Fuel Usage (Liters)	6,300,000,000	3,400,000,000	2,900,000,000
% Sales Obligation	Liters of bio-fuel needed to satisfy obligation at current usage level		
0.53%	33,390,000	18,020,000	15,370,000
1.06%	66,780,000	36,040,000	30,740,000
1.67%	105,210,000	56,780,000	48,430,000
3.35%	211,050,000	113,900,000	97,150,000
3.40%	214,200,000	115,600,000	98,600,000

Note: Of the total fuel used, 3.4% of the energy content must come from biofuel by 2012. However, each liter of fuel does not need to contain exactly 3.4% of biofuel. For example B10% diesel could be used to replace all diesel sold in NZ and satisfy the entire obligation leaving all petrol sold still a pure petroleum product. It is up to the oil companies to decide how to implement the regulation.

New Zealand Government estimates are for a 20% increase in energy consumption for transport fuel between 2005 and 2030. This equates to approximately 0.8% per year. The New Zealand Government's target for the transport sector is to be carbon neutral by 2040. This would mean that over time, all fuel needed in the transport sector would have to be sustainably produced with a neutral carbon balance.

Impact of U.S. Biodiesel Tax Credit

There is concern among some domestic manufacturers in New Zealand that the United States biodiesel tax credit of up to one U.S. dollar per gallon (on B100) will have an undue affect on the economics of actually manufacturing biodiesel in New Zealand. One domestic producer suggested that the tax credit gave imported fuel a 20% price advantage, which is difficult for domestic manufacturers to compete with. This problem seems to particularly apply to palm oil, which is reportedly transported to the United States, blended with 1% petroleum diesel, and then re-exported to a third country qualifying for a US$0.99 per gallon tax credit in the process.

However, one industry participant wasn't so concerned with the U.S. tax credit, but rather thought the factor of the potential penalties payable by the oil companies if they don't comply with the biofuel sales obligation would be of benefit to local producers of biofuel. The penalties would come into play in the 3rd year of the program (2010) and would equate to approximately NZD 0.70c/L of biodiesel not sold in 2010 and increasing to approximately NZD 0.84-0.88c/L in 2011 and to NZD 1.00-1.05c/L by 2012. This may encourage some companies to source their biodiesel domestically.

Joint U.S. – New Zealand Research on Biofuels

New Zealand Crown Research Institutes Scion and AgResearch have formed a research project with US-based Diversa Corporation. Under the project, they are coordinating their technology development initiatives to target the feasibility of a transportation biofuel industry in New Zealand that uses bio-based feedstocks such as trees and grasses. The three organizations have recently completed a preliminary study, undertaken at Scion in Rotorua and Diversa in San Diego, to investigate the potential for applying Diversa's enzymes to New Zealand-grown tree stocks to convert the wood into sugars, which can then be fermented and refined into ethanol and other products. According to Scion, the results from the preliminary study are extremely positive, which has prompted the three organizations to agree to move forward and conduct a feasibility study to further assess the technology and economics of a transportation bio-fuel industry in New Zealand.

LanzaTech, a New Zealand company and a leader in technology using bacterial fermentation to convert carbon monoxide into ethanol, announced in April 2007 that it has secured US $3.5 million in funding from Khosla Ventures, a U.S. company, and two New Zealand based investors. This funding will support further technology development, establishment of a pilot plant, and engineering work to prepare for commercial-scale ethanol production. Estimates indicate that this technology could produce 50 billion gallons of ethanol from the world's steel mills. It is also thought that the technology will contribute to the cellulosic bio-fuels business as it can convert syngas produced through gasification into ethanol.

Pacific Basin Initiatives

Victoria University in Wellington is spearheading a project to stimulate Vanuatu's cottage industry of using copra from its coconut plantations to produce biodiesel. By using the biodiesel to replace imported petroleum diesel, Vanuatu could reduce its dependence on imported fossil fuels, which account for a large proportion of GDP. In addition, by reducing fossil fuel carbon dioxide emissions, Vanuatu may be able to sell carbon credits. To date, this initiative has received a small amount of funding from the British Government, Victoria University, and the New Zealand Government. A national workshop will take place in mid February, 2008 to review progress to date on this project, develop a road map for future actions, and establish a funding strategy.

APEC and Bio-fuel Standards

APEC economies are aggressively pursuing the expansion of bio-fuel production and use. New Zealand chairs the APEC 21st Century Renewable Energy Development Initiative (Collaborative IX): Alternative Transport Fuels Policy Options for APEC Countries.