GHG reduction from transport biofuels

Introduction

In 2014, transport used 36% (256PJ) of New Zealand's energy supply and released 12.7 million tonnes of CO_2-e, which amounts to 40% of the GHG emissions from the New Zealand energy sector. Domestic fuel consumption in 2015 was: petrol (3.1 Billion litres); diesel (3.2 B litres); aviation fuels (0.33 B litres); and marine fuels (0.21 B litres). Nearly all this fossil fuel is currently imported, either as crude oil for processing at Marsden Point, or as a finished fuel.

Biofuels provide an opportunity to reduce transport sector emissions as transport moves to be a mix of electric, biofuels and fossil fuels, with each fuel type being most suited for different applications. Biofuels are particularly suited to reducing emissions in the strategically-important heavy transport, marine and aviation markets, where there are few other renewable alternatives.

Some retailed vehicle fuels already include a component of bioethanol or biodiesel and bulk purchases are available throughout New Zealand.

Currently bioethanol is produced in New Zealand from whey by Anchor Ethanol and biodiesel is manufactured by Greenfuels NZ from used cooking oil, and by Z Energy from tallow. Gull produce their biodiesel in Australia. Gull and Z energy retail bioethanol blended petrol and/or biodiesel blended diesel. Some biofuels are also imported. However, biofuels still only satisfy a small portion of New Zealand's transport fuel demand.

Biomethane, from biogas production, can also be used as a vehicle fuel, but its use as a fuel has reduced in recent years, despite it being readily available at waste water treatment plants and landfills.

Large-scale production of biofuels in New Zealand will depend on access to large volumes of biomass feedstocks. While whey, tallow, used cooking oils and agricultural wastes represent attractive feedstocks for initial deployment, quantities are limited and large-scale deployment will require purpose-grown feedstocks. For New Zealand, forests have been identified as the best feedstock option for large-scale deployment of biofuels.

There is potentially enough biomass available to kick start the production of advanced biofuels in New Zealand, particularly from increased forestry and wood processing residues. However, the development of dedicated bioenergy/biorefinery forests should enable the secure supply or low cost feedstock in the longer term.

Future opportunities using biofuels produced from woody biomass and organic waste are likely to be based on advanced biofuel technologies which produce a "drop-in" fuel which allows 100% use with some vehicle

retuning. However, advanced technologies for the conversion of woody biomass to drop-in fuels are still being developed and are not yet commercially proven. Bridging the gap between research and commercialisation (usually referred as bridging the technological "valley of death") for technologies in their pioneer status requires significant Research, Development and Demonstration (RD&D) efforts. Much of the uncertainty about the performance of new technologies can only be resolved through large-scale production, so learning during the first 3-5 years of new projects is crucial for evaluating the implemented technologies and for optimizing process parameters to drive down costs. Furthermore, the impact of different feedstocks and different feedstock production techniques on the environment and the feedstock supply chain can only be fully evaluated once production reaches a commercial scale. Early opportunities may lie in fuels for less sophisticated applications such as for larger scale engines or heat applications, even though they are competing against cheaper grades of fuel.

The extraction or production of biochemicals from biomass and organic waste, such as resins, lignin etc., could also catalyse the production of transport biofuels through the production of higher value co-products. This effectively lowers the feedstock cost for biofuel production and is expected to be a significant driver for biofuel production.

The barriers for greater investment in domestic biofuels production are the low international price of oil, low carbon price and the lack of a stable long-term package of policy measures to support investment in liquid biofuels.

National security of fuel supply risks indicate that development of the biofuels sector as a strategic contingency measure would be prudent.

This information sheet sets out what the Bioenergy Association's Liquid Biofuels Interest Group believes is achievable under a business as usual situation and under an accelerated scenario if advocated strategy and policy options are adopted.

Scenarios for Wood Energy Expansion

Scenarios

Scenarios assumed by the Bioenergy Association for growth in the production and utilisation of wood energy to reduce carbon dioxide emissions are:

Scenario 1: Business as usual

Conditions:

- Based on existing policies and market conditions. No policy changes
- Uses existing technologies and an extension of current trends
- No 'maybes'. Only realistic activities based on existing sector participant's activities.
- Assumes current ETS but 1 for 2 policy is deleted and ETS administration is improved. No significant other changes.
- Government continues low level support for biofuels R & D

Scenario 2: Encouraged Growth

Conditions:

- Government signals that it wants to encourage domestic mitigation so as to avoid the need for purchase of international units and seriously adopts some complementary measures to the ETS
- Government sets targets for a low carbon transport market.
- Government R, D & D funding increases for:
  - Advanced biofuels research (including fuels for marine and aviation applications)
  - Coproducts of the production of biofuels
  - Commercial companies to evaluate biofuel production and/or support demonstration scale facilities
- Government provides appropriate financial support to companies to invest in domestic biofuel production to develop new supply chains and deliver the technological learning required to drive down costs and reach cost competitiveness.
- Government encourages growth in the forestry sector with support for additional domestic added value processing of wood including biofuels and the coproducts.
- Government encourages use of biogas from landfill and waste water treatment plant as a transport fuel instead of generation of low value electricity
- Increased consumer education on the suitability of biofuels in existing vehicles and the development of appropriate fuel quality standards.

Aviation and international marine fuels are not considered in this analysis, even though they are nationally critical.

Analysis of two transport biofuel scenarios (Figure 2- Business as usual and Figure 3 - Accelerated) show that there can be 700-1000kt CO_2-e reduction in emissions compared to 1990 by 2040 and 1300-3500 ktCO_2-e by 2050.

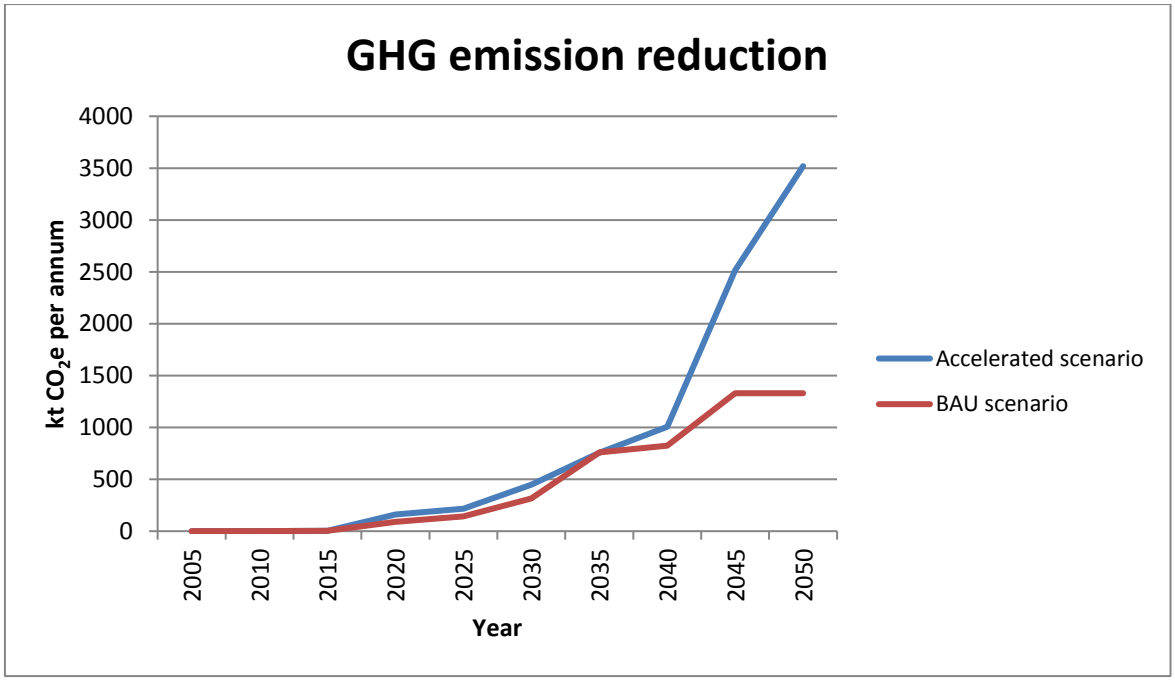

Figure 1: GHG emission reduction under business as usual and accelerated scenarios

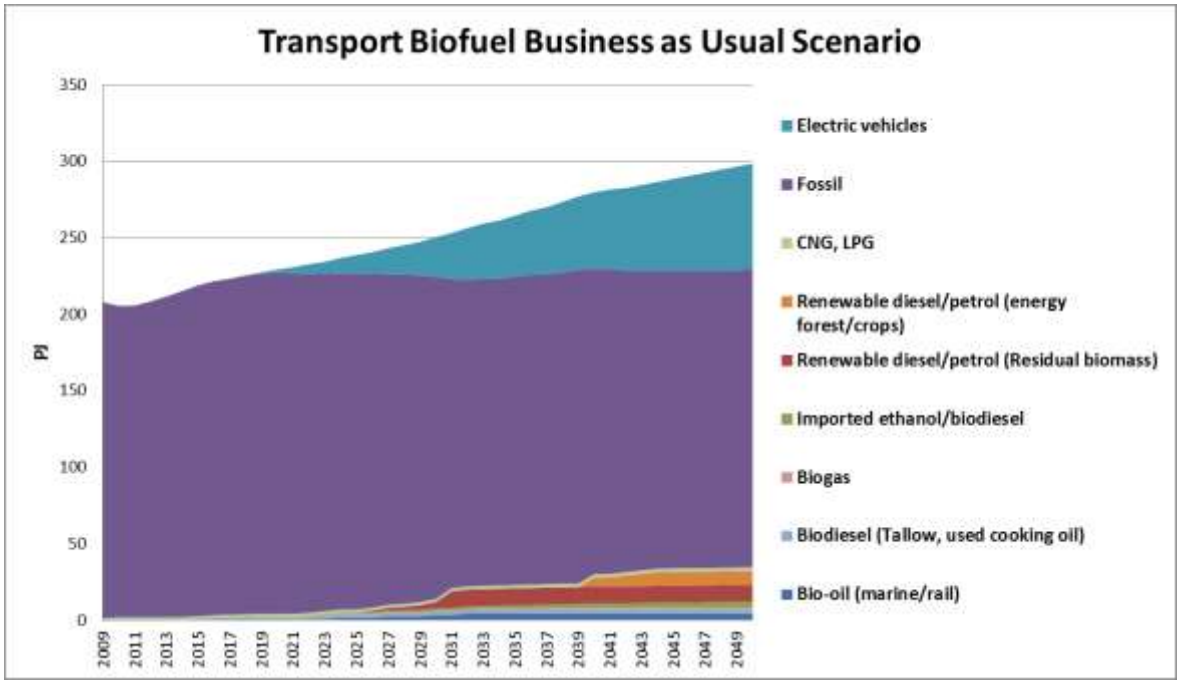

Figure 2: Business as usual scenario of annual transport biofuel production

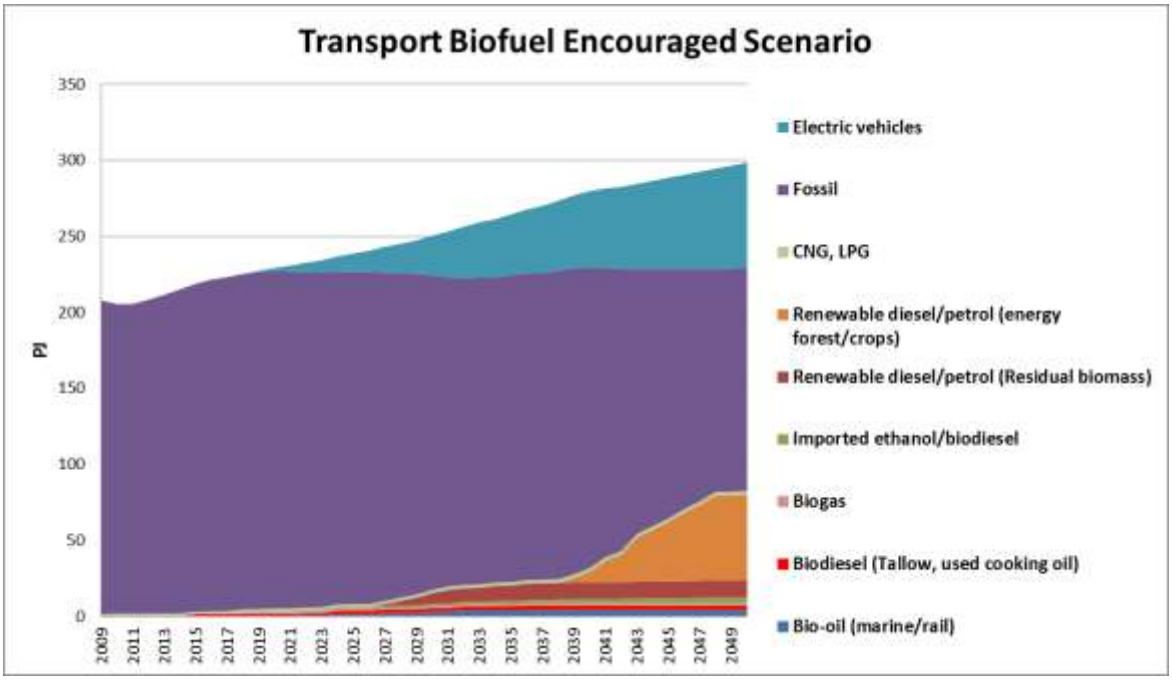

Figure 3: Encouraged scenario of annual transport biofuel production

Suggested complementary measures

The following complementary measures would encourage the production of liquid biofuels.

1. Government signals to local government and industry that it wants to encourage domestic mitigation to avoid the need for purchase of international units and emissions from export industries.

2. Government specifically support the reduction of GHG emissions in domestic industries, similar to that given to export and high growth industries. This would be supported by:
    a. Explicitly providing support to businesses engaged in GHG reduction transport activities;
    b. Providing accelerated depreciation and/or suspensory loans for capital investments resulting in greenhouse gas emission reduction;
    c. Government does an annual cost-benefit of forward offshore purchase of GHG obligations vs acquiring domestic mitigation through a capital fund which funds the public good component of transitioning low carbon transport fuels.
3. Introducing central and local government procurement policies so that renewable energy and efficient energy use options must be considered when making investment decisions and all additional benefits are included in a full life cycle analysis of options.
4. Government and Bioenergy Association agree transport targets to encourage production of transport biofuels
5. Government and industry through the Bioenergy Association develop a transport biofuel development programme based on the results of the Scion led New Zealand Biofuels Roadmap project.
6. Increase the 5% limit on biodiesel blending to 7%.
7. Government encourages additional domestic added value processing of wood with the consequence that greater volumes of high quality wood fibre are available for biomaterial and biofuel production.
8. Government R&D funding increases for:
    - Advanced liquid biofuels research having regard for the likely areas of application in NZ that will be economic over the next decade (eg targeting biofuels for industrial, marine and aviation applications, for strategic reserves and for their lower health related emissions)
    - High value bio-products where biofuels are a co-product

---ends---