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An Introduction to Bioenergy and its Interface with Forestry

The Climate Change Response (Zero Carbon) Amendment Act 2019 introduced a net zero greenhouse gas emissions reduction target by 2050. Achieving this will require significant changes to fuel use in New Zealand as fossil fuel is a major contributor to the nation's emissions. Bioenergy is an alternative form of energy that can contribute to the Government's goal. It is the most used form of renewable energy globally – bigger than hydroelectricity or wind, providing heat, electricity and fuel for transport and has the potential to create a major industry for New Zealand. But what exactly is bioenergy, and what role can forestry, in particular, play in its production in New Zealand?

Bioenergy makes use of the residues and co-products of other business and manufacturing processes. It adds value by using biomass (essentially any woody material in a forest for example, wood pellets or wood chips) and organic waste residues which otherwise would be wasted, and turning them into products that are high value and able to replace emissions intensive products in the medium to long term. Direct combustion is the most common way method for concerting biomass to useful energy. Burning biomass releases carbon monoxide, carbon dioxide, nitrogen oxides and other pollutants.

Biomass is seen as net carbon neutral as although the process of combustion releases emissions, the carbon used to grow the biomass was sequestered, meaning the atmospheric carbon was stored in vegetation, soils or woody products. This process is called biologic carbon sequestration.

Biomass in particular can be converted and used for a variety of energy uses:

- biomass to heat;
- biomass to liquid fuels; or
- biomass to electricity.

It can also be used instead of fossil fuels in transport, heat, industry and power, and construction.

We have recently assisted a number of clients in pursuing their carbon net neutrality goals by undertaking projects to replace their coal boilers to biomass systems of wood chip and wood pellet fuel. The Government announced in May 2022 that coal boilers will be removed from all New Zealand schools and replaced with renewable biomass or electric heating sources by 2025, thanks to a $10 million investment to expand the existing School Coal Boiler Replacement Programme.

The above are examples of the increasing interest we are seeing by the New Zealand public, including our clients, of reducing carbon footprints, and the value placed on alternatives to fossil fuels.

There is also a strong commercial market for biofuels, and already considerable interest from high profile organisations such as Air New Zealand and Fonterra.

The interface between Bioenergy and Forestry
(Continued)

Interface with Forestry

Large-scale bioenergy production from new plantation forests has been identified as the most promising route to meeting a large percentage of energy supply from renewable resources in New Zealand.

In the forestry sector, there is an increasing awareness of the opportunities for additional revenue from biomass that otherwise would be wasted or sold for a low financial return. Forest owners can collect logging and wood harvest residue and sell it for conversion into bioenergy (or undertake such conversions themselves if they invest in the right systems).

It is however not just forestry owners who stand to benefit. Farmers can also utilise their unproductive land (i.e. the slopes of gullies, shelterbelts and riparian strips) to grow woody plants. Commercial operators are also looking at how they can diversify their carbon removal practices. By way of example, the Zurich Insurance Group have just announced that they are partnering with three carbon removal suppliers, including Australia based InterEarth, and turning to a unique process where woody biomass is being buried to remove CO2. The “woody biomass burial method” involves growing highly adapted woody plants on degraded, low rainfall, previously cleared farmland. The biomass is then harvested, it is buried and then encapsulated in subterranean chambers. As the carbon is being sequestered and then buried, this does not release emissions like methods such as direct combustion do. This process is therefore more beneficial for the environment.

While there is a large amount of forestry plantations in New Zealand, to produce sustainable bioenergy resources the sector will need significant investment. Government support will likely be required in order to deliver the necessary large-scale investment in biomass processing. Currently the residual wood biomass in New Zealand is expensive to acquire, due to difficult terrain and transportation. It has been acknowledged by the sector that adopting low carbon standard regulations that stimulate biofuels is needed to address such issues.

The Forestry Industry Transformation Plan (**FITP**) has been established for the sector to support the Government’s objectives for a productive, sustainable and inclusive economy, and contribute to net zero emissions by 2050. The FITP's aim is to define the vision and create a set of actions for the Government and the sector to support and accelerate significant value-added activity across the forestry and wood processing value chain, and includes work to establish a biofuels industry. This will produce biocrude, liquid biofuels, and solid biofuels from the residues of trees.

Te Uru Rākau, the lead Government agency for the FITP, is developing an evidence base to support the development of the vision and action plan. This includes progressing the New Zealand Wood Fibre Futures Project with Stage 1 being published in late 2020, which identified viable wood-based alternatives to high carbon emitting products such as transport fuel, concrete, steel, and coal. The progression of the project involves developing business cases for investments in solid and liquid biofuels, and high-value wood products that can be used domestically and exported. Stage 2 of the Wood Fibre Futures Project was released in April 2022. It proposes how various types of wood processing and biofuel plants might be established in New Zealand from 2024 to 2040. The report explores how the Government might encourage investment in these plants.

Emissions Reduction Plan

Most significantly, the Government has published its long-awaited comprehensive Emissions Reduction Plan (**ERP**), on 16 May 2022 detailing the strategies and priorities for reducing greenhouse gas emissions across every part of the economy. As part of the announcement, $73 million has been allocated towards planting 10,000ha of new forests to produce biomass, in support of the New Zealand Wood Fibre Futures Project's recommendations. The ERP will:

- set out a cohesive set of actions to transform the forestry sector, grow the domestic wood processing industry and get more value from New Zealand's logs;
- Consider options to attract investment in the production of low-emissions wood products and biofuels; and
- Provide a transformation roadmap to lift value from the forestry and wood processing sector to:
  - increase wood processing and accelerate the bioeconomy;
  - lift productivity and resilience across the forestry and wood processing supply chain;
  - scale up internationally competitive wood-processing clusters; and
  - support increased use of wood in construction and improve export outcomes.

Further, the ERP includes action points to accelerate sustainable and secure supply and uptake of bioenergy in New Zealand and invest in expanding the supply of woody biomass. The Government will investigate ways to increase woody biomass supply to replace coal and other carbon intensive fuels and materials, and stimulate private sector investment. It has also promised to provide advice on diversifying forestry regimes, including alternative species, in order to develop new types of forest crops to deliver new products or woody biomass for emerging markets. These are all steps in the right direction.

Applicability of the New Zealand Emissions Trading Scheme to the Bioenergy Sector

The scope of the New Zealand Emissions Trading Scheme (**ETS**) will need to be re-considered as part of the development of the bioenergy sector. If a person carries out an industrial process which is recognised as a “removal activity” (one which causes a reduction of global warming gases in the atmosphere) under the Climate Change Response Act 2002 (**CCRA**) then that person can register with the ETS and earn New Zealand Units (**NZUs**) in proportion to the amount of Carbon Dioxide equivalent that is removed.

Currently the only relevant "removal activity" under the CCRA is the embedding of global warming gases in a product (i.e. the production of methanol). Accordingly, it appears that only a producer of biomass to liquid fuels would be eligible to register with the ETS. It remains to be seen if activities such as the 'woody biomass burial method' mentioned above would currently meet the criteria of a "removal activity" under the CCRA, or whether the legislation will evolve to capture these types of activities.

Want to know more?

We will continue to monitor the emerging bioenergy sector closely, including the Government's actions under the ERP.

In the meantime, if you have any questions about bioenergy and the role forestry can play in its production or about bioenergy products in general, please contact our specialist Carbon Trading, Emissions Trading Scheme and Climate Change Team.