Bioenergy and biofuels contribution to greenhouse gas emissions reduction and economic wellbeing

Bioenergy, biofuels and residual waste streams could provide the just transition from dependence on fossil fuels

Processing biomass and waste can build economic growth, employment and sustainability utilising New Zealand's capability and expertise in waste management, forestry, farming, wood processing and horticulture. Bioenergy and associated bio-based materials production from biomass and waste residues can lead to new business opportunities which by 2050 could more than double biomass energy supply up to 27% of the country's energy needs, with a consequential 15% reduction in greenhouse gas emissions*.

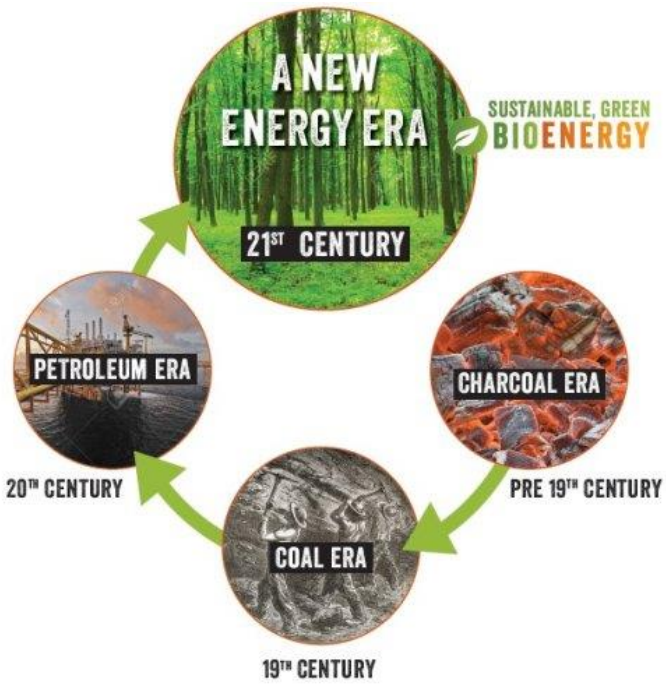
[* compared with 2017]

To achieve a low carbon NZ economy by 2050 we need a paradigm shift in both thinking and action!

Biomass processing:

- Processing biomass and residual organic waste generates revenue to offset operating costs and create a commercial return on investment for energy and non energy products
- Utilises municipal and organic waste to offset municiple treatment and landfill costs.
- Replaces fossil fuel use for electricity, heat and transport
- Generates heat for industry, processing / manufacture, civic and commercial applications
- Generates new bio-based products from processing outputs and the extraction of biochemicals
- Underpins the sustainable transition of our land use in forestry, farming and agriculture
- Underpins the economic resilence of communities and regions
- Captures and reduces greenhopuse gas emissions
- Helps meet the increasing global market demand for sustainably sourced product through circular economy principles.

The Bioenergy Association is very keen to assist Government and its consultants develop just such an implementation strategy.



Greenhouse gas emission reduction by 2050 below 2017 levels (kt CO_2-e pa)

Year	Reduction of use of fossil fuels in process heat[1, 5] (kt CO_2-e pa)	Methane reduction from waste to energy[2] (kt CO_2-e pa)	Emissions reduction from use of biofuels in transport (kt CO_2-e pa)	Total emissions reductiom (kt CO_2-e pa)
2030	700	1450	1500	3650
2040	1500	1640	3500	6640
2050	1800	1811	5000	8611

Energy increase by 2050 above 2017 levels (PJ)

Year	Reduction of use of fossil fuels in process heat (PJ)	Methane reduction from waste to energy (PJ)	Replacing fossil fuels by biofuels in transport (PJ)	Total energy increase (PJ)
2030	8	3.2	20	31.2
2040	17	3.9	48	68.9
2050	20	4.6	68	92.6

Will Only Be Achieved Through:

- A paradigm shift in thinking about how to maximise value from wood and waste processing,
- Adopting the most effective use of land, wood and residual waste to produce food, fibre, and fuel in order to ensure sustainable economies while mitigating and adapting to climate change.
- Government providing leadership and assistance to overcome market barriers.

Bioenergy and biofuels sector

1. Bioenergy has a unique point of difference from other forms of renewable energy as it contributes widely to the New Zealand economy. The use of biomass for energy (bioenergy), and as the resource for the emerging bioeconomy, provides opportunities for a fundamentally different least cost approach to achieving a low carbon economy compared with all other renewable energy forms. Biomass use and bioenergy can:
    - Substitute for all fossil fuel uses for any energy application,
    - Contribute to carbon storage (remove greenhouse gases from the atmosphere)
    - Provide significant land diversification opportunities and address environmental issues arising from land use (eg pastoral intensification and landfilling)
    - Provide many opportunities for regional economic growth and employment.
2. Focusing on use of biomass and extraction of value from waste leads to new business opportunities and improved business resilience of landowners and communities. Bioenergy is often the co-product of higher value products such as regional employment, bio-based materials and more sustainable land use.
3. Bioenergy is from a fully renewable resource, using proven technologies and has extreme flexibility. The processing of biomass can produce a wide range of revenue streams from application of heat; generation of electricty; use as transport fuel; extraction of chemicals and manufacture of bio-based materials; use as organic fertiliser; and purification of water.
4. Communities and business adopting a circular economy approach by matching local wood and waste residues as a feedstock input to the creation of products optimises the financial viability of the manufacturing; offsets costs of waste and MSW disposal; generates employment; and can form the basis of new business that supports the local economy.
5. Carbon price signals will be critical to transitioning away from fossil fuels and adapting to sustainable alternatives. The recognition and value factoring of societal benefits will assist achieving commercial and private investment partnerships to assist in the just transition.
6. Biomass processing initiatives to achieve what are often public benefits are generally highly integrated with other sectors and other activities so cross sector and all-of-government approaches are necessary.
7. Bioenergy processing could achieve greenhouse gas reductions of:
    - 1.8 Mt CO_2 -e pa from reduced use of coal and gas for process heat[1]
    - 1.8 Mt CO_2 -e pa by processing residual organic waste into energy[2]
    - 8.6 Mt CO_2 -e pa from use of biofuels in transport

    The levels of greenhouse gas reduction are potentially more cost effective than many of the other initiatives currently being considered by Government.

Process heat

8. The use of biomass fuels for process heat are proven and widely used by those with immediate access to their own biomass which can be used as a fuel.

[1] https://www.bioenergy.org.nz/documents/resource/Information-Sheets/IS48-GHG-reduction-using-wood-energy-190124.pdf
[2] https://www.bioenergy.org.nz/documents/resource/Information-Sheets/IS48-GHG-reduction-using-wood-energy.pdf

9. The market for buying and selling biomass fuel by those without immediate access to their own sources of biomass is in its infancy but now has strong foundations.
10. The biomass fuel supply chain has a number of players but like any evolving market the New Zealand biomass fuel supply market has cornerstone players who are expanding their supply capabilities at a fast but orderly rate so that boom/bust scenarios will be avoided.
11. There is potentially no reason why biomass fuel supply will be a future problem as there are many avenues for sourcing biomass such as using the 1 billion trees programme to produce a new carbon sink every 30 years by planting commercial forests. Managed shelter belts can provide additional revenue from sale of biomass fuel and improve farm business resilience. Wood processing could be intergrated at least cost with waste to energy bio-processing.
12. To achieve the Net Zero goal by 2050 will require incentives to reward early adopters and mitigate adoption risks until the ETS carbon price is over $50/t_c by 2025 and $100/t_c by 2035

Waste to energy

13. Waste-to energy is the generation of heat and electricty through processing of residual waste streams that can not otherwise be sustantiably reused or recycled, therefore diverting waste from landfill.
14. Generation of heat, electricity and repurposing of non combustibles (metal, concrete, gypsium) from residual waste streams forms part of the circular economy.
15. New Zealand can achieve zero waste to landfill by 2040 if we start seeing residual waste as an opportunity and not a problem.
16. There is opportunity to co-locate waste to energy facilities processing organic and solid residual waste streams with industrial heat users to displace the use of fossil fuel for the generation of heat and electricity.
17. For communities an ideal opportunity exists to combine bio-processing waste with the upgrade of waste water treatment plants. These upgraded plants have the ability to generate revenue to offset operating costs for local government bodies and could progressively be developed to the point of zero residual chemical discharge to water or sludge to land.
18. Diversion of waste from landfills to waste to energy facilities reduces CO_2 and methane emmissions thus improving air quality, enhancing the economic resilience of communities through reduction in waste water treatment facility costs, and reduction in landfill reliance whilst providing new offtake business opportunities through the production of electricity, heat and bio processing opportunities.
19. The technology for bio-processing waste and waste water is well developed and the footprint is smaller than for many existing sewerage processing systems, particularly those disposing to land.
20. Technology for treatment of both liquid and solid residual waste streams is well developed and accepted internationally and able to be utilised in New Zealand with minimal (if any) changes therefore mitigating technology risk.
21. Incentives such as accelerated depreciation or suspensory loans may be requred to reward early adopters and mitigate adoption risks.

Transport

22. Biofuel blends are a flexible and easily delivered renewable fuel for heavy land transport and marine engines where other renewable fuels are uneconomic or inapproriate .

23. Domestic production of biofuels from perpetually renewable natural resources will produce new employment, additional income from less productive lands, and provide future fuel supply security.
24. Storable liquid and gaseous biofuels can be used to enhance electricity security and heat demand using current proven electricty generation technologies.
25. Processing biomass and waste into liquid biofuels can be readily integrated with other forms of bio-processing to produce a range of high value bio-based materials.
26. Targets to reduce transport emmissions by a suggested 10-20 percent would stimulate the transport sector to adopt new technologies and fuels including drop-in biofuels and could be implemented by 2035.