



Actions to reduce use of fossil fuels for process heat and achieve net-zero carbon emissions by 2050

Reducing the use of fossil fuels for process and space heating can be by cofiring biomass in existing medium/large heat plant, or by replacing the existing gas or coal plant as it ages. It is expected that new heat plant will only use renewable fuels of electricity or biomass.

There is adequate biomass potentially available as fuel in all regions and increased demand will encourage expansion of the biomass fuel supply. Sources of biomass from forestry, wood processing and agricultural sectors will also widen with increased demand.

Medium sized heat plant in government owned facilities such as in education, prisons and municipal swimming pools will be early conversions as their size matches local fuel supply, and there are strong community drivers around regional development. Installations of biomass fuelled medium sized plant in manufacturing, food processing and horticulture will expand on the back of sustainable business drivers. Larger heat plant will use co-firing as a transition path while the biomass fuel supply market expands.

Up to 20 PJ of coal and gas energy conversions could occur resulting in a reduction of greenhouse gas emissions of 1800 kt CO₂-e pa by 2050¹. By 2050 biomass energy used in process and space heating could increase from the current 11% of total consumer energy to 16%.

To reduce net New Zealand wide greenhouse gas emissions by an estimated 3-4% by 2050 by transitioning from the use of fossil fuels to biomass fuel for the production of process heat will require a number of actions complementary to what the NZ Emissions Trading Scheme (NZ ETS) alone could achieve.

Transformation towards a net-zero emissions economy by 2050 is achievable but requires a mix of what could best be done by a partnership of Government and business.

Government has established the NZ ETS to assist in transitioning from high carbon fuels to low carbon fuels. However, to meet the Paris greenhouse gas emission reduction targets without any other initiatives other than the NZ ETS it is likely to require New Zealand to purchase international greenhouse gas reduction units. Bioenergy Association analysis shows that because of the high value of the public good benefits of switching from use of fossil fuels to biomass fuels for heating it would be more cost effective for the Government to introduce some light-handed complementary measures to assist Crown agencies and businesses to switch.

¹ Compared to 2017

This leadership would provide encouragement for other private sector heat facility owners to also consider transitioning to biomass fuels.

Bioenergy Association has analysed three scenarios – BAU; a Transition Scenario using existing policies and programmes as set out in NZECS²; and a Transformational Scenario. Under the Transformational scenario the following complementary measures would encourage up to 20 PJ of transition from coal (and in the latter years gas) to biomass fuel and thus achieve GHG reductions from public sector, and industrial heat applications of 1800 kt CO₂-e pa by 2050.

Greater and faster substitution of fossil fuels by biomass fuels for process heat would occur if policies such as fuel subsidies, mandatory targets or renewable energy credit schemes were adopted by Government. These are used successfully in most other countries but have not been considered in the association’s analysis. Transitioning from export of low value commodity logs to a forestry and wood processing sector focused on gaining maximum revenue from added value processing would be transformational for the New Zealand economy.

Analysis of the amount of greenhouse gas emissions which could be achieved by replacing fossil fuels with biomass fuel for process heat is set out in Bioenergy Association Information Sheet 48 *Reducing greenhouse gas emissions to achieve “Zero Carbon by 2050” using biomass energy for industrial and commercial heat.*



Policies and actions which would lift the transition from fossil to biomass fuels for the production of process heat above Business as Usual to the level of the Transformation Scenario are:

1. Improving the efficacy of the supply of biomass fuel from plantation forestry, wood processing, and farm forestry

- Provide 10 - 20 year regional biomass fuel demand scenarios to inform potential suppliers and users on availability and sources of biomass fuel supply³.
 - Identify scenarios of the fossil to biomass fuel switching potential in each region.
 - Map current and potential biomass sources in each region.
 - Publish scenarios of regional supply and use of biomass fuel.
- Use the One billion Trees programme to transform the forestry and wood processing sector to maximise revenue from added value processing with consequential increase in availability of biomass fuel.
 - Provide guidance on the possible future uses of the biomass derived from plantings
 - Provide guidance as to the CO₂-e sequestration benefits of different end uses of the plantings
 - Provide guidance on short and long rotation species which will provide a range of early return added-value products including biomass fuel.

² New Zealand Energy and Conservation Strategy 2017-2022

³ Follows the template provided by the successful Wood Energy South Project.

- Government and the wood processing sector, including downstream users such as biomass (processing residues) fuel suppliers, adopt a collaborative strategy to maximise the value from domestic processing of wood.
 - Establish cross sector working group focusing research on gaining added value from wood processing.
 - MBIE to extend the existing mechanism for the collection of data relating to the use for biomass for heat and to provide annual reporting on biomass use for heating by region.
 - Establish a working group including all relevant organisations and government entities (along the lines of the Land and Water Forum) to facilitate the use or treatment of waste biomass as a fuel.

2. A support programme to assist farmers to offset biological emissions by use of bioenergy based activities

- Provide guidance for farm forestry to produce woody biomass fuel from shelter belts, riparian planting, erosion control and woodlots.
 - Develop business case scenarios on the financial viability for farms
 - Obtain case study data on the financial viability of extracting fuel from farm forestry.
 - Research and demonstration on growing and extraction of biomass from shelterbelts, riparian planting, woodlots and erosion control for delivery as a fuel.
 - Research into short rotation high value species with collection and treatment of residuals as a solid biofuel
- Provide guidance for farms to produce biomass fuel from agricultural crop residues, short rotation species and energy crops such as miscanthus.
- Prepare and publish the following Technical Guides:
 - Methods for use of riparian planting to reduce nutrient runoff to waterways and production of biomass fuel.
 - Methods for collection and pelletisation of herbaceous energy crops and agricultural residual biomass eg miscanthus, corn stover, straw etc for use as fuel
 - Collection and processing of farm forestry residuals into a saleable fuel using on-site equipment.
 - Guidance on monetarising the carbon benefit from farm biomass fuel supply activities.
 - How to establish collectives for the supply of biomass fuel from farm forestry.

3. Government support policies

- Government implements the NZECS which signals to local government and industry that it will encourage the use of biomass as fuel.
- Introduce policies to change local and central government procurement policies so that renewable energy and efficient energy use options must be considered when making capital investment decisions, and all additional benefits are included in a full life cycle analysis of options.

- Review the present criteria for the Waste Minimisation Fund to ensure that it includes use of waste biomass which could be used as fuel for heat plant.
- Government's project appraisal model use a CO₂-e cost profile assumption published by MfE from time to time. This profile takes account of assumed movement of the cost of carbon over time as a result of the NZ ETS (This approach/modelling will also demonstrate that the Government is taking clear long-term decisions that reflect the likely real price of carbon over the life of the heat plant (i.e. 20 years plus).
- Extend the period of Crown Loans for biomass energy facilities beyond the current 5 years to better reflect the economic lifecycle costs and benefits of a wood fuel heat facility.
- Government introduces policies to allow for accelerated depreciation of renewable energy, waste to energy and energy efficiency capital investments. (Renewable energy and energy efficiency equipment is more capital intensive but often has lower on-going operating costs than alternatives.)
- Government establishes a GHG Reduction Fund to provide suspensory or low interest loans or similar for small/medium scale renewable energy and energy efficiency capital investments.
- Government does an annual cost-benefit of forward offshore purchase of GHG obligations versus acquiring domestic mitigation through a capital fund which funds the public good component of transitioning from coal to wood fuel.
- Each region prepares an integrated clean air policy which incorporates best practice heating including “district heating”
- Address air emission rule barriers to the consenting of heat plant.
- Establish regional integrated energy plans which incorporate land use, biomass resources, business and community air and waterway with community spatial aspirations.

4. R & D Programme

- R & D into the treatment and use of non-traditional biomass fuels eg stover, and their use for co-firing with coal as a transition for existing coal plant.
- Undertake R & D and provide demonstrations of cofiring of biomass in existing coal plant as a transition to eventual replacement of fossil fuels
- Provide guidance on the cofiring of high-quality biomass fuel eg pellets with low quality hog fuel
- From demonstration projects develop guidelines, reference documents and case studies for coal boiler conversions to biomass in the 2-10MW range
- R & D of torrefaction of biomass to make a ‘green coal’ fuel suitable for use in existing coal fired combustion plant.

5. Provide guidance, demonstration and assistance to owners of heat plant to reduce emissions and operating costs.

- Establish capital support schemes as part of regional development programmes in the Waikato and Otago/Canterbury regions similar to the Wood Energy South project.
- Government and the sector agree specific targets for the use of biomass as fuel in public sector facilities, food processing, and wood processing sectors by 2030, and 2040 and for all heat plant by 2050 and publish so that there is an informed market.
- Establish an across sector working group to agree on a strategy and action plan including: target regions and sectors; promotion; education and information programme; value proposition information; collection and dissemination of demonstration project information so that the 2050 target of net-zero emissions is achieved.
- Collate and publishing useful information from demonstration facilities for a range of applications
- Assist local government and private sector undertake feasibility studies of heating conversion options similar to the energy efficiency programmes run by EECA
 - Criteria for local government investment in heat plant facilities to be based on economic lifecycle costs and benefits and not just capital cost.
 - Guidance on the comparative benefits of alternative process heat technologies.
- Provide a national programme to assist local government and business have the best information possible for investment in biomass heating facilities which will reduce GHG emissions.
 - Collate and publish useful information from operational demonstration facilities
 - Identify, obtain and disseminate best practice information:
 - Guides to the production and co-firing of torrefied and traditional biomass fuels forspace and process heat production in existing heat plant.
 - Guide to the preparation and combustion for process heat of non-wood fuels such as waste water treatment plant biosolids, miscanthus, stover, and pelletised municipal solid waste.
 - Reduce cost and access barriers to existing information which potential users are not aware of.
- Facilitate the matching of heat users with biomass fuel suppliers in regions where the market hasn't yet developed.
 - Host regional meetings to assist heat users and their advisers to be up-to date with switching opportunities and practises.
 - Provide information on biomass availability to potential biomass fuel users.