



Section 2: Developing markets for bioenergy and direct geothermal use

This section examines barriers to the use of woody biomass and direct geothermal for process heat and seeks your feedbacks on our options to:

- Develop a users' guide on application of the National Environmental Standards for Air Quality to wood energy
- Facilitate development of bioenergy markets and industry clusters on a regional basis within Industry Transformation Plans, and
- Support recent initiatives underway to grow the bio-economy and support direct use of geothermal heat.

What's the problem?

This section responds to the Productivity Commission's *Low Emissions Economy* report recommendation:

14.3. MBIE and EECA should review existing initiatives related to information about fuel switching, co-firing, demand reduction and efficiency improvements for process heat, to minimise any information-related barriers to mitigation opportunities.

14.4. EECA and MBIE should consider a wider roll-out of policy initiatives to support the supply and use of biomass.

Location and security of supply

The availability of an energy source is only one of multiple factors that influence the location of a new industrial site. Proximity to primary commodities, labour, transport, and market are key considerations and often take precedence over the specific type or emissions intensity of an energy source. Biomass fuel availability is location-specific. To be economic, biomass users generally need to be located close to the biomass source.

In New Zealand, there are mismatches between woody biomass supply and process heat energy demand at a regional level. The supply of woody biomass residues exceeds the energy demand for process heat in some regions (such as the Bay of Plenty and Gisborne), while it is the opposite in other regions (such as Canterbury). In the Bay of Plenty, the residual biomass supply available could potentially be used to generate about 6.5 PJ of energy per annum, while the demand for fossil fuels (including coal, gas and petroleum) for generating process heat is about 2.6 PJ per annum. More information on biomass supply and process heat energy demand in all regions is shown in the map in Appendix 4.

In addition, while the supply of woody biomass residues may appear to be abundant in some regions, economic trade-offs would need to be made when deciding whether to utilise such residues for process heat. There are alternative uses of these residues, e.g. nutrient recycling for plantation forest (in lieu of the use of fertiliser), and the use of wood chips for cattle and calf beds. The mismatches between regional woody biomass supply and process heat energy demand means that it would not be economical to replace all coal with wood energy for process heat in all regions. While there is some potential for movements of biomass between neighbouring regions to address these mismatches, the economics of such movements depends on the terrain of the biomass source and

the infrastructure for accessing the biomass. In the case of the East Coast, its comparative isolation means that the transport costs for moving wood residues to another region are high.

There is potential for densification of wood residues into pellets or briquettes to increase the energy content per cubic metre of wood fuel, thereby making it more economical to transport wood fuels over longer distances. However, there are only some small-scale plants for producing wood pellets or briquettes in New Zealand.

The geographical dependence of wood energy in combination with the under-developed wood fuel supply chain²⁵ means that wood fuel is yet to be widely used in sectors other than wood processing. Some potential biomass users, particularly those with large energy needs, still have concern about the security of wood fuel supply over the life of their plant (20+ years).

Direct heat from geothermal sources is also limited due to geographical dependence and can only be considered for a new-build industrial plant if the chosen site is located close to a geothermal source. New geothermal direct use opportunities are likely to leverage or “piggyback” on electricity generation projects. A key reason to piggyback on electricity generation is the de-risking and cost reductions of exploring and recovering the resource, since direct use is likely to use only a small proportion of heat compared to electricity generation (e.g. about 5 to 15%).

Industrial clusters

A region tends to develop economic specialisations often based on the region’s natural resource endowment. For instance, there is a concentration of wood processing and pulp and paper manufacturing in and around Kawerau to take advantage of the Kaingaroa Forest and geothermal heat.

Regional specialisations create complex ecosystem or clusters of upstream and downstream industries, supporting services including professional and technical services, skills and training, and transport and other infrastructure configured to the needs of the industry. Through moving to lower emitting systems, the industrial clusters making use of wood and geothermal energy could also have other co-benefits, such as better health outcomes because of improved air quality. Industry clusters tend to develop organically, but once established may benefit from a more organised approach to their ongoing growth and development.

In particular, developing a shared heat or combined heat and power (CHP)²⁶ plant for a cluster of wood processing plants and other heat users (such as hospitals and prisons), may need a more proactive, coordinated and planned approach to their development, due to the multiple supply chain components the industry requires. Significant investment would be required to develop a shared CHP plant. It is estimated that it would cost about \$280 million to build a CHP plant with an output of 135 megawatt thermal (MWth) and 15 megawatt electrical (MWe).²⁷ The case for such an investment would depend on the specific circumstances of the region and facilities concerned.

²⁵ As outlined in the Technical paper, the reasons for this include concerns over security of fuel supply over the life of their plant; the availability of parties that can contract to supply the required volumes of fuel required over the long term; and fuel suppliers reluctant to make investments in capital investment in the absence of a long-term supply contract.

²⁶ A combined heat and power plant is one that generates electricity as well as heat. This can allow development in areas that might otherwise have insufficient electricity supply capacity.

²⁷ Scion (2015) [Assessment of wood processing options for Gisborne: Wood Energy Industrial Symbiosis project - Aim 3 resource convergence opportunities](#).

There have already been some relatively small-scale initiatives to establish industrial clusters. For example, EECA, in partnership with Venture Southland, implemented the Wood Energy South project in Southland. (See case study below).

Case Study: Wood Energy South

Between 2014 and 2017, EECA, in partnership with Venture Southland, implemented the Wood Energy South (WES) project to encourage Southland heat users to switch from fossil fuels to woody fuels. This project included credentialing energy specifiers (consulting engineers), subsidising feasibility studies, providing information and case studies on using wood energy, and providing capital grants and Crown loans to aid conversion to using wood energy. The WES project had a \$1.5 million budget over three years, and a target of an additional 0.15 PJ of wood energy use.

Key learnings from this project include:

- It takes time to develop projects. Even after a business case has been established it can take several years for heat plant owners to make a final investment decision. (Note: WES supported early work on Danone's \$40 million project to build a milk spray drying plant in Balclutha, which will be powered by forest waste. However, its construction is still not yet completed).
- A better understanding of the drivers and decision factors involved in private sector fuel switching would help uptake.
- A promising approach may be to target organisations or areas with large heat demand for fuel-switching to spur the establishment of a fuel supply chain.
- Wood Energy South identified health improvements for children in moving to wood chip boilers, and the life span of the corrugated iron on school buildings was extended with moving from coal to wood chip.

Councils' air quality planning rules applicable to wood energy

Under the Resource Management Act (RMA), councils are responsible for managing discharges to air. The Bioenergy Association has noted that some councils have developed air quality-related planning rules that may be an inadvertent impediment to the use of wood fuels. For example:

- There are concerns that some of the rules in councils' plans do not take into consideration the design of the equipment and its capacity to be operated without compromising acceptable air quality standards. For example, some councils have rules that limit the biomass fuel moisture content of wood fuel, but the Bioenergy Association considers that more sophisticated heat plant can effectively manage emissions from high moisture content wood fuel.
- Some councils' rules applicable to wood energy equipment appear to be based on outdated guidelines. For example, some councils' air quality management plans have chimney heights rules derived from the Third Edition of the 1956 Clean Air Act Memorandum on Chimney Heights, which may no longer be appropriate.

The National Environment Standards for Air Quality (NESAQ) are regulations made under the RMA that aim to minimise the adverse health impacts of air contaminants at the national level by:

- prohibiting activities that discharge significant quantities of contaminants to air, such as burning tyres, bitumen, oil and landfill waste
- setting standards for ambient (outdoor) air quality, and

- setting design standards for wood burners, including emissions and thermal efficiency standards. Note the NESAQ does not prescribe detailed technological specifications of wood energy facilities.

The resource management framework for managing air quality (i.e. RMA and NESAQ) gives councils broad discretion to set rules that are suitable for their local circumstances.

What are the options?

To address the issues, we propose the following options:

- Development of a users' guide on the application of the National Environmental Standards for Air Quality to wood energy
- Facilitate development of bioenergy markets and industry clusters on a regional basis within Industry Transformation Plans, and
- Support recent initiatives underway to grow the bio-economy and support direct use of geothermal heat.

In addition to these proposed options, there is also other work across government to grow the bio-economy, which may increase the availability of wood residue supplies for process heat. For example, EECA has begun to offer bioenergy analyses²⁸ – working with Scion to analyse the regional and site-specific availability of biomass fuel for large process heat users with potential to switch from fossil fuels.

Guidance on RMA consenting for wood energy plants

Option 2.1 Developing users' guide on application of the National Environmental Standards for Air Quality to wood energy

Description

We propose to develop an official users' guide supplementary to the NESAQ. The users' guide will provide councils and businesses with technical guidance on managing the development and operation of wood energy, including information on:

- interpretation of the NESAQ requirements from a wood energy perspective
- development of planning rules that would achieve desirable air quality without creating unnecessary impediment to the use of wood energy
- air quality outcomes of various models of wood boilers, and
- good examples of planning rules suitable for wood energy facilities would be provided in this users' guide.

We expect the proposed users' guide would be jointly developed by MBIE, MfE and EECA, in consultation with key stakeholders, such as councils and wood energy experts. As MfE is currently considering amendments to the NESAQ, we propose that the users' guide be developed after the NESAQ amendments are completed. We seek your feedback on whether a guide would be useful and what it could include.

²⁸ <https://www.eeca.govt.nz/energy-use-in-new-zealand/energy-focus-areas/process-heat/>

Analysis

Through addressing unintended regulatory barriers posed by councils' air quality planning rules, the proposed users' guide could potentially make it easier for businesses to obtain resource consents for wood energy facilities, thereby accelerating the uptake of wood energy for process heat. This could also help develop the wood energy market, as growing demand for wood energy encourages more wood fuel suppliers to enter the market.

The Government would incur some costs in developing the users' guide, probably in the order of hundreds of thousands of dollars, depending on its scope and the process for developing it.

Questions

Q2.1	Do you agree that councils have regional air quality rules that are barriers to wood energy? If so, can you point us to examples of those rules in particular councils' plans?
Q2.2	Do you agree that a NESAQ users' guide on the development and operation of the wood energy facilities will help to reduce regulatory barriers to the use of wood energy for process heat?
Q2.3	What do you consider a NESAQ users' guide should cover? Please provide an explanation if possible.
Q2.4	Please describe any other options that you consider would be more effective at reducing regulatory barriers to the use of wood energy for process heat.

Amending the NESAQ

Amendments to the NESAQ are currently being considered. There will be a separate public consultation on any proposed amendments.

Nevertheless, we do not expect that any amendments to the NESAQ will exhaustively set out all the detailed specifications of the technologies that are allowed, as the resource management framework for managing air quality (including the RMA and NESAQ) is intended to give councils broad discretion to set rules for managing emissions of air contaminants, taking into account their local circumstances. Air quality issues are different in different parts of the country due to geographical and climatic differences, and it is important for councils to have the flexibility to respond accordingly.

Questions

Q2.5	In your opinion, what technical rules relating to wood energy would be better addressed through the NESAQ than through the proposed users' guide (option 2.1)?
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Facilitating the development of bioenergy markets and industry clusters on a regional basis

The following section seeks your feedback to inform the development of options to support bioenergy markets and industry clusters. At this stage, we are not proposing specific options as there is ongoing work across government to grow the bio-economy. We need further information on the merits of these options before deciding whether additional work is necessary.

Industry Transformation Plans

Securing large-scale, long-term fuel supplies, such as for a shared combined heat-and-power (CHP) plant supplying a cluster of industrial and community energy users, will require long-term agreements with multiple partners, including the resource (forest) owners, contractors and the users. Given the number of parties involved, market facilitation by government may help to open up such agreements between suppliers and buyers.

We are proposing to facilitate development of bioenergy markets and industry clusters on a regional basis, as part of an Industry Transformation Plan (ITP) for the Wood Processing and Forestry sector, taking into account learnings from previous government initiatives, such as the Wood Energy South project (which was discussed earlier).

Through the Government's recently-released Industry Policy: From the Knowledge Wave to the Digital Age – Growing Innovative Industries, MBIE is leading the development of Industry Transformation Plans (ITPs) for four sectors, including the Wood Processing and Forestry sector.²⁹

As part of this ITP, MBIE is proposing to investigate the best approach to working with and supporting the development of industry clusters, as well as developing wood energy markets from both the demand and supply side. This could be achieved through supporting bespoke cluster organisations or through improving the co-ordination of regional economic development efforts.

Initiatives to grow the bio-economy

There are a number of recent initiatives the Government has underway to grow the bio-economy, and these could stimulate bioenergy supplies for process heat.

The Forestry Ministerial Advisory Group³⁰ is preparing advice on the role of New Zealand's forests in the transition to a bio-economy. The Advisory Group is working closely with Te Uru Rākau and MBIE to ensure alignment of research and resources.

Te Uru Rākau is developing a Forest Strategy with a broad view of forests and forestry. 'Forest' includes commercial forestry activities (e.g. growing, harvesting, processing and exporting) along with trees and forests contributing to social, environmental and cultural goals (e.g. permanent carbon forests, indigenous trees, trees in urban and farming landscapes).

²⁹ ITPs are proposed to set out an agreed vision for the sector and a set of actions that Government and industry will take to drive the transition to this vision. These plans will build on the range of existing sector-based work underway, but will have a strong emphasis on planning for the future, improving cohesion and clarity of overall strategic direction across Government initiatives, working through transitional issues, and understanding the workforce issues and opportunities.

³⁰ The Forestry Ministerial Advisory Group provides the Minister of Forestry with industry perspective and independent advice on matters agreed between the Minister and the Chair of the Advisory Group.

The Forest Strategy will broadly set out:

- an agreed shared direction for the forest sector for the next 30 years and beyond, that guides government and other participants' investment and effort
- clarity around the opportunities and different roles and responsibilities of forest sector participants
- a more joined up platform from which to grow and develop as a sector; and
- priorities for transformation to enable forest-based industries and activities to contribute to improved social and economic wellbeing for New Zealanders.

The Forest Strategy will include consideration of the role forests can play in transitioning to a low emissions bio-economy. It will also consider the role of direct overseas and government investment in wood processing facilities to improve environmental and climate change outcomes, and the promotion of regional economic growth. This initiative could help to stimulate a range of economic opportunities from forestry and may result in creating greater volumes and availability of wood energy for process heat.

Supporting the use of direct geothermal heat

The New Zealand Geothermal Association (NZGA) has developed the [Geoheat Strategy](#) and a complementary action plan that seeks to increase the use of direct heat in industry. The strategy outlines the opportunities and the approach to diversify the direct use of geothermal heat to create new businesses, decrease the use of fossil fuels in industry, support regional economic and social development, and carve out a role for New Zealand to promote the use of direct heat and associated technologies internationally.

MBIE continues to support geothermal stakeholders in exploring geothermal opportunities and making business-to-business connections for geothermal direct use. Where relevant and regionally-available, we will work with NZGA and other stakeholders to realise industrial cluster opportunities to also use geothermal heat directly.

Questions

Q2.6	In your view, could the Industry Transformation Plans stimulate sufficient supply and demand for bioenergy to achieve desired outcomes? What other options are worth considering?
Q2.7	Is Government best placed to provide market facilitation in bioenergy markets?
Q2.8	If so, how could Government best facilitate bioenergy markets? Please be as specific as possible, giving examples.
Q2.9	In your view, how can government best support direct use of geothermal heat? What other options are worth considering?

Summary assessment of options against criteria

	Develop user's guide for application of NESAQ to wood energy	Amending NESAQ
To what extent is the barrier addressed?	✓✓	✓
Primary benefits – emissions reductions	✓	✓
Primary benefits – EE & RE	✓	✓
Wider economic effects	Uncertain, as its impacts on consenting would be indirect.	Uncertain, as its impacts on consenting would be indirect.
Reduction in compliance costs	✓	✓
Administration costs	X	X X
Energy trilemma – security and affordability	Uncertain, as its impacts on consenting would be indirect.	Uncertain, as its impacts on consenting would be indirect.

Key: Option under active consideration Option not preferred