

28 February 2020

To: Ministry of Business, Innovation and Employment

From: Scion (the NZ Forest Research Institute LTD, trading as Scion)

Contact: Elspeth.MacRae@scionresearch.com

Re: Discussion document: Accelerating renewable energy and energy efficiency.

- The discussion document is focussed on “accelerating renewable electricity and lowering emissions from process heat.” Whilst this document does not directly address the use of biomass / bioenergy for transport the potential of this route to contribute to a low carbon economy and decarbonisation should not be ignored.

1. Key Points

- Biomass opportunities are under recognised, especially the potential for distributed power generation via combined heat and power (CHP) at industrial sites with a high temperature process heat demand.
- For biomass supply it is not a question of how much have we got, but how much do we need to or want to have? We can grow as much as we want / need; including at a regional level to meet concentrations of heat demand.
- Waste to energy seems to be ignored; especially the opportunities around putrescible municipal and industrial wastes which can do both industrial heat and power, from a waste stream that would otherwise go to landfill or discharged to water / land. Significant opportunity for distributed energy from low value materials may go undeveloped if this is not addressed.
- Heat and power are viewed separately and there are sites where combined heat and power will give you a better result.
- Identification of waste heat streams and their use for productive purposes is ignored.
- Forestry and wood processing can be a source of increased low carbon GDP in the long term if instability in wood supply to domestic processors is addressed. Regional plantings in areas with projected falls in wood supply are required. Especially in areas such as Canterbury which has high use of coal and no pipeline gas.

- Stabilisation of wood supply at a regional level with expanded on-shore wood processing could see development of low carbon GDP and would give more confidence in use of woody biomass as an industrial heat fuel.
- Government support for development of biomass fuels should concentrate on large users such as Fonterra e.g. recent developments at Brightwater and Te Awamutu.
- Need to consider coal use for process heat outside of boilers, direct use of biomass in lime kilns is an avenue to investigate, where significant volumes of coal are consumed.
- A focus on biomass substituting for coal and gas is required, as the declining supply of gas and the ban on new exploration permits could lead to the perverse outcome of increased coal use in the potential future situation where gas prices rise as supply tightens.
- Co-firing of wood (including densified and or torrefied wood fuels) into coal boilers should not be overlooked. For very large installations such as the dairy factories at Edendale and Clandeboye, getting sufficient fuel for 100% coal substitution within a reasonable transport distance may be challenging, but that should not exclude the opportunity to a partial replacement of coal with biomass via co-firing.
- There is a significant amount of information available from previous studies on biomass supply, coal demand and where these align – this should be exploited with the government being proactive in contacting specific companies and sites to make them aware of the opportunities. The Wood Energy Symbiosis project, conducted by Scion and funded by MBIE produced a range of outputs, including maps identifying opportunities around biomass / coal substitution.
- Government agencies should continue to lead the way with coal to biomass conversions (e.g. Hospitals, councils and schools) to demonstrate the viability of this option.
- Dissemination of information on electrification of heat should be done. Further, there should be an equal effort put into getting biomass to heat and power information packages out to industry and commerce. This should include promotion of the opportunities around waste to energy; specifically, anaerobic digestion of wet organic waste streams aligned with use of the syn-gas for heat or heat and power.

2. Introduction – Who is Scion.

- Scion is a Crown Research Institute with a core purpose to “enhance New Zealand’s prosperity, well-being and environment through trees – kia piki te ora, te taiao me te whai rawa o Aotearoa mā to ngāhere”.

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- Scion led development of the New Zealand Biofuels Roadmap (www.scionresearch.com/nzbiofuelsroadmap)

- A range of other bioenergy related work;
 - Bioenergy Options for New Zealand Project (2007 to 2009); a part of the EnergyScape project.
 - Wood Energy Industrial Symbiosis Project MBIE funded).
 - Residual biomass fuel projections for New Zealand (EECA funded, 2017)
 - Potential for the use of wood-based energy in expanded and integrated primary processing in the Gisborne region - Report for the Forestry Ministerial Advisory Group (2019)
 - Ligno-cellulosic biofuels initiative
 - Stump to Pump project

Signed by

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Dr Elspeth MacRae, Chief Innovation and Science Officer, HSNO Director

3. Response to discussion questions

Option 1.1 would require large energy users to report their emissions and energy use annually, publish Corporate Energy Transitions Plans and conduct energy audits every four years. Do you support this option?

Yes.

Good data is crucial to formulating appropriate policy and planning energy infrastructure.

Which parts (set out in Table 3) do you support?

- Target group - companies with an annual energy spend of greater than \$2 million per annum
- Public reporting
- Government reporting
- Energy auditing
- Compliance

The larger energy users represent a significant proportion of the emissions from a comparatively small number of sites. They must make changes for any progress on emissions to occur. Reporting should be to government with only government departments able to see individual company data. Auditing is the only way to ensure accurate data. It would also assist with improvements.

Should also be applied to government departments.

Data needs to include use of bioenergy and renewable electricity (e.g. solar panels)

What public reporting requirements (listed in Table 3) should be disclosed?

- Annual corporate-level energy use and emissions, split out by a range of sources including coal, gas, electricity and transport
- Energy efficiency actions taken that year
- Plans to reduce emissions to 2030
- Other (please specify)

Option 1.1. Suggests that requirements to publish Corporate Energy Transition Plans should apply to large energy users, and proposes defining *large energy users* as those with an annual energy spend (purchased) of greater than \$2 million per annum.

Do you agree with this definition?

- Yes
- No

22. If you selected no, please describe what in your view would be an appropriate threshold to define 'large energy users'.

\$1 million spend, and it should be applied at a national level, otherwise companies with multiple sites may split their spend by site to avoid reporting.

Government departments and agencies should also be required to report.

30. Do you support benchmarking in the food processing sector?

- Yes
- No

31. Would benchmarking be suited to, and useful for, other industries, such as wood processing?

- No
- Yes (please specify)

Wood processing is well ahead of the rest of the primary processing industries at most sites as there is widespread use of wood processing residuals to create process and drying heat, and in some cases combined heat and power units.

More emphasis on biomass for heat outside of wood processing would help reduce use of fossil fuels in process heat.

Much greater emphasis on the potential of small-scale (1MW or less) combined heat and power systems would be useful.

In your view, could the *Industry Transformation Plans* stimulate sufficient supply and demand for bioenergy to achieve desired outcomes?

- Yes
- No

Would a customised low-emission heating feasibility study be of use to your business?

- Yes
- No

41. What other options are worth considering?

Actions by Te Uru Rakau to stabilise regional wood supplies. There are many regions where the forests have a very uneven age class distribution which means they will have decline in wood supply around 2035 meaning a drop in the supply of harvesting residual and fibre logs that are suitable for use as fuel. The time to act to mitigate this is now - targeted regional areas of new medium rotation length forests (16 to 18 years) which can produce a mix of saw logs and fibre / energy logs. However, lots of forest in the wrong place is not helpful to either greater use of bioenergy or to the expansion of the wood processing industry, which is a major source of low carbon GDP.

How could Government best facilitate bioenergy markets?

Demonstration sites for small scale biomass fueled combined heat and power.

Do you agree that de-risking commercially viable low-emission technology should be a focus of government support on process heat?

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

The technology exists, the perceived risks are around fuel supply.

For emissions-intensive and highly integrated (EIH) stakeholders: What are your views on our proposal to collaborate to develop low-carbon roadmaps?

Yes, however it's pretty simple; identify the wood resources (done), identify the demand points (largely done) map out the opportunities where there is wood near a heat demand (largely done). There are significant data sets on renewable energy available from previous research; EnergyScape (NIWA) has GIS data on solar, wind, tidal etc resources. GNS has data on geothermal resources. Scion has data on biomass resources. Some of this was brought together in the Wood Energy Industrial symbiosis project and maps of resource and demand have been generated. There is potential for further extraction of information from these data sets.

Would low-carbon roadmaps assist in identifying feasible technological pathways for decarbonisation?

Yes if focused on specific companies to assist them achieve decarbonisation

Decarbonising can start tomorrow for some applications. Utilise dry, chipped or densified wood fuels in coal boilers via cofiring / partial conversion to biomass. Build on that with conversion of old coal boilers to wood fuels, which might be wood chip depending on local transport distances.

What are the most important issues that would benefit from a partnership and co-design approach?

More forests in regions with large coal demands (Canterbury, Southland, Waikato etc).

If you want to stop new coal boilers going in and get rid of old ones then there has to be a viable alternative to coal, for high temperature / steam demands. Biomass (wood and straw) can be used, we just need to act to ensure adequate supply in the long term. 1BT can be targeted to specific regions where wood supply is going to decline.

From a bioenergy supply perspective, the question is not really is there enough, more; How much do you want? We can grow as much as we need.

Much of NZs coal demand can be met from existing woody biomass residuals. However, there are regions where there are mismatches; Canterbury - lots of coal demand and declining wood supply; Gisborne – lots of wood supply but almost no coal demand (but challenging electricity supply for expanded primary processing).

However, if there is a region with identified supply demand mismatches (and there are – this is not hard), we could simply grow the required amount on appropriate land in the identified regions. 120,000 ha of sustainably managed forest could supply enough wood to meet all of NZs coal demand. However, we wouldn't even need that much as we already have residuals available to meet some of the coal demand.

What, in your view, is the scale of resourcing required to make this initiative successful?

Significant investment in terms of support from EECA and other government agencies and departments. Substantial support to encourage the afforestation that would be required.

Do you agree with the proposal to ban new coal-fired boilers for low and medium temperature requirements?

Do you agree with the proposal to require existing coal-fired process heat equipment for end-use temperature requirements below 100 degrees Celsius to be phased out by 2030?

Large boilers tend to be high temperature and less suitable to electrification due to the cost of the electricity; with biomass being a more price competitive option.

This section seems to be missing the point that many of the large coal boilers are high temperature and could be converted to burning biomass.

Low temperature heat can come from electricity, and at small scale might not be critical to the financial viability of a business. However, the gains in emission reduction might be small.

What is your view on whether **cost recovery mechanisms should be adopted to fund policy proposals in Part A of the *Accelerating renewable energy and energy efficiency* discussion document?**

Yes it should, in the order of \$1 to \$2 per GJ on coal.

What are the **advantages of introducing a levy on consumers of coal to fund process heat activities?**

This would incentivise coal users to get their levy money back by changing to a renewable option.

What changes to the NPSREG would facilitate future development of renewable energy?

Prioritise sustainable renewables over fossil fuels.

There should be greater emphasis on the opportunities around combined heat and power. They do not need to be separate and can be put together very effectively at large (Contact / Fonterra at Te Rapa), medium (Red Stag) and small-scale. Small scale is not common in NZ but there are opportunities to meet local electricity demand with electricity from waste heat, or to take waste heat from a power plant and use it (e.g. Huntly / green-houses)

Are there opportunities for **non-statutory spatial planning techniques to help identify suitable areas for renewables development (or no go areas)?**

GIS data on many potential renewable energy resources already exists; solar, wind, tide, biomass, geothermal etc.

GIS analysis is a powerful tool to identify opportunities where there is merit in a more detailed site-specific analysis.

Can you suggest any other options (statutory or non-statutory) that would help accelerate the future development of renewable energy?

Targeted regional afforestation to stabilise biomass supply at a regional level in the long term.

Standards for and policies to facilitate injection of biomethane (up to 100%) and biohydrogen (up to 20%) to the existing gas supply lines need to be developed to replenish natural gas, to take advantage of the existing gas distribution infrastructure and to reduce emissions from this sector.

What do you perceive to be the **major benefits to developing offshore wind assets in New Zealand?**

More renewables with a less variable production profile than onshore developments.

What is the best way to meet **resource adequacy needs as we transition away from fossil-fuelled electricity generation and towards a system dominated by renewables?**

Diversification. Better use of large point sources of waste heat. Development of distributed generation by supporting biomass combined heat and power.

Do you have any views regarding the options to encourage renewable electricity generation investment that we considered, but are not proposing to investigate further? (See pages 90 - 92 of the *Accelerating renewable energy and energy efficiency* discussion document).

Feed-in tariffs should be investigated.

Waste to energy (MSW, MBS and other putrescible waste can be used to combined heat and power via anaerobic digestion and running a genset for combined heat and power production.