Beyond the Boundaries

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Energy Markets
Ministry of Business, Innovation, and Employment
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RE: Process Heat in New Zealand: Opportunities and barriers to lowering emissions (Technical Paper, Jan 2019)

Introduction

1. This is a submission by Oji Fibre Solutions (NZ) Ltd (Oji FS) on MBIE and EECA's 'Process Heat in New Zealand: Opportunities and barriers to lowering emissions' Technical Paper, published 22 January 2019.[1]

Background to Oji Fibre Solutions

2. Oji FS is an Australasian pulp, paper and packaging products processing business with substantial direct investment in the New Zealand economy. Oji FS exports to global markets, predominantly in Asia, with major competitors spread around the globe. Oji FS is also a substantial employer with over 1400 direct employees based in NZ.
3. Oji FS operates some of New Zealand's largest industrial sites, including the Kinleith pulp and paper mill and the Tasman pulp mill (in Kawerau), and is New Zealand's largest user of process heat. The majority of this process heat is produced using biofuel renewable energy, with over 80% of our process energy needs derived from renewable sources. On an annual basis, we utilise over 21 PJ of energy from wood-based biomass (Kraft black liquor and wood residues), approximately 2.6 PJ of geothermal steam, with fossil fuel use amounting to approximately 4.6 PJ. OjiFS generates approximately 350 GWh per annum of electricity via cogeneration plants utilising some of this process heat, but nevertheless is one of New Zealand's largest electricity consumers, with gross load in the order of 900 GWh per annum.

General Comments

4. Oji FS welcomes the opportunity to provide a submission on the Technical Paper. Oji FS is committed to contributing towards meeting NZ's obligations to the Paris Agreement. Oji FS is a party to the Climate Leaders Coalition, and has a stated target to reduce emissions intensity by 6% of 2015 levels by 2020.
5. Our overriding concern with the Paper is that it is too narrow in focus, and does not consider the wider impact that decisions on process heat have on emissions in other parts of the economy. Carbon leakage between different sectors is a real issue, let alone international carbon leakage.

[1] https://www.mbie.govt.nz/dmsdocument/4292-process-heat-in-new-zealand-opportunities-and-barriers-to-lowering-emissions

6. For instance, electrification of process heat is counterproductive. Increasing electrification leads to increased demand, which leads to higher electricity spot prices (unless generation is built ahead of demand). For users of electricity as well as energy for process heat, this increased electricity cost applies not just to the electrified process heat, but also to existing electricity load.

7. In addition, the marginal source of energy for electricity generation is always thermal. NZ is primarily energy-constrained (rather than capacity constrained, given the peaking ability of hydro-generation), with the marginal energy coming from gas or coal fired thermal generation. Modern boilers have efficiency of greater than 80%, whereas the effective efficiency of thermal generation is less than 50%. Consequently, unless generation is 100% renewable, the electrification of process heat will actually increase the overall emissions profile, at significant cost. Even if generation was 100% renewable, the cost of achieving this goal will be substantive, and we suggest there are more effective use of these funds for emissions reductions than renewable electricity generation.[2]

8. We note that the subtitle of the paper is "Opportunities and barriers to lowering emissions". From our reading of the paper, the focus is clearly on the "barriers" rather than on opportunities. We have the view that there are numerous opportunities across the entire supply chain for reducing emissions from process heat.

Barriers

9. While there are many barriers to reducing emissions from process heat, Oji FS considers that the two main barriers which should be the focus of the work stream are:

   - Alternative sources of energy for process heat are higher cost, lower efficiency and lower reliability. Cost, efficiency and reliability of energy supply are the three factors considered in potential investments, and without any benefits across these three factors, organisations will simply not switch fuel sources.
   - The high degree of uncertainty regarding the future price of carbon and in particular the regulatory uncertainty associated with the ETS. Investments always have a financial component to the decision making process, and the uncertainty around future carbon regulation and long-term pricing means that decisions are geared towards short-term benefits.

Opportunities

10. Oji FS considers that two opportunities to focus on, which provide the greatest benefits are:

   - Improving the efficiency of existing process heat plant. This is primarily when upgrading or replacing existing assets.
   - Increasing the electricity production from process heat. There is potential for greater energy capture from process heat requirements through optimising cogeneration plant.

11. In addition, Oji FS has a further issue that it would like MBIE and EECA to consider:

   - The opportunity for increasing the energy efficiency and energy recovery through the Kraft pulp manufacturing process. Lignin produced during this process has a high calorific value and is burnt in recovery boilers to generate steam, which is used to generate electricity and provide process heat to the pulping process. Increasing forestry resource in the central North Island to provide feedstock for the pulping process will also provide increased bio-renewable energy source for the production of electricity, reducing the need to burn fossil fuels to provide process heat and electricity.

12. Oji FS is a member of the Bioenergy Association, the Major Electricity Users Group, the Wood Processing and Manufacturers Association and the Wood Council of NZ. Oji FS also has a close

[2] Noting that "renewable" geothermal energy has a not insignificant emissions profile, and in the case of some geothermal plant is similar to gas fired thermal generation.

association with the NZ Institute of Forestry and the Forest Owners Association. To the extent that submissions from these organisations do not contradict this submission, Oji FS supports and endorses such submissions from these organisations.

Submission Response

13. Oji FS welcomes the Process Heat in NZ Technical Paper (Paper) and supports its purpose. Specific comments following the structure of the Paper are below:

1) Introduction: The transition to a low emissions economy

14. We note the comment in paragraph 2 of the Paper that “decreasing emissions from process heat systems is necessary to ensure NZ achieves its climate change goals and obligations”. Climate change is a global issue, and therefore the focus must always be on reducing global emissions, although we note that the NZ’s climate change goals are intended to contribute to reducing global emissions. We note that the issue of international carbon leakage is important, but also point out that there is potential carbon leakage from industry to electricity production, and that reducing emissions from process heat by means of electrification will typically lead to increased emissions from thermal generation, and (unless there is 100% renewable generation) overall a net increase in emissions.[3]

15. We agree that improving the energy productivity of existing processes is the best mechanism for reducing emissions. We note that, in limited situations, fuel switching may be beneficial, but that the broader consequences of any fuel switching need to be clearly understood.

2) Context: The use of process heat in NZ

16. We generally agree with the comments made through this section. We note the final comment in paragraph 32 that “…a very high carbon price would likely be required to switch to renewable technologies...”. Our concern is that the focus then becomes one of increasing the carbon price rather than looking at the overall process efficiency and completing a full cost-benefit analysis. We note this is particularly relevant when considering fuel switching, particularly from say gas to electricity, whereby the overall cost will be higher, with potentially a net increase in emissions.

3) Opportunities and barriers to lowering emissions from process heat

Barrier A: The cost of emissions is not fully priced

17. We agree that “it is likely that price signals from the NZ ETS alone will not, or are unlikely to, influence behaviour for many process heat users.” There are multiple factors which influence decision making, with industry and Government needing to work together on ensuring to achieve the opportunities from a low carbon economy.

Q1: To what extent has the NZ ETS influenced process heat investments in your business?

18. The ETS has certainly assisted in being able to quantify the externalities associated with emissions. However, the benefits are generally limited to short term decision making, as Oji FS’ financial modelling is focused on one to three year periods,[4] so potential increases in carbon pricing in the medium to long term have limited impact on the assessment of potential investment decisions.

Q2: To what extent do you agree that businesses are accounting for the price (and future price) of emissions, but face other barriers to reducing process heat related emissions?

Q3: To what extent do you agree that businesses are accounting for emissions prices but are unresponsive to changes in the emissions price?

19. There are numerous barriers to reducing emissions, however the cost of alternatives and emissions pricing are by far the most significant, and these should be the focus. A complicating factor is the

[3] Discussed in more detail later in this submission.
[4] For various reasons, project payback is the preferred tool for assessing projects, versus NPV or IRR.

lifetime of assets - long life-span assets are potentially in use for 30+ years, and would be costly to replace before end-of-life. Changes in emissions pricing that potentially impact these assets are only relevant when replacing these assets is commercially viable.

20. Emissions pricing is a certainly a factor in company decision making, but the uncertainty around future carbon pricing and associated regulation means that short term financial implications carry a higher weighting in the decision making process than potential long-term changes in emissions prices.

Q4: Does the NZ ETS provide an incentive to significantly reduce emissions beyond current levels for businesses who receive industrial allocation?

21. The key incentive for ETS participants is price of carbon at the margin. All ETS participants, whether or not they receive an EITE allocation have the same incentive to reduce emissions – a $25 /t cost saving is independent of whether or not the company receives an EITE allocation. EITE allocations are simply a mechanism for reducing carbon leakage and ensuring businesses are not adversely affected in comparison to competitors who do not face a carbon charge.

Barriers to improving energy efficiency and the uptake of renewables in process heat systems

Barrier B: Energy projects have to compete with other capital investment projects

22. Risk, return, and costs associated with investments are the key inputs into companies' decision making processes. Future uncertainties in any these three inputs, including industry uncertainty, favours short-term decision making.

23. While objectives such as environmental sustainability or social responsibility may be considered as secondary objectives, many organisations endeavour to quantify the value of these secondary objectives. However this is not a straightforward process and, particularly given the often short-term view of investment decisions, reiterates the importance of government support to obtain the long-term benefits associated with certain investments.

24. While energy costs are significant to our organisation, improvements in production, including reliability improvements, are the primary focus. Energy efficiency type projects are therefore typically considered when they provide additional benefits to the organisation, particularly when the payback of other investments is shorter than that for energy projects.

25. As mentioned previously, the price of carbon is explicitly incorporated into investment decisions. However the uncertainty around future carbon pricing means that a conservative approach to potential carbon price increases is taken, with modelled future carbon pricing likely to be on the low side.

Barrier C: Access to capital

26. While access to capital is an issue for energy efficiency investment, if the project has a suitable return on investment or payback period, capital will be sourced for that investment. The difficulty comes when such investments do not meet the investment criteria. The key focus should therefore be on ensuring the costs and benefits of such projects are accurately quantified to enable optimal decision making.

Barrier D: Aversion to production disruption

27. While the potential for disruption during change of any technology upgrade is a concern, this can normally be readily managed. However, the key issue for most businesses is ensuring any essential supply to the business operations is reliable and stable.

Barrier E: Hidden costs and benefits of energy improvements

28. The risk and opportunity of hidden costs and benefits apply to all business decisions and are no different for process heat projects. The Bioenergy Association undertakes a number of information dissemination activities to ensure that potential investors and their advisers are well informed about

best practice and provided professional development opportunities for advisers. These education requirements are normal in all industries and are no greater for the process heat sector.

Q5: To what extent does your business ring-fence capital for energy related projects?

29. In our business, all capital projects are assessed using a standard framework which is primarily financially driven. Energy related projects are assessed against this framework along with other potential capital projects.

Q6: To what extent are objectives such as sustainability incorporated into your organisations investments, i.e. is sustainability included in your KPIs?

Q7: Are these objectives considered secondary to risk and return?

30. Oji FS has specific sustainability focused targets, including a target for emissions reductions intensity by 6% of 2015 levels by 2020. This and other sustainability issues are major considerations in investment decisions, but usually assessed as a financial consideration through assumptions around emissions pricing and other environmental benefits (eg. impact on consents and water/air quality).

31. Reliability, costs (and benefits) and operational efficiencies are key objectives for any investment decision, with such factors quantified in financial and risk assessment. Subjective targets that aren't able to be quantified have limited application in assessing projects.

32. However, we note that sustainability and related objectives also act to support our license to operate and potentially enhance our reputation with wider stakeholders.

Q8: Do you agree that energy efficiency or renewable projects are often not implemented as they are not core business investments?

33. As a large energy user, virtually all projects have an impact on the company's energy profile. Consequently, energy costs and efficiencies are considered as part of production-oriented projects. However, energy efficiency projects that do not have any associated production improvements are rarely implemented as they do not usually meet the requirements under our investment framework.

Q9: Is your business limited by access to capital for energy related investments? Is this due to lender appetite or are these limits self-imposed?

34. Overall capital spending is determined by our owners based on a number of factors. Each individual project is assessed using an investment framework, and therefore energy related investments are considered alongside other potential capital investments. The limits are self-imposed and are independent of lender appetite.

Q10: To what extent do hidden costs or co-benefits (as described above) hinder or progress process heat investments?

35. Unless a benefit is able to be quantified, it has little impact on process heat investment decision making. The main issue is endeavouring to quantify externalities such hidden costs and benefits through an independent mechanism (for example, emission pricing). The uncertainty in emissions pricing means that such hidden costs and benefits will not be fully taken into account in investment analysis.

Barrier F: Inadequate information on the emissions profiles of products or firms

36. We face demand side pressure on a regular basis to reduce emissions associated with our production. The majority of customers in turn use our emissions profile as an input into their own analysis for product information.

Barrier G: Some firms have poor information on their own energy use

37. We agree that large energy users generally have comprehensive information on energy use, and that this issue is primarily for low energy users or businesses for which energy costs are a small proportion of overall costs.

Q11: Does your organisation actively monitor its energy use and/or its emissions?

38. Yes. Energy use and emissions are also reported on a monthly basis. We also publish an annual "Sustainability Report" which reports on annual emissions along with other sustainability measures.

Q12: Do you think that there would be benefits from publishing individual emissions data reported by NZ ETS participants and/or large process heat users?

39. We think publication individual emissions data would be a distraction from the primary issue of reducing emissions. Oji FS already publishes emissions data and advise our customers on our emissions profile for products we supply, which in turn enable them to make informed decisions on purchases.

Q13: Do any of the informational barriers described above have an impact on your organisation's decision to invest in process heat technologies, and if so, to what extent?

40. No. Although we acknowledge that we may be unfamiliar with some technologies.

Q14: Could you please rank the three informational barriers as listed directly above this box in order of impact on your organisation?

41. N/A

Barriers to the electrification of production

Low emissions

42. The comment made in paragraph 68 of the paper that electricity "…offers a range of benefits, including low emissions…" is erroneous. While NZ electricity generation is in excess of 80% renewable, the marginal generation in terms of overall energy supply is thermal, whether supplied by a CCGT, gas fired peaking plant, coal fired rankine units or diesel fired (eg. Whirinaki). By definition, electrification increases electricity demand, therefore increasing the amount of thermal generation required at the margin. While the average emissions associated with electrification would be lower, the assumption that electrification reduces overall emissions is incorrect. This would only apply in an electricity system that was 100% renewable.

43. While we acknowledge, and to a certain extent support, the present Government's goal of 100% renewable generation by 2035 (in a mean hydrological year), we believe that this is almost certainly unachievable and costly. In any case, the focus should not be on electrifying process heat, but should be on using electrification in the less-efficient transport sector.

Plant Efficiency

44. We also dispute the statement that electricity has high "…plant efficiency…". In an electricity system that is supplied at the margin by thermal generation, the overall efficiency of process heat supplied directly is considerably more efficient than electricity. For instance, modern boilers can obtain thermal efficiencies in excess of 80%. Modern CCGTs have thermal efficiencies in the order of 55-60%. Once you take into account transmission losses, distribution losses and local electrical losses, the effective efficiency of thermal generation is less than 50%. Steam turbines (eg. Huntly rankine units and gas fired peaking plant) are even less efficient. Consequently (unless generation is 100% renewable) electrification will lead to a net increase in emissions.

Low capital cost

45. The further comment that electricity has a "…relatively low cost of capital plant" is also incorrect. Electrical plant has a high cost of capital compared with typical process heat plant such as boilers. Not only that, but the cost of upgrading site electrical networks, electricity distribution networks and even electricity transmission networks can be prohibitively expensive as well as time consuming.

Low operating cost

46. Operating costs associated with electrical equipment can also be prohibitive and unpredictable. For instance, the electricity wholesale price (spot price) has recently been in excess of $150 /MWh on average, with peak prices even higher, plus additional transmission and distribution costs. While large industrial consumers are likely to have hedged electricity volume, the impact on longer term electricity pricing is significant. In comparison, gas used for process heat, particularly when coupled with cogeneration, is in the order of $10/GJ (including T&D costs), or in the order of $50-$80 /MWh.

47. As electrification increases electricity demand, this puts pressure on electricity prices, thus undermining further electrification. Any electrification therefore needs to be focussed on the sectors that provide the greatest benefit (e.g. transport) where it is more likely to be cost-efficient while also reducing net emissions.

Barrier I: High cost of electrical energy relative to other high carbon fuels

48. We agree that there is a high cost of electrical energy relative to other high carbon fuels. However, we disagree that this is because of the negative externality of carbon emissions not being taken into account. Thermal generation (eg. gas or coal fired power stations) face a carbon charge which is passed through in spot market pricing. As these generators typically supply the marginal energy (at least on a medium term basis), and as already stated, are less efficient, marginal electricity must always have a higher cost than alternative fuels.

Barrier J: Electricity supply is fundamentally more complex than other fuels

49. We fully agree that the electricity supply chain is more complex than other fuels. We disagree that electricity is difficult to store – South Island hydro-dams have significant capacity and benefit from hydro-firming intermittent generation such as wind.

50. More importantly, the wholesale (spot) price of electricity is highly variable, with extreme half-hourly price volatility. Marginal prices are determined by supply and demand, with generator offers effectively setting the market price. Thermal generation offers incorporate the cost of carbon, so wholesale electricity pricing already reflects the ETS.

Barrier J1: Connection Costs and the TPM

51. This is a significant barrier in our view. Transmission upgrades are extremely costly, and can require not only an upgrade of substation assets but also transmission lines. In either case, we are potentially talking about tens of millions of dollars. In addition, while parties face the cost of specific upgrades, particularly for connection assets, interconnection charges are in addition to this, and at, for instance, $115k per MW, add additional operating costs.

Barrier J2: Time and costs associated with developing electricity connections and new generation plant

52. We fully agree that not only are transmission and distribution upgrades costly, they are also time-consuming and can take several years depending on the complexity and whether resource consents are required.

53. We agree that the issue around Transpower charging regime, particularly across multiple connected parties creates a significant disincentive to being the first mover and other parties free-riding off one party's investment.

Barrier J3: Perceived risk of electricity supply disruptions

54. While the electricity system is highly reliable on a national basis, disruptions occur on a regular basis. We object strongly to the statement that electricity supply disruptions are a 'perceived risk' – electricity disruptions are a major risk to our business and are extremely costly. On an annual basis, OjiFS would be impacted by at least 10 disruptions to electricity supply. Even a momentary interruption or voltage disturbance causes significant interruptions to production and can be extremely costly.

Barrier J4: Variable and uncertain emissions intensity of electricity use

55. We have major concerns with the calculation of emissions intensity for electricity. At the margin, the emissions intensity is the emissions associated with the highest emission generation source operating. Assuming no thermal generation, this would be the Ngawha geothermal station. Alternatively, given that NZ is energy constrained (given hydro peaking ability), the highest emissions profile (eg. Whirinaki or Huntly rankine units operating on coal) should be used when assessing alternatives. Any project which uses more electricity needs to be assessed against the marginal emissions rate rather than the average emissions rate.

56. Barrier K: Electricity has historically been a 'last choice fuel' for industrial processes

57. This is absolutely correct, and with good reason. Industrial process requirements make electricity undesirable for industrial processes for any large industry. The true costs and risks of electricity supply for large users of process heat are significant and are generally well understood by those firms.

58. There may be applications for users of low-grade process heat where a supply chain for alternative fuels has potential issues.

Q15: Has your organisation considered electrifying part or all of a given site's heating process?

59. Yes. However, this is costly and impractical for our large sites. We have smaller sites which could potentially be electrified. This is still a costly exercise and while we will continue to investigate the potential, at this stage seems highly unlikely.

60. In saying this, electrification is more likely to occur in the South Island where low-emission natural gas is not available.

Q16: If so, to what extent do you agree with the barriers I to K listed above?

61. All the barriers listed above are correct to some extent. See comments above.

Q17: What does your organisation consider are the largest barriers to the electrification of its production?

62. Electrification is not a valid option for our organisation:

- The majority of our process heat requirements are for high temperature processes, reaching temperatures in excess of 200 degrees, or producing steam in excess of 40 barg. Electricity is unable to provide an efficient mechanism for supplying this level of heating.
- The energy requirements for process heat are unable to be met in anything approaching a cost-effective manner. For instance, gas use at Kinleith alone is approximate 2.5 PJ per annum, which is equivalent to 700 GWh (say 80 MW on average). The cost of upgrading electricity the transmission system alone is prohibitive, let alone the increased operating costs.
- The electricity network is far more fragile than the gas network. Interruptions to gas supply are rare and able to be smoothed out, whereas electricity disturbances are instantaneous and regular. Potential interruptions from electricity disturbances are costly and have a significant disruption to production.

Q18: Are there any costs or co-benefits of electrification that we have not included that your organisation has identified?

63. One additional cost is the potential impact on net electricity associated with reduced cogeneration. For example, steam produced for process heat requirements can be used in a cogeneration plant – electrification not only increases electricity demand, but also reduces low-cost cogeneration opportunities.

Barriers to the use of woody biomass

Barrier L: The economics of biomass fuels is situationally dependent and complicated

64. We agree that the economics and implications of using biomass fuel is situationally dependent. However, we disagree that it is more complicated than fossil fuel alternatives, particularly coal or waste oil/diesel.

65. We agree that biomass fuel availability and cost is location-specific, similarly to coal and geothermal. The low energy density of some biomass fuel compared to coal means that the cost may be significantly different the further the biomass fuel has to be transported. This is a cost issue but not a barrier.

66. We agree that a range of factors make it difficult to determine the best approach to transitioning from use of fossil fuels to biomass. However this is primarily an information issue and we believe there is an opportunity for EECA to work with the Bioenergy Association on this issue.

67. More importantly, the forestry and wood processing sector have potential to produce residual biomass ideally suitable as an energy fuel is similarly. Currently the export of unprocessed logs means that NZ is effectively giving away a major potential source of energy fuel. This needs to be a focus if NZ is move towards more bioenergy.

Barrier M: Biomass supply chains are undeveloped and face development difficulties

68. We agree that "A lack of demand has hindered the development of a wood fuel supply chain in New Zealand beyond the wood processing sector." and that "Supplying large amounts of fuel requires significant capital investment in equipment (i.e. trucks and heavy machinery). A fuel supplier is unlikely to make these investments in the absence of a long-term supply contract."

69. We believe that there growth of the fuel supplier network will continue as the demand for fuel grows, and that demand will continue to grow as the cost of fuel falls and users have more confidence in the supply chain.

Barrier N: Air emissions regulations

70. We agree that air emissions regulations are a barrier and this needs to be addressed. A consistent approach across regulatory authorities, with a particular focus to facilitate increased renewable energy production is required. This could potentially be addressed by Government guidelines or a national environment standard.

Q19: Has your organisation considered biomass as a fuel source? If so, what did you conclude and why?

71. Biomass is already our primary fuel source. Presently we utilise approximately 19 PJ per annum of black liquor (lignin extracted from wood as part of the Kraft pulping process), with another 2 PJ of woody biomass (wood residues/hog fuel). Projects are focussed on more efficiently utilising existing biomass for energy production.

Q20: To what extent do you agree with the barriers L to M listed above?

72. We agree that all three barriers present issues for business considering switching to biomass fuels. Certainly the economics of biomass fuels is situationally dependent, and supply chains are still developing.

73. However, we note that there is the potential for a significant amount of in-forest residues are available at low cost (extraction and transport cost only). In addition, more wood-processing in NZ would provide increased levels of fuel availability and assist with the development of supply chains.

Q21: What does your organisation consider to be the largest barrier(s) to the use of biomass for supplying heat?

74. We believe the most significant barrier to the use of biomass for supplying energy is that until now, there has only been superficial interest in the use of biomass energy amongst Government entities. Biomass has the potential to make a significant contribution to reducing emissions, and only recently have Government entities started engaging on this issue.

Q22: Has your organisation identified any costs or co-benefits of using biomass that we have not included above?

75. Oji FS believes the wood processing sector is an essential part of a future low emissions economy, and policy goals to retain and improve the competitiveness of NZs wood processing sectors in the international marketplace are essential.

76. By example, it would be more efficient for logs to be processed within NZ (rather than exported whole) and have increased residues available domestically for pulp mills and renewable energy production. The volume of logs exported whole, rather than processed in NZ, is influenced by many factors, including the value of the $NZ. However we note that importing countries place a high value on the residue/bio-fuel value from whole logs, as evidenced by the use of tariff's and non-tariff measures.

77. Policy measures aimed at transitioning the NZ economy to a lower emissions pathway need to assume that other countries will place an increasingly higher value on wood residues as a form of bioenergy, as feed stocks for their own bio-refining industries and as wood-based carbon storage and capture within construction.

78. Every time a log is exported, a portion of renewable fuel is also exported as most of the residues used for process heat come from the waste products of sawmilling etc. NZ therefore faces the full cost of emissions on harvest without the benefit of using the renewable fuel to offset fossil fuel emissions. A significant amount of renewable energy could readily be provided via renewable wood processing residues if domestic wood processing expanded[5]. Conversely, any reduction in NZ's domestic wood processing sector is a reduction in NZ's ability to achieve this country's stated goal of transitioning the economy to the lower GHG emissions track.

79. Biomass can be used as a replacement for fossil fuels in a wide range of applications around the supply of heat, and potentially used to generate onsite electricity used in manufacturing. There is enough recoverable woody biomass available throughout New Zealand that 60% of current coal use in heat plant could be replaced by biomass fuel. There are considerable opportunities to move to a biofuels across the economy and reduce coal and gas use. The determining issue is around availability and price of such biomass.

80. One issue is around boiler type and the ability of an existing boiler to use different fuel types. We believe there is a real opportunity when companies are looking at replacing existing boilers to ensuring any new boilers are able to run on woody biomass.

Self-generation from renewable sources - wind or solar

Q23: Has your organisation considered building onsite generation? If so, why did the project go ahead or not go ahead?

81. We are continually reviewing options for building on-site generation. Sites for both wind and geothermal generation are in reasonable proximity to our two main industrial sites. These have not progressed due to project risks and not being commercially viable at the time they were considered.

82. We are also investigating opportunities to replace our existing recovery boilers at Kinleith with a high energy recovery boiler (operating in excess of 500 °C and 100 barg) with the potential for significant increase in cogeneration electricity production. This is not commercially viable at present.

Q24: Are there any barriers to, or co-benefits from, the use of onsite generation that we have not included that your organisation has encountered?

83. The major co-benefit from increased on-site generation is that this contributes to the level of renewable generation in NZ, and reduces fossil-fuel based thermal generation.

84. Industrial cogeneration from renewable sources (ie. from black liquor produced in the Kraft pulping process) has the potential to provide an additional 50+ MW of electricity production for no increase in emissions, and more importantly, has no resource consent related issues, but the full value of the emissions reductions from such a project are not able to internalised into the project financials.

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[5] 'Future Scenarios of Wood Energy for Emission Reduction', Dr Martin Atkins and Dr Tim Walmsley, University of Waikato, May 2016.

The use of direct heat from geothermal

85. We agree that use of direct heat from geothermal steam presents an opportunity to reduce process heat submissions. However, the key obstacle is simply geographical dependence – existing plant can utilise geothermal steam if it is available locally. For instance existing equipment can be readily replaced with a geothermal steam supply provided it was commercially viable.

Q25: Does your organisation have the potential to use direct heat from geothermal?

86. Yes. We are already using geothermal steam at our Kawerau mill. We are also in the process of replacing an aging boiler at Kawerau with geothermal steam supply.

87. There is also the potential for geothermal steam supply at Kinleith.

Q26: If so, what are the key barriers that hinder your organisation from using direct heat from geothermal?

88. The key barrier at Kinleith is that there is no developed geothermal field within close proximity to the site. There is the potential for development, but this is outside our core business.

Q27: Has your organisation identified any other barriers to, or co-benefits from, the direct use of geothermal heat that we have not included above?

89. No

Switching from coal to natural gas

90. We agree that, where practical, substituting natural gas for coal is an appropriate mechanism to reduce emissions. We agree that this is only practical in the North Island where existing gas transmission and distribution infrastructure is available.

91. We note the comment about security of supply. In our opinion, gas supply is far more secure than alternatives, particularly for large users. Even during the Pohokura outage of 2018, natural gas was available for process heat requirements. Reducing development of fields may cause the supply and demand balance to change in the future, and indeed, this is a greater concern for large natural gas users.

Hydrogen as a low emissions fuel for process heat

92. We agree with the Paper's assessment of hydrogen as being inappropriate as a potential fuel for process heat. In theory electrolysis using renewable electricity would reduce emissions, but at significant cost. While NZ has any thermal generation, hydrogen used for process heat is not a valid option, and would only serve to increase net emissions.

93. We also agree with the assessment of steam-methane reforming, and that this is significantly more expensive and emissions intensive than utilising alternative carbon-based fuels.

Please feel free to contact me if you have any questions regarding this submission. Oji FS is more than happy to meet with EECA and MBIE to discuss any specific questions or clarify any points made in this submission.

Yours sincerely,

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