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Windsor Energy

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Submissions Analysis Team
Climate Change Commission
PO Box 24448
Wellington

27th March 2021

Climate Change Commission Submission

To whom it may concern,

Please find enclosed our submission to the Climate Change Commission. We are New Zealand's foremost EPC contractor in the process heat sector and have a unique insight into the problems of replacing or converting the existing coal-fired industrial heat plants in the country.

This submission represents a brief overview of the issues from our perspective. We are very happy to be able to assist in any way that we can and would be delighted to be able to provide more detail and share our analysis and research with you. Please don't hesitate to contact me personally should you require more detail.

Yours sincerely,

[redacted]

[redacted] – Windsor Energy

Windsor Energy

[redacted]

Submission

Executive Summary

- Windsor Energy, formerly RCR Energy, are New Zealand's foremost EPC contractor designing, manufacturing, installing and commissioning heat plant for process steam and hot water.
- The Company has operated in New Zealand since around 1958.
- In New Zealand, Windsor have been responsible for installing more biomass boiler capacity than any other company and their installations burn more biomass material than anyone else.
- Since 2018, Windsor have been focussed on providing the market with cleaner alternatives to coal and have concentrated on partnering with global leaders in sustainable energy technology to provide a full range of alternative heat generating systems across all sizes and fuels with the aim of minimising net carbon emissions.
- Windsor completed the first large boiler conversion (43MW) in New Zealand from coal to biomass pellets in 2020 at Fonterra's Te Awamutu site.
- Windsor strongly supports the ban on all new coal plant in New Zealand and believe that there are ample more environmentally acceptable solutions available.
- Windsor believes that the ending of the use of coal for industrial heat by 2035 is a realistic target and that this date could be improved upon with the correct planning and resourcing. This enhanced date will however be a challenge.

Windsor's unrivalled experience in the realm of providing process heat to New Zealand industry puts them in a position of having a unique insight into what will be required to convert the current installed base from coal to carbon neutral alternatives.

This submission deals mainly with the question of the conversion of coal plant to other fuels however the question of gas still remains. With the potential short-term supply constraints on gas and the desire to phase out gas in Budget Period 3, Windsor believes there are ample technical solutions available for replacing gas with biomass and electricity and that, given the longer timeframes, there is time to meet the required electrical infrastructure and pricing concerns. Equally, there is time to explore in greater depth the potential for scaling up biogas production.

Coal Plant Conversion

1. Technology

The target timeframes are challenging and whilst users of industrial heat need to be incentivised and encouraged to optimise their use of heat to reduce the coal capacity that must be converted, in order to meet the 2035 target, they would be required to begin converting their coal base load capacity immediately.

Although other technologies will become available over time the three main technologies available today will be biomass, waste derived fuels and electricity in the form of electrode boilers.

1.1. Biomass

There is a plentiful supply of woody and other biomass in New Zealand and the projections are that the food processing and timber sectors could be amply supplied by waste streams of biomass from the timber industry going forward.

The options are to convert existing coal plant to burn biomass or to build replacement boilers. For new boilers, the technology used to burn these fuels is well understood, well proven, efficient and in line with the costs of the coal boilers they will replace. In New Zealand there is an added advantage in that the most reliable, efficient and cost-effective technology solutions to replace existing plant is very like the plant it replaces thus reducing the cost of implementing new maintenance regimes and the training of operators.

In the case of conversion, where existing coal plant is suitable, the time taken to convert will be similar to building new boilers and will generally result in a slight reduction in the output power of the plant. Both options however are viable solutions.

1.2. Electrode Boilers

Electrode boilers offer a fast reacting, efficient and extremely reliable source of process heat at a relatively low capital cost. The challenge with electrode boilers comes with the lifetime cost where cheap renewable electricity is not available. Currently New Zealand's existing electrode boilers are used to top up process heat supply and not as part of the base load provision due to high power costs.

Coupled to the electricity pricing uncertainties there are major infrastructure problems with getting power to the processing plants that would require it.

If the infrastructure and pricing issues could be addressed, electrode boilers, coupled with electrical storage systems, would represent an excellent, clean complement to biomass fired plant. Windsor is concerned however that in the near future this will not be an option open to many until such time as these cost and infrastructure issues are addressed.

1.3. Waste Derived Fuels

For the purposes of process heat generation, the use of waste derived fuels could play an important part. Fuels split into three main categories; fuels derived from food processing, construction and demolition waste and municipal waste.

The technologies for burning these are again well understood and the unique problems they need to overcome are; high moisture content (+55%) in the case of food processing waste and controlling toxic emissions in the case of the others.

The combustion of food processing waste is usually done by co-firing with another fuel, in this case biomass, and it serves the dual purpose of disposing of waste that would otherwise need to be safely disposed of and producing heat. There are few drawbacks to burning this waste on the same sites that are producing it apart from a small potential additional capital requirement for plant capable of dealing with the increased moisture content.

Other waste derived fuels (construction, demolition and municipal) are all viable alternatives however combustion systems and emission controls will be more expensive and all require specialist fuel processing and sorting. At present, this processing capability, at a scale capable of supporting this as a viable fuel option, does not exist in New Zealand. Windsor works with a number of waste processors in Australia and moving forward to 2035 this reprocessing industry should be one that is actively supported to help meet the 2035 target.

2. Capability

Windsor's has historically concentrated on the market for thermal plant in the range of 10MW to 50MW. Although it has a range of biomass, electrode and electric boiler solutions available in the sub-10MW range, most of its process heat customers, predominantly in the food processing sector, have requirements to replace plant in this 10MW to 50MW range. Windsor assesses the overall size of large (>10MW) coal assets in the food processing and timber sectors to be in the region of 1GW nationwide.

Whilst considering the challenges of delivering on the 2035 target (or improving on this), Windsor drew on its experience of delivering large boiler projects over the last 30 years. In normal market conditions, without having to scale up its workforce markedly, Windsor was able to deliver 2 major projects concurrently with the total delivery time for those projects being roughly 18 months and, assuming the project was between 10MW and 50MW, no real time penalty associated with larger projects. Scaling this delivery up to 5 projects per 18-month period is considered achievable.

Just concentrating on food processing and timber sectors, this 1GW translates to around 35 new or converted boilers, assuming a split in line with existing assets and designed to optimise rollout of 40MW, 30MW and 20MW installations. This would equate to 4 large boilers per 18-month period between 2022 and 2035. If the target date for conversion of existing assets was brought in to 2030, the number of boilers per 18-month period would rise to 6.5.

3. Meeting the Challenge

Windsor Energy is currently the only New Zealand company with the technology available, the experience and the in-country, full-service engineering resource to deliver heat plant of this size let alone this required volume. Far from being a monopoly in relation to this challenge, Windsor would rely heavily on manufacturing partners, other technology subcontractors, installation specialists and civil contractors in order to be able to meet this demand.

The analysis that Windsor has done concentrates on the large boiler requirements of the food and timber sectors and does not extend to the circa 500MW+ currently utilised by other sectors. There are a number of companies in New Zealand that are capable of servicing this

end of the market that would not impact heavily on available design and engineering resources employed at the 10MW+ sector however, without careful planning, there will clearly be potential bottlenecks over installation, infrastructure and civil resources with the volume of work that will be required.

It is clear that in meeting the 2035 targets for the food and timber sectors, capabilities will need to be scaled up dramatically. If this date is brought in to 2030 this will be even more acute but is possible with the right support and planning.

The key areas to address in planning for this roll out will be:

3.1. Resource

Around 13,000 man-hours of engineering and commissioning are required for a single large boiler project. Around 3,000 hours are involved in the detailed design of a new boiler of a size that has not been designed previously. With concurrent projects being executed, the requirement for experienced engineers will be high. Investment in these resources will be critical and it is likely that a proportion will need to be sourced from overseas. Although the project and design strategy planned by Windsor would allow a slower ramp rate of engineers over the period this will be a critical area.

There will undoubtedly be pressure in supplying sufficient site engineering staff to facilitate installation (typically in the order of 30000 manhours) and with no fabrication capability available in New Zealand for boilers of this size we would rely on overseas manufacture.

The combined effects of having to increase overall resources quickly and having to be able to keep ahead of what will undoubtedly become a competitive global market for resource and manufacturing as other countries adopt similar strategies, means that it is imperative that this initiative gets underway as soon as possible. Gearing up resource and supply-chains takes time and the sooner customers have the confidence and a clear path forward in order to make commitments to suppliers like ourselves, the better able we are to make the necessary investment.

3.2. Product

There are obvious advantages to rolling out the largest boilers first. There are economies associated with engineering resource and manufacturing that will benefit the end customer as well as giving suppliers such as ourselves more time to scale up our teams.

There are equally huge advantages to standardising boiler designs around a small number of key products in different sizes. The main advantages are in reducing engineering, manufacturing and installation times and costs.

For this process to be optimised it is suggested that the Early Contractor Involvement model will be critical. This however is probably not enough and it requires a coordination of customers and suppliers at a central level to prevent a "free-for-all" with competitive pressures and aggressive timelines pushing up prices and potentially compromising quality and safety as the pressure to accept borderline code compliant equipment from overseas becomes greater.

If this is truly an initiative designed to deliver a carbon neutral future for New Zealand then some forum at the Government level for centralised planning, investment and coordination between suppliers and customers will be required.