

Low-emissions economy inquiry  
New Zealand Productivity Commission  
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### **Submission from Pioneer Energy Ltd**

Pioneer Energy is pleased to respond to the Productivity Commission's DRAFT report on the Low Carbon Economy Outlook for New Zealand. Pioneer is a specialist low carbon energy producer and retailer for both heat and power and owns and operates 15 local renewable power stations using hydro-electric, wind and biogas generation technologies as well as owning and operating 15 on-site process heat energy facilities across industrial, institutional and commercial customer sites. To support these heating facilities Pioneer also operates a wood fuels business covering the South Island which also supplies independent customer wood fuel boilers for schools, small regional hospitals and accommodation facilities.

Pioneer is one of few fully integrated clean energy business in New Zealand at present and was the first such business in New Zealand to be certified by Enviro-Mark under their Carbon Emissions Measurement and Reduction Scheme (CEMARS®). Pioneer also sells certified renewable electricity to its partner business Ecotricity under a similar CarboNZero scheme.

We appreciate the opportunity to respond and make the following key points relating to the Commission's draft report, based on the experience we have in low carbon supply markets.

We agree with the Commission's views that:

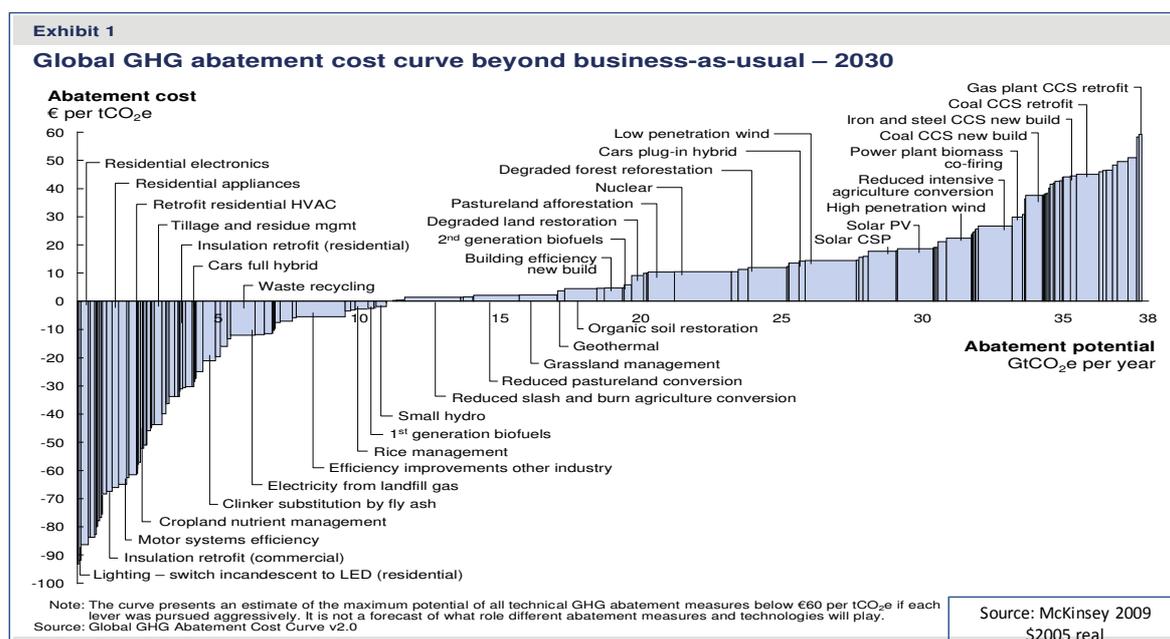
- a shadow carbon price reflecting the required long term investment costs is absolutely necessary to avoid inefficient future investments in fossil fired solid fuel coal boilers. We recommend a shadow carbon price for use in government procurement policies that is not the ETS cap price, as this will defeat its purpose.
- whilst a market pricing mechanism is always preferred, in some cases the shadow price cannot be relied upon by investors if it is not included in procurement policies. This has been Pioneer's experience when government intervened during the Kyoto period. This intervention materially impacted Pioneer's investments in both its process heating assets and its new wood fuels business.

We disagree with the Commission’s initial findings which infer that biomass fuels are not carbon efficient solutions. In particular, we note from the report the following excerpts (emphasis added):

“In its review of New Zealand’s energy policies, the International Energy Agency (IEA) concluded that current coal prices and the low energy content of biomass compared to coal have been obstacles for the switching of large industrial users in the South Island to biomass. At the same time, biomass has also considerable greenhouse gas (GHG) emissions and cannot be seen as low-carbon in a lifecycle analysis. (IEA, 2017a, p. 200) A full analysis on the climate impact of biomass needs to take into account changes in the forest carbon stock, emissions from combustion, and supply-chain emissions from harvesting, collection, processing and transport. There is still uncertainty over some of these factors (Brack, 2017)

Brack, D. (2017). Woody biomass for power and heat: impacts on the global climate. London, UK: Royal Institute of International Affairs.”

We feel there are shortcomings in this initial research review. Biomass fuels have been recognised globally as renewable when sourced from sustainable resources such as plantation or purpose grown short-rotation forests. Carbon price marginal abatement (MAC) costs (ref: Stern (2006) and McKinsey (2009)) clearly show biofuels as making cost-effective contributions.



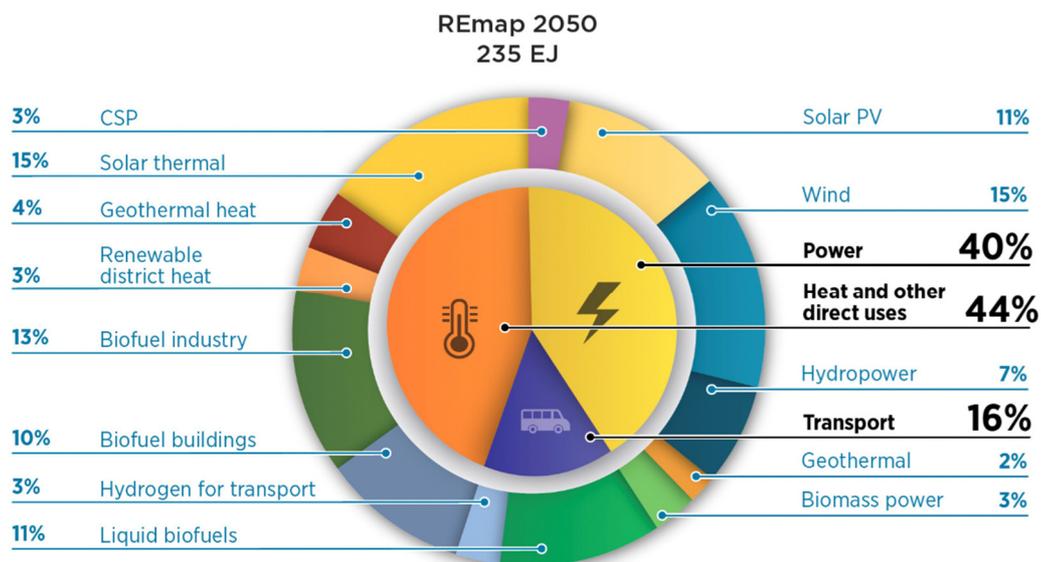
Further, a joint report from the International Energy Agency (IEA) and International Renewable Energy Agency (IRENA) in 2017<sup>1</sup> and another by McKinsey<sup>2</sup> in 2016 both include assumptions for growing contributions from 1<sup>st</sup> and 2<sup>nd</sup> generation biofuels as carbon prices

<sup>1</sup> Perspectives for an Energy Transformation - Investment Needs for a Low-Carbon Energy System

<sup>2</sup> The future of second-generation biomass

By Simon Alfano, Federico Berruti, Nicolas Denis, and Alberto Santagostino

increase and production costs reduce up to 2025. The figure below from the joint report by the International Energy Agency (IEA) and International Renewable Energy Agency (IRENA) in 2017<sup>3</sup> illustrates bioenergy as making a significant contribution to renewable energy.



**Figure ES.7 • Final renewable energy use by sector and technology in REmap,**

Bioenergy is forecast to contribute 37% of renewable energy by 2050, which is a higher contribution than from Wind or Solar PV energy resources. The figure also illustrates that biofuels have multiple potential applications as drop-in or blended liquid, gas or solid fuels and complement solar thermal technologies.

Biomass fuels in the South Island context will displace the highest emitting lignite coal fuels and this needs to be taken into account when considering the full life cycle economics, not just the forest carbon cycle. Offsetting coal heating emission with shorter rotation forest species would in our view achieve a lower carbon solution over the long term by offsetting Gross Emissions in perpetuity.

In a wider economic context, New Zealand’s biomass growing conditions are superior to most other economies so biofuels, together with an established wood processing export sector, could provide additional benefits of offsetting Gross Emissions and achieving carbon archiving in wood products. We estimate that a plantation forest can leave more than 15% of carbon in the soil and stumps, achieve more than 30% on long cycle archiving and another 30% in biofuels offsetting coal or other fossil fuels in perpetuity. Of these three different forms of carbon sequestration, biofuels offset to fossil fuels for heating or transport fuels has the greatest Gross Emissions reduction efficiency and long term low carbon benefits, as it is a more direct low carbon substitution.

The Commission’s draft report recognises that carbon sequestration from forest growth is only a temporary solution, due to the long forest carbon cycle. In our view, the Commission

<sup>3</sup> **Perspectives for an Energy Transformation** - Investment Needs for a Low-Carbon Energy System

and government should be promoting bioenergy options to reduce Gross Emissions, rather than focusing primarily on Net Emissions from forestry sequestration. A Gross Emissions cap is the nearer term objective of the Paris Agreement and is a far more sustainable long-term outcome for the New Zealand economy.

Biomass fuels also work well with most other fuels. In our experience one of the most efficient and lowest cost heating solutions for many institutional, commercial and industrial customers will be gas combined heat and power (CHP). At plant thermal operating efficiencies greater than 75%, and lower network delivery infrastructure costs, CHP seems to have been discounted from the report options. CHP could provide a very cost-effective pathway option for many existing process heating users in North Island locations and could be combined with smaller high temperature biomass boilers. Together these options would reduce Gross Emissions and electricity network and infrastructure demands that will be under increasing pressure from electric vehicle adoption. This combination of distributed gas, biomass and electricity solutions will give New Zealand better energy security and economic resilience than an all-electric future.

In summary, we believe evidence from international research on biofuels, and prioritisation by government to reduce Gross Emissions, would conclude that biomass process heating is actually a superior low carbon and lower cost option to direct electrical heating. There are sound commercial arguments for combining lower temperature heat pumps and heat recovery systems together with higher temperature biomass heating to achieve a more diversified hybrid heating system.

Below we provide some further information on bioenergy projects.

## **1. Bioenergy Solutions for Process Heating**

Pioneer has implemented more than \$70m in biomass heating solution investments on large process heating sites at normal private sector commercial returns, even with ETS carbon prices below \$15 per t<sub>c</sub>. The Commission's report assumes emissions costs will be well above \$30 t<sub>c</sub> so a much broader uptake of bioenergy is possible.

The market cost of the woody biofuels supplied to current customers has ranged from \$8/GJ up to \$14/GJ depending on the level of fuel quality desired. We compare this to gas heating fuels at between \$8/GJ for natural gas and \$28/GJ for LPG bottled gas delivered and over \$45/GJ for delivered electricity. This fuel cost difference between biomass wood fuels and delivered electricity is sufficiently high enough to cover any additional capital life cycle costs of wood boilers over electrical heating plant.

However, there are barriers and constraints on uptake of woody biomass fuels due to the higher cost boilers, requiring more plant space and less supply cost security and certainty. We therefore encourage government to show leadership in developing the wood fuel supply chain by ensuring its own institutional agencies utilise biomass fuels for building heating and

providing some complementary measures to the ETS to assist the private sector with access to low-cost financing options for higher cost wood boilers.

Government owned institutions account for more than 1,000 existing coal or LPG fired boilers than could be using biomass to support the developing wood fuel supply chains. Agencies MBIE, Scion, GNS and Waikato University have recently undertaken regional biomass resource assessments that indicate there is sufficient existing wood fuel residues available to replace more than 50% of existing coal fired boiler capacity. The only barrier to uptake in the government sector is therefore a lack of an adequate procurement policy requiring biomass to be prioritised over other fossil fuels.

## **2. Waste to Energy**

Pioneer owns and operates 3 biogas generation facilities as well as two industrial waste to energy heating facilities. These facilities are expensive to own and operate, but have lower marginal cost (or avoided disposal costs) fuels. The reduction in Gross Emissions from direct intervention in reducing fugitive methane emissions has a clear leverage advantage. Some form of complementary measure to the ETS, for example an issue of additional NZUs or AAUs as an incentive to spend the additional capital requirements, would see more waste to energy investments progressed. Such a mechanism was used in the early Kyoto period when international AAUs were issued for landfill gas projects and these incentives proved successful.

Pioneer is aware of a high number of local waste digestion projects that would have additional benefits of lowering waste water contaminants as well as offsetting fossil fuels with biogas production. The addition of NZUs at the facility level would see the higher risk-return hurdles achieved for these sorts of riskier projects.

## **3. Drop-In Biofuel Substitutions**

The Commission's draft report has taken a relatively binary view of different boiler fuelling options. In reality different fuels can deliver different levels of process heat and/or different seasonal heating outcomes as process demands might dictate. At the macro level a blended fuel outcome is more likely to occur over time compared to direct substitutions.

Biomass derived fuels, whether gas, liquid or solid wood fuels, are unique in a market context as they can be used for drop-in substitution and blending or co-firing with existing gas, liquid or solid fossil fuels for heating, transport or electricity generation. For example, the electricity sector analysis appears to have missed consideration of liquid biofuels running open cycle gas turbines (OCGTs) for dry years reserves – i.e. a 100% renewable dry year solution using conventional power plant identical to the existing Whirinaki Peaking Plant. This important feature of biofuels appears to have been missed by the Commission.

Again, we argue that the government's focus should be primarily on reducing Gross Emissions. The private sector can then be encouraged by the ETS mechanism and market

carbon costs to make investments in Net Offsets. Biofuels can be blended to reasonably high fractions in gas, liquid or solid fuel formats and used in part or whole to replace fossil fuels as different situations dictate. Pioneer has successfully co-fired biomass wood fuels with coals in their Dunedin Energy Centre for more than 8 years. This energy centre is 28MWth and has for decades supplied the University of Otago, Southern District Health and Cadbury's process factory. The co-firing conversion was relatively low cost, at less than \$2m per 8MW boiler, and a converted boiler will operate on biofuels through summer months. Reductions of fossil fuel emissions can then be made progressively as new wood fuel supply chains are developed.

## **Conclusion**

Pioneer believes the draft report provides a good outline of the economic trade-offs relating to transitioning to a lower carbon economy but has, in our view, put too much emphasis on renewable electricity and Net Emissions at the expense of other distributed gas and biomass solutions that can reduce Gross Emissions.

We would be happy to meet and discuss our experiences further.

Yours truly,



Fraser Jonker  
**CEO**  
Pioneer Energy Ltd