



TRANSPOWER

Keeping the energy flowing

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Process Heat in New Zealand: Opportunities and barriers to lowering emissions technical paper

We welcome the opportunity to submit on the Ministry of Business, Innovation and Employment's (MBIE's) technical paper on *Process Heat in New Zealand: opportunities and barriers to lower emissions*, published 22 January 2019.

MBIE is considering this issue at a critical time when the Government is seeking to enable a pathway to meet our climate change commitments to decarbonisation. Proactive consideration of potential opportunities and barriers to electrification of process heat is an important contribution to the national discussion on how to realise the advantages that can be generated through a clear plan to deliver a low-emissions economy.

As outlined in Transpower's *Te Mauri Hiko – Energy Futures* report, we agree with MBIE that electrification of process heat backed by new renewable generation will be a key driver in New Zealand's transition to a low-emissions economy. For the electricity sector, a low-emissions economy entails the potential doubling of electricity demand by 2050, the challenge of ensuring the transmission system can meet the needs of increasing demand and supply when and where it arises, and more complex flows of electricity throughout the entire system.

In this context, the electricity sector will need to meet several important challenges, including significant investment in new renewable generation and associated transmission connections, new transmission investment, changes to the roles of networks (to enable new technologies and more complex trading relationships), and the increased importance of system reliability and security of supply. Only by focusing on both electrification of transport and process heat as well as enabling new renewable generation will New Zealand be able to achieve its ambition to decarbonise.

We appreciate that MBIE's questions, as posed in the technical paper, are primarily seeking input from businesses that own process heat plant. We agree access to a reliable and secure supply of electricity through transmission and, as applicable, distribution systems is critical to lowering emissions in the industrial and commercial sector. As owner of the national grid and system operator for the wholesale electricity market, Transpower has an important role to play in enabling and supporting the electrification transition for process heat.

In that context, in this submission we make the following key recommendations:

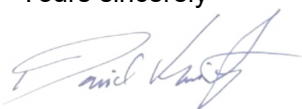
- 1. Focus on starting electrification with low and medium temperature process heat plant categories:** MBIE should focus on enabling the electrification of plant in the low and medium process heat categories, where technical solutions are proven and economic today. This will be a key stepping-stone towards wider electrification of process heat.
- 2. Government leadership to build capability:** MBIE should recommend the Government take a leadership role in building capability, both in the provision of information and demonstrating the conversion of process heat plant to electricity. This could involve leading the way with the electrification of hot water, space heating and sterilising needs for public hospitals, prisons and schools – and in doing so developing the sector's technical advice, analysis and investment tools, to enable the wider opportunity.
- 3. Give specific attention to the potential investment and information hold-up problems that risk delaying decarbonisation:** Plant investment cycles, alongside the cost of connection assets, could create specific hold-up problems in the process heat electrification, especially given many of the largest opportunities arise in regional locations. MBIE should ensure proactive investment in networks is enabled, and accurate information on loads, use and plant replacement cycles, is more widely available to assist with prudent network investment decision-making.
- 4. Develop National Policy Statements for renewable generation and transmission:** MBIE and the Ministry for the Environment (**MfE**) should complete their Outcome Evaluation Report on the National Policy Statement on Electricity Transmission (**NPSET**), and the Government amend the National Policy Statements on Renewable Electricity Generation (**NPSREG**) and the NPSET to facilitate investment in renewable generation, and the transmission infrastructure necessary to support the electrification of process heat.

We respond to the relevant questions set out in the technical paper below.

MBIE can make a significant contribution in advancing a common understanding around the opportunities and challenges facing electrification of process heat in New Zealand, and the part it can play, as New Zealand moves towards electrifying and decarbonising its economy.

Transpower thanks MBIE for its leadership on this technical report and looks forward to continued engagement on this important piece of work.

Yours sincerely



David Knight
Company Secretary

ATTACHMENT – SUBMISSION FORM

<p><i>Question 14: Could you please rank the three informational barriers as listed directly above this box in order of impact on your organisation?</i></p>	<ol style="list-style-type: none"> 1. Barrier H: Lack of information or aversion to new technologies. Based on our discussions with customers and potential customers this is the biggest barrier. New technology for process heat electrification has not yet been widely deployed in New Zealand, so there is an incomplete understanding of the new energy-efficient technologies available and the compelling economics of these in some circumstances. There is also an “all or nothing” approach, that is holding back partial electrification, for example of thermal vapour recompression. 2. Barrier F: Inadequate information on the emissions profile of products or firms. This is the second biggest barrier in our view. Our interactions with customers and potential customers highlight consumer and social encouragement for decarbonisation is acknowledged, but the provision of more complete information about emissions for consumers and other groups could provide for greater impetus for individual businesses to act. 3. Barrier G: Some firms have poor information on their own energy use. In our view this is the smallest barrier. As MBIE observes, this tends to be where spend (and hence use) is smaller. As such, we see this as a smaller opportunity to achieve the overall goal. <p>We consider EECA and MBIE have a role to play in providing information and tools to assist with a good understanding of the technologies available to enable a transition to lower emissions for process heat users, and prudent analysis of the potential investment.</p>
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Barriers to the electrification of production

<p><i>Question 15: Has your organisation considered electrifying part or all of a given site's heating process?</i></p>	<p>Transpower is discussing electrification of process heat with several of its customers and potential customers around the electrification of process heat. As owner of the national grid, Transpower has an important role to play in enabling and supporting the electrification transition for process heat. Access to a reliable and secure supply of electricity through transmission and, as applicable, distribution systems is critical to lowering emissions in the industrial and commercial sectors.</p>
<p><i>Question 16: If so, to what extent do you agree with the barriers I to K listed above?</i></p>	<p>Barrier I: High cost of electricity energy relative to other high carbon fuels</p> <p>In our view, there is a lack of robust information comparing the price of electricity to other fuels for process heat. This should take account of the efficiency of electrical process heat at different temperatures as this is a key aspect of the economics. We understand EECA has done some work in this area. We encourage it be made more commonly available and cited as a reference.</p> <p>Barrier J: Electricity supply is fundamentally more complex than other fuels</p> <p>Whilst fossil fuels are more tangible and therefore perceived as being easier to physically store and transport, there are a number of consequential and ongoing costs associated with the infrastructure and personnel required to enable storage and transportation that are often not taken into account when identifying the cost of the given fossil fuel. MBIE should ensure any analysis tools it may develop to support industry ensure such costs are captured.</p> <p>That said, Transpower appreciates the electricity sector will need to meet several important challenges, including significant investment in new renewable generation and associated transmission connections, new transmission investment to meet increasing demand, and the continuing focus on robust management of system reliability and security of supply.</p> <p>We are of the view that, once transitioned, electricity is no more complex to manage than other fuels (and in many cases will be easier). The barrier is at the point of contemplating</p>

	<p>electrification, and this should be a focus of initiatives designed to ease the electrification challenge. Electricity can become even less complex to manage with real-time pricing (RTP) for “spot” wholesale electricity: this is on the Electricity Authority’s work programme. RTP would provide generators and purchasers with firm prices in real-time, and enhanced scarcity pricing signals. These technical changes would all flow through to greater commercial certainty for industrial users considering electrifying process heat.</p> <p>Barrier J1: Connection costs and the Transmission Pricing Methodology</p> <p>New investment will be required in transmission assets and services to enable the electrification of the economy. Multiple new grid connections will be required before 2050 to connect new industrial process heat plants, and renewable generation.</p> <p>Transpower is required to ensure the transmission system meets prescribed security and reliability standards. This is our focus when we design and build our transmission assets. These regulatory obligations necessitate us to consider the impact of increasing, decreasing and/or changing capacity on the system as a whole and not working on part of the system in a vacuum. Taking a holistic view and addressing consequential needs on the system is something we could explain better to our current and potential customers.</p> <p>As we evolve Transpower for the future, we are reviewing our design standards, seeking increasing innovation and efficiencies in design. We are mindful of the need to enable New Zealand’s energy future, and the part we will continue to play in ensuring the ongoing affordability of the price of electricity.</p> <p>We are entering a period of increasing connections, there is an opportunity to take a long-term view and plan for a grid that will enable a decarbonised economy. We see potential to reconfigure elements of the grid around the core higher voltage lines, reinforcing capacity in some areas and rationalising it in others.</p>
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	<p>There should be a focus on ensuring the investment framework allows proactive, prudent and timely transmission investment, consistent with supporting the long-term interests of consumers, while helping to enable New Zealand's just-transition to a low-emissions economy. It is also important transmission pricing outcomes for individual customers and potential customers do not inefficiently disincentivise the transition.</p> <p>It is also important to focus on distribution networks and their flow-through impact on transmission. There is a risk large plants initially connect to distribution networks for their initial electrification, but such networks cannot support their full electrification. Once the connection costs are balance sheet items for these customers and distribution customers, it may become harder to electrify further process heat on these sites without connecting to the transmission network – raising the risk of stranded distribution network assets.</p> <p>Barrier J2: Time and costs associated with developing electricity connections and new generation plants</p> <p>We agree the time required for obtaining resource consent for an electrical connection and/or a new electricity generation facility can be long, with the cost involved uncertain and prohibitive for some businesses.</p> <p>We consider MBIE should complete its Outcome Evaluation Report on the NPSET, and the Government should amend the NPSREG and the NPSET to facilitate investment in renewable generation and the transmission infrastructure necessary to support it.</p> <p>We propose a focus on both information and enabling proactive network investment would minimise the impact of this barrier on New Zealand's transition to a low-emissions economy in time to meet our carbon commitments.</p> <p>In terms of information, we encourage EECA to continue its focus on gathering data on process heat – publishing it with frequent updates and additions. This would enable broader sector planning.</p> <p>There is a critical need to ensure the network investment and funding regime is fit-for-purpose</p>
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	<p>in light of the Government’s carbon commitments – enabling proactive investment in networks (or preparatory work to minimise time delays closer to the need date) to ensure networks can meet increasing loads (especially where these are shared).</p> <p>Barrier J3: Perceived risk of electricity supply disruptions</p> <p>We agree that continuing high levels of system availability is important to ensuring confidence in the transition to electricity as the fuel source of choice for process heat.</p> <p>As discussed above, we consider it critical the regulatory settings facilitate sufficient investment in new renewable generation, and proactive investment in the transmission network, to ensure supply is sufficiently secure (including in a dry year) to meet the increasing demand.</p> <p>Transpower’s role is also to enable new technology (such as batteries and other distributed energy resources) and to develop new potential service offerings. This could include more varied levels of reliability – whether higher or lower - with appropriate pricing incentives.</p>
<p><i>Question 17: What does your organisation consider are the largest barriers to the electrification of its production?</i></p>	<p>From our discussions with customers and potential customers, Transpower considers the key barrier to the economic electrification is the information and technical expertise to start economic conversions, retrofitting and new investments.</p> <p>In our view, MBIE should recommend the Government take a leadership role in building capability in terms of the provision of information, and technical advice and support for the conversion of process heat plants to electricity. This could involve leading the way with the electrification of hot water, space heating and sterilising needs for public hospitals, prisons and schools – and developing analysis and investment tools, which take all intangibles, and costs and benefits into account. This could demonstrate the compelling economics of electrification and allay concerns about reliability and complexity.</p>