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New Zealand Productivity Commission
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Submitted online

Productivity Commission's *Low-Emissions Economy Draft Report* – EEA submission

Introduction

The Electricity Engineers' Association of New Zealand (EEA) is the national representative organisation for technical, engineering, asset management, and health and safety issues within the electricity supply industry. EEA members include corporate and individual representatives from all sectors of the industry including generation, electricity networks, contractors, engineering consultancies and equipment suppliers.

Our submission focuses on findings and recommendations from *Chapter 5 – Innovation* and *Chapter 12 – Electricity* that directly relate to EEA's work on engineering and management of electricity supply assets. EEA will not comment on the Productivity Commission's recommendations that relate to market forces and pricing incentives.

Overall the Productivity Commission's report identifies most of the key challenges that relate to the electricity supply sector, and EEA sees value in this document informing the government about some common misinterpretations. For example:

- Page 340 of the report identifies that solar photovoltaics (PV) could increase rather than reduce in the longer term the amount of greenhouse gas generated by the power industry as it displaces investments from new renewable power plants to more thermal-based generation. These are important arguments to present to the government and New Zealand consumers who may incorrectly consider the installation of residential solar PV to be an efficient way of reducing carbon emissions.
- Pages 321-322 identify the two facets behind 'resource adequation': electricity consumption on the one hand, capacity on the other hand. Educating the public on the importance of peak demand management is an ongoing challenge for the power industry, and one where the emergence of new technologies could have crucial implications (either in worsening the situation or in helping smooth peak demand). As such, EEA supports recommendation R15.3 to continue to promote the uptake of energy efficiency in building and the reduction of emissions associated with peak electricity demand.

EEA supports the recommendations from the Productivity Commission in relation to the electricity sector, in particular recommendations R12.1 and R12.2, cautioning the government against providing subsidies or using regulation to favour particular types of renewable energy, and against setting emissions targets for electricity that may lead to counterproductive outcomes.

Summary of recommendations

EEA's recommendations to the Productivity Commission relate to:

- the importance of strong local research centres to efficiently adapt the use of new technologies to the New Zealand context, and to better understand their wider industry implications (*innovation*),
- the need for careful attention and strong industry engagement when developing government regulations on emerging technologies, so that government intervention does not hinder the adoption of clean technologies (*innovation*),
- the technological challenges of geothermal energy as a backup source of electricity, which could be made more prominent in the report to strengthen the Productivity Commission's recommendation R12.2 (*electricity*),
- measures that could improve the outcomes of the National Policy Statement on Renewable Electricity Generation (*electricity*):
 - that generation, distribution and transmission activities be considered in their entirety,
 - that the need to connect renewable electricity generation to the distribution network be mentioned as part of Policy C1 in the National Policy Statement,
 - that more consistent acknowledgment and guidance on the technical issues triggered by the development of new renewable electricity generation on the wider electricity networks be provided.

These recommendations are further discussed in the body of this submission.

Comments by Chapter

Chapter 5 – Innovation

While New Zealand's electricity technology research and development continues to grow from a small base, we have historically been regarded as strong innovators and adaptors with many of our leading engineers working for global technology companies.

A key to continuing and growing our local companies and engineering skills lies in **strong local research centres to better understand new technology use and its wider impact, whether the technology is imported or not**. Research centres such as the University of Canterbury's Electric Power Engineering Centre (EPECentre), a partnership between Government, industry and academia, should continue to play a key role in helping with innovation and developing engineering skills and capability to ensure New Zealand can play a role in national and international electricity technologies. Some examples of EPECentre's contribution include – to date – a solar calculator, a tool for modelling distribution generation in New Zealand low voltage networks, and research on the impact of electric vehicles (EVs) and distributed generation on the wider New Zealand electricity supply industry. Future opportunities for research include decarbonisation of the transport and process heat sectors, grid automation, Internet of Things and Big Data.

As New Zealand has a unique electricity supply profile, relying on an isolated (island) infrastructure heavily dependent on hydro generation (58% in 2017¹), **we cannot rely on international research to give us an idea of how emerging technologies will play out in the New Zealand context**. Upcoming challenges are expected to arise with a dry year pattern starting to emerge, which -could redefine the strategy the sector has to take to ensure security of supply. The work of New Zealand innovation and research centres remains therefore critical for local technology use, whether New Zealand is predominantly a technology taker or not.

¹ MBIE's Electricity Generation Data Table 2017

Regulatory barriers to new technology adoption

It is important that careful attention and strong industry engagement be considered when developing regulations on emerging technologies, so that government intervention does not hinder the adoption of clean technologies. An area of concern for EEA relates to ensuring New Zealand has product, technical and safety standards which enable quality and safety outcomes for customer technologies (e.g. PV, EVs).

Some recent examples include:

- The referenced standards in the Electricity (Safety) Regulations (ESRs) have not been updated since 2010 and are out of date. This becomes a problem for emerging technologies, such as PV, when the standard referenced for inverters (AS/NZS 4777) is from 2005. There have been significant advances in inverter technology, yet they cannot be easily adopted in the NZ due to the outdated ESRs. This has stalled innovation, such as the *Guide for the Connection of Small-Scale Inverter-Based Distributed Generation* which was developed through a collaboration between the EEA and GREEN Grid research programme. There is also industry uncertainty caused by ambiguity around if or when later versions of the standard will be accepted and increasing concern over compliance requirements relating to importing products built to both the new and outdated standards.
- The *Electric Vehicle Charging Safety Guidelines*, originally published by WorkSafe in 2016, caused concern within the power industry. The first version was not widely consulted, contained errors, ambiguities and requirements that were challenging to meet and was written in such a way to suggest it may later become regulatory requirement. We understand this made early investors in EV charging feel very vulnerable to regulatory risk. When the guidelines came up for review in late 2017, EEA formed a working group and put in comprehensive feedback on the document to achieve good technical and safety outcomes and ensure requirements were both clear and workable. EEA believes practitioners in industry, who are upskilling in evolving technologies, have expertise, experience and a willingness to add value to initiatives aimed at improving industry standards (i.e. safety regulations, standards adoption, creating guidelines etc). There is an opportunity for better collaboration between private sector experts and regulatory experts to deliver standards and a regulatory framework which will support the adoption on emerging technologies.

Chapter 12 – Electricity

Renewable electricity generation targets

EEA welcomes the government's initiative to look at possible very-low-emissions pathways early, bearing in mind the rapid changes in technology innovation. However, the government's renewable electricity generation targets are, in comparison, 'around the corner' (in 7 years' time for the 90% target and 17 years' time for the 100% target). This needs to be taken into account when developing public policies and regulations affecting directly or indirectly the power industry, as these regulations can take a number of years to be developed and, once implemented, as much time to be reviewed.

The 90% renewable electricity generation target by 2025 is not new and the power industry has now widely incorporated it as a certain fact in its asset management and investment strategies. In 2015, the combined cycle gas fired plants Otahuhu B and Southdown were decommissioned, coal-fired units at Huntly power station are to be shut down by 2022, and plenty of resource consents are available for wind power plants (2.5 GW as of April 2016,

excluding abandoned projects²). The work distribution companies are currently undertaking to review their pricing structure also shows the potential for better peak demand management, which will contribute to reducing thermal-based generation occurring during those peaks.

The 100% target does come with important technical, stability and cost implications. The Productivity Commission report acknowledges these challenges in its Figure 12.6 regarding the cost-emissions-adequacy trade-off. We also welcome the accurate observation from the Productivity Commission that “expanding the supply of electricity (via the electrification of transportation and process heat) could increase the challenge of reducing electricity emissions”.

The Minister for Energy has mentioned on several public occasions the potential for geothermal generation to provide backup generation to help New Zealand reach the objective of 100% renewable electricity generation by 2035³. **It would be worth specifying the technological implications of this scenario in the report.** The challenges associated with backup geothermal generation (e.g. high maintenance costs, geothermal reservoir’s reaction to being shut on and off with the potential for well loss) are mentioned on page 79 of the Sapere report included as a companion document to the Inquiry, but EEA would recommend these observations be presented more prominently within the Productivity Commission report along with the discussion regarding the feasibility and wider cost-benefit analysis of the 100% renewable electricity target. In its current version, the report only focuses on the carbon emissions produced by geothermal electricity generation. This would give a stronger argument to the Productivity Commission’s recommendation R12.2 for the government “*to be cautious in specifying targets for emissions within the electricity sector*” and would have more relevance to the power industry in the ‘shorter term’ of 2025 and 2035, rather than as part of the much longer term discussion on reaching zero net carbon emissions for the electricity sector by 2050.

EEA acknowledges that technological development until then may make it more feasible to reach the 100% renewable electricity generation target (e.g. technology development in battery storage, geothermal energy, etc.), but recommends this be approached with caution based on the current uncertainties on said technological developments.

National Policy Statement on Renewable Electricity Generation (NPSREG)

In response to question Q12.1 from the Productivity Commission with regards to how the NPSREG on Renewable Electricity Generation could be strengthened to give clearer direction to regional, district and unitary councils, EEA would like to reiterate some recommendations made in a 2015 submission jointly to the Ministry for the Environment and the Ministry of Business, Innovation and Employment as part of the consultation on the outcomes of the NPSREG⁴:

- i. **That generation, distribution and transmission activities be considered in their entirety, as all sectors interact with each other.** This means that the objectives and permissions set under one particular NPS for one sector of the electricity supply industry must be taken with clear consideration of the benefits, adverse effects or constraints they will trigger for other industry sectors, in particular for distribution networks whose assets are not regarded as of national significance (contrary to the transmission grid and renewable electricity generation).

² Electricity Authority Generation Update – April 2016

³ For example, during the Energy Panel run by the BusinessNZ Energy Council on 2 August 2017: <https://bit.ly/2xvPxGw>

⁴ EEA submission on the outcomes of NPSREG and NPSET/NESETA, dated 6 November 2015

ii. That Policy C1 of NPSREG on the practical constraints associated with renewable electricity generation activities includes mention of the need to connect renewable electricity generation to the distribution network, in order not to limit the statement to connections to the national grid.⁵ Distribution networks are facing high transactional costs and delays in getting consents to connect generators (community-scale or larger), in particular due to dealing with multiple landowners and with multiple local authorities.

iii. That the technical issues triggered by the development of new renewable electricity generation and impacting the electricity network be consistently recognised and addressed to improve the outcomes of the NPSREG. The benefits of connecting renewable electricity generation to the electricity network are recognised under the NPSREG framework. Adding consistent guidance on its technical impacts may further improve outcomes.

Conclusion

EEA would like to thank the Productivity Commission for the opportunity to comment on its draft *Low-Emissions Economy Report*. Should you wish to further discuss or clarify any matters mentioned in this submission, please contact Marion Sorez, Industry Analyst, at marion@eea.co.nz or Peter Berry, Executive Director, at peter@eea.co.nz or 04 4738 600.

Yours sincerely,



Peter Berry
Executive Director

⁵ The current wording states that “*decision-makers shall have particular regard to [...] the need to connect renewable electricity generation activity to the national grid*”.