Orion

20 September 2017

Low-emissions economy inquiry
New Zealand Productivity Commission
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Dear Commission members,

Re: Orion submission on Low Emissions Economy – Issues Paper

1. Thank you for the opportunity to comment on the Low Emissions Economy – Issues Paper ("Issues Paper").

2. Orion is the electricity distribution company serving central Canterbury. Given our area of expertise, we shall confine our comments on the Issues Paper to the matter of electric vehicles (EVs) and the measures New Zealand needs to adopt to ensure EVs have the maximum effect in reducing emissions.

3. In summary, based on our extensive experience and knowledge in the area of managing electrical load, we believe:

    - New Zealand regulators and the electricity industry need to engage, collaborate and plan now to address the electricity load management issues EV charging will bring in order to achieve the maximum emission benefits EVs offer. Without such collaboration additional fossil fuel generation, with negative emission impact, will likely be needed and electricity stability issues might result.
    - New Zealand needs to ensure that overnight EV charging occurs in a **coordinated** manner. Simply shifting EV load to overnight periods is not enough.
    - To advance the debate on various options, quantifying the economic cost that un-coordinated EV charging could impose on the country is needed.
    - There will be monetary and emissions benefits from greater EV ownership details being made available to the electricity industry.
    - Ownership of vehicle data is an issue that regulators potentially need to consider.

4. Orion fully supports a rapid uptake of EVs in New Zealand and believes they offer a tremendous opportunity to lower New Zealand's greenhouse gas emissions. However, unless as a country we consider some of the impacts an unplanned introduction of EVs could have on our electricity power system, significant environmental wins will be lost.

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The EV opportunity and challenge

5. The Issues Paper is correct in stating that EVs offer by far the greatest opportunity to reduce transport emissions in New Zealand. It is for this reason that Orion has been a significant early adopter and encourager of EVs, through sponsoring EV events, introduction of EVs into our operational fleet, and installing significant EV public charging infrastructure.

6. The Issues Paper refers[1] to the Concept Consulting report on the impact of various emerging technology, and notes that Concept Consulting concluded that wind generation could meet all the increased demand from the uptake of EVs to 2040, if charging of EVs occurs at times of the day when there is lower grid demand (i.e. overnight).

7. However, we note that the Concept Consulting report also concluded that EV charging may not necessarily be shifted to overnight and if this is the case then "ultimately an increase in fossil generation to meet additional demand in the evening peaks" will occur and that OCGT peakers, which produce significant emissions, will be needed[2]. This Concept Consulting report finding, that fossil fuel generation may be needed, is not featured in the Issues Paper.

8. Based on Orion's extensive electricity load management experience, having made coordinated load management a central part of our operations including coordinating load management for seven other networks in the upper South Island, we believe that there is a real risk that this second scenario of fossil fuel generators being needed will eventuate **unless we begin soon** as a country to address the load management issues EV charging will bring.

9. The Issues Paper, and the Concept Consulting report, correctly notes that shifting EV charging to overnight periods is needed. However, crucially, this is only half the challenge New Zealand faces.

10. As a country we also need to ensure that overnight EV charging does not all begin at approximately the same time. If EV charging begins en masse at the same time in the evening (which is quite likely under existing time of use electricity pricing arrangements), the additional electricity load required to charge the EVs will not be able to be delivered by the electricity system without significant financial and environmental cost. It will likely also result in electricity market stability issues.

11. The lack of wide EV engagement that has taken place to date in New Zealand means that many parties, including we suspect the Productivity Commission, are unaware of this dual EV charging challenge. It is a challenge that is not to be underestimated.

12. Any belief that charging of EVs overnight, and EV charging that is smoothly spread out over the night period, is going to occur naturally and under current market conditions is incorrect. The electricity industry and various government departments need to jointly work together to address current deficiencies and determine a toolkit of approaches that will encourage EV drivers to charge their vehicles overnight in a coordinated and well managed manner. Without such a joint working

[1] Pg 28
[2] Pg 19 of the Concept Consulting Report

approach it is highly likely New Zealand will incur significant, and potentially unnecessary, negative financial and environmental impact.

13. However, Orion believes the problems are not without solution. We just need to begin to engage on them, and plan solutions, soon.

The first part of the challenge – why we need to shift EV charging to low load periods (i.e. overnight)

14. Substantial overseas trials have shown that, after taking into account diversity factors, such as not all EVs being plugged in at the same time, that if overnight charging isn't encouraged, EVs will add 1 to 1.5kW per EV to peak electricity demand (i.e. around 6pm in the evening).

15. Based on a 35% penetration rate of EVs in New Zealand in 2040 (which is by no means an ambitious forecast given the latest global EV predictions), this suggests that EVs could add well in excess of 2,000MW[3] to New Zealand's peak electricity load by 2040. If this occurs high emitting peaking generation plant will likely need to be built and local and national electricity grids will need to be expanded, which will also result in embodied emissions.

16. This issue of embodied emissions (embodied in the manufacture of more electrical equipment) if local electricity networks, Transpower's national grid, and generation plant all need expanding as a result of how, and when, EVs charge is not noted in the Issues Paper. The Issues Paper only notes that "indirect emissions depend on the extent to which electricity used to charge batteries is generated from fossil fuels"[4]. Whilst these embodied emissions will be second order to the emissions from additional fossil fuel use in generation, they should not be forgotten.

17. Also, from a New Zealand productivity perspective the building of additional un-necessary electricity network and generation plant comes at significant economic cost. We believe the economic cost that un-coordinated EV charging could impose on the country should be quantified. With such quantification, industry players and the government would be better placed to understand the financial benefit possible actions to achieve co-ordinated charging could bring and allow more informed decisions on possible solutions. Orion itself would be interested in partnering with others in the development of such economic quantification.

The second part of the challenge – why we need to co-ordinate the timing of when overnight EV charging begins

18. It is often suggested that "time of use" pricing could be used to manage the timing of EV charging. Indeed the Issues Paper makes this suggestion. However it ignores the fact that time of use pricing will likely result in power system and market stability issues. This is because with time of use pricing, at the switch over time between a high price period and a low price period, unless some type of coordinated EV charger management occurs, a large electrical load will come on almost instantaneously.

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[3] Assumes a light vehicle fleet size of six million in 2040, based on the growth rate in NZ's light vehicle fleet from the year 2000 to 2015. The NZ light vehicle fleet size was approximately 2.5m in 2000 and increased to 3.5m by 2015.
[4] Pg 24

19. Orion's own initial estimate is that by 2040 for our network alone, if we kept our current TOU pricing in place and made no other amendments to the way we manage load, we would face an over 100MW instantaneous increase in load when our night rate period starts (9pm). Scaling this up to a New Zealand wide level this suggests an in excess of 1,000MW instantaneous load increase is possible.

20. Such an enormous instantaneous increase in load is quite simply unlikely to be capable of being managed. Electricity supply instability is likely. Rather "smoothing out" or staggering the start time of EV charging, so that not all EV charging starts at the same time, is needed.

21. However, the means to achieve such smooth and coordinated EV charging management is as yet not agreed. For the benefit of New Zealand financially and environmentally, it is an issue which needs intelligent and coordinated consideration.

A suggested solution and regulatory considerations

22. Industry players and government parties need to work together and collaborate to overcome the challenges faced to ensure EV charging is coordinated to shift to low load periods (i.e. overnight) and smoothly brought on. If this collaboration occurs there is no reason to believe that electric vehicles cannot significantly reduce New Zealand's emissions.

23. An example of the type of collaboration that is needed is provided by the issue of a lack of identity of where EV owners are located.

24. The identification of where EV drivers live (and charge up their vehicles) has been a major issue for overseas countries with a greater penetration of EVs than New Zealand's. This is because an inability to identify where EV drivers live is a major obstacle to allowing electricity companies to monitor network impacts and communicate with EV owners on how to charge their vehicle in a manner that reduces the need for emitting generation to be built.

25. We understand that a number of countries are considering release of EV registration details in some form to electricity companies to allow such communication and network monitoring. We suggest that consideration of the release of EV registration details, in a highly secure manner to certain electricity industry participants, in New Zealand may be appropriate given the potential cost and emission impact non-release of this information may cause.

26. We believe collaborative discussions on the issue of release of EV registration details should be held. These discussions should determine if release of EV registration information, in a manner that protects the privacy of people but provides to the electricity industry the necessary information to ensure ongoing security of electricity supply to EV drivers and other consumers, can occur.

27. A further issue that needs to be addressed is ownership to access to in-vehicle data. This issue is currently being considered by EU regulators and Orion believes it should also be considered by New Zealand regulators.

28. In Europe, vehicle manufacturers are proposing a common technical architecture to access in-vehicle data, including information on the state of charge of an EV battery. This approach would

channel all future communication and data access through the vehicle manufacturer's proprietary server. Only part of the data generated would then be sent to a 'neutral server' and be accessible for independent operators, at undoubtedly a cost. This solution would we understand likely give vehicle manufacturers an ability to influence the EV charging time.

29. In Europe, consumer associations are arguing that vehicle manufacturer ownership of data undermines vehicle owners' right to decide who they share their data with and for what purposes. These consumer associations also argue that it's potentially a serious threat to competition, innovation and consumer choice in the digital era.

30. Whilst we are not stating that the New Zealand motor vehicle industry will adopt a position of trying to own EV data, through say sales contracts, we need to be aware of this possibility and consider whether it would be of benefit to New Zealand. If the New Zealand vehicle industry in the future seeks to capture ownership of vehicle data in New Zealand in a similar manner to that proposed in the EU, the ability for New Zealand to minimise electrical infrastructure costs and minimise future fossil fuel generation might be compromised.

31. The type of collaboration needed to consider release of EV registration information, ownership of vehicle data and our earlier example of the need for collaborative consideration of the cost to New Zealand of un-coordinated EV charging, are but three examples of the types of government and industry discussions that need to occur in the next few years.

Conclusion

32. Orion fully supports a rapid uptake of EVs in New Zealand and believes they offer a tremendous chance to lower New Zealand's greenhouse gas emissions. However, unless as a country we consider some of the impacts an unplanned introduction of EVs could have on our electricity power system, we will not make the most out of this emissions reduction opportunity.

Yours sincerely

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