LODESTONE ENERGY

25 July 2023

Electricity Authority
By e-mail: forecasting@ea.govt.nz

To whom it may concern

Submission on Review of Forecasting Provisions for Intermittent Generators in the Spot Market

Thank you for the opportunity to submit on the above Issues Paper. As the EA may be aware, Lodestone Energy is currently in the process of building two 23.7MW solar farms at Kaitaia and Edgecumbe which will be commissioned in the next 4 to 9 months respectively. We have been engaging with the System Operator and EA to fully understand our obligations to forecast into the market when these solar farms go live.

We are in the process of developing our forecasting tools with these go-live dates in mind, and have some concern that our investment in systems and processes could be rendered obsolete within our first year of operation depending on the outcomes of this Options Paper.

Please find our comments below.

Submitter	Lodestone Energy Limited

Question #	Question	Comment
Q1	Do you agree with the Authority's problem definition? If not, why not?	We agree with the overarching problem definition however do not necessarily agree with the root causes of the problem that are described in the paper i.e. that forecasts are inaccurate due to lack of incentives or penalties on generators. The paper fails to recognise the fact that weather is highly non-linear and the accuracy of weather forecasts from sources such as NIWA and Metservice deteriorate the further out in time they go. This is because fluid flow (Navier Stokes) equations are non-linear i.e. a small change in input conditions can cause large and unpredictable changes in outputs. Computational fluid dynamic (CFD) models are limited by the boundary condition assumptions, fluid equation simplifications, the level of model discretisation and computing power. So even if participants were somehow incentivised to improve the generation bids, they would still be reliant on large-scale third party weather forecasting that will inevitably have forecast inaccuracies on parameters such as wind, cloud cover at a site level, 6-12 hours out from real time.

[redacted]

Question #	Question	Comment
		The economic analysis is flawed in that the base case modelled by EY was based on a "near perfect forecast" 12 hours ahead. This is a hypothetical construct as it inherently assumes that it would be possible with enough resources and money thrown at the problem to produce such a near perfect forecast. The poor forecasting of rainfall in the hours leading up to the evening floods on 27 January in Auckland show the fallacy of this construct.
Q2	Do you agree that a new forecasting arrangement should apply to all grid-connected intermittent generators that are required to submit offers?	Yes
Q3	Note this question is referring specifically to generators who have thermal assets: For all trading periods between 1 November 2019 and 31 October 2022, how often do you think you made the incorrect decision whether to start or stop your thermal unit(s)? Please provide reasons why this occurred.	Not applicable
Q4	What else, if anything, should be considered when assessing the relative advantages and disadvantages of the four forecasting arrangements the Authority has identified?	The financial ability for market participants to comply with more onerous forecasting requirements should be considered. If, say, IG participants were required to source more accurate third party weather forecasts and develop more advanced and complex models to produce more accurate generation forecasts, this would create an unlevel playing field between the large generator-retailers with large >100MW intermittent generation sources and smaller new entrant generators. The former would have more economies of scale in their portfolio to cover the costs and implementation of such as system, where it could be a significant cost impost to a community owned solar or wind farm that is just over the 10MW threshold.
Q5	What other types of forecasting arrangements, if any, should be considered to improve the issue of inaccurate and unreliable forecasts?	No other come to mind
Q6	Do you agree with the proposed evaluation criteria? If not, what is your view and why? Are there other criteria that the Authority should consider?	The criteria are fine. As per our response in Q4 above, a criteria that ensures that the solution takes into account economies of scale, and keeps a level playing field between large and small intermittent generation.

Question #	Question	Comment
Q7	Do you agree with the Authority's assessment of each forecasting arrangement above? If not, why not?	On the whole yes.
Q8	The Authority has not weighted the criteria based on importance. Are there particular criteria that you consider to be more important that the others?	No
Q9	Are there additional criteria that the Authority should be considering?	As per answer to Q6
Q10	How frequently do you think intermittent generation forecasts should be updated, and how often do you think intermittent generators should be required to revise their offers to reflect updated forecasts?	Six hours seems to be a reasonable assumption for updating the underlying weather models as this would strike a balance between accuracy and affordability. No more than half hourly.
Q11	Do you think the Authority should implement accuracy standards? If not, please explain why.	Yes, on the proviso that the accuracy standards reflected uncertainty levels the further out in time – as indicated in 13.18
Q12	If the Authority was to implement accuracy standards: a) do you think outcome [or] process standards would be more effective? b) should there be a single standard or multiple standards across different timeframes? c) should the standard(s) be focused on ensuring actual generation is within 30 MW of the amount that was forecast, or should the MW compliance threshold be higher or lower? d) should the accuracy standards be based on the percentage of installed capacity rather than a certain amount of MW?	a) Outcome standards are likely to be more effective as they could allow participants to use innovation (e.g. AI) to generate forecasts. b) If outcome standards are chosen then they should differ across longer timeframes. If process standards are chosen, in theory it wouldn't matter as the EA would choose the process to achieve the outcomes it desires across those different timeframes c) 30MW seems like a reasonable deminimus d) No - this would inherently disadvantage smaller generators who would not have the same resources as large generators to implement a system to achieve this level of accuracy.
Q13	Following the 9 August 2021 grid emergency, reports from two investigations recommended that the Authority amend the Code to disallow persistence forecasting and require wind generations make more accurate offers to the system operator about supply. Do you agree that the Authority should amend the Code to disallow persistence forecasting?	No. The preamble indicated that persistence forecasting was generally more accurate than prior hours.
Q14	Do you think the Authority should implement accuracy incentives and/or penalties for non-compliance? If not, please explain why.	This depends on whether the system is centralised or decentralised. For a centralised system where a provider is being paid to provide forecasts then there should be penalties for not achieving the agreed level of accuracy. For a decentralised system, penalties are likely to disadvantage smaller generators and create a barrier to entry over larger

Question #	Question	Comment
		generators. Incentives might be the better approach in a decentralised system, to support the smaller generators to implement better forecasting techniques.
Q15	If the Authority was to implement a decentralised forecasting arrangement, do you have any suggestions for what type of incentives could be applied?	Under a decentralised system, generators will inevitably need access to the advanced weather forecasting models that are run by NIWA or Metservice i.e. a data feed of wind or solar resource forecast specific to their generation locations. They then need automated tools to automatically process this data, apply any known plant constraints and generate an offer file which needs to be uploaded to WITS. Such a system is complex and costly to implement and could be quite a burden on a small intermittent generator and therefore a barrier to entry. Incentives might be in the form of providing financial support to smaller generators to access such data and develop such systems.
Q16	If the Authority was to implement a centralised forecasting arrangement: a) do you have any suggestions for what type of incentives could be applied? b) should penalties for not meeting the standard(s) be prescribed? c) should penalties be higher for over generating than under generating (or vice versa)?	a) none b) there will need to be some commercial tension, but presumably a penalty regime would not exceed a certain percentage of annual revenue, otherwise the regime will be too commercially risky for any provider c) no as this might introduce bias one way or the other
Q17	Do you have a view on who should have responsibility for submitting forecasts and who should pay for forecasting?	From an NZ Inc perspective, it is likely that the most cost efficient solution would be to centralise the forecasting. The recovery of the cost should be done on a per MWh basis rather than per participant basis as that would level the playing field between small and large generators.
Q18	Do you have a view on what types of information should be published and what platform it should be published on?	An aggregated wind and solar generation forecast by Island similar to the one that has been established for North Island wind on EM6 would be a good way to keep the market informed on accuracy of the forecasting methodology chosen.

We are happy to provide further feedback or clarification on the above if required.

Kind regards

Peter Apperley
GM Engineering
[redacted]