

12 November 2024

Submissions
Electricity Authority
P O Box 10041
Wellington

Via email: fsr@ea.govt.nz

Dear team,

Re: Consultation Paper— [Part 8 Common quality requirements review – Addressing common quality information requirements](#)

NewPower Energy Services Ltd and subsidiary Infratec NZ Ltd appreciates the opportunity to make this submission on the Electricity Authority's (Authority) consultation on addressing more frequency variation in New Zealand's power system.

NewPower is a subsidiary of WEL Networks Limited, New Zealand's sixth largest distributor. NewPower subsidiary Infratec NZ Ltd is delivering low-carbon utility-scale solar and battery solutions at a time of unprecedented growth in New Zealand. Infratec developed and commissioned NZ's first utility scale battery energy storage (BESS) facility at Huntly, connected to WEL Networks' distribution assets. By way of context for this submission, NewPower is the operator of this new 35MWh rated BESS which will operate within both Network and Grid compliance modes, and so can offer a range of network, transmission and energy market services within NZEM's wholesale market dispatch compliance rules. This BESS is already contracted to the System Operator as an ancillary service agent for instantaneous reserves.

Infratec has also constructed and commissioned approximately 66 MW of utility-scale solar farms connected to distribution networks in New Zealand for clients with an additional 60MW currently under construction. We also commissioned the 4MW Naumai solar farm in Northland in Q3 2024.

All generation except the Rotohiko BESS are exempt stations, being under 30MW net export. We have provided detailed Asset Capability Statements to the System Operator (SO) (consistent with the Code). And, despite being below the 30MW net export threshold, have incurred significant costs for each solar farm associated with detailed technical testing by both the distributor and SO both during the design stage and commissioning of these generating stations.

Key points in our submission

In summary, NewPower and Infratec:

1. NewPower is concerned with the proposed code change to specify that non “black-box” EMT models for the generation plant must be provided to the SO. In NewPower’s previous experience we have been unable to obtain these non “black-box” EMT models from inverter suppliers even with an NDA in place. NewPower is concerned that insufficient counterfactuals have been assessed and that the economic impact of potential delay to generation build has not been assessed properly.
2. NewPower recommends that the Authority takes this opportunity to specify that different levels of information are required for different sizes of generation plant. NewPower believes that smaller generation plant should be able to provide less information than larger plant, specifically when it comes to modelling. The reason for this is that smaller generation plant has less ability to impact the system and the financial impact of smaller generation plants providing the same level of information as a large generation plant is disproportional. The cost benefit for mandating all smaller generation to provide the same level of information as larger generation is not proven.
3. NewPower is also concerned about the required SO resourcing levels to manage assessing ACS information and for modelling all of the IBR generation. In NewPower’s experience there is currently significant delays with the System Operator processing ACSs and would anticipate this would worsen with the proposed code changes. As there would need to be significant power system modelling resource in the System Operator for the additional complexity of the EMT modelling, has the Authority considered the costs of the additional resource for the additional information processing and additional modelling?
4. The Authority needs to consider what operating model the New Zealand power system is going towards (i.e. centralised System Operator or System Operator plus Distributor System Operators). This strategic framework is relevant to who should be receiving certain information.
5. NewPower is concerned about the conflict of interest for distributors (many of which are building generation) when it comes to the intellectual property regarding design of distributed generation. How does the Authority propose this conflict of interest is managed?

NewPower welcomes discussion with the Authority on any points in our submission that the Authority would like further clarification or information for.

Yours Sincerely,



Darren O’Neill
Product Development Manager
NewPower Energy Services Ltd

Appendix 1: NewPower’s response to the consultation questions

Questions	Comments
<p>Q1. Do you agree with the key drivers of change in power system modelling requirements identified in this section? If you disagree, please explain why.</p>	<p>Yes.</p> <p>NewPower agrees that the complexity of modelling IBR is more than modelling traditional synchronous rotating generation. NewPower agrees that modelling the power system to a certain level of accuracy is beneficial for managing the power system, but the level of accuracy that things are modelled at must be weighed against practical realities and other impacts.</p>
<p>Q2. Are there any other drivers of change in power system modelling requirements which are not covered in this section? If so, please elaborate.</p>	<p>Changes in modelling techniques (e.g. use of AI systems), which may mitigate the need for unencrypted EMT models (i.e. not “Black-Box”). Also changes in computational capacities (e.g. quantum computing).</p> <p>Over time there will be better modelling understanding and/or generic models developed for modelling IBR. This could potentially mitigate the perceived need for non “black-box” EMT models. Also, in time power system operators will find new ways to manage IBR generation that may decrease the need for very accurate modelling.</p>
<p>Q3. Do you agree with the Authority’s elaboration on the common quality-related information issue set out in this section? If you disagree, please explain why.</p>	<p>No.</p> <p>The issue is more of an economic nature than a technical nature.</p> <p>The system operator and Transpower (ie grid owner) can connect new generation with insufficient asset information but will need to manage asset related risks at some costs (e.g. constraints on operation, increased ancillary service procurement, increased asset testing requirements, and potential over-investment in transmission capability).</p> <p>The benefits of improved asset information need to be compared with the costs of determining the information, transacting the information, populating models with the information and storing the information. This cost falls on generation asset owners initially and then distributors, the System Operator and Transpower</p> <p>A question arises as to whether the System Operator’s tools (e.g. Digsilent PowerFactory, PowerTech DSATools and MHI’s PSCAD) are the appropriate tools for the modelling needs of the future – both in terms of complexity and the quantity of data to be modelled in near real-time. In other words, is the Authority confident that all the additional information will be used and make a difference to power</p>

system management And if so, has the Authority assessed the potential cost and delay in generation build that this requirement may have?

Transpower has used the alternative of installing protection equipment when there is uncertainty about asset performance.

The Authority's list of information issues should only include issues that can be addressed by the proposals.

Distributors may choose a different approach to managing DER on their networks than the approach used by the System Operator and Transpower on the transmission grid. The distributor approach may not rely on extensive modelling to confirm performance but a mixture of required standards and real-time/historic data (e.g. from smart meters) to manage performance.

While the asset information needs of the system operator, Transpower as grid owner and distributors overlap to some extent, the needs for each party are not exactly the same:

- The system operator needs asset information to confirm compliance with the asset owner performance obligations and to plan and operate the transmission system with existing assets.
- Transpower as grid owner needs asset information about assets that will exist in the future such where the assets might connect, size, technology type and so on.
- Distributors need asset information to determine the effects of assets on their network, the ability of the distributor to meet its asset owner performance obligations and transmission agreement obligations.

NewPower notes that all generation over 1 MW must submit an ACS, so even through generation less than 10 MW typically doesn't have to provide SCADA feeds to the system operator, the system operator will be aware of the generation and have access to meter readings to find out what it is typically doing. NewPower would like to raise the point that if the generation threshold level changes for the requirement for generation to provide SCADA feeds to the System Operator this will impose significant cost on smaller generation, as to provide SCADA information the System Operator requires an ICCP link must be used (which is very costly to implement).

NewPower recommends that System Operator webservices be expanded to allow for near-real time site information to be given to the System Operator in a more economic manner for smaller generation plants.

	<p>The Australian case study referenced by the Authority seems to go against what the Authority is proposing in this consultation regarding the supply of non “black-box” EMT models. Also the case study highlights the large costs associated with complex power system modelling. NewPower has summarised some key points from this case study below:</p> <ol style="list-style-type: none"> 1. The estimated cost of developing these EMT models is quite significant (\$200k up to 700k), so smaller projects might not be feasible 2. Mentions that even in Australia the manufacturers are reluctant to share EMT-type models, even in encrypted format 3. Point D.10 mentions that the Australian Energy Market Commission resolved that “asset owners must provide RMS information to the registered participants in the National Electricity Market in compiled, encrypted and secured format”
<p>Q4. Do you agree that the current provisions in the Code are insufficient to address the common quality-related information issue described in this section? If you disagree, please explain why.</p>	<p>No.</p> <p>The system operator and Transpower also have the right to refuse the connection of new assets if they are not satisfied with safety or performance aspects.</p> <p>The problem is due in part to the system operator and Transpower not being able to articulate the reasonableness of their asset information requests.</p> <p>A Code amendment that defines “reasonably requested” may go a large way towards avoiding disputes and operational inefficiencies.</p>
<p>Q5. Do you consider there to be any other aspects of the common quality-related asset information issue that are not covered in this section? If so, please elaborate.</p>	<p>Yes.</p> <p>The Authority should use this opportunity to define what levels of information are required for different sizes of generation plant. For example, a 1 MW solar farm should not be required to provide the level of information that a 400 MW solar farm should be required to provide. The justification for this is that a 1 MW solar farm poses far less risk to the system than a 400 MW solar farm. , Also the financial impacts for a 1 MW solar farm to provide the same level of information is disproportionate. This is particularly important when it comes to modelling, smaller generation plant should not be required to do the full suite of modelling. Another benefit of this is that it would reduce the burden on external modelling consultants which are a limited resource.</p> <p>An example of the additional costs that this proposed code change could have to smaller generation plant can be taken from actual costs of studies experienced for different levels of generation by</p>

	<p>NewPower. Studies for a solar farm <10 MW cost approximately \$25k and studies for larger generation plant above 30 MW cost approximately \$145k (in 2022 and consultant costs have increased significantly since then). If the proposed change causes the scope of the studies for the smaller solar farm to be the same level as the larger generation plant studies the smaller solar farm could see a study cost increase of ~600% and also cause significant delays due to the duration of the increased scope of studies. Also, in NewPower’s view, the cost of grid studies will increase with this proposed code change.</p> <p>Note that IBR manufacturers / suppliers are incentivised to produce a good product that addresses power system issues. This has been seen in overseas markets where IBR suppliers have developed grid-forming inverters to meet the needs of the market and help with power system stability.</p>
<p>Q6. Do you agree with the short-listed options presented by the Authority? If you disagree, please explain why.</p>	<p>No.</p> <p>Common quality related obligations should be applied at grid exit points and grid injection points. Distribution studies should not be prescribed in Part 8. Part 6 may be a potential option for specifying distribution studies, but it needs to be left to distributors to specify the extent of studies required. The distributor is responsible for managing power quality on their networks.</p> <p>We question the accuracy of the statement:</p> <p>“The updated information requirements would be those necessary to enable the system operator, distributors, and Transpower, as a transmission network owner, to meet their common quality obligations under the Code.”</p> <p>None of Transpower’s or distributors’ common quality obligations require other parties’ asset information.</p> <p>Grid Owner common quality obligations:</p> <ul style="list-style-type: none"> • 8.17. HVDC owner contribution by injections to overall frequency management. • 8.19 (4). HVDC owner contribution to frequency support in under-frequency events. • 8.19 (5). South Island AUFLS provision. • 8.20. Contributions by grid owners to frequency support. • 8.22 (1). Voltage range AOPOs. • 8.25 (1). Design and configuration of grid assets are consistent with technical codes and support system operator’s ability to meet PPOs.

- 8.25 (2). Use reasonable endeavours to ensure a generator with a generating unit above 1 MW connected to the grid notifies the system operator of its existence.
- 8.25 (3). Provide communication facilities that comply with the technical codes.
- 8.25 (4). Provide information that complies with the technical codes to the system operator.
- 8.26. Cooperate with system operator.
- 8.28 (1). Comply with AOPOs at all times.
- 8.28 (2). Cooperate with system operator to restore compliance.
- 8.28 (3). AOPOS under commissioning and test plans.
- 8.28 (4). Pay readily identifiable and quantifiable costs associated with non-compliance.
- Schedule 8.3 Technical Code A.

Distributor common quality obligations:

- 8.19 (5). North Island AUFLS.
- 8.22 (3) Voltage range AOPOs.
- 8.24. Load shedding obligations to support voltage.
- 8.25 (2). Use reasonable endeavours to ensure an embedded generator with a generating unit above 1 MW notifies the system operator of its existence.
- 8.25 (3). Provide communication facilities that comply with the technical codes.
- 8.25 (4). Provide information that complies with the technical codes to the system operator.
- 8.26. Cooperate with system operator.
- 8.28 (1). Comply with AOPOS at all times.
- 8.28 (2). Cooperate with system operator to restore compliance.
- 8.28 (3). AOPOS under commissioning and test plans.
- 8.28 (4). Pay readily identifiable and quantifiable costs associated with non-compliance.
- Schedule 8.3 Technical Code A.

The above list of clauses shows some clauses in the Code apply to both Transpower grid owner and distributors, but this is not universal. If the Authority decides to apply the same common quality requirements on distributors as Transpower, we suggest the Code be revised to simplify the description of obligations.

Black box EMT models combined with validating test results are sufficient for the system operator to assess compliance and be confident about the accuracy of power system modelling of that generator.

	<p>NewPower doesn't fully understand the need for the System Operator to have access to non "black-box" EMT models, would the Authority be able to elaborate on this.</p>
<p>Q7. Do you have any feedback on the desirability of a document incorporated by reference in the Code specifying various common quality-related information requirements?</p>	<p>It is important to confirm that the proposed document to be incorporated into the Code meets the requirements of the Legislation Act 2019 before work on the sub-option progresses.</p> <p>We assume Transpower and / or the system operator would be required to undertake best practise consultation before finalising any document. The consultation paper states "The system operator would be required to do this in a manner consistent with the preparation of other system operation documents under Part 7 of the Code". Part 7 is clear that the system operator must consult on any amendments to a system operator document (clause 7.20) - it is less clear that Part 7 describes a process of consultation for development of a new system operator document.</p> <p>The Authority should clarify if this system operator document replaces all the clauses in the Code relating to common quality obligations. In addition, obligations on generation asset owners must be commensurate with the risks created by a particular capacity of generation – a 1.5MW generation plant is likely to have magnitudes less impact on the power system than a 400MW plant of the same technology.</p>
<p>Q8. Do you agree with the pros and cons associated with each option? What costs are likely to arise for affected parties (eg, asset owners, network operators and network owners) under each of the options?</p>	<p>Option 1</p> <p>Option 1 does not provide surety for network owners and operators to meet their common quality Code obligations as meeting those obligations does not depend on third party asset information.</p> <p>While there may be decreased costs to the system operator, distributors and Transpower there will be increased costs on asset owners and manufacturers. It is not obvious there will be reduced costs to end consumers.</p> <p>Having IBR manufacturers leave the market due to information requirements could be a serious threat to New Zealand's energy transition. Also, there will be projects that are past financial close that may have manufacturers who won't supply unencrypted EMT models. The Authority has NOT detailed what impact having IBR manufacturers leaving the NZ market could have on the energy transition or the New Zealand economy. Also New Zealand can't dictate to global / overseas manufacturers – we are a small market and 'take' what's available. High international demand for renewable generation equipment means a manufacturer could easily decide NZ is too hard / costly / uncertain to supply.</p>

Has the Authority done an analysis of how many IBR manufacturers / suppliers would be willing / unwilling to supply non “black-box” EMT models to the system operator. NewPower argues that this is a key piece of information that should form the decision regarding mandating the supply of non “black-box” EMT models to the System Operator.

Option 2

It is not clear under Option 2 what benefits there are to distributors in sharing common quality-related asset information. There will be increased costs on distributors. Distributors or their consultants have access to adequate power system models (at <https://www.emi.ea.govt.nz/Wholesale/Datasets/Transmission/PowerSystemAnalysis>) to meet the needs for distributor studies. It is also not obvious that there is a reduced potential for distributors to invest in assets to compensate for inadequate asset information as the distributor will have the necessary asset information via its connection agreements.

It is not clear if distributors need access to detailed RMT/EMT models to manage their network. Also Part 6 states that the generator must provide information to the distributor that is reasonably required for that distributor to operate their distribution network. So NewPower is unsure what the purpose of Option 2 is given this. Also, if the distributors require further information should this not be addressed in Part 6 of the code?

Many distributors are building their own generation plants, so sharing full detailed ACS information with distributors will likely be an intellectual property (IP) issue for other generators. As ACS information can contain custom designs and custom control logic. Has the Authority considered how to manage this IP conflict?

Option 3

In terms of Option 3, Transpower has the ability via transmission agreements to access the ACS information provided to the system operator by grid connected parties. However, as Transpower does not have a direct relationship with embedded generators, provision of ACS information by

	<p>embedded generators to Transpower is on a voluntary basis. Perhaps Transpower needs to provide the right incentives.</p> <p>There does not seem to be a requirement in the transmission agreements for distributors to ensure that embedded generators provide asset capability statement information to Transpower. This could be an option for achieving a 'sharing' of information.</p>
<p>Q9. Do you consider any perceived conflicts of interest arising under the second and third short-listed options to be material in nature? If so, please elaborate.</p>	<p>There is an issue with Transpower getting ACS information as this information gives Transpower an competitive advantage over other grid owners and providers of transmission alternatives. We suggest an appropriate approach is for the system operator to publish models (e.g. like those at https://www.emi.ea.govt.nz/Wholesale/Datasets/Transmission/PowerSystemAnalysis) in an encrypted model if necessary to allow other parties (including Transpower) to use the models to analyse potential investments. This approach avoids duplication on the system operator and Transpower parts in terms of managing the asset data.</p> <p>Note that the FSR programme, and therefore this proposal "is focussed on how New Zealand's power system operates in real time, or close to real time, to continuously balance electricity supply and demand and to supply consumers with electricity that is of an appropriate quality". (para 2.3 of consultation paper) It is not clear that Transpower grid owner should have an interest in system operation in near or real-time. The grid owner is responsible for planning the transmission grid for the next 50-100 years.</p>
<p>Q10. Do you propose any alternative options to address the common quality-related information issue? If so, please elaborate.</p>	<p>NewPower's proposed alternatives are:</p> <ul style="list-style-type: none"> • Have the system operator manage the asset capability information and provide suitable models for other parties to use for those parties' purposes (e.g. carrying out distribution studies, investigating non-transmission alternatives). • Allow generators to provide "black-box" EMT models and let the System Operator manage any associated risk. NewPower believes that as long as the "black-box" EMT model performs close enough to the generator the risk is low. • Get the System Operator to use generic IBR models and tune them to behaviour close enough to the black-box model provided. This was the System Operator will have full understanding of the model without any risks to IBR suppliers' intellectual property.
<p>Q11. Do you agree with the Authority's high-level evaluation of the short-listed options to</p>	<p>No.</p>

help address the common quality-related information issue? If you disagree, please explain why.

Consistent with our comments above, we do not agree with the Authority's high-level evaluation of the short-listed options.

The Authority has provided no counterfactuals to providing non "black box" EMT models. For example, allowing generators to provide "black box" EMT models and managing any associated risks. Also has the System Operator assessed the option of using generic IBR EMT models, which could be tuned to perform similarly to the "black-box" EMT models and give the System Operator the freedom to fully understand the model and change control settings as needed?

The Authority has not assessed the potential generation build and pipeline delays due to this proposed code change sufficiently and the economic impact this could have on New Zealand. Does modelling the power system very accurately justify potential delay of generation build?

The Authority has also not considered the costs associated with requiring this information to be provided. These costs should be included in the any cost benefit analysis along with all other costs and impacts.

Also, when does the Authority predict that the power system issues will arise due to IBR generation that seems to be the driver around the additional modelling requirements? Was this timeframe prediction used for the timing of this consultation?