

Dear Sir/Madam,

Please find attached the Centre for Smart Power and Energy Research (CSPER), School of Engineering, Deakin University's submission to the Electricity Authority Te Mana Hiko consultation on *Improving Information on High-Voltage Network Capacity*.

Prepared by Dr Alireza Ganjovi and Associate Professor Saman A. Gorji, this submission provides technical and governance-focused commentary on the Authority's proposed amendments relating to high-voltage network visibility and the development of supporting technical specifications.

The submission broadly supports the proposed framework and recognises the growing importance of network visibility as electricity systems become increasingly distributed, digitalised, and inverter-dominated. In particular, the increasing penetration of distributed energy resources, storage, electrification, and flexibility services is changing the information requirements needed to support efficient system operation and investment.

Rather than focusing solely on transparency, the submission emphasises the importance of system observability. We argue that hosting capacity should increasingly be viewed as a dynamic rather than purely static concept, and that improving visibility of network conditions can support more efficient connection decisions, better utilisation of flexibility resources, and greater use of non-network solutions.

Accordingly, the submission supports the proposed amendments and the use of technical specifications as a practical and adaptive mechanism for implementation. Particular attention is given to issues relating to information consistency, interoperability, condition-dependent capability, and the need for ongoing adaptive governance as network conditions and technologies continue to evolve.

The submission further highlights that improved network visibility should be regarded not only as a planning tool, but also as an operational capability. As power systems become more dependent on inverter-based resources and increasingly rely on distributed flexibility, maintaining effective system observability will become essential for supporting efficient and reliable operation.

Drawing on our research and regulatory engagement activities in areas including regulatory observability, flexibility resources, digitalisation, and inverter-dominated power systems, we believe that future frameworks should remain practical, interoperable, and capable of evolving with changing system needs. In this context, we would welcome the opportunity to contribute to the development of the technical specifications supporting the proposed Code amendment.

We appreciate the opportunity to contribute to this consultation and trust that the submission will assist the Electricity Authority in finalising the proposed amendments. We would welcome any further discussion or clarification if required.

Yours sincerely,

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Appendix B Submission form
Improving information on high-voltage network capacity

Submitter

Centre for Smart Power and Energy Research (CSPER), School of Engineering, Deakin University (Dr Alireza Ganjovi and A/Prof Saman A. Gorji)

Questions	Comments
Q1. Do you agree with our assessment of the current state of the information and capabilities needed to inform network hosting capacity? If not, please explain why.	Yes. We broadly agree with the Authority's assessment. Existing information is often fragmented and provides only partial visibility of network conditions. As electricity systems become more distributed and inverter-dominated, hosting capacity should be viewed as a dynamic rather than purely static concept. Strengthening system observability and improving information consistency will support more efficient utilisation of flexibility resources and non-network solutions.
Q2. Do you agree the issues identified by the Authority are worthy of attention? If not, please explain why.	Yes. We consider these issues worthy of attention. Limited visibility of network conditions can create barriers to efficient connection, investment decisions, and the utilisation of flexibility resources. As distributed energy resources, storage, and electrification increase, strengthening network observability will become increasingly important for supporting efficient and reliable system operation.
Q3. Do you agree with our assessment that now is the time to regulate for network visibility? If not, when do you consider would be the right time?	Yes. We agree that now is the appropriate time. Increasing penetration of distributed generation, storage, electrification, and flexible demand means that improved network visibility and system observability are becoming operational necessities. Delaying action would widen information gaps and reduce opportunities to utilise flexibility resources and efficient non-network solutions.
Q4. Do you agree with our assessment of the outcomes that network visibility supports? If not, why not?	Yes. We agree with the outcomes identified by the Authority. Improved network visibility strengthens system observability, supports more efficient connection and investment decisions, and improves the utilisation of flexibility resources. It can also help avoid unnecessary network augmentation by enabling non-network solutions where these provide a more efficient outcome.
Q5. Do you consider the proposed amendments to Part 6 of the Code would promote the Authority's statutory objective? If not, why not?	Yes. We consider the proposed amendments would promote the Authority's statutory objective. Improved network visibility strengthens system observability, supports more efficient connection and investment decisions, and enables greater use of flexibility and non-network solutions. These capabilities will become increasingly important as electricity systems become more distributed and inverter-dominated.
Q6. Are there any matters you believe are missing from the proposed Code amendment? Please specify.	Yes. As electricity systems become increasingly distributed and inverter-dominated, we consider that future development of the framework should extend beyond static capacity disclosure. Greater visibility of network constraints, flexibility resources, and condition-dependent capability would improve system observability and support more efficient use of non-network solutions.
Q7. Is the indicative timeframe for implementing the proposed Code amendment likely to be adequate? If not, please provide information supporting a different timeframe, including identifying cost savings from a later implementation date.	Yes. We consider the indicative timeframe to be broadly adequate. Timely implementation will help strengthen system observability and reduce information gaps as electricity systems become increasingly distributed and flexibility-dependent. We do not presently see a strong case for delaying implementation.
Q8. What are your views on the proposed approach where detailed information about the data sets captured within the definition of network capacity information would be contained in technical specifications?	We support this approach. Locating detailed requirements within technical specifications provides greater flexibility and allows information requirements to evolve without frequent Code changes. This approach can support interoperability, consistency, and adaptive development as electricity systems become increasingly distributed and inverter-dominated. However, technical specifications should remain transparent and sufficiently standardised to promote effective system observability and data comparability across networks.
Q9. Do you consider that the proposal to develop network visibility specifications in consultation with interested parties would be effective? If not, why not?	Yes. We consider a consultative approach to developing network visibility specifications to be appropriate and effective. It can support adaptive governance and help ensure that information requirements remain practical, interoperable, and responsive to evolving system needs as electricity systems become increasingly distributed and flexibility-dependent.
Q10. Is the proposed timeframe for developing the specifications likely to be sufficient?	Yes. We consider the proposed timeframe to be broadly sufficient. A timely and consultative process should provide adequate opportunity to develop practical and interoperable specifications while avoiding unnecessary delays in improving system observability.
Q11. Do you agree with the proposal to start with high-voltage network visibility? If not, please share your perspectives on where best to start.	Yes. We agree with starting at the high-voltage level. High-voltage networks are generally more observable and have a stronger influence on connection decisions and system operation. A phased approach provides a practical foundation while allowing the framework to evolve over time as capabilities and visibility at lower voltage levels improve.
Q12. Do you agree with the assumptions the Authority has made? Why/Why not?	We broadly agree with the Authority's assumptions. They provide a reasonable basis for progressing high-voltage network visibility. However, some assumptions may evolve over time as electricity systems become more distributed and inverter-dominated. Continued review and adaptive development of the framework will therefore be important to maintain effective system observability and support emerging flexibility resources.

Q13. Have we correctly identified the benefits of network visibility?	Yes. We broadly agree that the identified benefits are appropriate. In our view, improved network visibility strengthens system observability, supports more efficient connection and investment decisions, and enhances the utilisation of flexibility resources and non-network solutions. These benefits will become increasingly important as electricity systems become more distributed and inverter-dominated.
Q14. Do you have any information that might help quantify the value of these benefits? If so, please provide this information.	While we do not have specific estimates for New Zealand, we consider that improved network visibility can create value through more efficient connection decisions, better utilisation of flexibility resources, and the avoidance or deferral of unnecessary network augmentation. In increasingly distributed and inverter-dominated systems, these benefits are likely to grow as system observability becomes more important for efficient planning and operation.
Q15. Have we correctly identified the costs of network visibility?	Yes. We broadly agree that the key costs have been identified. However, these costs should be considered alongside the longer-term benefits of improved system observability, including more efficient utilisation of flexibility resources and the potential to avoid or defer unnecessary network augmentation.
Q16. Do you have any information that might help quantify the costs? If so, please provide this information.	We do not have specific cost estimates to provide. However, we expect that many implementation costs will be upfront and transitional in nature. These costs should be assessed against the longer-term benefits of improved system observability and the potential to avoid or defer inefficient network investment through better utilisation of flexibility resources and non-network solutions.
Q17. Have we correctly identified the regulatory overlaps?	Yes. We broadly agree that the key regulatory overlaps have been identified. However, ongoing coordination and periodic review will remain important as electricity systems become more distributed and flexibility-dependent, and as new data and interoperability requirements emerge.
Q18. Do you agree with our assessment that there is a net benefit notwithstanding any regulatory overlap? If not, why not?	Yes. We agree that the proposal is likely to deliver a net benefit notwithstanding any regulatory overlap. The benefits of improved system observability, more efficient utilisation of flexibility resources, and the potential to avoid or defer unnecessary network investment are likely to outweigh the costs associated with overlapping requirements.
Q19. Do you have any information that might help quantify the costs and benefits associated with the regulatory overlap? If so, please provide this information.	We do not have specific estimates regarding the costs and benefits associated with regulatory overlap. However, we expect these impacts to be relatively modest compared with the broader benefits of improved system observability and more efficient utilisation of flexibility resources. Continued coordination between regulatory frameworks can help minimise duplication and maintain interoperability.
Q20. Do you agree that the Authority should consider reducing the regulatory overlap as the proposed specifications are developed?	Yes. We support efforts to reduce unnecessary regulatory overlap during the development of the specifications. Maintaining consistency and interoperability across frameworks can help minimise duplication, reduce implementation costs, and strengthen system observability.
Q21. Do you agree with our assessment that there will be net benefit from the proposed amendments? If not, why not?	Yes. We agree that the proposed amendments are likely to deliver a net benefit. Improved system observability can support more efficient connection and investment decisions, enhance the utilisation of flexibility resources, and help avoid or defer unnecessary network augmentation. These benefits are likely to become increasingly important as electricity systems become more distributed and inverter-dominated.
Q22. Do you agree the proposed amendment is preferable to the other options? If you disagree, please explain your preferred option in terms consistent with the Authority's statutory objective in section 15 of the Electricity Industry Act 2010.	Yes. We consider the proposed amendment to be preferable to the alternative options. In our view, it provides a practical and adaptive pathway for improving system observability while supporting more efficient utilisation of flexibility resources and non-network solutions. These outcomes are consistent with the Authority's objective of promoting reliable and efficient electricity system operation for the long-term benefit of consumers.
Q23. Do you agree the Authority's proposed amendments comply with section 32 of the Electricity Industry Act?	Yes. Based on the information presented, we consider the proposed amendments to be consistent with section 32 of the Electricity Industry Act. In particular, the amendments appear to provide a proportionate and practical approach to improving system observability and supporting the efficient operation and development of increasingly distributed electricity systems.
Q24. Do you have any comments on the drafting of the proposed amendment?	No major issues are apparent. We support the use of technical specifications to accommodate future changes and encourage continued emphasis on consistency, interoperability, and adaptive development as network visibility requirements evolve.
Please indicate if you wish to be consulted during the development of the technical specifications supporting the proposed Code amendment.	Yes. We would welcome the opportunity to participate in the development of the technical specifications. Through our research and regulatory engagement activities, we have been working on topics including regulatory observability, flexibility resources, inverter-dominated power systems, digitalisation, and adaptive governance. We believe these perspectives may help support the development of practical, interoperable, and future-oriented specifications that remain responsive to evolving system needs.