System Operator Strategy:

Key Trends and Issues review questions

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Organisation	Upper South Island Load Management Forum represented by: Orion, MainPower, Westpower, Marlborough Lines, EA Networks, Alpine Energy, Network Tasman, and Buller Network

Q1	Do you agree with the trends and drivers we have identified for the energy sector over the next ten years?

Orion agrees with the trends and drivers identified for the energy sector. We add the following comments:

- For the political and regulatory environment,
  - as a general theme, a tension will persist between making progress at an impactful pace over perfection while also avoiding adverse outcomes for customers and their participation.
  - under issues and drivers of change, we would also add in a reference to **geoeconomic** instability as well as geopolitical instability. There is a risk that challenges to trade, investment, supply chains and access to natural resources may potentially escalate into full-scale economic war with port blockades, export restrictions for key goods, cancelled contracts and capital controls. Certainly, this risk has been highlighted by the World Economic Forum.[1] We think this warrants a mention in its own right.
- For economic and market changes,
  - there is a significant challenge coming from more participation/players in the market and the management of the many interfaces to coordinate and control the system. This translates to the need for more sophistication in forecast modelling.
- For societal and consumer evolution,
  - the SO should consider its role in supporting and facilitating the controller ecosystem beyond Transpower, how this ecosystem will coordinate and what operational data insights and sharing will be needed for stable operation. We consider Transpower's SO planned workshop on the 24th of March an important initiative to begin these discussions.
  - under issues and drivers of change, we would also add in a reference to AI, especially in relation to changing demographics. AI will change the workforce and workforce expectations.
  - under implications for NZ's energy sector, not only is the workforce ageing but sections of the workforce may not be required due to the increasing

[1] https://www.weforum.org/stories/2026/01/global-risks-2026-top-10-two-and-ten-year-horizon/

use of AI but on the other hand different workforce roles will also be created.

- For technological change,
  - the SO should not overlook the transition management needed between existing technology and new technology. This is to ensure minimisation of adverse transition impacts and unnecessary infrastructure investment by Transpower. This is particularly so for the Upper South Island Load Management which the SO and Transpower bake into their demand forecasts in winter periods. As the transition from ripple-only to next generation hot water control progresses, it will be important to manage the risk that a deteriorating level of response from existing platforms during transition could trigger short-lived need for permanent capacity expansions[2]. Scale transition to new technologies needs to be tested and widespread before existing hot water control is fully phased out.
  - in terms of data and digitalisation, we agree that the enhanced data access and use require data and asset information from different parties. However, we suggest adding in a reference to the necessity for appropriate protection of personal data and legal clarity around the access to and use of other data related to the electricity sector.

Q2	Which ones do you think will have the biggest impact? Are there any that will be less or more impactful than we've identified? Less or more likely to occur?

In our view technological change will have the biggest impact, followed by political and regulatory environment.

Policy drives electrification, renewables and grid investment.

While societal and consumer evolution drives end point technology change, the important impact in this cause-and-effect relationship is that this drives a need for change, provides the greatest opportunity and increases complexity for whole of system management.

As the SO states *"The power system has always been complicated but technology is driving much greater complexity in power system operations which must be addressed on top of the increasing volume of work due to greater numbers of market participants and grid investment."*[3].

This is also supported by the IEA's (International Energy Agency) Global Energy Review 2025 report key findings on global energy demand "The increase was led by the power sector as electricity demand surged by 4.3%, well above the 3.2% growth in global GDP, driven by record temperatures, electrification and digitalisation."[4] This line is significant because it explicitly identifies **electrification and digitalisation**—two major forms of technological change—as central drivers of electricity sector growth. In IEA terminology, "digitalisation" includes -smart grid technologies, automation, -data driven- system optimisation, and the rising electricity demand from data centres and AI workloads.

[2] *The value of network-coordinated water heating in the Upper South Island- Concept Consulting page 14 (this report is due to be released in the public domain during March)*

[3] *SO Strategy consultation page 28*

[4] https://iea.blob.core.windows.net/assets/5b169aa1-bc88-4c96-b828-aaa50406ba80/GlobalEnergyReview2025.pdf

	A key area of challenge will be forecasting, and its accuracy, given increasing intermittent generation, the rate and frequency of large load changes because of demand flexibility, and more variable weather conditions. The development of commercial models and the role of regulation in that may be more impactful than indicated in the SO consultation. There is complexity in commercial and relationship matters as well as technological change.
Q3	What other trends or drivers may come into play for the energy sector over the next ten years that are relevant for power system operations?
	As integration between systems increases, and the use of different proprietary software platforms, the sharing of information and the purpose of that sharing will become more complicated. There are a myriad of licensing arrangements relating to the use of different platforms. Accessing data from those different platforms requires compliance with all of those arrangements. In addition, many consumers have a keen interest in knowing who has access to their personal information and how that information is stored, handled and shared. However, this plays out in the next 10 years, we think data regulation will be extremely impactful on the electricity sector in New Zealand. The Authority's 2025 work on the future system operation models highlighted strong support for the hybrid DSO model where coordination of real-time dispatch is shared between the transmission system operator (TSO) and one or more distributors-as-DSOs. While a model has not yet been decided, as the regulatory requirements for Non-Traditional Solutions (NTS) drive into the sector, players may need to decide and discuss their level of reach for interface and control from transmission through to ICP level. All players are going to need to talk more often and more intently as this evolves. Transpower refers to the Future Security and Resilience Roadmap on page 14 of this consultation. We would like to understand how this is tracking and how EDBs can partner with Transpower on this.
Q4	What advanced technologies (e.g., AI, automation, digital twins) and real-time data capabilities will be critical for maintaining power system reliability as the system becomes more complex?
	The SO should begin trials on secure data exchange between itself and EDBs to support integration, information sharing and insights for operational control. This could support standardisation where it makes sense. Algorithmic and coordination consideration of consequential impacts of movement in one part of the system resulting in unexpected responses from a further part of the system will be more complex to manage e.g. if SO signals demand response from some parts of the system and other parts are automated to come on when load reduces with the consequential effect that demand doesn't reduce as expected.
Q5	Where do you see the operation of the power system being in ten years, and its role in the broader electricity sector? What will be the same and what will be different?

We see the operation of the power system in ten years being highly digital, dynamic and self-healing.

What might be different is,

- tighter integration of the digital and physical world
- Dynamic load and generation
- Both less and more tolerance for outages. Those with the technology to self-support may be more tolerant and those without the technology to self-support may become less tolerant
- All aspects of control and coordination will be more granular.
- The 'normal state of the network' will be a different proposition. The normal state of network will not be static, but automated and dynamic depending on the mix of load and generation at feeder level e.g. open points will shift dynamically to balance system flows and constraints.
- The need for pre-contingency operations will increase.[5]
- Technology will get cheaper (EV and batteries) and lead to a significant tipping point in terms of penetration across networks.

What will be the same is,

- The need for human oversight
- Continual measurement, monitoring, assurance and risk management
- Reliance on electricity as an essential service
- Cybersecurity needs (although these will increase)
- The need to renew and replace existing assets

Q6	What skills and capabilities will the System Operator need to expand or develop, and how can the sector best support workforce transition and wellbeing during this change?

The SO will need to operate with increasing volumes of data that need to be stored in a way that provides for necessary dashboarding and reporting to support trending, forecasting, monitoring and automatic operations of the system. We agree that cognitive loading will be a very real challenge moving forward. The need for collaboration of engineering, operations control and data, digital and technology skillsets (such as data scientists) will increase as these integrate in real world control.

An important soft skill will be knowing 'what is the right question to ask'. Computational skills and a differing understanding of electricity distribution/transmission systems will be needed due to the integration of physical assets and virtual assets. Specialisation in certain aspects may be needed during the transition until broader skillsets develop.

An opportunity that could be explored is development of a microcredential on system control and/or a training programme/internship/apprenticeship/clearer pathways from other disciplines to control centre operations. Collaborations with other sectors with similar roles such as Airways Training Centre[6] could be considered.

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[5] *Pre-contingency operations is a term used in power-system engineering and electricity-market operations. It refers to how the power system is operated before any contingency (fault, outage, or unexpected event) occurs.*

[6] *https://www.studywithnewzealand.govt.nz/en/study-options/education-provider/304-provider*

Q7	Are there areas where the System Operator could usefully provide more of a leadership role?
	Safeguard the existing level of response, such as USI load management, Transpower and the SO has assumed into its planning and operation, while developing the framework for extended access to key load management resource (i.e., hot water and electric vehicle charging). Refer to our answer to Q8- lead microcredential development with DSO in mind for cross sector control capability. We believe "there would be merit in Transpower adopting a hybrid approach to its current NTS funding that includes: • a development programme focussed on working with the LMG and its members to support successful transition to next generation load control. This could include work to sustain ripple control in the interim, while helping develop and execute a commercial model for next generation hot water and electric vehicle control • within the context of the commercial model, trialling access to T2 network deferral response. This approach would help safeguard the level of response Transpower has assumed into its planning, while developing the framework for extended access to key load management resource (i.e., hot water and electric vehicle charging)."[7]
Q8	What is one thing that you would like the System Operator strategy to address?
	The one thing we would like the System Operator strategy to preserve existing demand response as we transition to control with next generation load management. We would like to see the SO more clearly set out its view on the USI load management tool (more specifically its relationship with distributors and their ability to control load) and how it sees that from a strategic point of view, now, and tomorrow. While USI load management service is baked into SO forecasts the value the SO puts on this response is not well signalled or understood. Although not a direct matter for the SO Strategy, we anticipate with new aggregator players entering the market there may be a risk for the security of the power system from 'default' of aggregator. We suggest that aggregators may need to be participants under the Code and that provisions be made, akin to when a Retailer defaults, to protect of consumers e.g. if aggregators fail what is the market process around this? A small point, but there are a number of spelling mistakes throughout the document. We presume these will be addressed in the final version.

[7] *The value of network-coordinated water heating in the Upper South Island- Concept Consulting page 14 (this report is due to be released in the public domain during March)*