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Transpower

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Dear System Operator

System Operator Strategy

Orion thanks Transpower as System Operator (SO) for the opportunity to provide feedback on the system operator strategy development, specifically the phase two draft strategy priorities and actions.

Our impression is that the Strategy is comprehensive and appears to reflect broad feedback Transpower received in their engagement phase. We provide our feedback on some, but not all questions posed by Transpower.

Strategic Priorities

PRIORITY ONE: OPERATING A SECURE, HIGHLY VARIABLE POWER SYSTEM

We agree, system security must remain one of our highest priorities. The increasing penetration of inverter-based resources (IBRs), distributed energy resources (DERs), and large loads requires greater network visibility, stronger protection, and more robust system controls. Although we may consider our power system better positioned than those in Spain or Chile, failing to establish appropriate inverter-based resource (IBR) requirements, and clear processes for validating control systems throughout their lifecycle, could ultimately expose us to similar risks. We are pleased to see the attention on this in the Now-2028 timeframe within P1.1 and P4.4 priorities.

We encourage the System Operator to work more closely with Electricity Lines Businesses (EDBs) on the greater need to accommodate conditions outside of normal operating limits - e.g. voltages that are outside of the typical agreed band at the connection point. We are interested to understand if the SO anticipates 'dynamic operating envelopes' for GXP connection points to enable greater demand/export according to the capability of the grid.

PRIORITY TWO: EFFICIENT MARKET OPERATIONS AND INFORMATION PROVISIONS

We agree that market design, supply and demand dynamics information and rules will need to evolve with a highly variable power system to ensure we maintain competitiveness and focus on the efficiency trio-allocative, productive and dynamic efficiency.

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PRIORITY THREE: EVOLVING OPERATIONAL CAPABILITY

We agree that investing in tools, forecasting, modelling, AI and human capability will be important as system complexity increases. This will increase efficiency and provide space for capability to engage in high value work.

PRIORITY FOUR: LEVERAGING DATA AND DISTRIBUTED RESOURCE INTEGRATION

We agree that leveraging data and distributed resource integration is an important priority subject to these additional points;

- we think a missing priority is the establishment of clear governance and processes for the TSO–DSO model for instance common technical standards and effective enforcement of IBR requirements (utility scale). Germany provides a useful example, with one of the most developed frameworks for maintaining network security as IBR penetration increases.
- there needs to be better TSO-DSO coordination: we encourage greater collaboration between the SO and EDB operations control personnel to support complimentary progress on expectations of the SO strategy and the EA DSO roadmap. This will be particularly important where EDBs have existing material load management in place.
- grid-scale batteries can also play an important role in supporting system stability and enabling more effective management of distributed energy resources. The SO strategy helpfully has several initiatives that focus on BESS- P2.1, P2.2, P2.5, P5.2.
- we would advocate for bringing the market sandpit initiative forward into the Now-2028 delivery timeframe. This is to ensure opportunity for early learning and outputs that can support other initiatives in the SO Strategy, and to build early trust and co-design between relevant participants.

PRIORITY FIVE: STRENGTHENING INDUSTRY RESILIENCE

We agree with the SO strategy priority for strengthening industry resilience. We add that interoperability of the Future System Operator is critical and very important – as an EDB we would appreciate engagement with the SO to increase opportunity for visibility and input into this including to understand what functionality is being included/excluded within the plans.

A bow tie style risk assessment and ‘what if’ thinking to identify existing and emerging risk from a changing system could be a useful joint industry exercise that might inform scenarios not previously tested or planned for.

Importance of strategic priorities and definition

We consider grid security and data/visibility as a fundamental priority. Without visibility of DER, flexible demand, BESS, large loads and distribution network constraints, the SO will be limited in its ability to deliver the outcomes described under the other priorities.

Accordingly, we consider the following as examples of matters to address earlier rather than later as they go to the heart of building certainty where possible;

- standardisation of datasets.
- identification of data that the System Operator will require.
- required interoperability with a Future System Operation.
- ability to communicate and provide ‘guardrails’ to behind the meter DER for all customers.

In respect of trade-offs, we consider that further investigation may need to be navigated around;

- cost versus visibility and data management, and
- security and resilience investments versus cost of electricity.

Priority outcomes and initiatives

P1.1- Evolving real-time security and supporting Future Security & Resilience work program

We consider that modelling the system is one thing but there is also a need to be clear about the IBRs performance requirements and enforcing the way they operate, for instance reactive power requirements, transient performance, sequence current management.

P1.3- Improving Special Protection Scheme (SPS) Management

Special protection schemes (SPS) need to be integrated with advanced distribution management systems (ADMS). As network complexity increases, standalone substation control systems may no longer be sufficient to identify and respond automatically to system security violations. Greater consideration is therefore needed for how wider-area control systems can coordinate and automate SPS actions across the network.

Additionally, it may be necessary to broaden the view of possible solutions for instance considering leveraging digitisation and control systems over in-the-field costly protection.

We note also that SPSs are increasing in number rapidly and while they enable the system to be run harder this comes with additional risk e.g. a single event can result in the disconnection of multiple GXPs. Improvement of SPSs which are implemented is positive, but underlying residual risk remains.

P2.1- Updates to Scheduling, Pricing and Dispatch (SPD) market system

Dispatch of small-scale DER is not presently within many EDB's capabilities. There is a 'connectivity gap' until specified inverter requirements can be integrated with a means of communicating with those inverters to enlist a response. We agree the timeframe to 2031 will be needed. We suggest pilot studies would support progress well before 2031 as issues to be addressed may surface early e.g. Solar Zero- SO dispatch reserves.

P2.6- Market sandpit

We encourage the SO to bring the timeframe for delivery of market sandpits forward into the Now-2028 window. We believe opportunities may be lost for learning and informing the strategic priorities as we move forward if we do not bring this forward. For instance, we are very supportive of small-scale technology pilots of grid edge DER. There is a need for a clear standard to allow EDBs to develop and plan DSO technology stacks to meet TSO requirements.

P3.5- Talent Pipeline ongoing maintenance/growth

We agree that attention to the talent pipeline is critical however we suggest that Transpower considers multiple paths to achieving a strong pipeline.

We observe that Transpower should not close off broader capabilities that can be grown to support the needs of system operations. The view should be for a mixture of talent and diversity that may not only be sourced from university level graduates. Skillsets acquired from real-world knowledge of electrical systems and equipment (technically adept), and mental dexterity to handle multiple conflicting priorities and issues at the same time are just as important. Transpower should consider both the soft and hard skills needed in a future control environment.

Reviewing micro-credentials or other short courses to support career transition, and looking to other similar industries for insights, training capability and arrangements may be beneficial e.g. Airways.

It should not be overlooked that with the ever-increasing number of data points, alarms, potential supply scenarios and required speed of decision-making, no person will be able to manage all outcomes. Instead, the future will see artificial intelligence (AI) interpret data and trends, summarise and make recommendations for human review. Understanding the boundaries or cost-benefit between systems and system automation, and human input is important moving forward.

P3.7 Evolve compliance monitoring

We understand the need to evolve compliance monitoring however we suggest that there is a complimentary requirement to provide enhanced participant education as requirements evolve and become more complex.

P4.4- Future System Operator interoperability

We support the SO working closely with the EA and we note the release of the EA's roadmap for the future of distribution system operation in NZ in parallel with this consultation.[1] The SO strategy timing will need sequencing with the EA's 'what success looks like' 12 month and by 2030 expectations of EDBs.

Interface and integration are going to be challenging areas to navigate toward interoperability. Building a strong relationship with existing network operators and emerging aggregating parties will be key to development that balances customisation and configuration in a cost-effective way.

It is likely that not all DER/CER will be 'accessible' by the TSO or DSO as technology evolves e.g. balcony plug in solar. There might be parts of the system that can't be fully understood, controlled or dispatched due to customer choice.

P5.2 Evolve black start and restoration processes

Using synchrophasors across both transmission and distribution networks would provide improved visibility of system dynamics. This would enhance situational awareness and would support earlier identification of poorly damped oscillations, enable more accurate assessment of damping risks, and allow operators or automated control systems to respond before system stability is compromised.

Key barriers or enablers to delivery

We provide some additional thoughts on key barriers for Transpower's consideration. Key barriers may also include;

a) the sectors' ability to communicate a new future that's understandable and enlists participation by everyday consumers. Any strategy relies significantly on end consumers being engaged with the concept of demand management and flexibility, and having the trust, through the sectors' social license to operate, to agree to device control either directly or indirectly.
b) landing on the necessary clear DSO capabilities and handoff points agreed between parties and related commercial arrangements and mechanisms
c) development of primacy rules doesn't seem to have been addressed. In a hybrid model how would the TSO and DSO avoid getting into a 'priority/bidding war' when looking to use the same DER resources to address differing drivers e.g. constraint, price etc?
d) navigating trade-offs for instance; cost versus visibility and data management, security and resilience investments versus cost of electricity

Yours sincerely

Dayle Parris

Head of Revenue and Regulation

[1] https://www.ea.govt.nz/documents/10379/A_roadmap_for_the_future_of_distribution_system_operation_in_New_Zealand_2.pdf