Australian Energy Market Operator (AEMO) and National Energy System Operator (NESO) Exchange Summary – July 2024

Opportunity and impact

System Operators can benefit greatly from in-depth technical engagements, facilitating two-way knowledge sharing, exposure to the control room operating environment, and relationship building. In June 2024, a Senior Engineer from AEMO visited National Energy System Operator (NESO) for in-depth technical engagement, particularly focused on:

- The application of high-resolution electromagnetic transient (EMT) power system models - helping improve operational management of continency events and strengthen grid security.
- Whole-of-system planning – helping define processes and methodologies for planning a power system increasingly dominated by distributed energy resources (DER).

System Operators engaged

The following System Operators were involved:

- AEMO – Australia
- NESO – Great Britain.

Key insights

The exchange provided an opportunity for the AEMO secondee to shadow NESO engineers across operational, market, and compliance teams, to develop an understanding of their roles and responsibilities, as well as the NESO power system and energy market context.

AEMO's development of EMT models started in 2015 and has matured progressively since. The secondment provided an opportunity for AEMO to provide NESO with insight into AEMO's EMT modelling methodology, including how AEMO uses wide-area EMT models to evaluate power system risks, evaluate system strength and stability, and how model information is accessed (including via the Connections Simulation Tool). As an outcome of the secondment, NESO is considering adopting elements of AEMO's EMT model development and management methodology.

The engagement also provided an opportunity to discuss a number of other pertinent topics including:

- Grid-forming inverter specifications and requirements, including grid-forming and black start capabilities at Dersalloch wind farm.
- NESO's development of new metrics for small-signal strength to help identify points on the grid that may be susceptible to sub-synchronous oscillations.
- Findings of NESO's Stability Pathfinder project which have identified cost-effective and efficient alternative sources of inertia – particularly relevant to AEMO in the context of recent Australian Energy Market Commission (AEMC) rule changes to improve market arrangements for security services in the National Electricity Market (NEM).
- Offline and online tools used by NESO for impedance scan and oscillation detection, particularly the use of Phasor Measurement Unit (PMU) data in its in-house Sub-synchronous Oscillation (SSO) identification tool. In this tool, NESO applies machine learning to identify SSO scenarios and where they are in a real-time

operations context. NESO also discussed its DOME research project, which is currently investigating whether online impedance spectra can be used to provide warning of, and mitigate, oscillations on the power system.

The exchange highlighted that, despite operating in very different power system and market contexts, NESO and AEMO face similar challenges, and reiterated the importance of mutual learning and knowledge exchange.

Recommendations

Based on this engagement, it is recommended that System Operators consider:

- Leveraging industry best practices for EMT model development and management.
- Where possible, leveraging existing technical standards, which in turn also assists manufacturers.
- Considering how SSO detection and other mitigating tools and mathematical metrics may be applied to evaluate system strength stability.

Contact

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