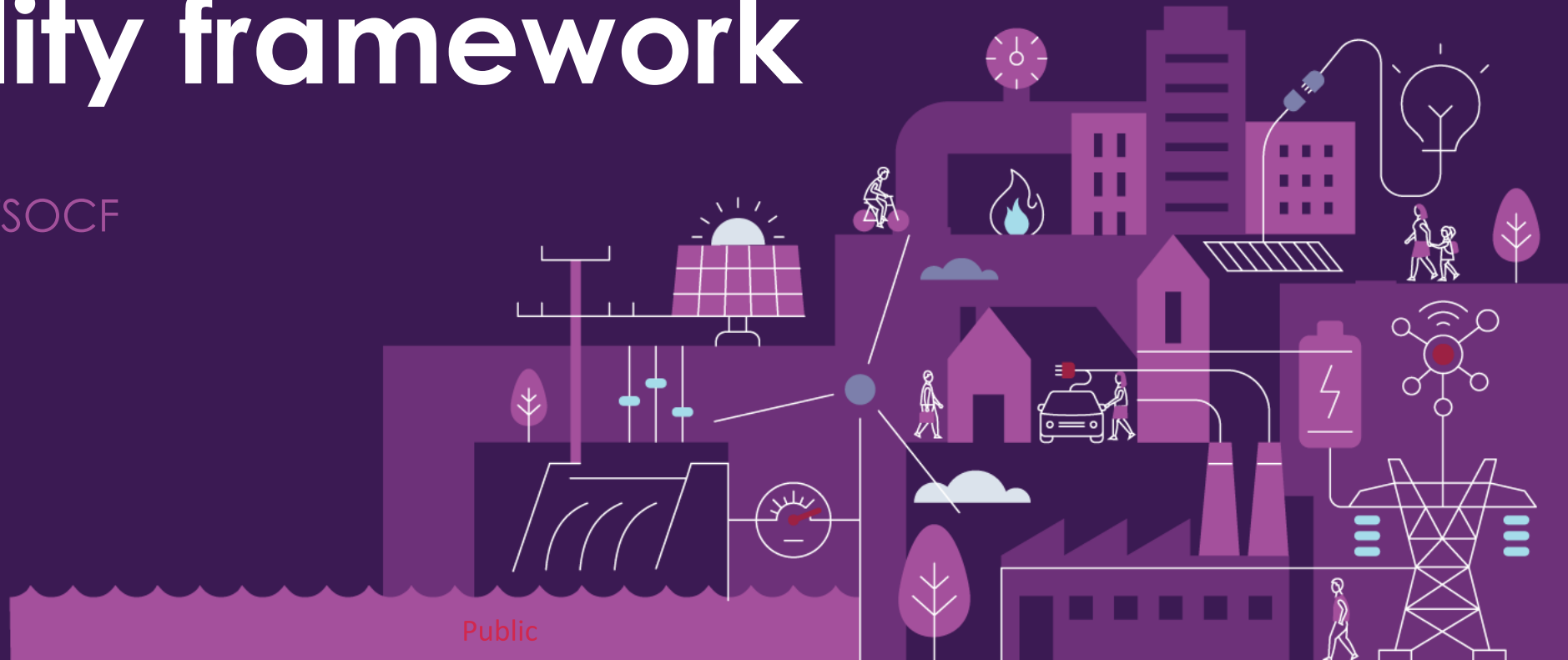
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Transmission system operational capability framework

Debrief on the final TSOCF



14:30 AEDT

Tuesday 27 October

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We acknowledge the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and continuing connection to Country, and hope that our work can benefit both people and Country.

'Journey of unity: AEMO's Reconciliation Path' by Lani Balzan

AEMO is proud to have launched its first Reconciliation Action Plan in May 2024. 'Journey of unity: AEMO's Reconciliation Path' was created by Wiradjuri artist Lani Balzan to visually narrate our ongoing journey towards reconciliation – a collaborative endeavour that honours First Nations cultures, fosters mutual understanding, and paves the way for a brighter, more inclusive future.

Read our RAP

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Agenda

TIME	TOPIC	PRESENTER
14:30	Welcome and introduction	Matt Wikman (AEMO, chair)
14:35	Refresher on TSOCF	Nick Babcock (AEMO)
14:45	What has changed between draft and final	Bertrand Etchepare (AEMO)
14:55	What's next	Hugo Klingenberg (ElectraNet)
15:10	Q&A	Matt Wikman (AEMO)
15:15 AEDT	Meeting close	Matt Wikman (AEMO)

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Refresher on TSOCF

What is transmission system operational capability?

- Capability to plan, coordinate, monitor, operate and respond to transmission system conditions in support of secure, reliable and efficient power system operation.
- Includes:
  - People, processes, systems, data and tools for operations planning and real-time operational activities
  - Capability to maintain the system within technical limits, respond to credible and non-credible disturbances, and support system restart.

Why is a framework needed?

- Energy transition to a high renewables power system is happening at scale and at speed.
- AEMO and TNSPs need to anticipate and stay ahead of key emerging operational capability challenges, or risk being left without the appropriate capabilities to effectively manage those challenges.
- **Largest emerging NEM resilience risk is the widening gap between power system complexity and operational capability.**
- A capability framework:
  - Aligns these challenges with the identified future power system requirements to address those challenges.
  - Is needed to support timely capability planning and regulatory submissions for capability uplift.



What is the framework's purpose?

- Industry framework to support efficient transmission system operational capability.
- Considered, consistent and transparent view of transmission system operational capabilities needed to support the energy transition.
- Intended to support AEMO and TNSPs to assess, prioritise and progressively improve operational coordination, capability and maturity.

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How does the framework operate?

1. Define assessment scope

- Define the scope including operational functions, network areas, capability domains and interfaces.
- Identify capabilities to be assessed within the scope.

2. Assess future requirements and current maturity

- For each capability identified, assess maturity required under future system conditions and current maturity – across people, process and technology.

3. Identify gaps and prioritize uplifts

- Compare maturities to identify capability gaps.
- Prioritize uplifts based, for instance, on their potential operational impact, implementation feasibility or expected consumer value.

4. Develop and maintain uplift

- Develop & maintain a structured uplift roadmap to address prioritised gaps, including actions, timing and outcomes.
- Align with existing planning, regulatory and investment processes.

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Framework development & status

	1. CAPABILITY LIST Dec 25 to Apr 26	2. FRAMEWORK Apr to Sep 2026	3. APPLICATION Oct 2026 =>
STATUS	Complete	Complete	Ongoing
DESCRIPTION	Draft capability list for core transmission system operation functions essential to the transition to high-renewable generation conditions.	Capability list integrated into implementable framework to provide coordinated, consistent & transparent view of capabilities needed to support the energy transition.	TNSPs and AEMO to assess, prioritise & progressively improve operational capability and maturity.
STAKEHOLDERS	Endorsed by NEMOC / EJPC. Developed by technical working group of TNSPs, CutlerMerz, AEMO. AEMO confirmed its role in framework development via discussions with AER & ENA.	Developed by technical working group of TNSPs, CutlerMerz, AEMO. Parallel regulatory input from AEMO & TNSPs. Structured engagement with AER, AEMC, ENA, large and small consumer reps.	To be supported with updated engagement plan.

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What has changed between Draft and Final?



Consultation on draft TSOCF



Feedback received from:

- ElectraNet
- ENA
- EUAA
- Haast
- Iberdrola
- SVDP
- TasNetworks
- TransGrid
- VIOTAS

- AEMO considered all feedback received and incorporated relevant changes into the final version.
- AEMO published **Q&As** providing further clarification, including on feedback considered but not incorporated into the final version.

NOTE: All TSOCF materials are available on AEMO's website

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Changes from draft to final

CATEGORY	DESCRIPTION
Stronger consumer and community benefits focus	• Recognises the potential to avoid unnecessary consumer costs and reduce community impacts. • Incorporates consumer and community value into uplift prioritisation and evaluation.
More clearly defined intended users	• Clarifies that the framework is intended for AEMO and transmission businesses performing transmission system operator functions. • Focuses application on primary TNSPs, typically those holding an Instrument of Delegation. • Excludes DNSPs and organisations primarily limited to transmission asset ownership or limited operational transmission activities.
More practical application guidance	• Adds a structured process for assessing capability maturity, identifying gaps and developing an uplift roadmap. • Includes a worked example in the accompanying spreadsheet showing maturity levels under future system conditions.
Updated framework adoption and evaluation model	• Provides more detail on how AEMO will work with TNSPs through established governance and engagement arrangements. • Supports consistent interpretation and the exchange of experience from applying the framework. • Expands evaluation to cover adoption, operational readiness, coordination and stakeholder feedback.
Expanded stewardship and stakeholder governance	• Defines AEMO's role in maintaining the framework, coordinating updates and supporting consistent interpretation. • Introduces proportionate engagement, with streamlined treatment of minor updates and targeted consultation on material changes.

NOTE: Change-marked version of TSOCF available on AEMO's website

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Worked Example

- Level 1 Capability Domain – Outage Management
- Level 2 Core Capability – Electronic Switching
  - The capability to plan, authorise, execute, verify and record switching using electronic or automated switching arrangements under normal, outage, commissioning, abnormal and emergency conditions
- Level 3 Enabler – Electronic switching governance and execution
  - People capability (developing): Electronic and automated switching capability is embedded across outage planning, control-room, field and commissioning functions. Personnel are competency-assessed for complex, abnormal and degraded-mode operations, with clear accountability for automation governance, exception management, overrides and continuous improvement.

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Worked Example

TNSP Capability Maturity	People Capability	Process Capability	Technology Capability
Foundational	Authorised control-room and field personnel are trained and competency-assessed to prepare, check, authorise, execute and verify switching instructions.	Switching instructions are prepared, checked and authorised through controlled procedures, but execution and status confirmation rely mainly on printed or static documents and verbal communication between the control room and field personnel. Operators manually prepare and verify switching steps and carry out completion of each critical step. Deviations trigger stop-and-escalate action, and completed records are retained for assurance and audit.	Outage or switching-management tools support instruction preparation using controlled templates and produce static documents for execution. Network configuration and equipment status are checked by the operator separately using operational systems. Records are manually updated, scanned or archived, with manual integration between switching, outage and real-time network systems.
Developing	Electronic and automated switching capability is embedded across outage planning, control-room, field and commissioning functions. Personnel are competency-assessed for complex, abnormal and degraded-mode operations, with clear accountability for automation governance, exception management, overrides and continuous improvement.	Switching is managed through an end-to-end workflow integrated with outage planning, access and work authoritisation, field execution and operational conditions. Safe switching instructions are generated against the network state logic and verfied by the operator and switching personnel. Execution of the switching is done within one system and verbal co-orindation only for critical steps and external parties (e.g. AEMO). Electrically unsafe sequences, equipment conflicts and potential customer or power-system impacts are flagged by the system before execution; barriers and concurrent work are monitored in real time; and exceptions require controlled approval and review.	The switching platform integrates with outage management, AEMS/SCADA, network models, and mobile field tools. Network-state-aware validation and approved automation support eligible switching sequences, with real-time progress visibility, automated event capture, resilient communications, cyber-security controls and tested degraded-mode operation.
Advanced	In addition to Developing, personnel take on supervisory (in-the-loop/on-the-loop) roles for supervised-automated sequences - confirming intent, monitoring automated progress and intervening or reverting to manual execution as conditions change. Outage planners and schedulers are skilled in using decision-support and market-impact information to sequence and re-time outages under weather-dependent generation, and are practised in rapid, pre-authorised recall where available so plant can return to service quickly when conditions shift.	In addition to Developing, sequences are automatically generated and validated against the current and planned network state, with pre-conditions systematically confirmed before release. Planning and scheduling tools test proposed switching against forecast network and weather conditions, flagging conflicts and impacts early enough to resequence or re-time work, and hold pre-validated recall sequences so plant can be returned to service rapidly. Personnel supervise execution step-by-step or block-by-block, holding release points and intervening at any time, with automated support advancing while human authority is deliberately retained rather than moving to unsupervised automation.	In addition to Developing, the platform also integrates with scheduling, protection and asset data, and market and constraint information. Rules engines and approved automation prepare, check and progress eligible sequences, including automated pre-condition and conflict checks with early flagging to planners. Planning tools help optimise outage sequencing and timing and where available to hold pre-validated recall sequences for rapid supervised initiation. Human-supervision features - clear sequence status, defined release/hold points, override and abort controls - support graceful hand-back to manual execution, with model, rule and automation changes managed under version control.

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What's next? ElectraNet approach to next steps

electranet

AEMO

Context to our approach

- TNSPs have obligations to plan, build, operate and maintain a reliable and secure transmission network.
- Although our compliance obligations have not changed, the operating context has changed significantly.
- We have been developing plans to uplift our operational capability.
- The TSOCF, with articulated requirements, now provides a structured approach to maturity and gap assessments and uplift prioritisation.
- We plan to apply the TSCOF in two steps– to close the immediate capability gaps and develop a roadmap to take us forward.

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TSOCF plan – Step 1

- High-level maturity and gap assessment against L2 capabilities.
- Align our operational capability uplift plans to the above.
- Example: Capability 5.1 in the Outage Management Domain

Extract from TSOCF:

L2 - Core Capability	Emerging Situation	Expectations on TNSPs
Outage coordination, management and scheduling in operations planning The capability to assess, coordinate and schedule planned outages using forecast conditions, credible contingencies, project interfaces, modelled future network states and cross-network impacts.	High renewable concentration, low operational demand, evolving network topologies, specific IBR behaviours, dynamic stability issues requiring EMT analysis, and tighter reactive-power margins create system security risks not captured by current steady-state assessments, traditional outage planning processes, and basic N-1 security checks.	TNSPs need outage planning processes that go beyond static N-1 screening by incorporating forecast system conditions, topology, reactive-power margins, complex dynamic stability risks, IBR performance considerations, project interfaces and look-ahead model states. This should support informed outage scheduling, contingency planning and coordinated management of operational risk before outages reach real-time execution.

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TSOCF plan – Step 1 (cont)

- We have identified action items that need to be addressed to close the critical gaps.
- The uplift plans per capability are planned over two stages.
- This high-level assessment supports our Revenue Proposal.
- Example: Capability 5.1 (cont)

Assessed maturity	Assessment context	Gap to address — Stage 1	Gap to address — Stage 2
Foundational	Outage and work planning are established, but increased complexity, fragmented tools and manual coordination constrain scalability, integration and auditability.	Deliver integrated outage planning tool for intake, risk assessment, modelling, prioritisation, approval and scheduling with future network states, cross-network impacts and auditable decisions.	Optimise outage portfolios dynamically using probabilistic risk, resource, market and network constraints, with automated multi-party coordination and scenario re-optimisation.

TSOCF plan – Step 2

- Going forward, use the TSOCF to guide a more structured approach to operational capability uplift planning, prioritisation and execution.
- Build on the Step 1 high-level assessment and the TSOCF worked example to develop and maintain an uplift roadmap for longer-term action items.
- Keep engaging with AEMO, other TNSPs and industry stakeholders in the application and improvement of the TSOCF.

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Q&A



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