Watch the whole series

About AEMO

AEMO is the independent system and market operator for the National Electricity Market (NEM) and the WA Wholesale Electricity Market (WEM).

We also operate retail and wholesale gas markets across south-eastern Australia and Victoria’s gas pipeline grid.

Ownership

40% Market participants
60% Governments of Australia
Today’s Webinar

- What is the RIS?
- Scope development
- Key findings and actions
- Managing the transition
What is the RIS
AEMO is planning for change

AEMO's Integrated System Plan (ISP) is a whole-of-system plan that provides an integrated roadmap for the efficient development of the NEM out to 2040.

But, even changes to 2025 are significant.

By 2025 ...
- 10-20 GW of new wind and solar generation
- Installed capacity of distributed PV could more than double

Note: 2025 figures based on Draft 2020 ISP Central scenario build. Distributed PV values based on Step Change scenario build.
What is the RIS?

Scope

• A technical study into changes needed to operate the future system (network and resources) reliant on renewable generation
• Utilises ISP modelling and 'energy' scenarios
• Explores what else we need to do as an industry to prepare for a future with high levels of wind and solar, in addition to what is already done in the ISP

Outcomes

• Different perspectives on the needs and challenges of the future NEM
• New evidence to support industry transition and maximise the value for end consumers
• Enhanced actions to enable the transition towards increasing levels of wind and solar generation
Scope development
### Changing power system characteristics

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The RIS focuses on **instantaneous penetration**.
Increasing wind and solar

- In 2019 the **instantaneous penetration of wind and solar generation in the NEM** was just under 50%

- By 2025, this could reach:
  - 75% under the ISP **Central** scenario
  - **100%** under the ISP **Step Change** scenario

Notes: Actual 2019 penetration includes all lost energy; 2025 projections only include network congestion but do not include system curtailment or participant spill.
Technical areas of study
Managing Distributed PV

Challenges

- **Performance** of the DPV is becoming critical
- **System dispatchability** is decreasing

Actions

3.1 – 3.3 Fast-track DPV performance standards and validation

3.4 – 3.5 Minimum level of curtailability and visibility
Variability and uncertainty

Challenges
- Magnitude of ramps increase by 50%
- Forecasting limitations increase uncertainty
- Ensuring sufficient flexible resources

Actions
6.1 Adapt forecasting systems
6.2 Improve information provided to support security constrained dispatch
(2.3) ESB ahead market process to explore options for explicitly valuing flexibility and incorporating into scheduling and dispatch
Managing Frequency

Challenges

- Decline in the primary frequency response
- NEM inertia levels are decreasing

Actions

4.1 Primary Frequency Rule change
4.2 Develop frequency control workplan
- Inertia safety net
- Revise frameworks
- Define RoCoF limits
- DPV impacts on UFLS
- Switched reserve limits
- Regional requirements
- Model improvements
System Strength

Challenges

- Maintaining minimum system strength levels
- Increasingly complex generator connections

Action

5.1 Pursue opportunities to improve frameworks and system strength coordination across the NEM
  - AEMC and ESB processes
  - ISP through scale-efficient renewable energy zones (REZs) and assessment of market benefits through provision of coordinated system strength services.
**Challenges for secure system operation**

### Challenges

- System is being pushed towards minimum limits. The existing dispatch process was not designed to manage this.
- Increasing complexity
- Increased variability and uncertainty

### Actions

#### 2.1 – 2.2
AEMO to **redevelop existing scheduling systems** to better account for system needs

#### 2.3
ESB ahead market mechanism to increase certainty on dispatch of energy and essential system services

#### 2.4 – 2.5
New operational processes, tools, and operator training

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**Historical number of directions and duration, 2015-20**

*Incomplete year; data current at 5 March 2020.
Note: values above each column represent number of directions issued.*
Managing the transition
By 2025 the instantaneous penetration of wind and solar will exceed 50%.

The RIS provides an action plan to securely meet penetrations up to and beyond 75%.

If action is not taken, wind and solar may be limited to 50-60% of total generation.

No insurmountable reasons why the NEM cannot operate securely at even higher levels of instantaneous wind and solar penetration in future.
Going forward ...

- Significant system transformation possible in the next 5 years
- Strategic construction of new network capability, identified through **Integrated System Planning**
- Need for **flexible market and regulatory frameworks** that can adapt swiftly and effectively
- Feedback into Integrated System Planning for cost benefit analysis to maximise value to end consumers
- Opportunity to lead the world in demonstrating the successful operation of a large power system with high levels of wind and solar
How to get involved

- Watch the full webinar series
- Videoconference workshops (May/June 2020)
- Written submissions (June 2020)
- AEMO will post relevant engagement information on its website


For any further enquiries, and lodgement of written submissions, please contact AEMO’s Future Energy Systems team at FutureEnergy@aemo.com.au
Watch the rest of the series
