2019 Planning and Forecasting Consultation Workshop

February 19, 2019

Agenda

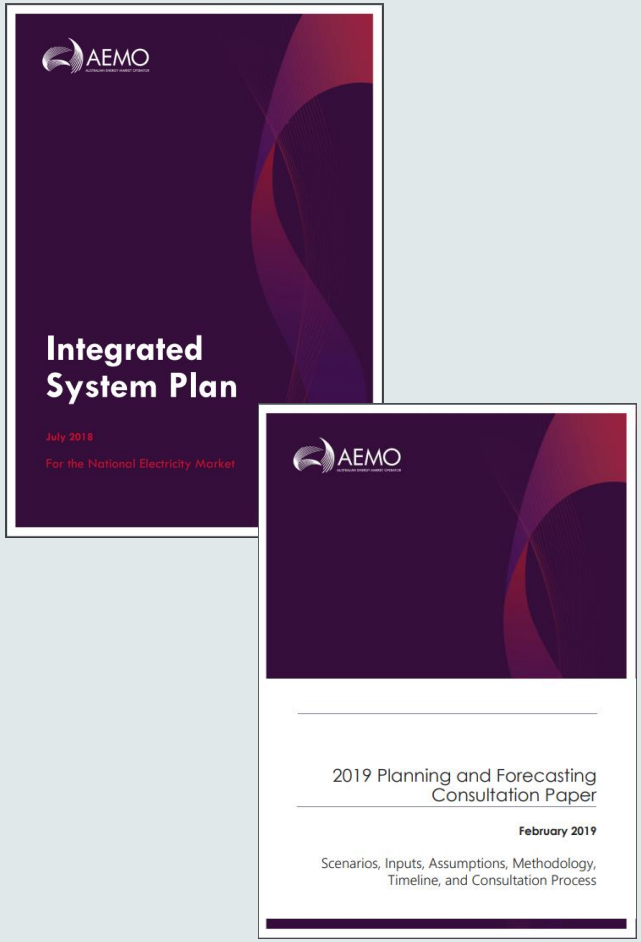
- ❑ Welcome and Introductions
- ❑ AEMO's Forecasting and Planning Consultation – Overview and key events
- ❑ Session 1: Scenarios

… Morning tea …

- ❑ Session 2: Key Inputs
- ❑ Session 3: Material Issues
- ❑ Summary of breakout sessions following each session
- ❑ Next steps and workshop close

Forecasting and Planning: 2019

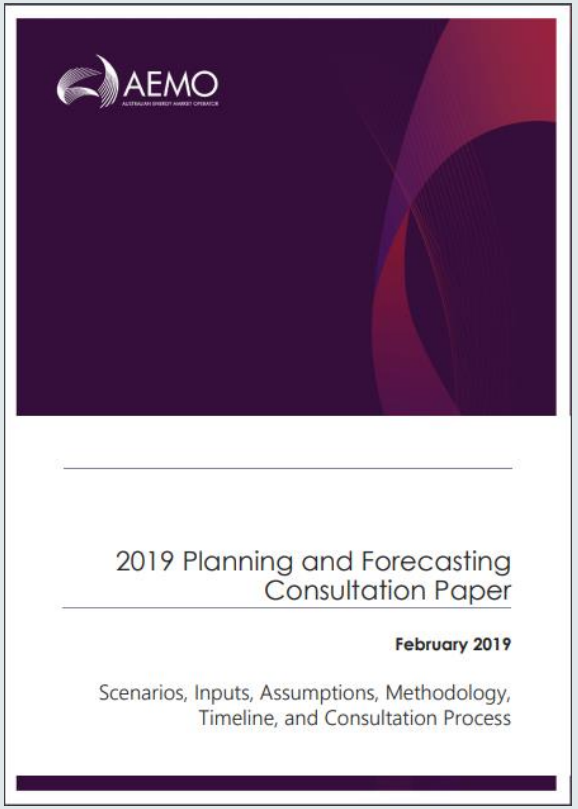
- Both ESOO and ISP will be important decision support tools as the ISP becomes an actionable development plan, and retailers become liable for the reliable delivery of energy to their customers
- Key events and draft dates:
  - Scenarios and Inputs Consultation – March 2019
  - Reliability workshop – April 2019
  - REZ workshop – July 2019
  - ESOO published – August 2019
  - Draft ISP – December 2019
  - ISP Workshops – December 2019
  - Final ISP – April 2020



Consultation Paper outline

- Consultation Paper contains:
  - Stakeholder engagement plan for 2019-20
  - Core scenarios for AEMO publications in 2019-20
  - Inputs and assumptions, including relevant sources
  - Material issues and improvements in 2019
  - System strength and inertia methodologies
  - 2018 ISP feedback

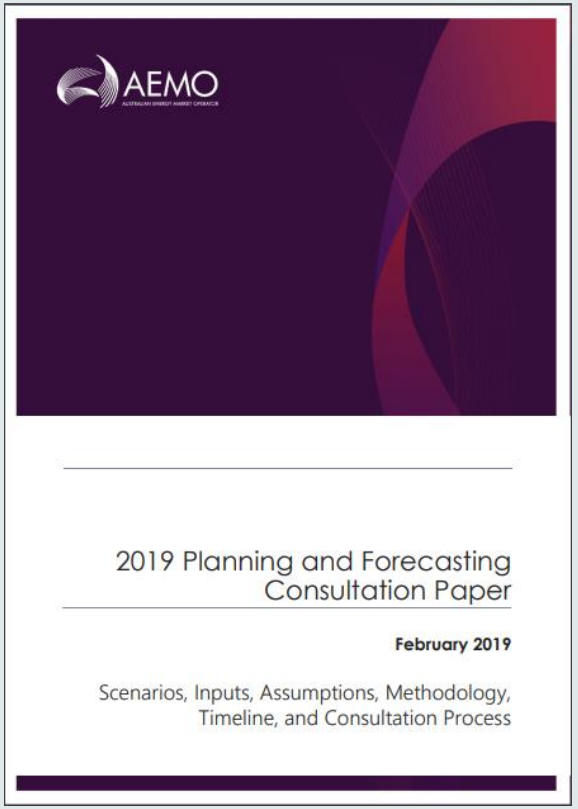
- Supporting materials:
  - AEMO inputs and assumptions Excel workbook
  - Reference documentation for major input sources



Consultation Paper timeline

- Consultation Paper timeline:

• 5 February	Publication of Consultation Paper
• 19 February	Stakeholder workshop
• 20 March	Submissions on Consultation
• April	Stakeholder workshop to finalise scenarios
• TBC	Consumer Engagement Panel
• TBC	Final scenario and assumptions report



Session 1: Scenarios

- Proposed scenarios approach energy dynamics in 3 key dimensions:
  - Level of DER
  - Level of large-scale renewable generation uptake (and thermal generation retirement timings)
  - Level of energy demand

Table 5 Scenario dimensions

Scenario	DER uptake	Large-scale renewable generation uptake	Energy demand
Neutral	Medium	Medium	Medium
Fast change	Low	High	High
Slow change	High	Low	Low
High DER	High	Low	Medium

Session 1: Scenarios

- **Questions received prior to the workshop:**
  - What policy settings will AEMO apply, and will those settings be adjusted after the Federal election? (Infigen)
  - Why are policy decisions, and DER, endogenous rather than exogenous? (ECA)
  - What justification is there for using the 4 degrees CSIRO scenario, when not in line with Paris agreements, even for the neutral case? (Infigen)
  - What impact will not valuing emissions reductions have on the modelling? When will stakeholders be consulted on the emissions reduction objectives? (Infigen)
  - How will energy-intensive industrial loads, such as aluminium smelters, be considered across scenarios given the risks they may face in future (Hydro Tas)
  - What is the rationale for having low DER in the Fast Change scenario (Infigen)
  - Why are the number of scenarios so limited? (Energy Consumers Association)

Session 1: Scenarios

- **Question themes:**
  - **Policy settings**
    - AEMO has proposed to apply current policy settings.
    - Current energy policies are captured, including renewable development policies at Federal and State level.
    - This includes reflection of international policies consistent with the Paris Agreement Nationally determined Contributions, and influence on technology costs.
    - Domestically, decarbonisation will be an outcome, in these scenarios, of changes in renewable generation development, and timings of ageing coal-fired generation retirements
  - **Scenario details**
    - Energy consumption is a key driver explored through scenarios – economic outcomes, price influence, policy, commodity prices, input costs etc. all influence future energy forecasts
    - Low DER is reflected in the Fast Change scenario to widen the range of consumption forecasts.
    - Scenarios address three axes of energy change, focusing on economic stimulus, DER uptake and renewable development. Technical change is embedded within the scenarios – either a fast rate of change with technical developments supporting that change, or slow.

Regional breakout session 1

To discuss:

Q1: What additional details would clarify the proposed scenarios?

Q2: What detail is missing from the scenarios and their driver descriptions?

Scenarios:

- Neutral Scenario:
  - The Neutral scenario reflects a future energy system based around central estimates of all key drivers.
- Fast Change Scenario:
  - Stronger economic and population growth.
  - Faster decarbonisation of stationary energy sector and transport sector.
  - Accelerated retirement of existing generators and development of renewables.
  - Proportionately less decentralisation
- Slow Change Scenario:
  - Weaker economic and population growth.
  - Slower decarbonisation of stationary energy sector and transport sector.
  - Life extensions of existing generators leads to a slower retirement schedule.
  - Proportionately higher decentralisation.
- High DER Scenario:
  - Higher uptake of DER.
  - Increased engagement by consumers.
  - Evolving the role of transmission.

Summary of regional breakout sessions

- Scenarios

Morning tea

Key input assumptions

- Demand and Energy drivers
  - DER
  - Electric Vehicle uptake and grid impact
  - Battery storage and virtual power plants
- Policy settings
- Generation costs – capital cost trajectory and operating expenses
- Hydro generation and large scale energy storage
- Generator technical parameters
- Fuel prices
- Renewable Energy Zones
- Network developments
  - Network connections
  - Marginal loss factors
  - Network augmentations
  - Non-network alternatives

Key input assumptions change since 2018

- AEMO will be updating its key input drivers affecting demand forecasting ahead of ESOO and ISP work.
- Includes increased focus on electric vehicles, DER potential and grid impact, role of virtual power plants.
- Consultation on demand forecasting methodology highlighted potential improvements.
- Forecasting accuracy report highlighted potential improvements.

Key input assumptions change since 2018

- AEMO / CSIRO GenCost project
- Consultation with FRG, ISP feedback, CSIRO workshops, industry workshops, consultants
- Updated data sets:
  - Generation technical settings (GHD)
  - Forward Australian generation technology costs (CSIRO)
  - Updated renewable resource profiles, adding additional reference years (DNV-GL)
  - Review and data sharing with key hydro facilities of hydro operational capabilities
- Review of transmission development options
- Release of Input assumptions book

Session 2: Inputs and Assumptions

- **Questions received prior to the workshop:**
  - Please clarify how renewable resources for Renewable Energy Zones are determined and distinguished, as visually there is virtually no distinction in the published ISP resource maps? (Hydro Tas)
    - AEMO engaged DNV-GL to develop wind resource profiles on a half-hourly basis, reflecting historical wind speeds. Historical solar measurements used.
    - Resulting renewable resource traces reflect historical actual data, translated to generation profiles (MW)
  - How will electric vehicles be considered, particularly if the transport sector decarbonises through electrification (and associated NEM impact)? (Infigen)
    - DER and electric vehicle development and deployment to be assessed within scenario analysis
    - AEMO is further investigating the potential impact of electric vehicles to incorporate into 2019 forecasts. This includes workshops and consultancy inputs. These updated forecasts will influence ESOO and ISP analysis.

Regional breakout session 2

To discuss:

- *Considering the data provided in AEMO's consultation paper and input assumptions workbooks*

Q1: *What data is missing that could help to understand and interpret AEMO's scenarios*

Q2: *What forecasting and planning methodology is unclear, affecting your interpretation of AEMO's modelling approach?*

Q3: *Are data sources clear, enabling review and validation of the appropriateness of the inputs?*

Q4: *Are the refinements made to the 2018 data clear enough to enable critique of proposed data changes?*

Summary of regional breakout sessions

- Inputs and Assumptions

Session 3: Material issues

- System resilience to climate change and weather variability, and the policy settings to guide the transition of the sector.
- Uncertainty over the timing and scale of existing coal generation retirement and what new energy sources will replace it.
- Ensuring there will be adequate supply to maintain reliability following the closure of Liddell power station.
- The increasing influence of consumer investment trends such as rooftop PV, battery storage, demand side participation, and energy efficiency.
- How to address the emerging technical challenges related to the energy transformation, such as frequency stability and power system strength.
- Uncertainty over how the regulatory framework will change over the outlook period.
- Developing and consulting on the process for producing an actionable ISP and an enforceable ESOO for the purposes of the Retailer Reliability Obligation (RRO).

Session 3: Methodology improvements to address identified issues

- Enhancing the understanding of pumped storage with specific emphasis on Snowy 2.0 and the Battery of the Nation projects.
- Understanding whether the risks of potential generator early closure, given revenue outlooks.
- Utilising improved cost, storage, lead time and demand management assumptions, based on the GenCost project, which was published in December 2018 in collaboration with CSIRO, ARENA and industry stakeholders.
- Identifying the necessary measures to enhance the resilience of the future power system through network and non-network services.

Session 3: Methodology improvements to address identified issues

- Considerations of the role that Virtual Power Plants and other DER opportunities may play in future.

- Developing an approach to value measures that enhance the resilience of the power system to climate change risks.
  - This aspect will incorporate insights from the Department of Environment and Energy (DoEE) funded Energy Sector Climate Information (ESCI) project between CSIRO, BOM and AEMO.

- Commencing tri-sector integration of electricity, gas and transport in AEMO's co-optimisation model. This work will leverage AEMO's work with Infrastructure Victoria, ARENA, CSIRO and industry on the "zero emission vehicle" roadmap.

Session 3: Material Issues

- **Questions received prior to the workshop:**
  - Are changing marginal loss factors (MLFs) considered, depending on what is developed, and where, and how much? (Stanwell)
    - AEMO produced MLF curves for the 2018 ISP. Extensions of this method to iterate generation development, ensuring appropriate response to market signals.
  - What secondary markets are assumed to complement the existing energy market and provide increased incentives for interruptible consumers, or energy storage solutions? (Sligar and Associates)
    - Energy storage solutions were a key outcome of the 2018 ISP. AEMO is furthering the modelling capability to capture multiple storage sizes. Scenario analysis to investigate role of demand side participation.
  - Are revenues, and not just costs, considered in the modelling (ECA)
    - Revenue assessments a consideration for AEMO in 2019.
  - How will the detail of operating the network be captured considering the January 2019 event where load shedding occurred while VIC was forced to export to NSW (ECA)
    - AEMO uses layered network development representations in its models to consider thermal and stability limitations. Maintaining system security and reliability is key to assessing any network development plan.

Regional breakout session 3

To discuss:

- Material Issues for 2019

Q1: *What additional clarity might be provided to understand AEMO's methodology improvement program ahead of 2019's forecasting and planning work?*

Q2: *What important issues are not addressed?*

Q3: *Considering the AEMO methodology documentation available, what clarity can increase understanding and review of methodologies already adopted or proposed for 2019?*

Summary of regional breakout sessions

- Material Issues

Next steps - Consultation

Table 2 Consultation timeline for this report

Key milestone	Indicative date
Forecasting and Planning Consultation published	Tuesday 5 February 2019
Stakeholder workshop to address any questions of clarification conducted	Tuesday 19 February 2019
Submissions on Forecasting and Planning Consultation received	Wednesday 20 March 2019
Stakeholder workshop to finalise scenarios and resolve issues conducted	Tuesday 2 April 2019

Next steps - Consultation

- Consultation Paper submissions to forecasting.planning@aemo.com.au by **20th March 2019**

- This feedback will be reviewed, responded to, and incorporated into forecasting and planning work for 2019 and beyond.
- Further consultation to finalise scenarios and resolve any outstanding issues in April 2019
- Final scenarios and assumptions to be published ahead of ESOO and ISP modelling.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