Matching the pace of transformation

SIEW October 2017

Dr Tony Marxsen, Chairman AEMO
Our vision

To deliver energy security for all Australians, and meet the changing needs of the market by involving multiple jurisdictions, participants, and communities.

We operate Australia’s National Electricity Market and power grid in Australia’s eastern and south-eastern seaboard, and the Wholesale Electricity Market and power grid in south-west WA.

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

We are a company with three control centres and multiple offices across five States. Our costs are recovered through fees.

Ownership

40% 60%
Market participants Governments of Australia
Overview of the Australian power system

The National Electricity Market and Wholesale Electricity Market

- The National Electricity Market (NEM) Wholesale Electricity Market (WEM) in Western Australia incorporates around 48,000 km of transmission lines and cables.
- It supplies about 220 terawatt hours of electricity to businesses and households each year.
- It supplies around 11 million connections.
- It has a total electricity generating capacity of more than 50,000 MW.

Australia’s gas markets

- AEMO operates the Retail and Wholesale Gas Markets across South-Eastern Australia.
- Australia has a growing LNG export industry, making up the largest portion of domestic demand.
The National Electricity Market (NEM) is often described as one of the most competitive in the world

Centralised / Off-grid generation

Transmission & distribution

Trading & retail

Metering

Behind-the-meter (BTM)

**Energy Value Chain**

- **Centralised / Off-grid generation**
  - 36 Renewable Generation >8300MW
  - 9 Generation Companies >2000MW
  - 30 Wholesaler (Generation) <2000MW

**Transmission & distribution**

- 1 National Electricity Market (NEM)
- 5 Transmission networks
- 13 Distribution networks

**Trading & retail**

- 30 Retailers
  - Have over 70% market penetration (AGL, Origin and EnergyAustralia)

**Metering**

- Power of choice reforms
  - 2009-14 Smart meter rollout (VIC)
  - AEMC 2015 rule change allowing competition from 1 December 2017.
  - Aim to facilitate market led smart meter rollout

**Behind-the-meter (BTM)**

- 9.8m NEM Contestable Consumers

**Risks/Opps:**
- Many applications and value streams
- Safety risks
- Cumulative impact of continuing rooftop solar growth

**Australian Energy Market Operator (AEMO)**

Australian Energy Market Agreement led to the formation of:

- Australian Energy Regulator (AER)
- Australian Energy Market Commission (AEMC)

Source slide: PwC Australia with information from AEMC, AER, AEMO, COAG
The Australian energy industry changed on 28 September 2016

Black system event - with a state losing power, impacting 1.8 million Australians

- Loss of three transmission lines (tornado wind speeds 190-260km/h)
- Six system faults, protective settings activated, disconnection of wind farms, 465 MW loss
- Heywood Interconnector compensated, safety protection measures activated, 900 MW from Victoria to SA lost.
FINKEL VISIO NS OF A CLEAN WORLD

Power play
The Chief Scientist has plotted a masterly path for the country’s energy future, writes Ben Potter.

The battle to build a solar system has entered a new phase. Australia is on the verge of a major shift towards renewable energy, which could provide a significant boost to the economy and create thousands of new jobs.

The future of solar energy in Australia is now in the hands of the government and the state governments. The federal government has committed to building a national grid of solar panels and has announced plans to invest $2 billion in solar farms.

The state governments have also committed to building solar farms and have announced plans to invest $2 billion in solar farms.

The National Energy Market (NEM) is also playing a key role in the transition to renewable energy. The NEM is a pool of energy markets across Australia that enables the efficient and competitive trading of electricity.

The NEM is currently undergoing a major transformation to enhance its ability to manage the transition to renewable energy. This includes the development of new market mechanisms and the integration of new renewable energy technologies.

The transformation of the NEM is critical to ensuring a smooth transition to renewable energy. It will enable the efficient and competitive trading of electricity, which will be essential to the successful integration of renewable energy into the grid.

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Two-way power grid evolution

Huge growth in customers providing energy back to the grid.

By 2050, customer-owned generators will supply 30-45% Australia’s electricity needs.

Source: CSIRO
Australia’s changing load profile

South Australia daily demand for grid electricity

Average Annual SA1 Operational Demand as Generated (MW)

Time (hrs)

2009
2011
2014
2016
2020 Forecast
2030 Forecast
The changing generation mix

- Coal: 27,864
- Gas: 7,235
- Hydro: 7,558
- Wind: 1,172.25
- Liquid fuel: 616
- Utility solar: 0
AEMO's actions to support the transformation

- Frequency and inertia requirements
- Operational changes and advanced forecasting tools
- Proof of concepts
- Advice on reserves and need for flexibility
- Storage
AEMO is playing an active role in managing the transformation

Australian market has changed rapidly
- with government policy, consumer attitudes and technology all contributing

Reaching a tipping point
- where renewables are becoming cheaper than traditional resources and can be deployed more rapidly

Markets need to value and price supply reliability and security
- inertia, system strength, and dispatchability all need to be considered.