Impacts of new technologies on security of supply

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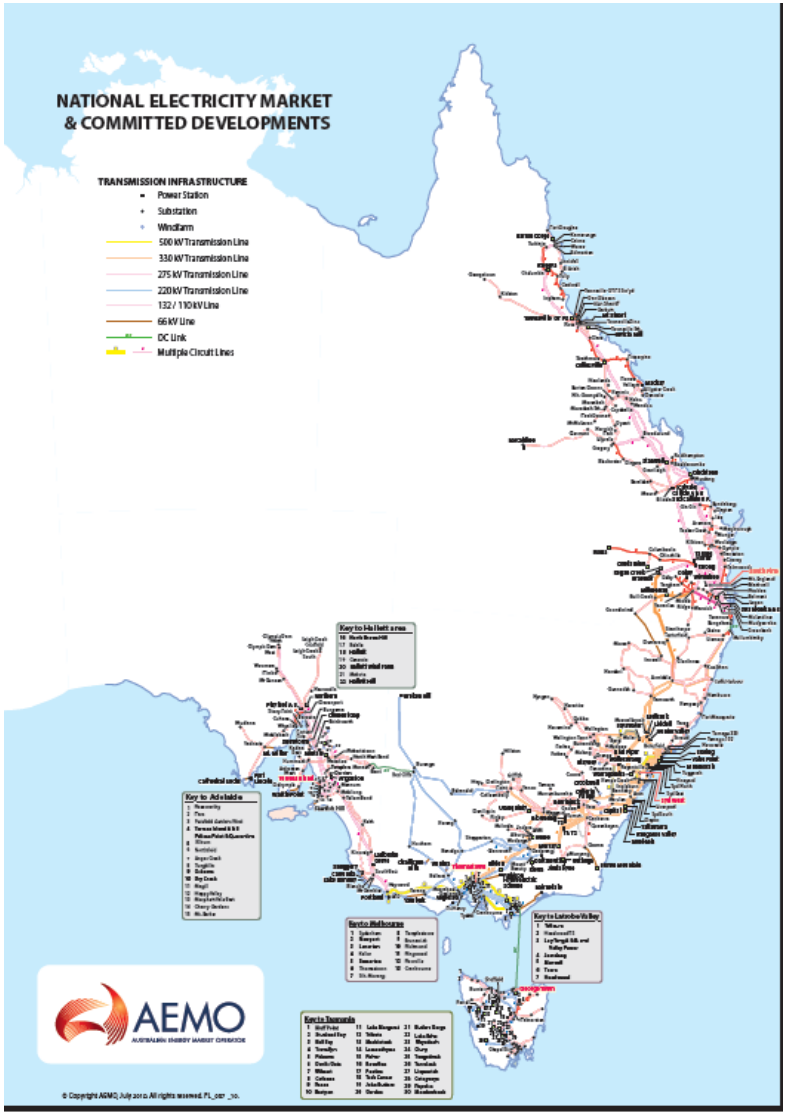
Impact of New Technology on Security of Supply

From a Market Design and Rules perspective

- Australian NEM
- NEM Governance
- New Technology – some characteristics
- Some current NEM issues and the impact from new technology
- Current developments to reduce impacts

That which impacts investment ultimately impacts security of supply

The Australian National Electricity Market (NEM)



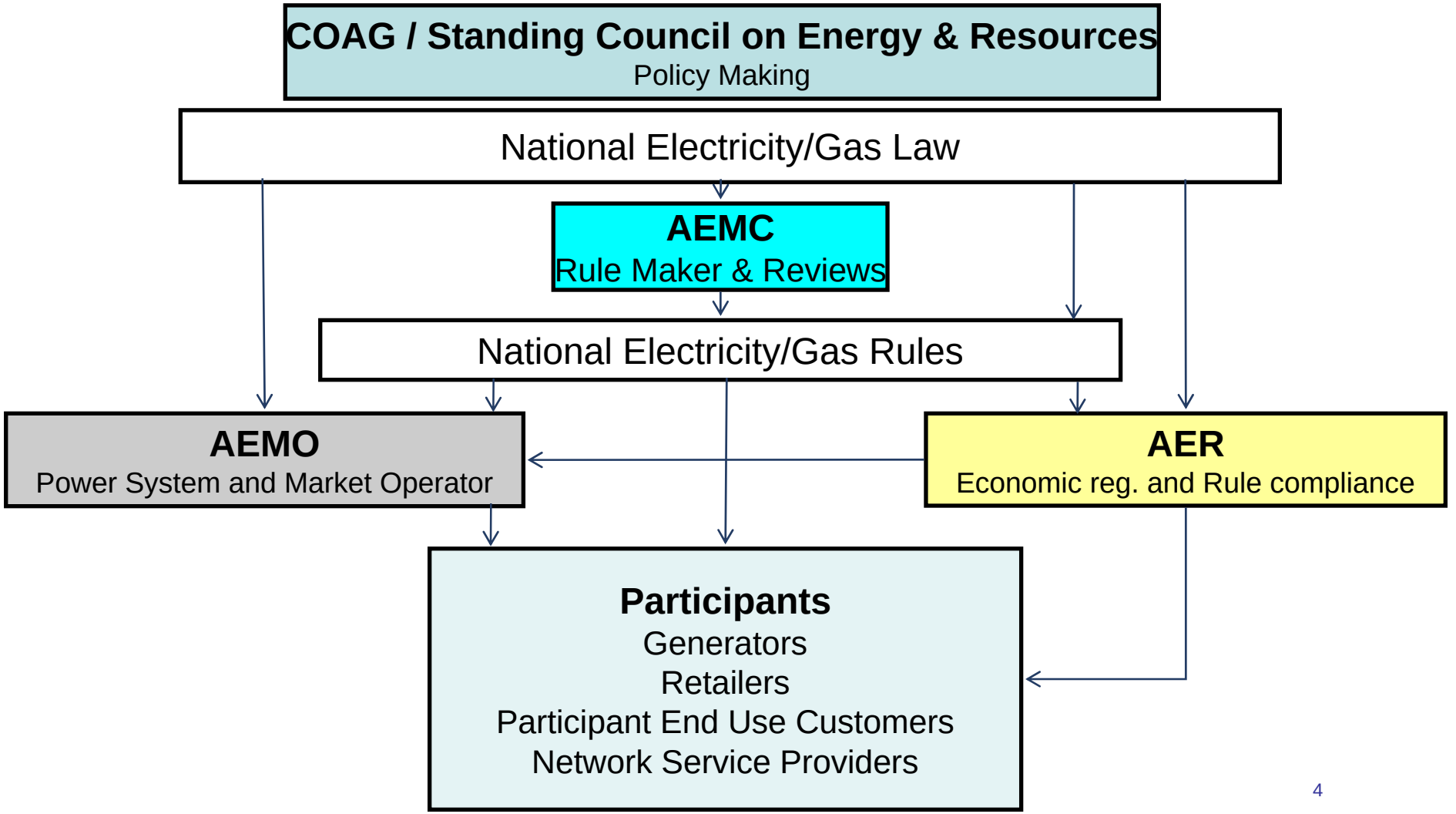
NEM Statistics

- 900,000km of network
- 10 Million customers
- 200 terawatts pa

Market Design

- Gross pool, energy only, mandatory
- 5 regional half hourly spot prices
- Financial contracts manage risk

Australian NEM Regulation and Governance



Australian Energy Market Commission Role

Two principle functions:

1. Rule maker for the national electricity and gas markets
2. Reviewing and providing advice

AEMC is guided by the National electricity and gas objectives:

"…to promote **efficient investment** in, and **efficient operation** and use of, electricity and natural gas services for the **long term interests of consumers** with respect to price, quality, safety, reliability and security of supply…"

What does New Technology Look like in Australia

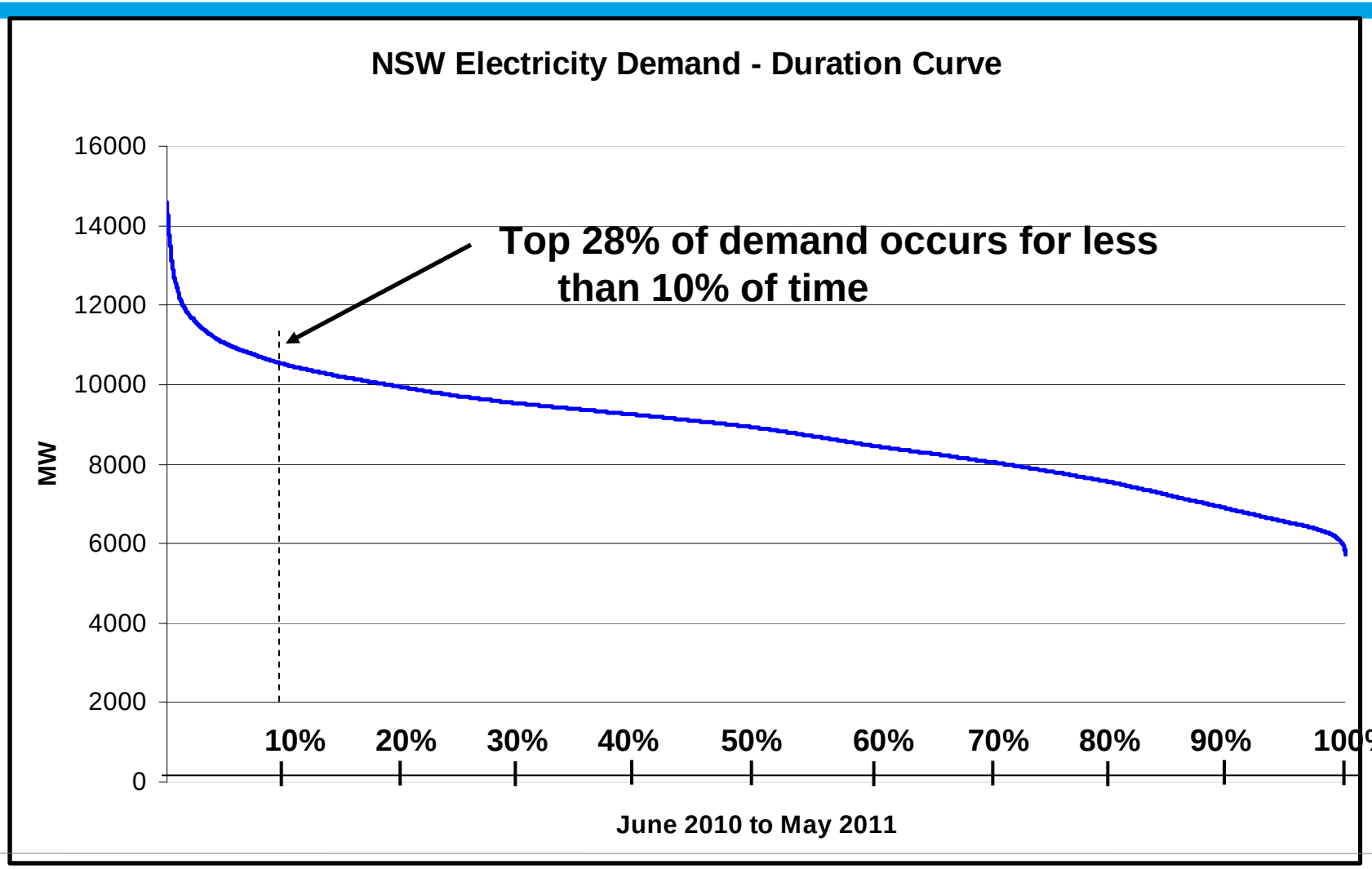
Generation

- Intermittent & not dispatched – wind and solar
- Small scale – from micro to 100’s MW
- Some embedded in distribution network
- Some in very remote locations
- Many connections
- Different technical standards – voltage capability, fault ride through, inertia, temperature sensitivity

Current Issues – Impact from New technology

- Increasing peak demand
  - Low network utilisation and high costs
  - Not helped by intermittency
- Climate impacts
  - Ability of the system to cope with extreme weather events
  - Some new technology is not robust
- Rising retail prices
  - Mainly driven by network investment
  - Subsidies for renewable generation can increase retail prices
  - External sources of funds for plant can depress wholesale prices

Current Issues – Peak Demand

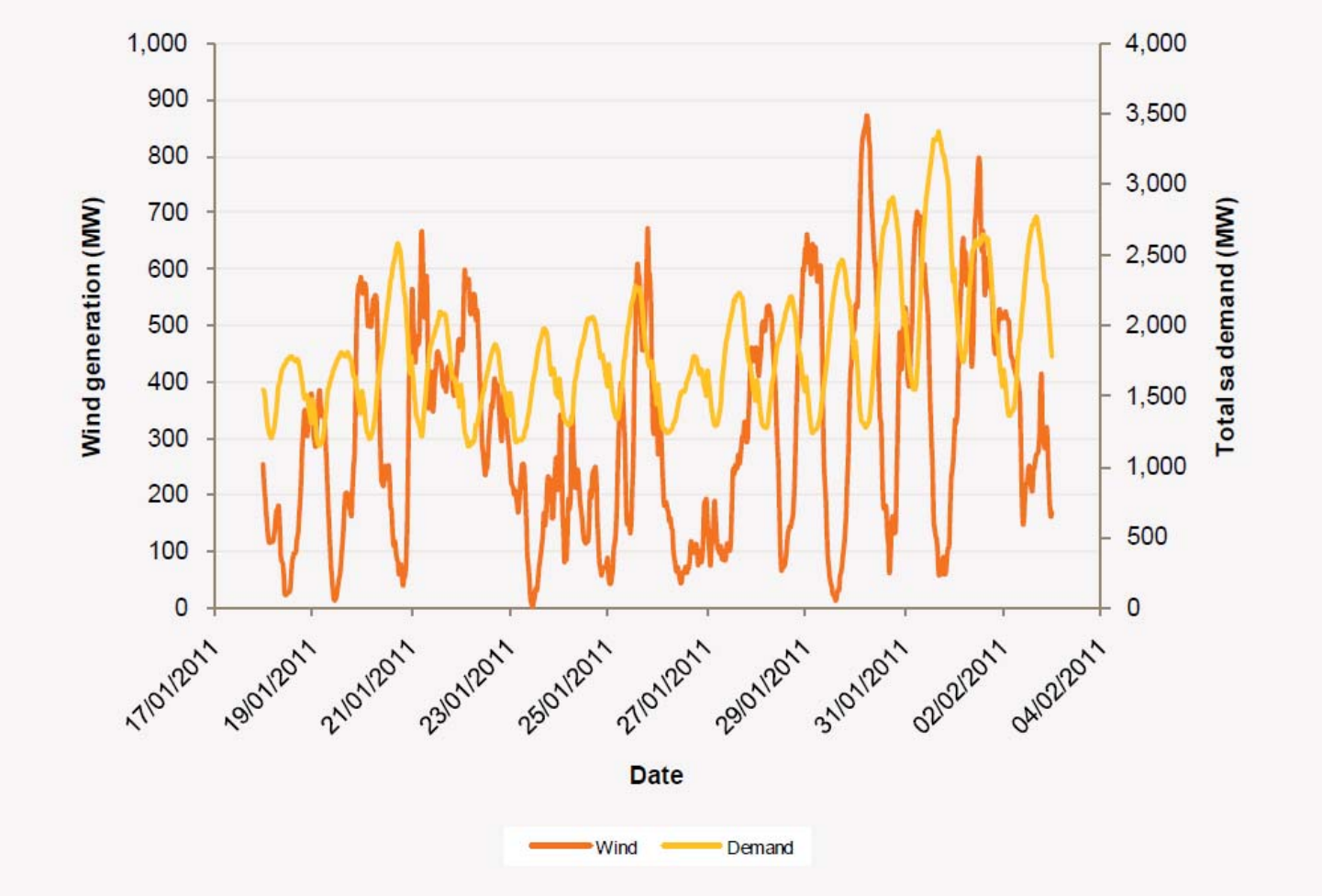


Current Issues – Peak Demand and wind gen

- The scale of potential new wind generation entry in the NEM is substantial
- Wind generation currently makes up around 3.5% of total installed capacity, and supplies around 2.7% of the total energy produced in the NEM
- In South Australia, wind generators make up around 20% of total MW installed capacity and around 22% of the total energy generated in SA

Current Issues - Demand & Intermittent generation

Wind generation and South Australian demand January 2011



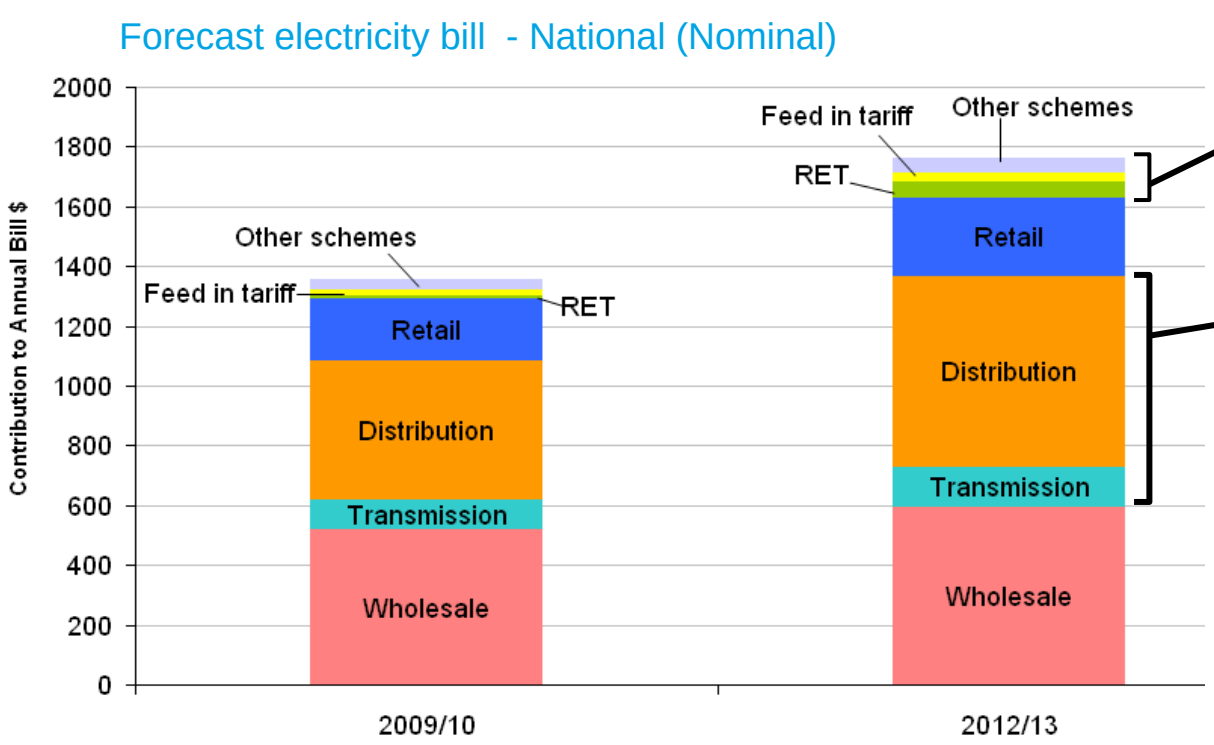
Current Issues – Climate impacts

- Prior to Summer 2011/12
  - Increasing heat waves
  - Increasing bush fires
  - Increasing flooding

- Impact from new technology
  - Temperature effects
  - Fault ride through and inertia

Current Issues - Rising Retail Prices

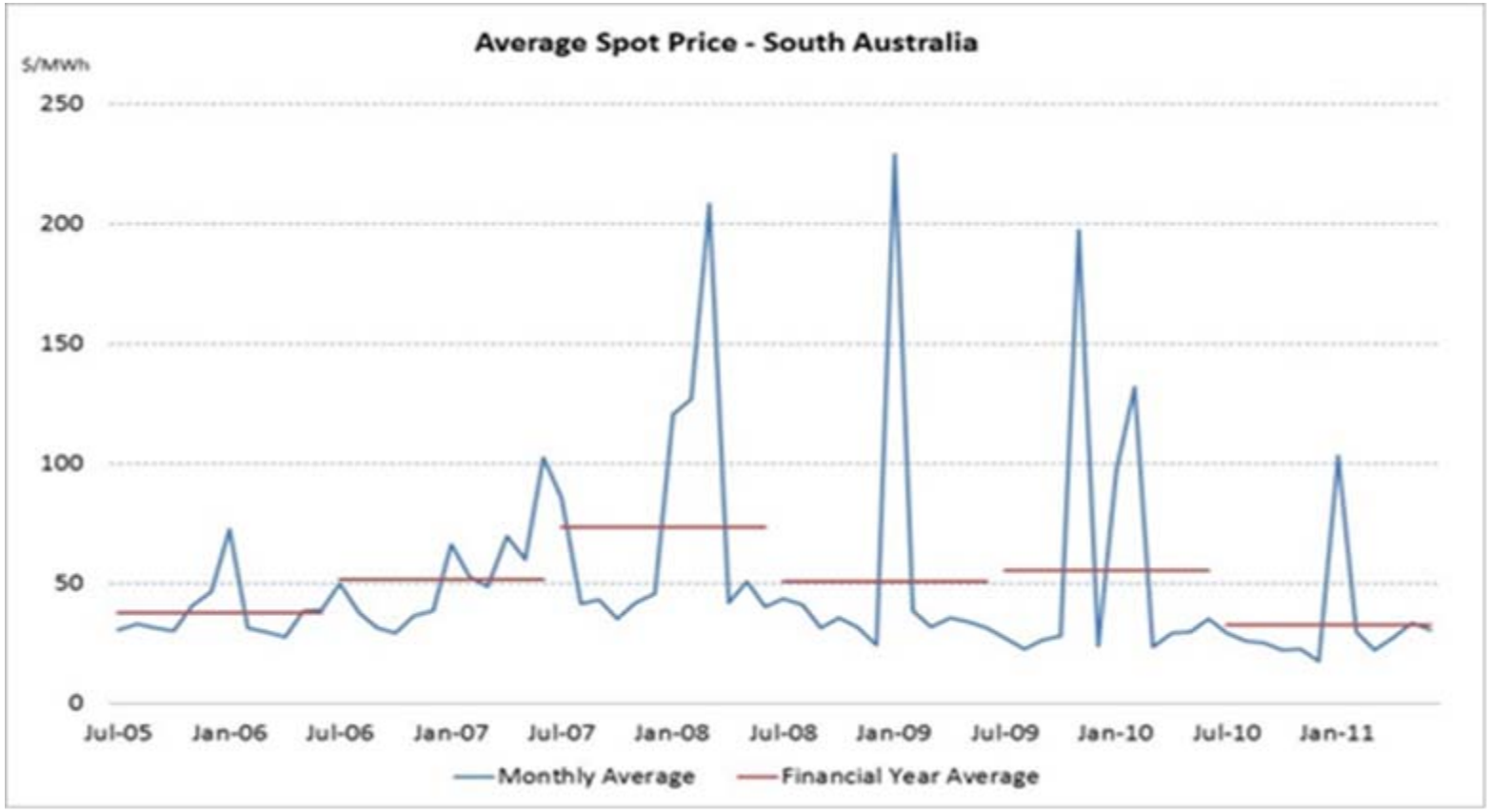
Average increase of about 30% over three years



Government environmental policies

Increasing network charges have been responsible for around 50% of the increases

Current Issues - Volatile Wholesale Prices



Source: AEMC

Current Issues – Retail prices

- New technology
  - Incentives required for renewable generation
  - Some of those subsidies are funded by retail tariffs
  - Network costs to connect – some large distances, some issues in negotiating with Network businesses
  - External sources of funds can depress wholesale prices and potentially limit other investment

NEM Developments to Ameliorate Impacts

- Enabling efficient Demand Side Participation
- Reviewing Technical Standards for generation and transmission
- Reviewing distribution reliability standards
- Enabling efficient use of small generators
- Reviewing framework for generation and transmission investment

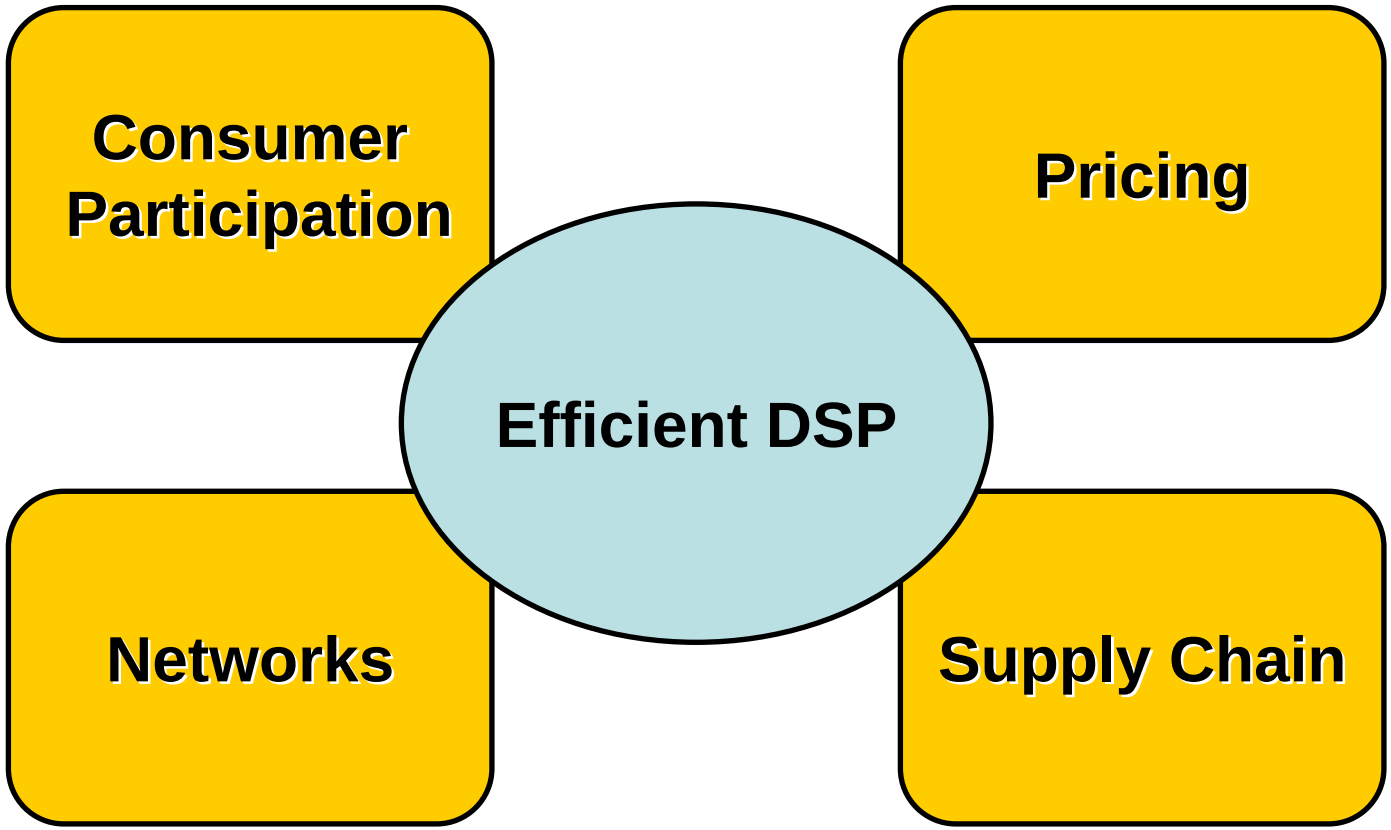
Demand side participation

- Demand side participation - when consumers make informed decisions regarding the quantity and timing of their electricity consumption
- The AEMC is currently working on a number of projects in this area:
  - Power of Choice review

    Enabling consumers to make informed choices about the way they use electricity can help achieve efficient investment across the demand and supply chain

    Effective demand side participation can help to mitigate the impacts of increases in peak demand

Power of Choice



Demand side participation

- Other related projects
  - Energy Market Arrangements for Electric and Natural Gas Vehicles review
  - Distribution Network Planning and Expansion Framework Rule change

Review of Technical Standards

- In 2010 the AEMC published its *Review of the Effectiveness of NEM Security and Reliability Arrangements in light of Extreme Weather Events*
- The Governments' response to the review in June 2012:
  - Review technical standards for generation and transmission
  - Further advice on how the value of customer reliability and reliability settings relate
  - Changes to governance for setting system reliability standards

Review of Distribution Reliability Standards

- Draft position shows that there are potential benefits of reducing reliability standards in NSW
- Impact is very modest as reliability standards are only one driver of network costs
- Cost savings from reducing distribution reliability standards are greater than the costs to consumers of poorer reliability (increased interruptions to supply)

Integrating Small Generators

- Efficiently accommodating small sources of generation
- The AEMC currently has a number of projects:
  - Connecting Embedded Generators rule change
  - Small Generation Aggregator Framework rule change
  - Transmission Frameworks Review – connections – looking at negotiating framework, costs, standards and timing

Transmission Framework review

- Looking at:
  - Access by generators - two options under consideration:
    - non-firm at no cost (essentially status quo) or
    - optional firm at cost – aims to give locational signals to generators and investment signals to transmission companies
  - Planning on a more national basis
  - Connections

Conclusion

- Current NEM issues of peak demand, changing climate and rising prices - and the impact from new technology
- Current developments to reduce impacts
  - Enabling efficient demand side participation
  - Reviewing reliability and technical standards
  - Enabling smaller generators into the NEM
  - Reviewing the framework for transmission

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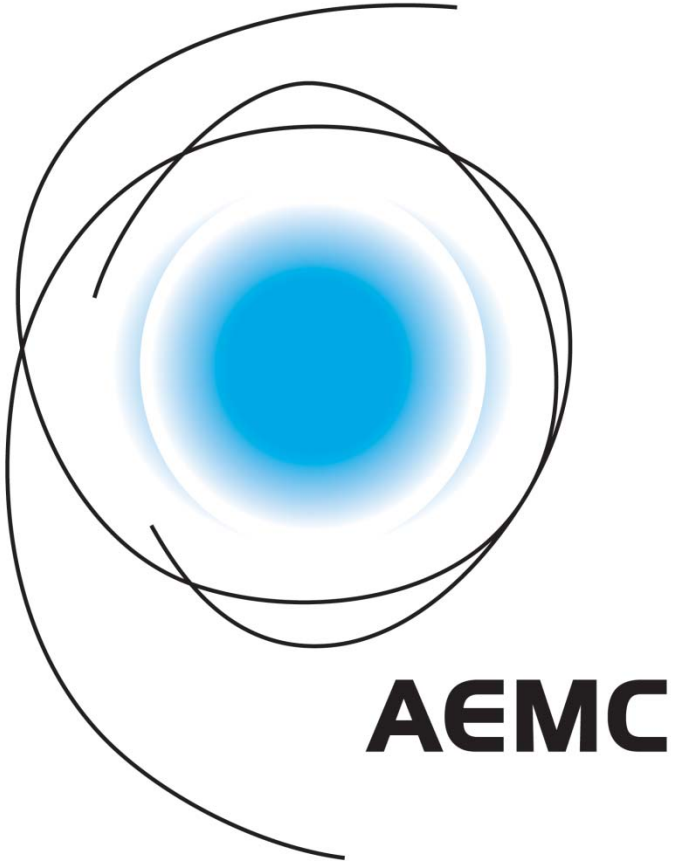
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