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# Efficient Network Planning Under Uncertainty

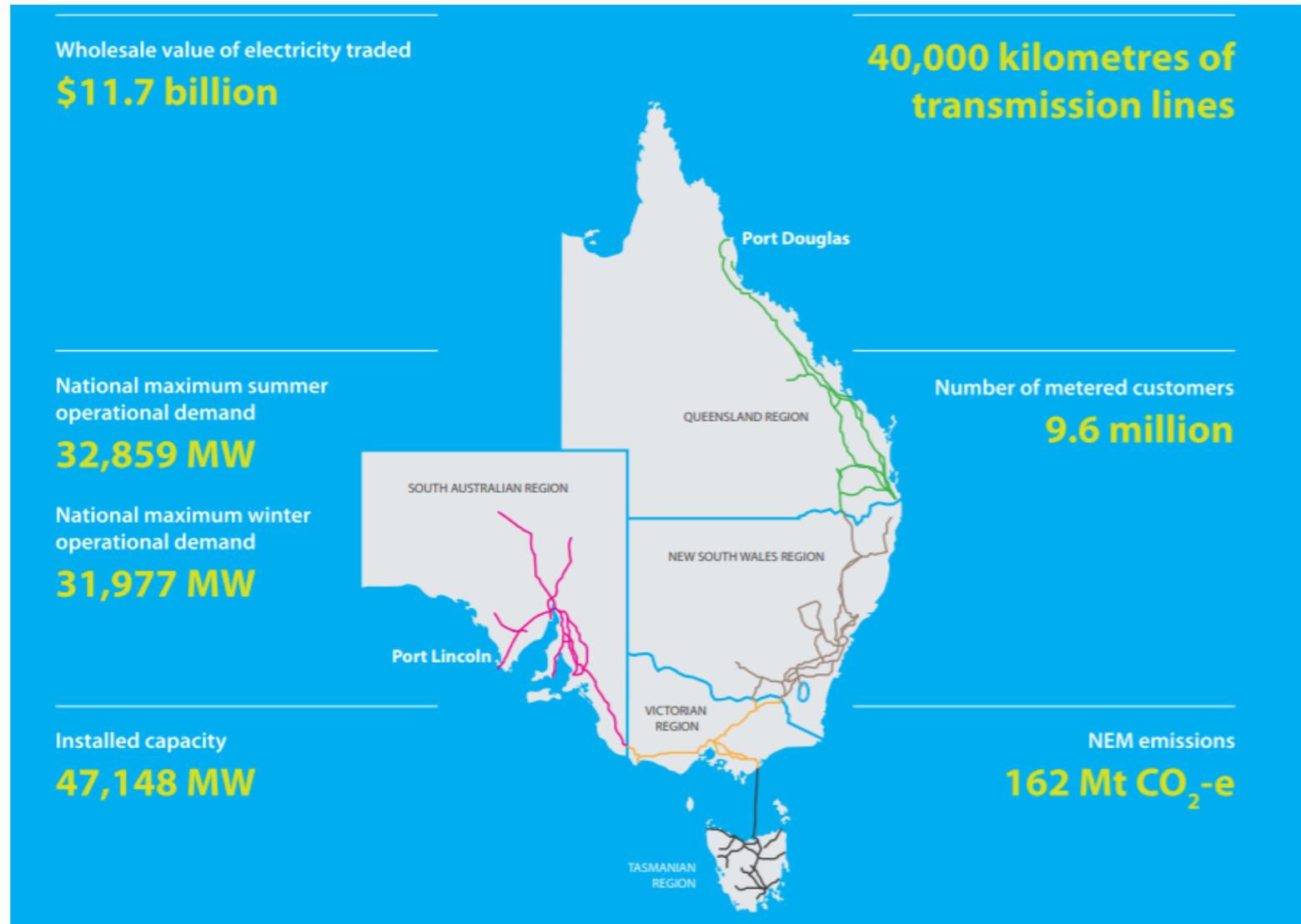
The Role of Non-Wires Alternatives and  
Lessons from Australia

6 June 2019

# Overview



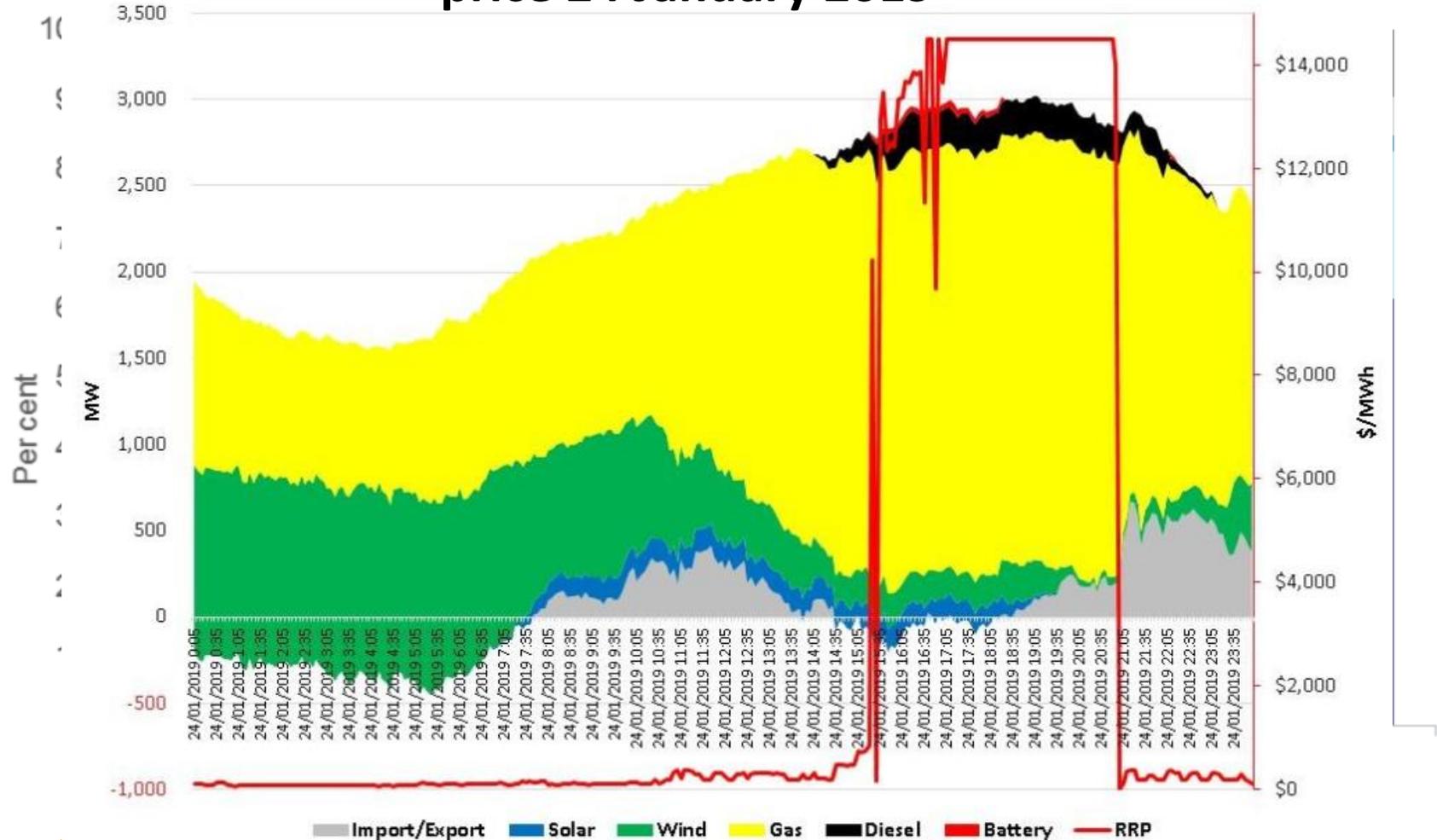
# One of the world's longest interconnected systems



Source: Independent Review into the future security of the National Electricity Market, 2017 (“Finkel Review”)

# Limited generation diversity drives volatile prices

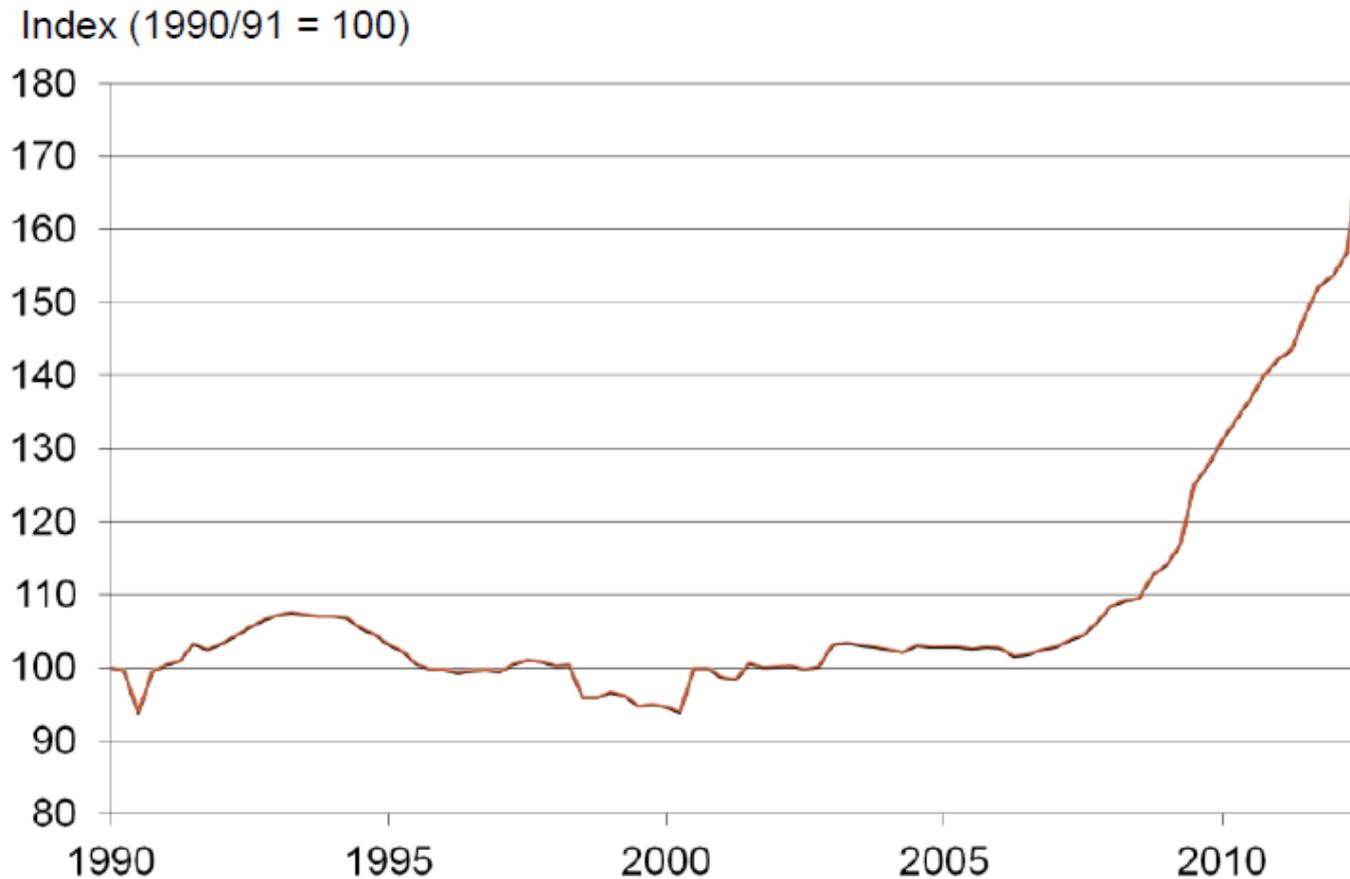
Figure 1: Australian electricity generation by type and average spot price 24 January 2019



Source: Australian Energy Council, Environment and Energy (2018) 2019 Australian Energy Statistics, Table O excluding rooftop PV

# 'Gold Plated' networks drive bill increases

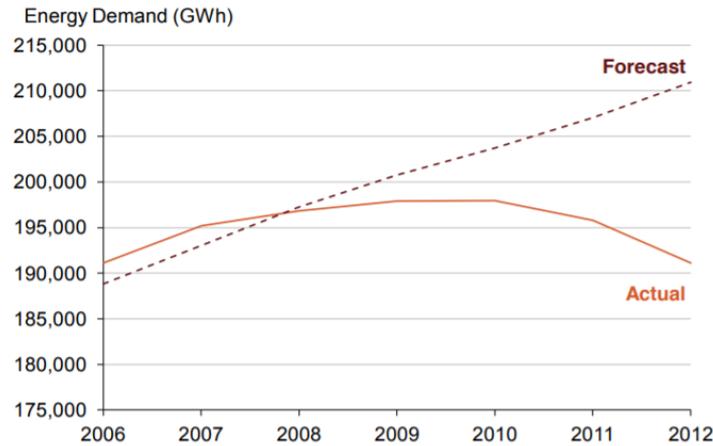
**Figure: Growth in electricity retail prices**



Source: Australian Bureau of Statistics (2012)

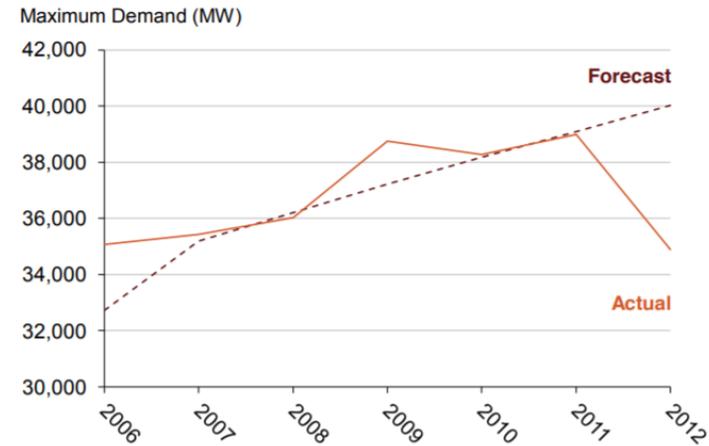
# Changed usage have impacted forecasting accuracy

Figure 6.2: NEM energy demand forecast and actual



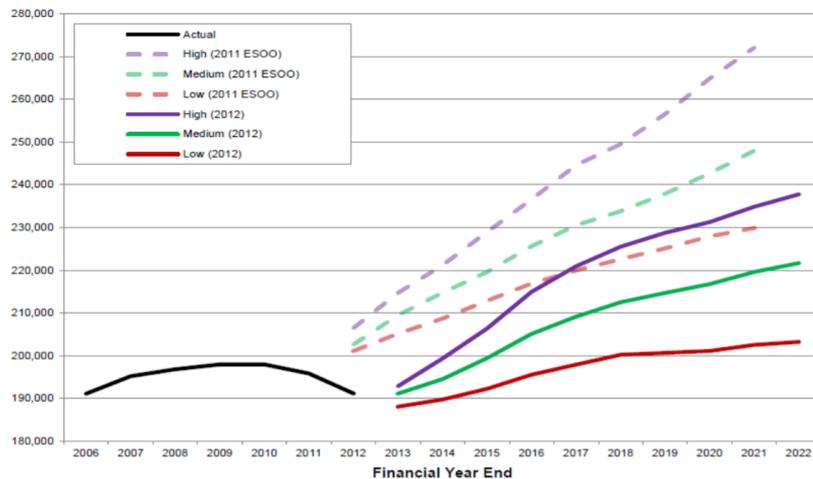
Source: NEMMCO (2006), AEMO (2012d)

Figure 6.3: NEM maximum demand forecast and actual

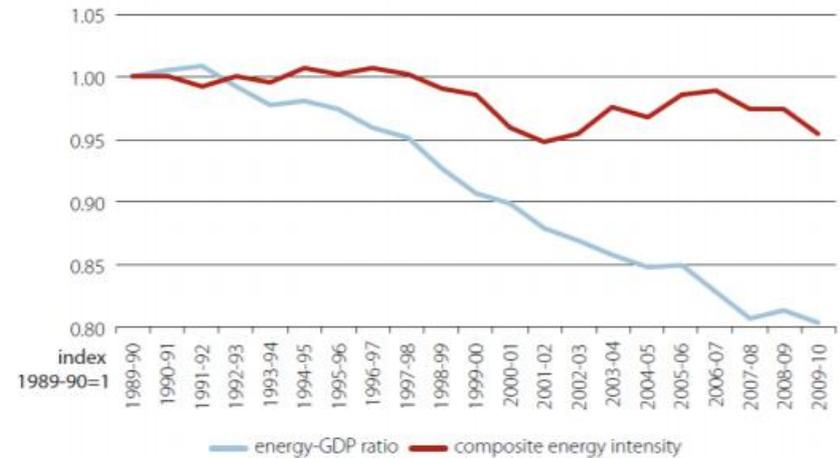


Source: NEMMCO (2006), AEMO (2012d)

NEFR2012 v ESOO2011 Annual Energy (GWh)



Source: Australian Energy Market Operator (2011,2012)



Source: BREE, Economic analysis of end-use energy intensity in Australia Bureau of Resource and Energy Economics, Canberra, May 2012.

# NWAs are applications of DERs...

...that defer or eliminate a traditional investment  
(poles and wires)

Non-Wires Solutions can include:

PV

Storage

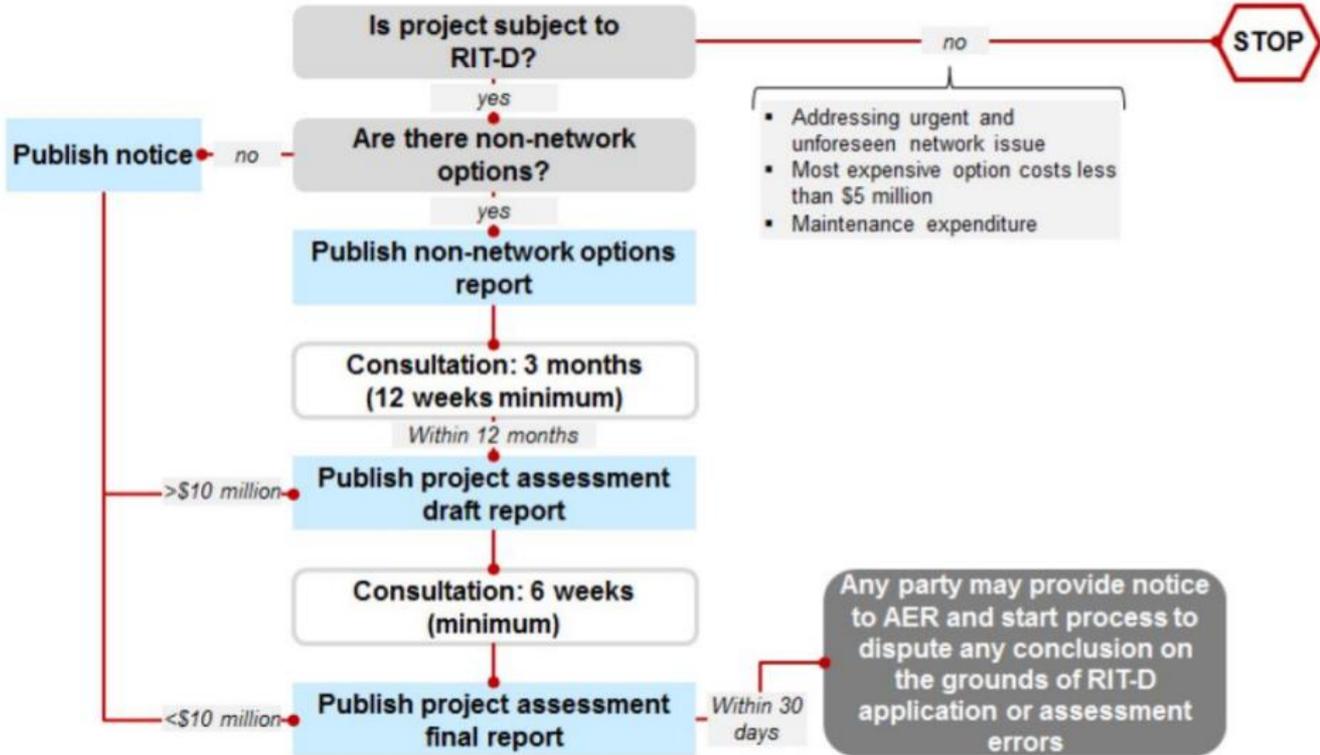
Energy Efficiency

Demand Response

Backup Generation

Modular, scalable NWAs provide flexibility

# RIT-D introduced to encourage efficient investments

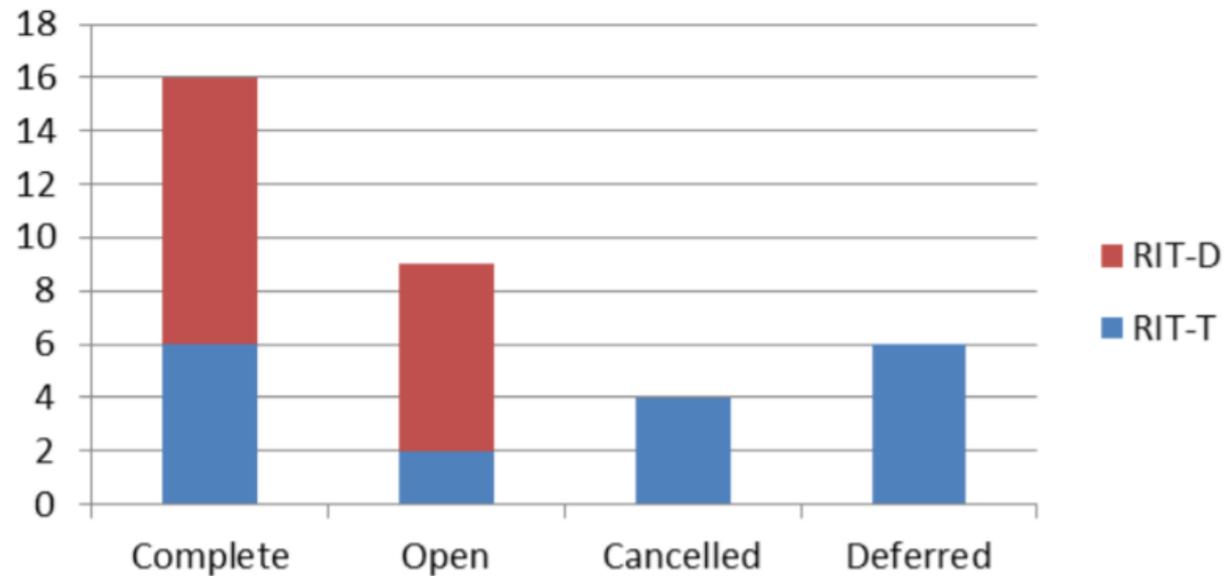


Source: AEMC, Rule determination: National Electricity Amendment (Replacement expenditure planning arrangements) Rule 2017, July 2017, p. 64.

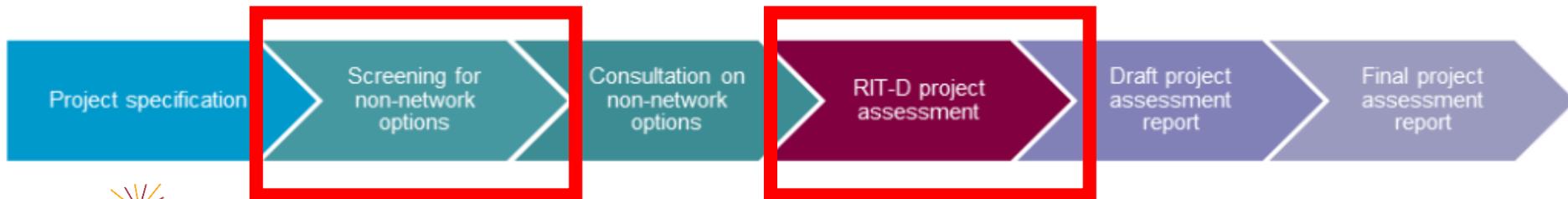
# Limited NWA from RIT-D to date

- 17 applications
- 11 reports
- 1 successful NWA

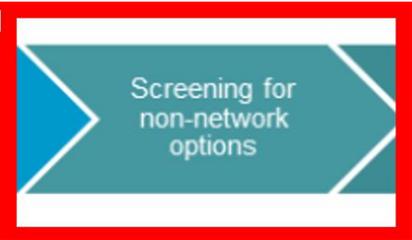
Figure: RIT's commenced to date



RIT-T since 2010, RIT-D since 2013; (AER)



# Restricted eligibility limits RIT-D application



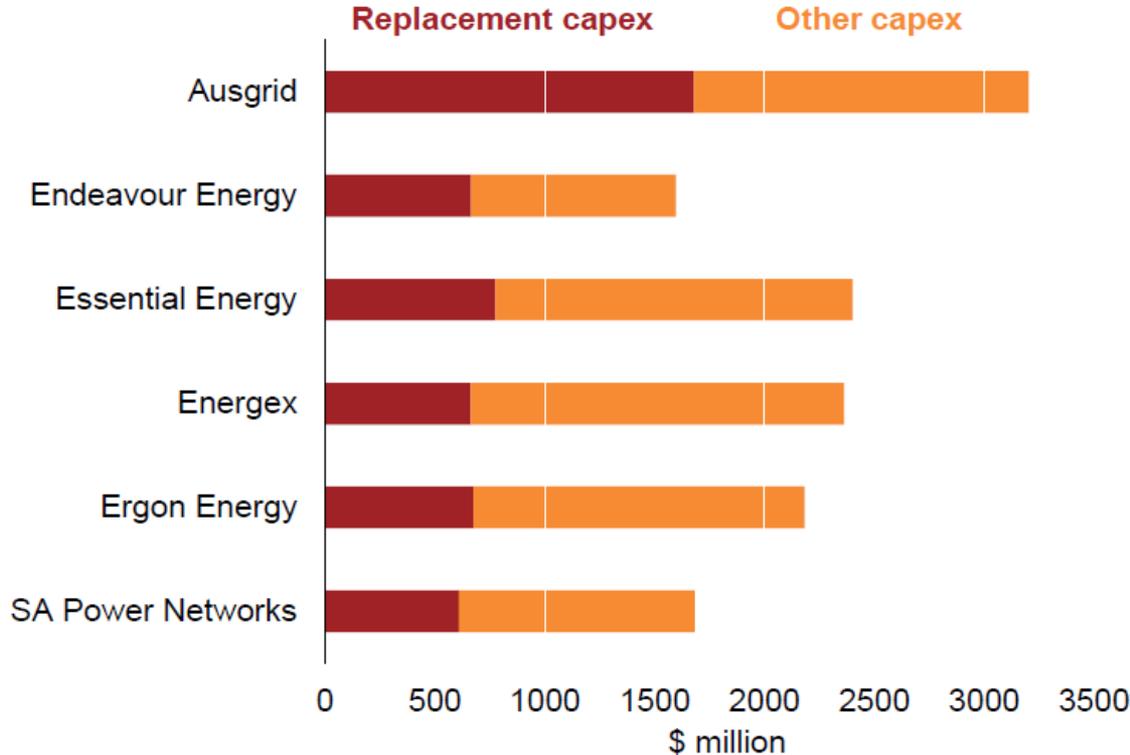
- Cost threshold >AUD\$6m

(Demand Management Incentive Scheme covers projects under \$6m)

- Did not apply to replacement ex

Changed from Dec 2018

Replacement capital expenditure relative to total capital expenditure



Note: The information reflects the final AER decisions relating to Ausgrid, Endeavour and Essential, and the AER's preliminary decisions regarding Energex, Ergon and SA Power Networks.

Source: Grattan analysis of AER (2015a), AER (2015b), AER (2015e), AER (2015c), AER (2015d), AER (2015f).

# Option screening questionable without enforcement

- Must consider all feasible NWA in screening, but no specific enforcement provisions
- Engagement practices are questionable
  - Inconsistent levels of engagement
  - Limited time for providers to assess options

*Network businesses should use their discretion in determining the rigour they apply to their investment decisions*

*- Market Commission*

Rating	Colour Coding
Does not meet the criterion	Red
Does not fully meet the criterion (or uncertain)	Yellow
Clearly meets the criterion	Green

**Source:** Jemena Electricity Networks RIT-D Stage 1: Non-Network Options Screening Report

Options	Assessment against criteria			
	Meets Need	Technical	Commercial	Timing
<b>1.0 Generation and Storage</b>				
1.1 Gas turbine power station	Yellow	Red	Red	Red
1.2a Generation using renewables (Solar)	Red	Red	Red	Red
1.2b Generation using renewables (Wind)	Red	Red	Red	Red
1.3 Dispatchable generation (large customer)	Red	Yellow	Red	Red
1.4 Large customer energy storage	Red	Yellow	Red	Red

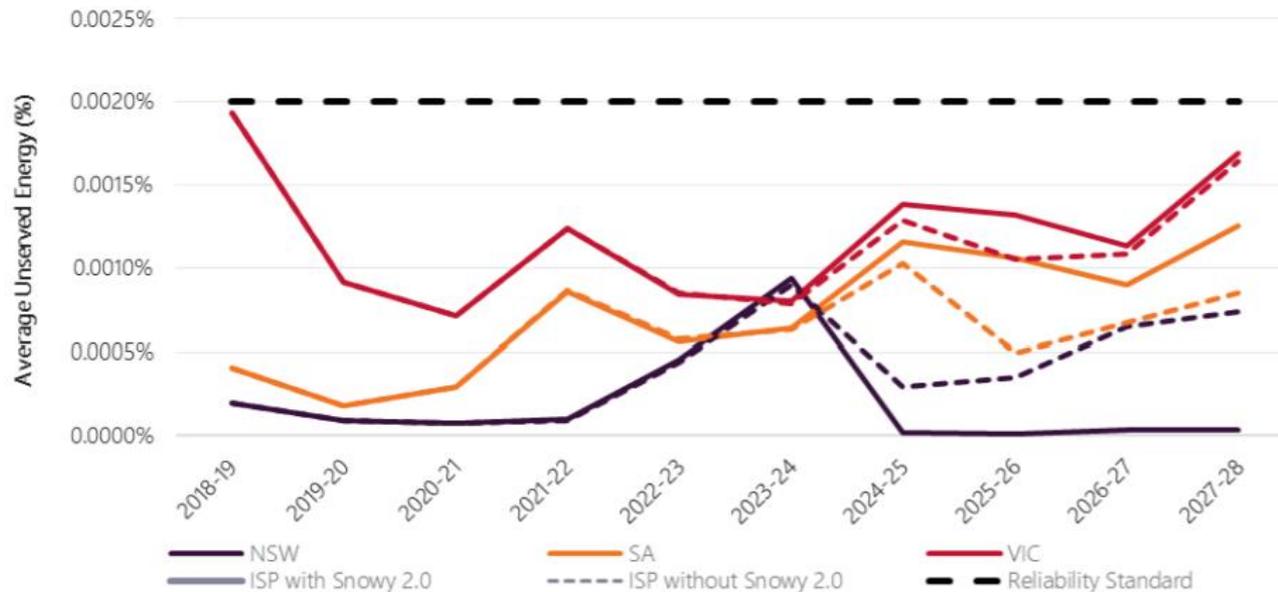


# Treatment of reliability is a key constraint

- Challenges comparing NWA with network investments
  - Results in overbuild/redundancy
- Value of customer reliability
  - Used to sway CBA to favor network soln (review underway)



Figure: Projections of NEM Unserved Energy

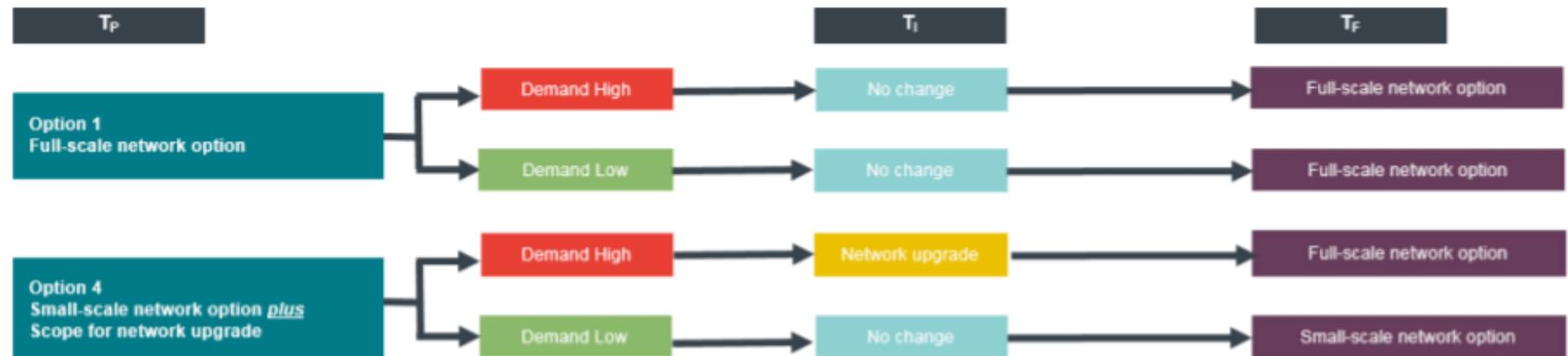


Source: AEMO ESOO 2018

# Option Value

“a benefit that results from retaining flexibility in a context in which certain actions are irreversible (sunk), and new information may arise in the future as to the payoff from taking a certain action.”

Figure: Decision tree analysis proposed to determine option value



Source: AER 2018

# Next steps

- Survey definitions of ‘option value’
- Option value might be realized through credible options that ‘build-in’ the ability to:
  - Expand at minimal cost (e.g. excess capacity)
  - Withdraw or reduce scope (e.g. smaller, scalable investments)