AUSTRALIAN ENERGY REGULATOR

Regulatory landscape for the electricity sector in Australia

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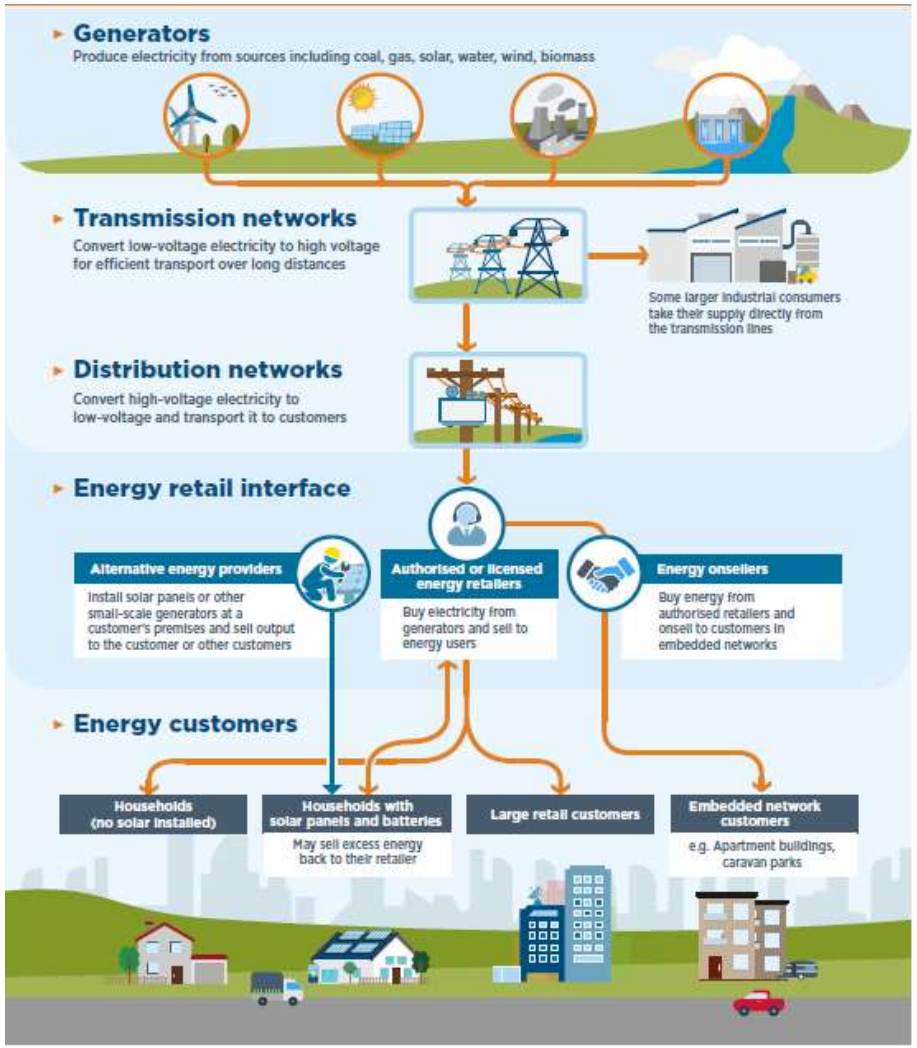
27 November 2019

The electricity supply chain



Break down of electricity bill components in different Australian States

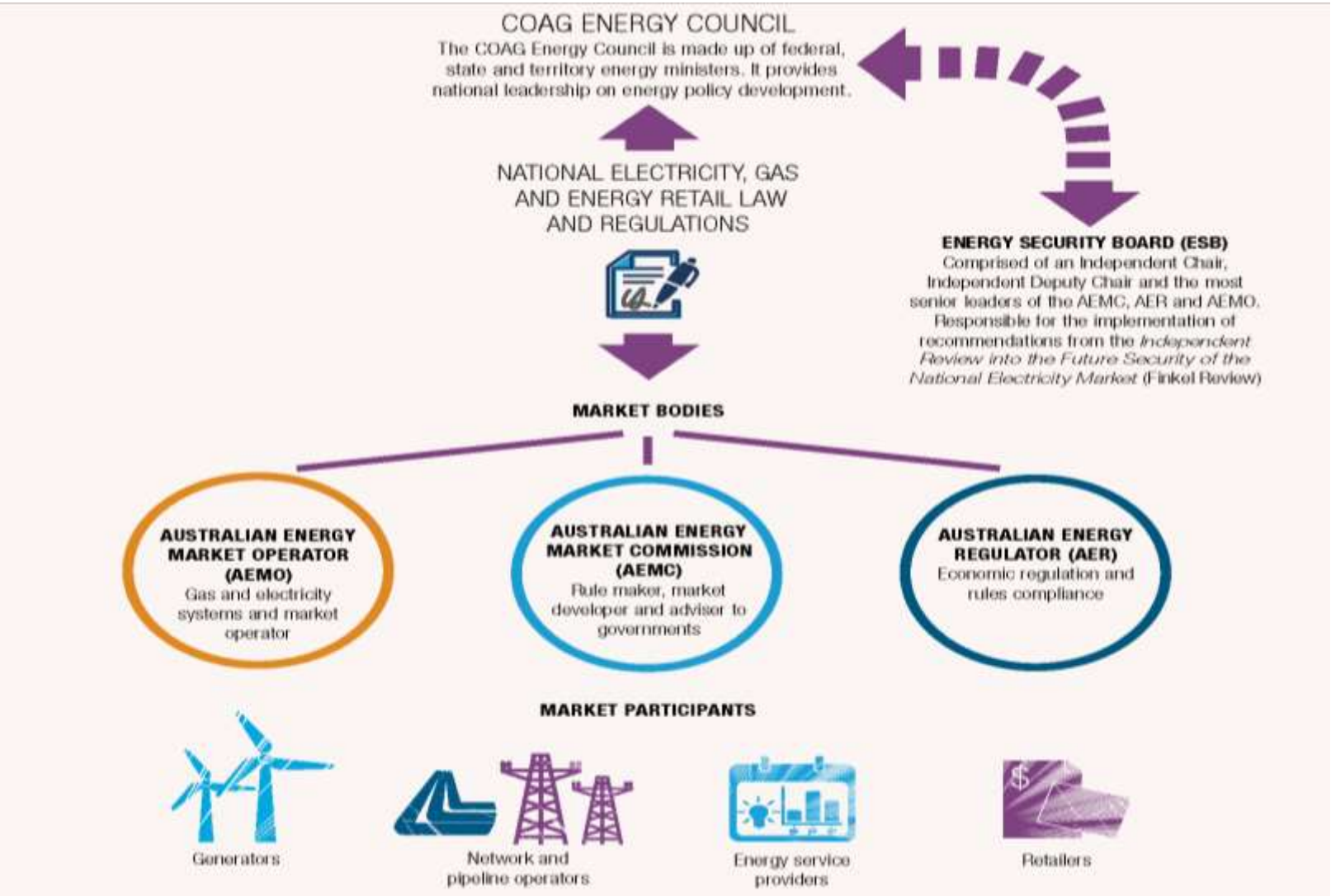
Figure 1.2
Composition of a residential electricity bill

kWh, kilowatt hour.

Note: Data are estimates for 2017–18. Average residential customer prices excluding GST (real $2016–17). Retail costs and margin are combined for the ACT and Tasmania due to data availability.

Source: ACCC, *Restoring electricity affordability and Australia's competitive advantage, Retail Electricity Pricing Inquiry—Final report*, June 2018, p. 8; ACT data from AEMC, *2017 Residential Electricity Price Trends, final report*, December 2017, p. 111.

Australia's energy governance regime



Guided by the National Energy Objectives

The National Electricity Objective:

- to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:
  - price, quality, safety and reliability and security of supply of electricity
  - the reliability, safety and security of the national electricity system.

The National Gas Objective:

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

The National Energy Retail Objective:

- to promote efficient investment in, and efficient operation and use of, energy services for the long term interests of consumers of energy with respect to price, quality, safety, reliability and security of supply of energy.

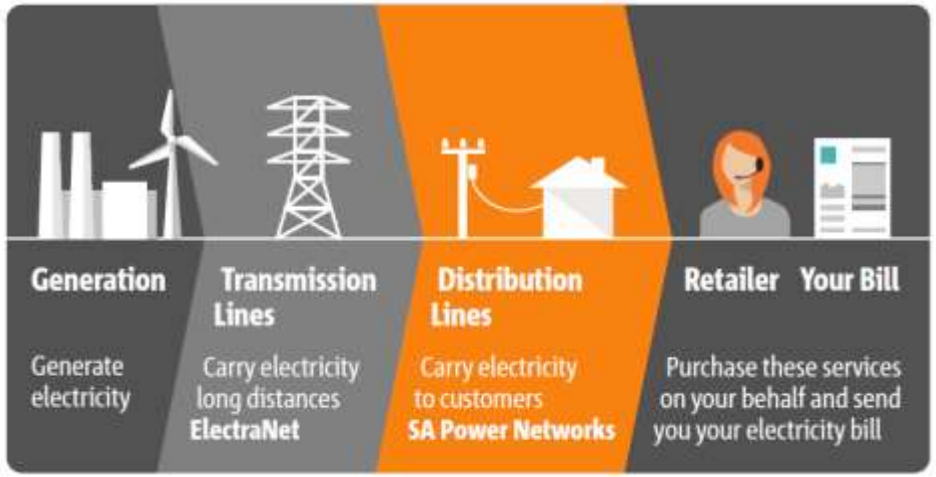
AER strategic objectives

Strategic objectives which drive our annual work program are:

- Drive effective competition where it is feasible
- Provide effective regulation where competition is not feasible
- Equip consumers to participate effectively, and protect those who are unable to safeguard their own interests
- Use our expertise to inform debate about Australia's energy future, the long-term interests of consumer and the regulatory landscape
- Take a long-term perspective while also considering the impact on consumers today

Competition or price regulation?

- Competitive markets where feasible (first best solution)
  - Generation, retail
  - Some network services (e.g. metering, connections,)



- Price regulation were necessary (second best solution)
  - Transmission, distribution
  - Shared network services (natural monopoly)

Natural monopoly

- Very high fixed costs (sunk costs)
- Low variable costs (marginal costs)
- One provider can service the whole market at lowest total costs
  - most efficient solution
- Infrastructure networks typical example

Price vs revenue caps

Price caps

- Revenues fluctuate due to sales (incentive to understate consumption forecasts)
- Incentive to align prices to marginal costs hence keep profits stable (in theory)
- Some complications

Revenue caps

- Revenues guaranteed
- Incentive to sell less to reduce costs and increase profits
- Fairly simple to administer
- Mandated in transmission regulation
- AER adopted in distribution

AER role in networks

AER has two broad energy network regulation roles:

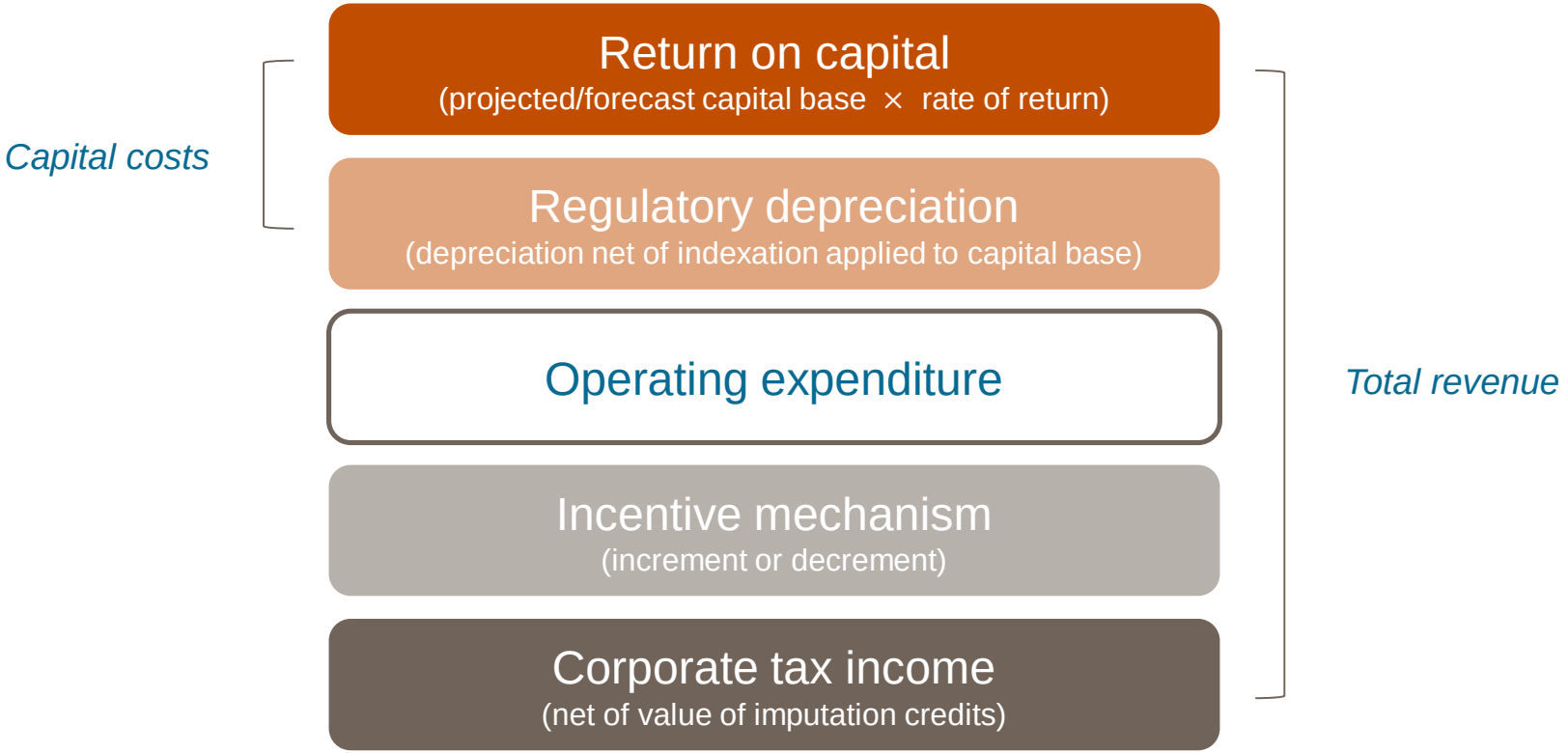
1. Approving the amount of revenue that transmission and distribution network businesses can recover from customers for using networks. This is done through the regulatory determination process

2. Networks pricing and oversight

Regulated: How?

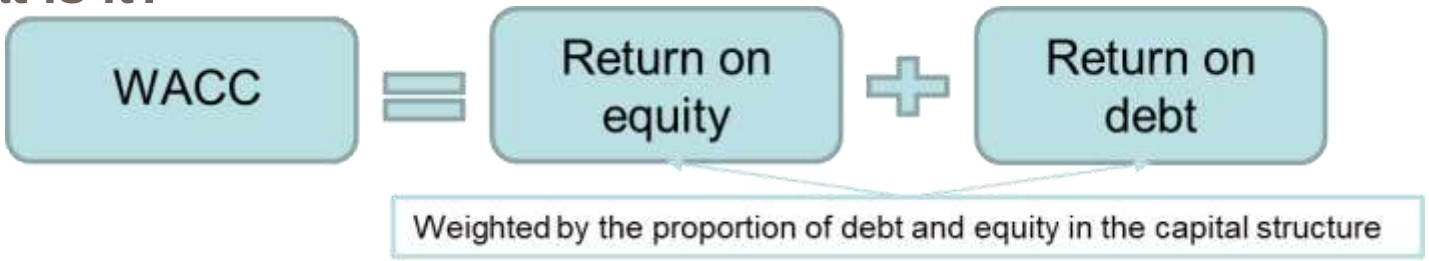
- Rate-of-return regulation
  - Network recovers actual costs plus a margin
  - Incentive to over-build if return set too high
  - No incentive to manage operating costs
- Incentive regulation (Australian approach)
  - CPI-X regulation
  - Prices/revenues “capped” for a period of time
  - Network keeps all or some benefit of cost savings against target
  - Network wears all or some detriment from cost increases against target
  - Efficiency savings shared with customers when prices/revenues reset

The building blocks



Rate of return (WACC)

What is it?



- Gamma (the value of imputation credits) affects the return on equity and the tax building block

How do we estimate it?

- Return on debt – trailing average approach
- Return on equity – foundation model approach (CAPM + cross checks)
- Gamma – range of evidence

What's our key objective?

- Allowed rate of return objective
- NPV = 0 investment condition

$$NPV = -cost + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} \dots\dots\dots\dots + \frac{CF_n}{(1+k)^n}$$

Opex

What is it?

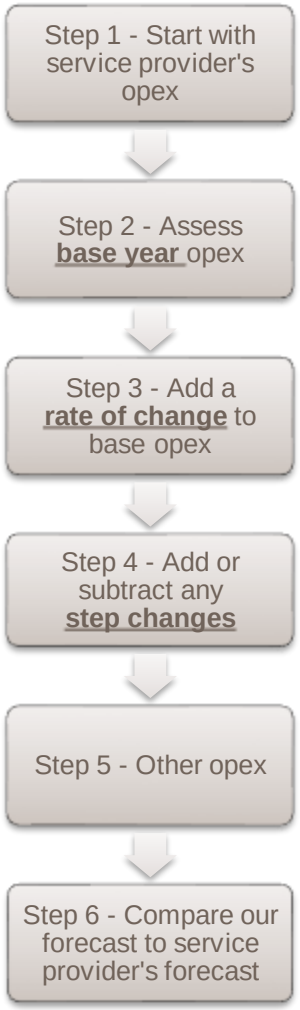
- Non-capital expenses associated with running the network (e.g. labour, materials, services)

How do we estimate it?

- Base-step-trend approach
- Base opex:
  - greater reliance on top-down benchmarking to assess efficiency
  - Trend forward historical costs if efficient, use benchmarked opex estimate if inefficient

What's our key objective?

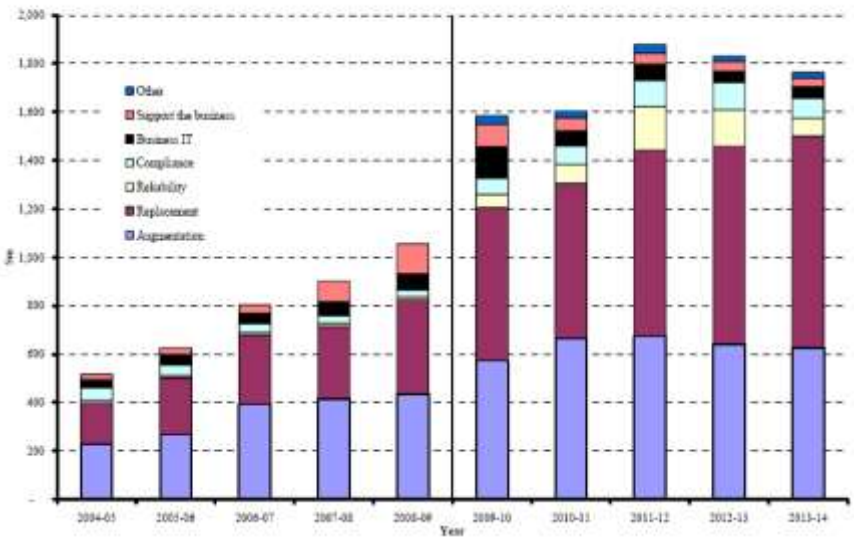
- Total opex forecast must reflect the opex criteria – efficient, prudent and realistic costs of meeting objectives:
  - Meeting expected demand
  - complying with regulatory obligations
  - maintaining the quality, reliability, security and safety of the services and system.



Capex

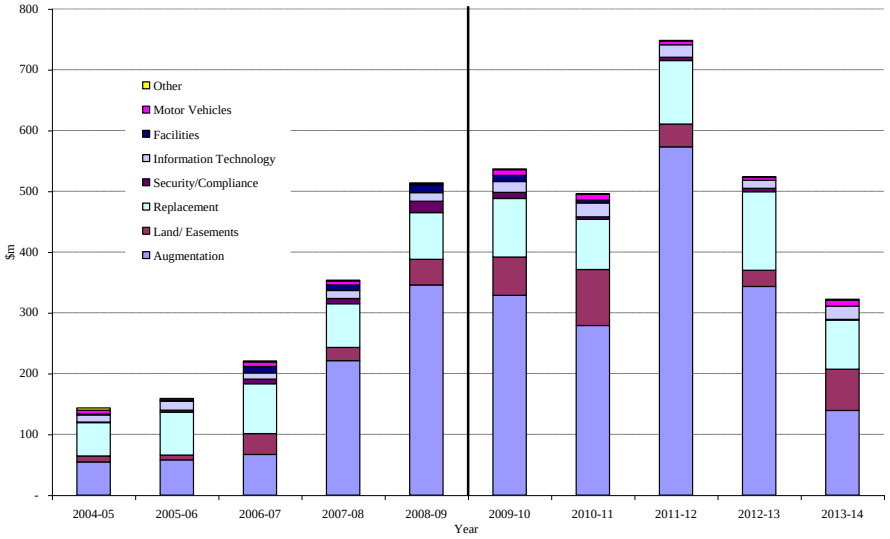
Distribution

- Somewhat stable- many diverse assets



Transmission

- Lumpy- dominated by large projects



Capex

Network capex

- Augmentation expenditure (augex)
  - Driver: demand forecast
- Replacement expenditure (repex)
  - Driver: asset condition / age
- Connections expenditure
  - Driver: customer connections

Non-network capex (IT, vehicles, buildings)

The incentive arrangements

EBSS	• **Efficiency benefit sharing scheme** – provides for a fair sharing between network businesses and network users of opex efficiency gains and losses made during a regulatory control period
CESS	• **Capital expenditure sharing scheme** – allow for the benefits/costs of capex underspends/overspends to be shared between network businesses and their customers
DMIS	• **Demand management incentive scheme** – provide incentives for network businesses to implement efficient non-network alternatives and manage demand
STPIS	• **Service target performance incentive scheme** – provide incentives for network businesses to maintain and improve service performance

Benefit sharing scheme for opex

- Under competition, businesses seek efficiency gains to improve profits
- In regulatory setting:
  - opex allowance is reset every five years (efficiency gains are “clawed back”)
- Therefore, incentives to:
  - pursue efficiencies weaken as period progresses; and
  - shift expenditures around to establish an increasing trend into the next period
- Benefit sharing mechanism designed to ensure constant incentive to reduce opex in each year

Electricity Network revenues

A key factor in rising electricity prices in the NEM has been electricity network prices.

What have been the causes?

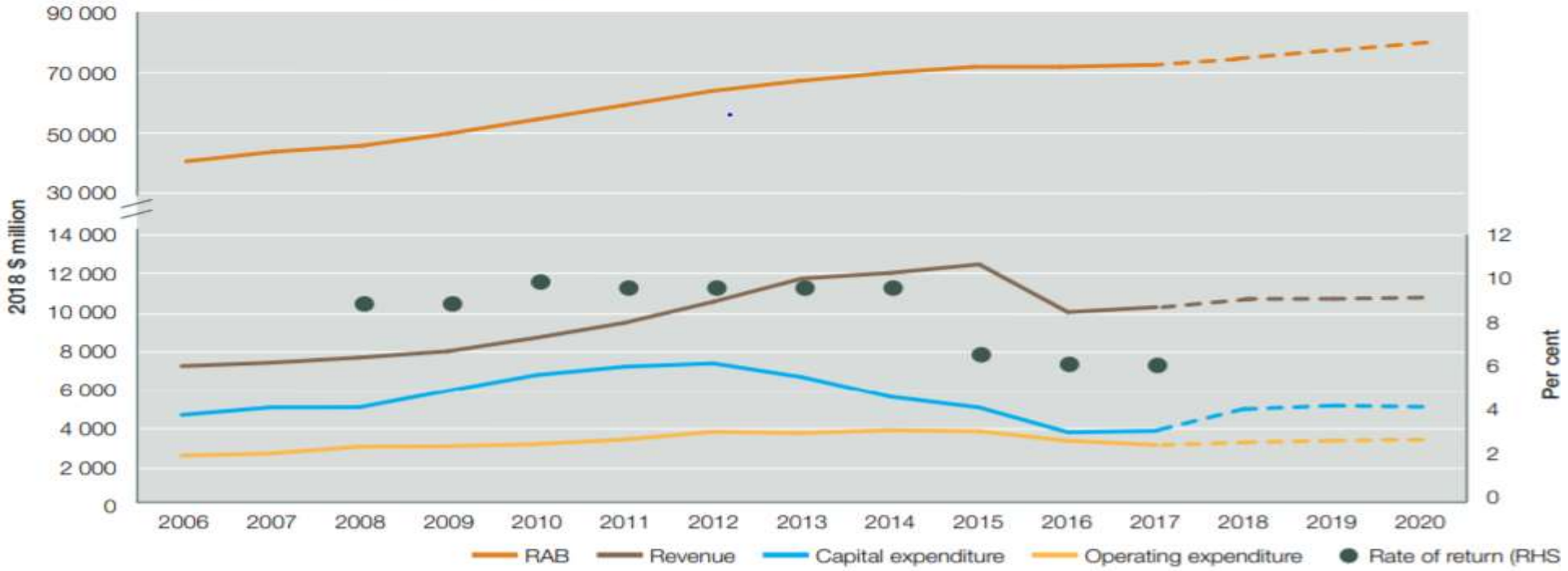
- Poorly designed regulatory appeals frameworks
- Too much prescription on the regulator
- Network reliability standards imposed by State Governments

Figure 3.9
Electricity network revenues

Note: Actual outcomes, CPI adjusted to June 2018 dollars. Assumptions set out in notes to figures 3.7 and 3.8.
Source: Economic benchmarking RIN responses, AER regulatory decisions and regulatory proposals from businesses.

The AER is overseeing decreases in network revenues

Figure 8
Electricity distribution revenues and key drivers

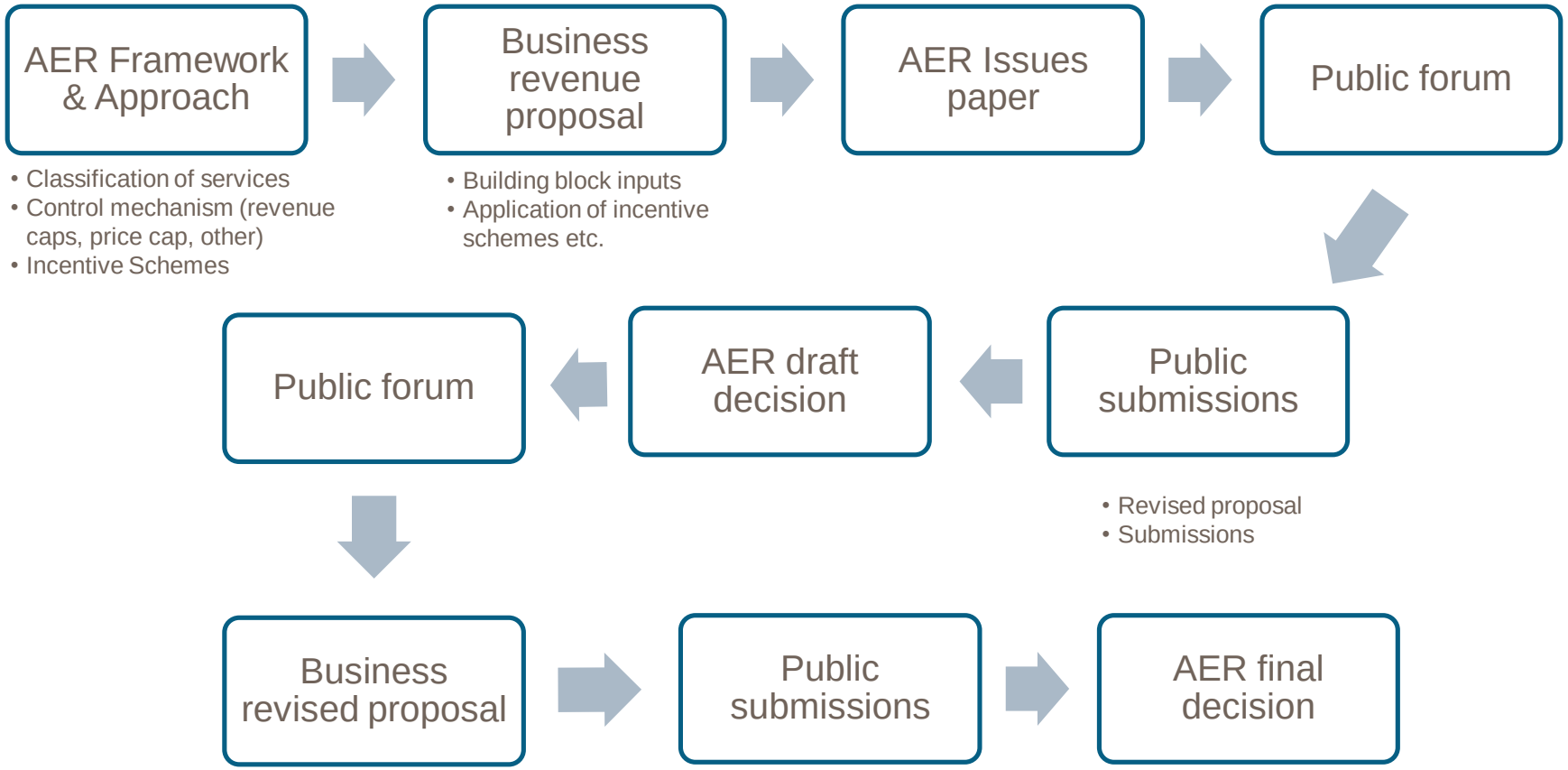


RAB, regulatory asset base; WACC, weighted average cost of capital.

Note: Revenue, capital expenditure, operating expenditure and RAB data are actual outcomes to 2017, and forecasts for 2018–20. RAB is actual closing data at end of relevant year. Data is shown for the relevant regulatory year on an end of year basis. The Victorian networks report on a calendar year basis. All other networks report on a financial year basis. All data is CPI adjusted to June 2018 dollars. Rates of return (WACC) are weighted average cost of capital forecasts ir AER revenue decision and Australian Competition Tribunal decisions.

Source: AER estimates derived from Economic benchmarking regulatory information notices, AER revenue determinations, Australian Competition Tribunal decisions and AER modelling.

The AER regulatory process

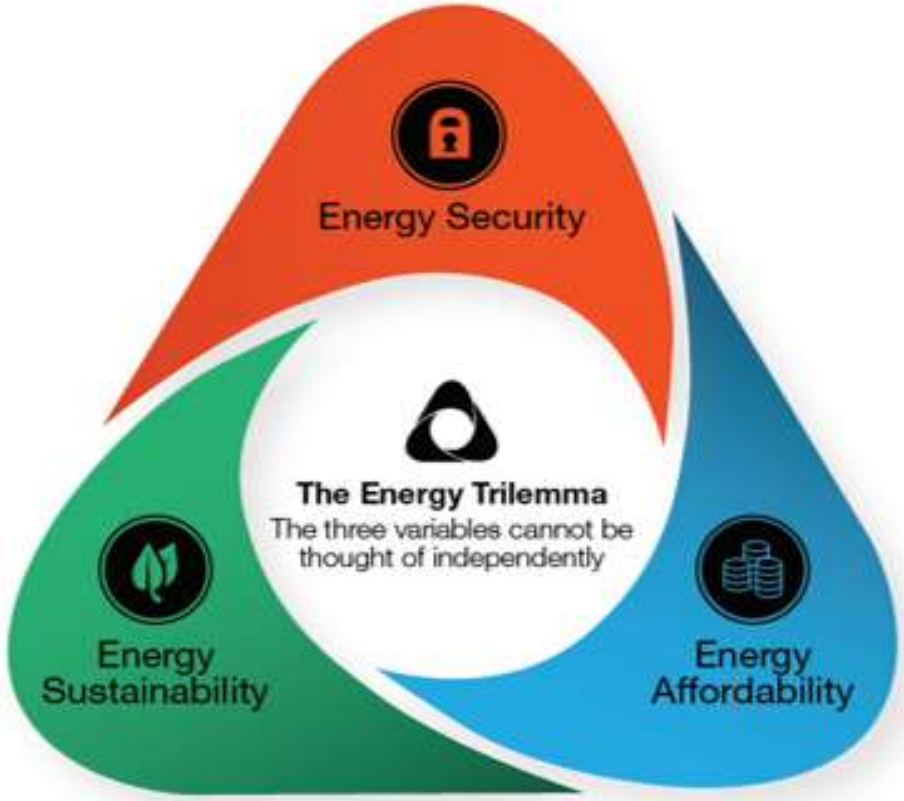


The Australian energy market in transition

The Australian energy sector is undergoing a massive transformation….

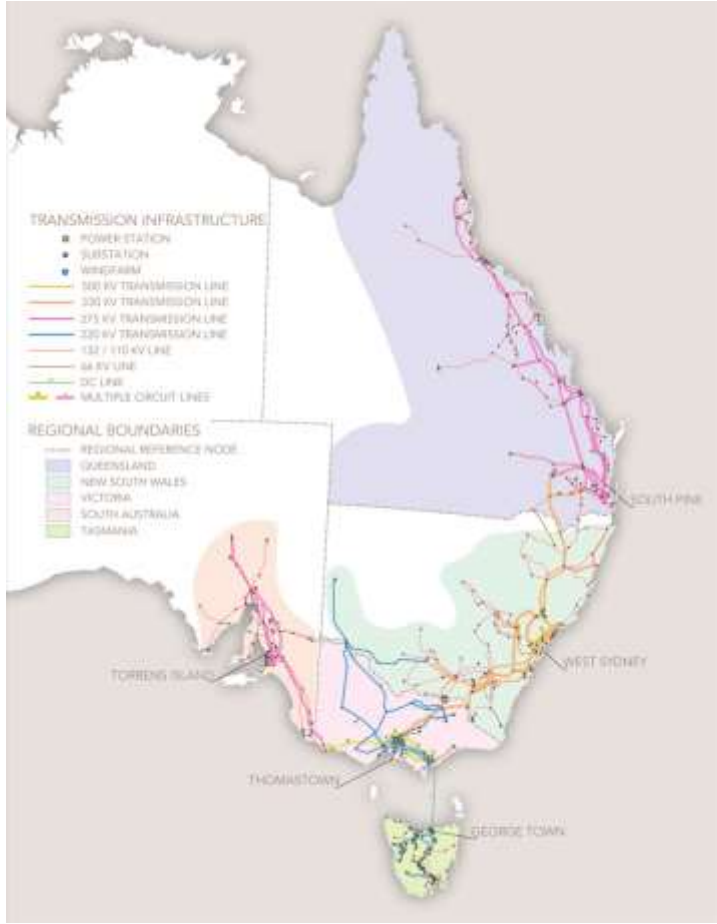
- Australian energy sector undergoing significant change and transformation
  - Driven by technology change, significant growth in renewable generation – originally through subsidies, but becoming low cost market driven
  - Climate change policy – no carbon price or emission trading scheme in Australia – concerns about investment uncertainty for generation
  - Increasing consumer engagement – high take up of solar PV generation by households, reliance on electricity increasing – electrification of the economy
  - An ageing generation fleet – old baseload coal fired generation facilities are closing down
  - Rising electricity prices
  - Government intervention to invest in new generation
  - Changing Australian gas market and high gas prices
- AER has a key role in monitoring the performance of the wholesale and retail markets, and publishes an annual “State of the Energy Market Report”.

The energy policy trilemma…



Source of diagram - ARUP

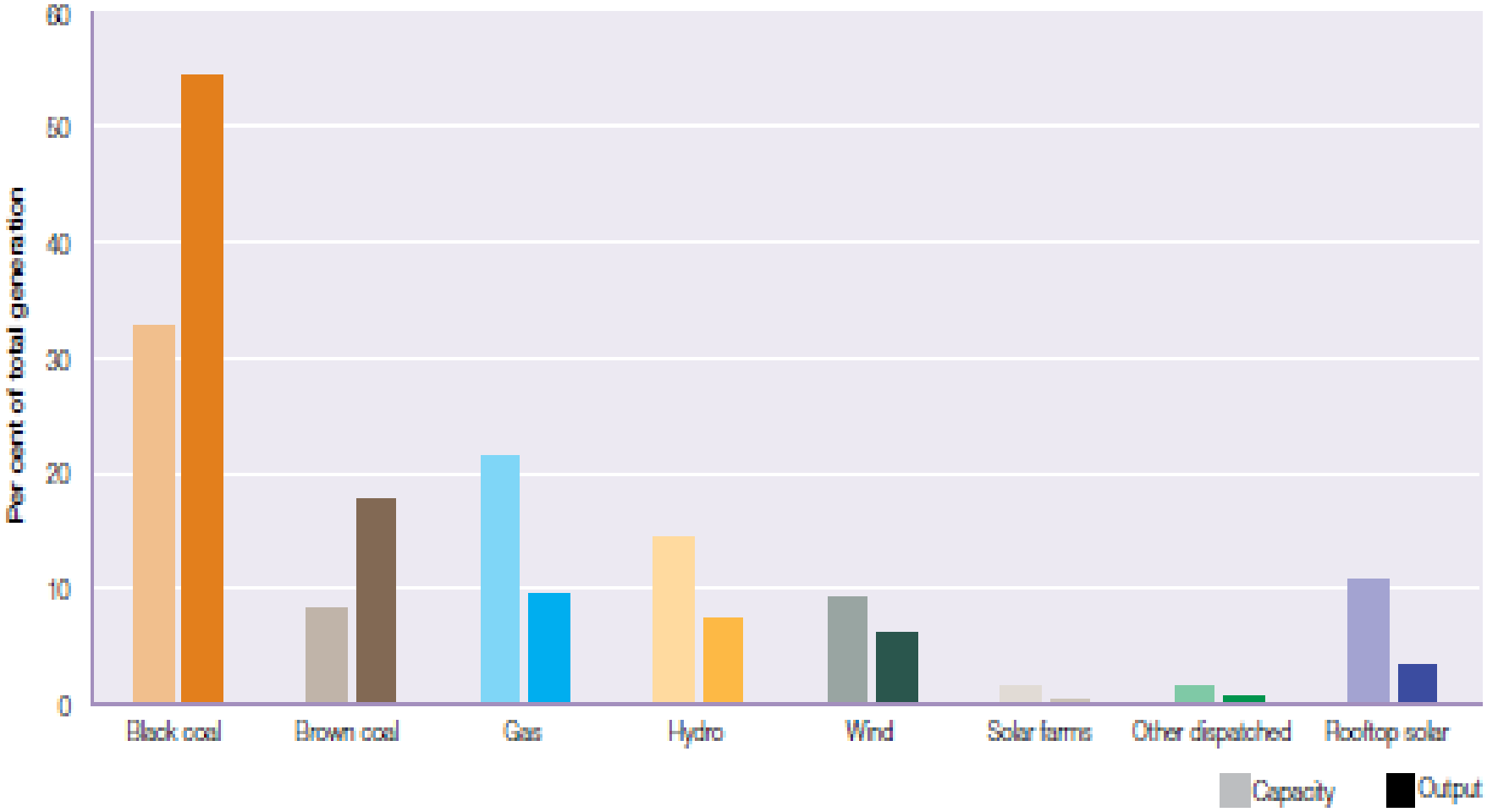
The National Electricity Market ("the NEM")



- The longest AC grid in the world.
- Five regions with limited interconnection
- Energy only market
- Gross pool
- Real time
- Central dispatched
- Marginal pricing
- High spot price risk
  - $14 500/MWh cap
  - -$1000/MWh floor
- Financial markets to hedge risk
- No market power mitigation

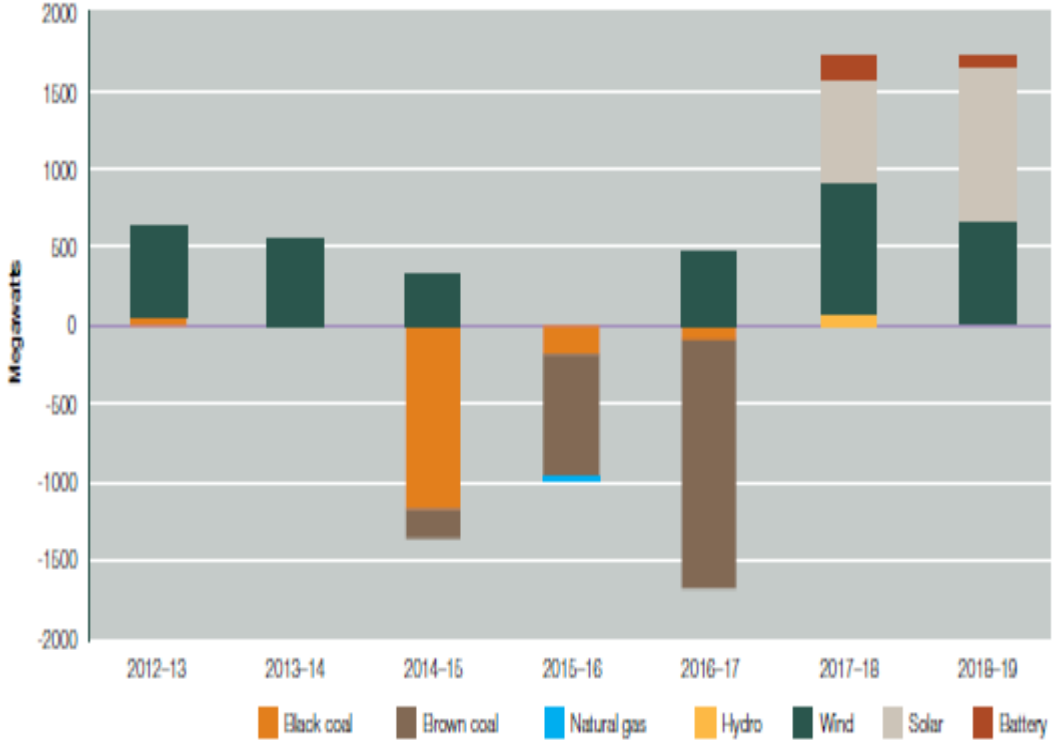
Source: Australian Energy Market Commission

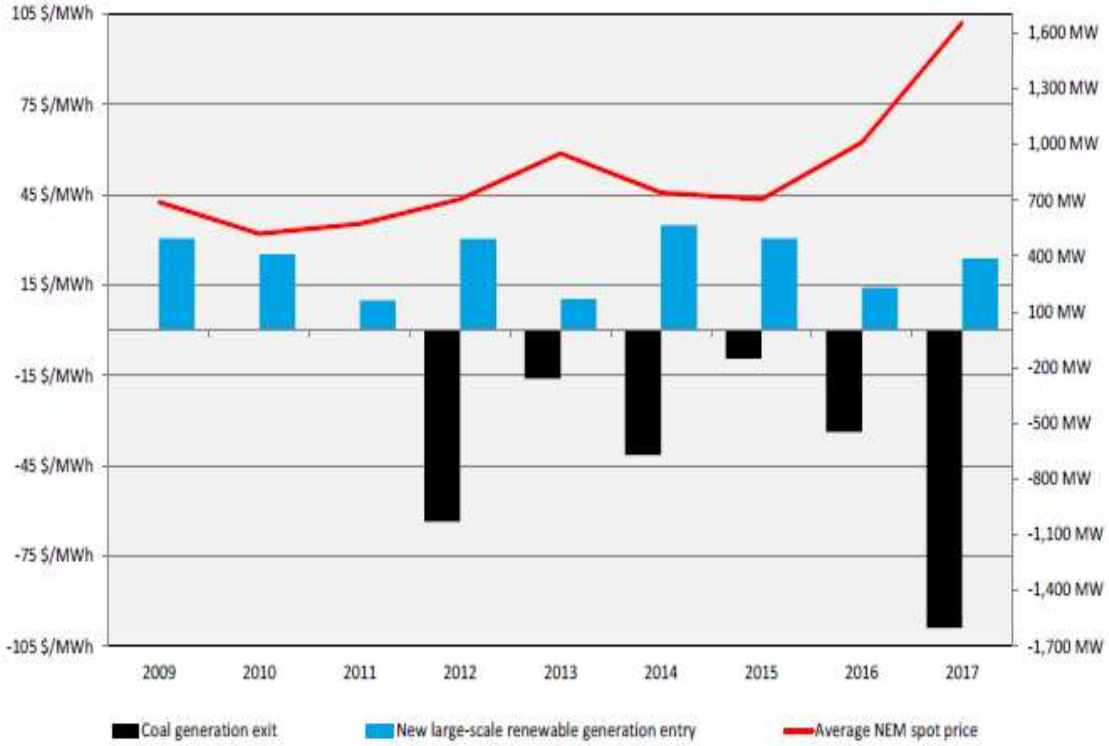
Generation in the NEM by fuel source



Changing generation mix in the NEM

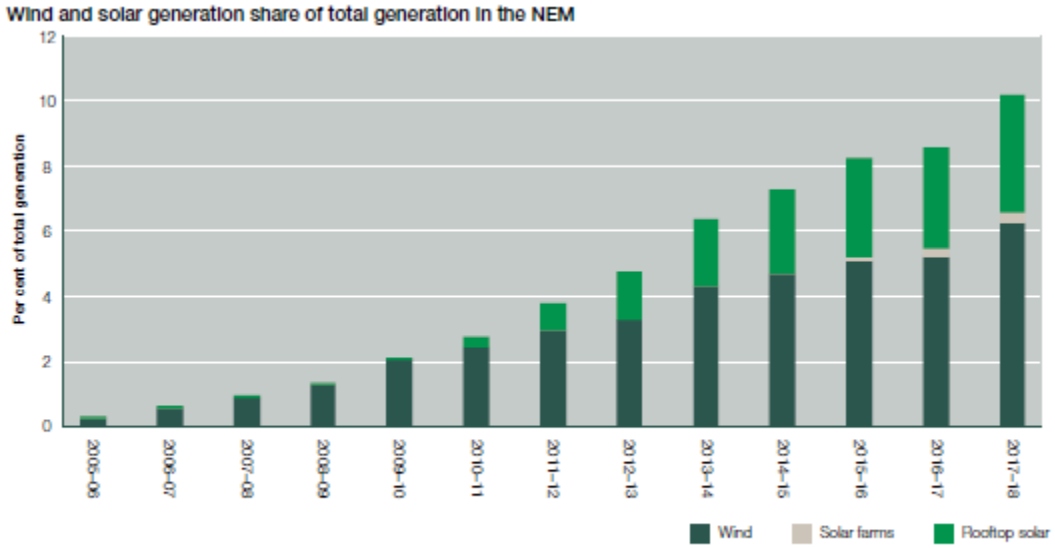
- Traditional coal baseload generation being replaced by renewable generation (wind and solar)
- Exit of large lumpy baseload generation has increased prices – flexible generation becoming more important
- New generation projects are low cost intermittent renewable plant – no new investment in “dispatchable” generation that responds to demand - Investors in flexible generation raise concerns that it is difficult to invest without a clear emissions policy or carbon price



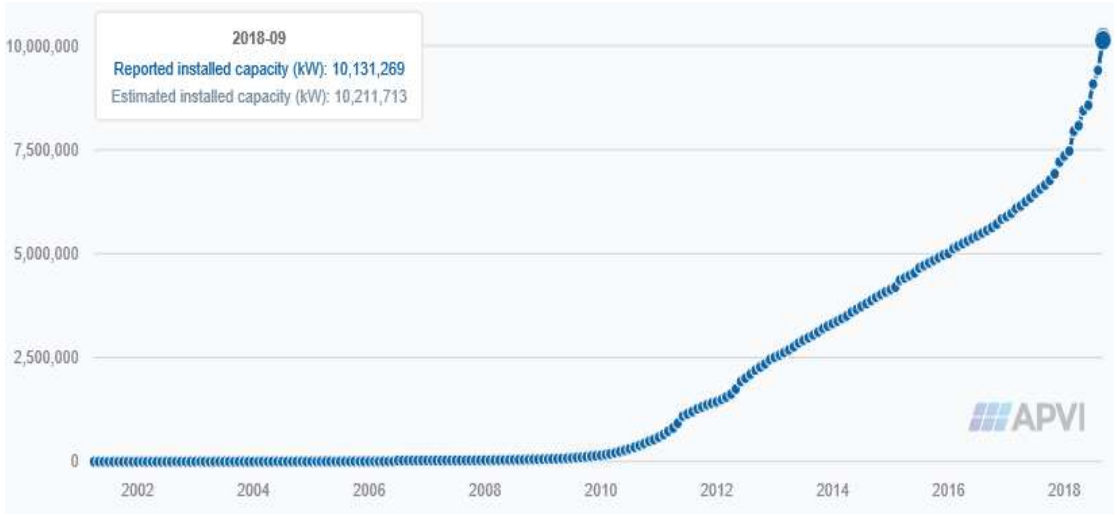


Electricity – the generation mix is changing

- Around 2 million Australian energy customers have installed roof top solar PV
- Approximately 8.1 GW as at 30 June 2019 – equivalent to 4*2000MW large coal stations
- Growth in large scale renewables also significant – driven by subsidy schemes (the RET)



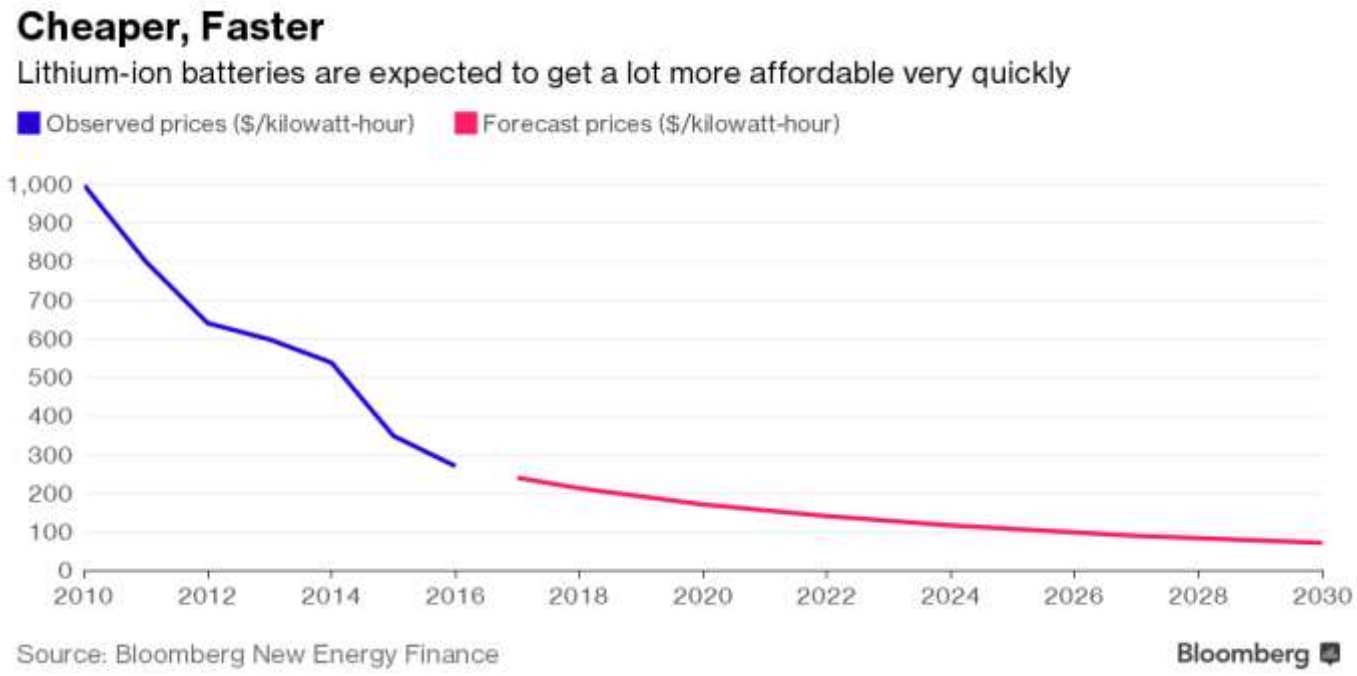
Australian large scale renewables investment



Source: Australian Photovoltaic Institute

Australian solar PV installations since April 2001

Battery Storage getting cheaper too – but penetration is still low in Australia



What might the future look like – towards 2040…

- Greater reliance on renewables, supported by dispatchable generation (gas fired peakers, battery storage, hydro electric power)
- Generation to become more variable and weather dependent – important that renewables are supported by dispatchable generation

Figure 9 Forecast NEM generation capacity in the Neutral case

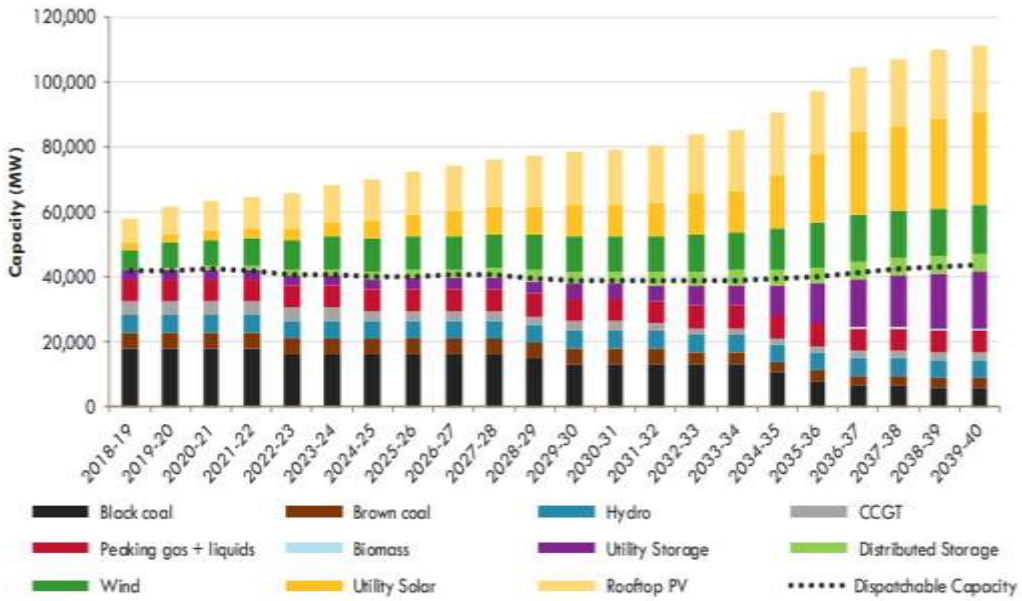
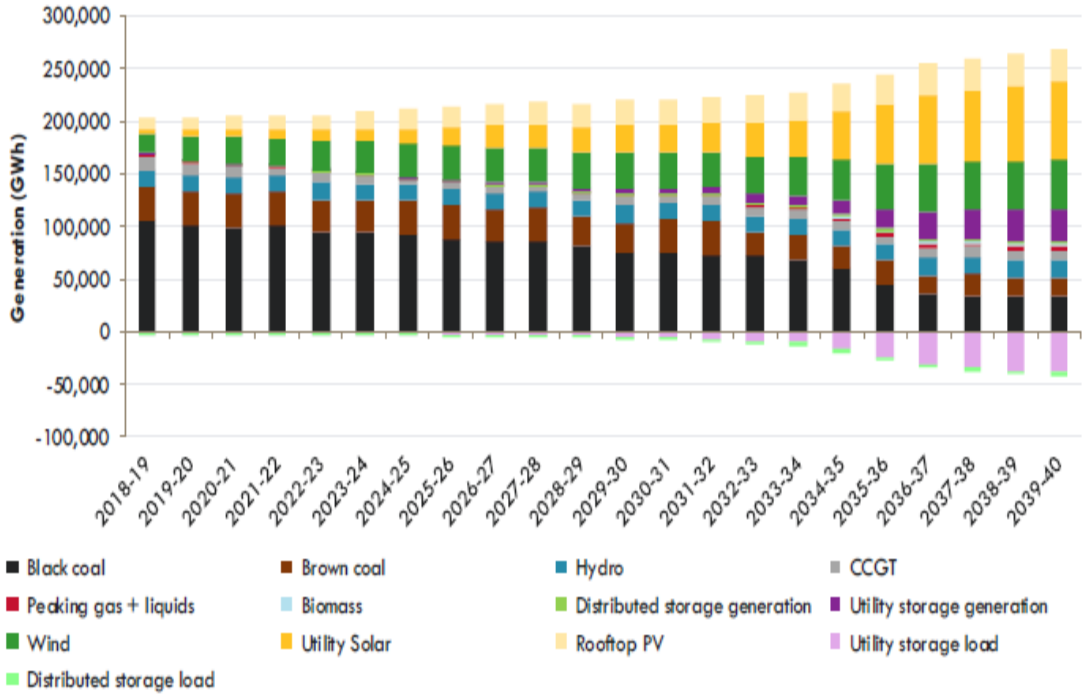


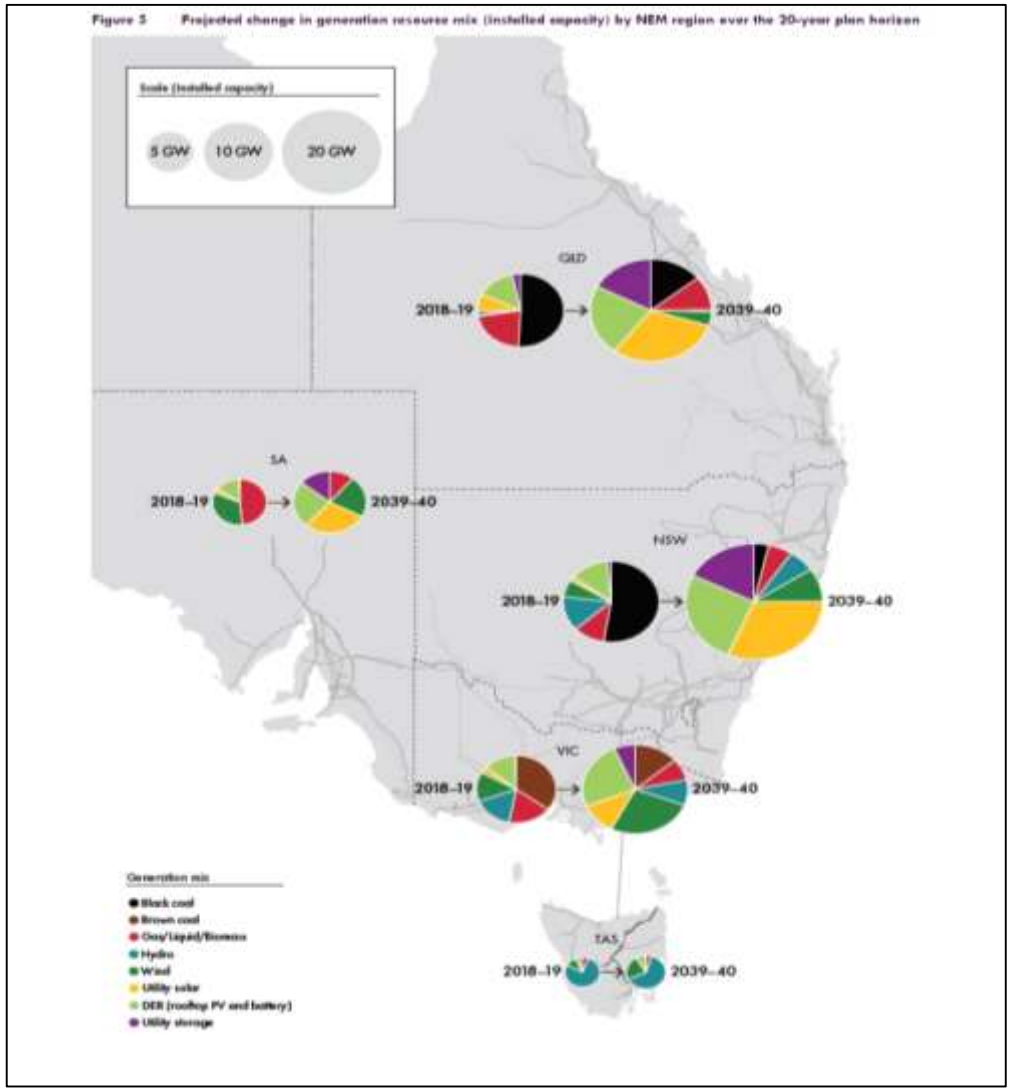
Figure 13 Forecast NEM energy generation in the Neutral scenario

Source: AEMO, ISP



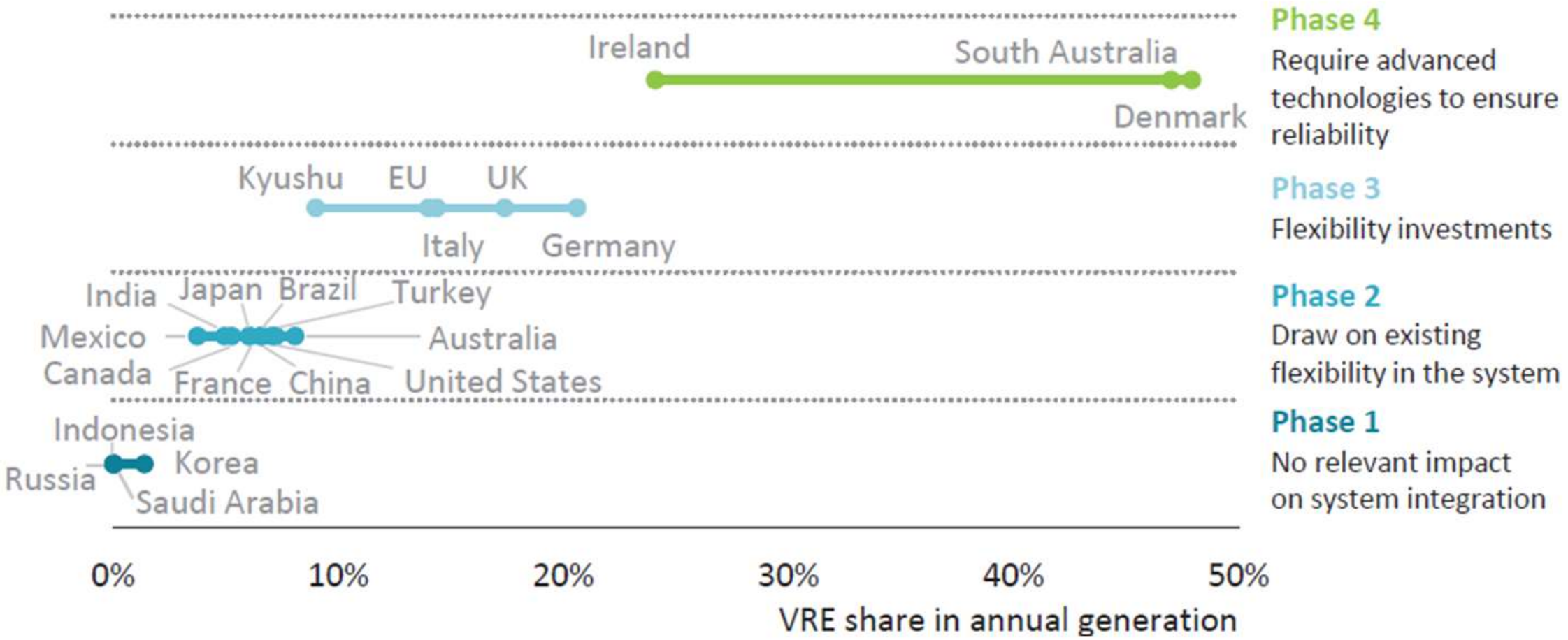
The changing energy mix

- A more diverse mix brings challenges
- Existing coal fired generation – traditionally cheapest source of generation – lower utilisation rates but important for orderly transition
- Conventional generation needs to be flexible to back up variable renewables - ***dispatchability***
- Transmission interconnectors likely to become more important – linking NEM regions
- Ability of existing conventional generators to operate flexibly will influence take up of storage
- Battery storage for demand management at peak and reduced grid consumption when paired with household solar PV.



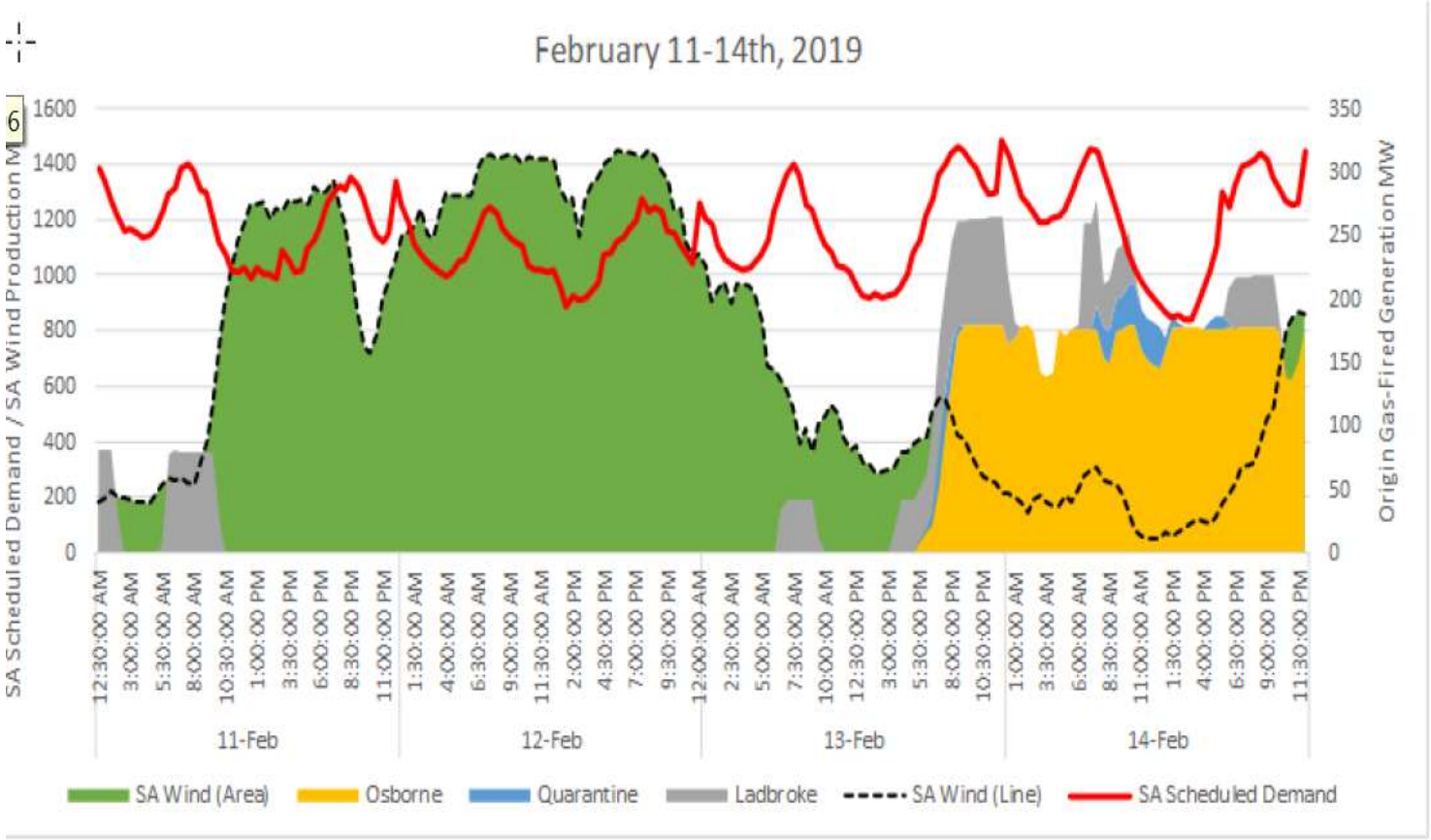
Source: AEMO – ISP 2018

South Australia – significant renewable take up



International Energy Agency document: *Annual share of variable renewables generation and related integration phases in selected countries/regions, 2018.*

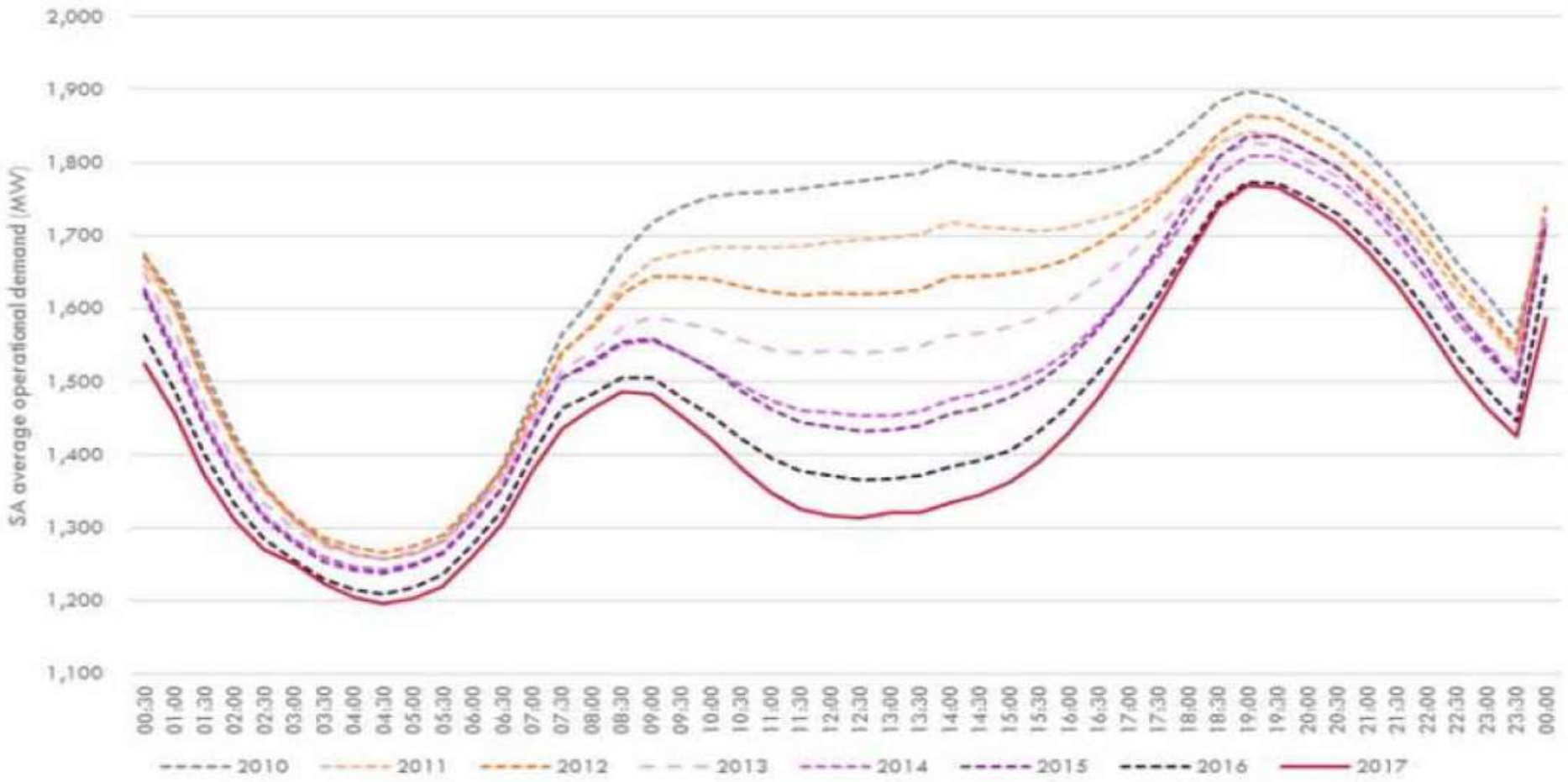
South Australia – February 2019 – highlighting the variable nature of renewables – importance of flexible generation



Source: *Origin Energy ADGO presentation, March 2019*

Source: AEMO market data

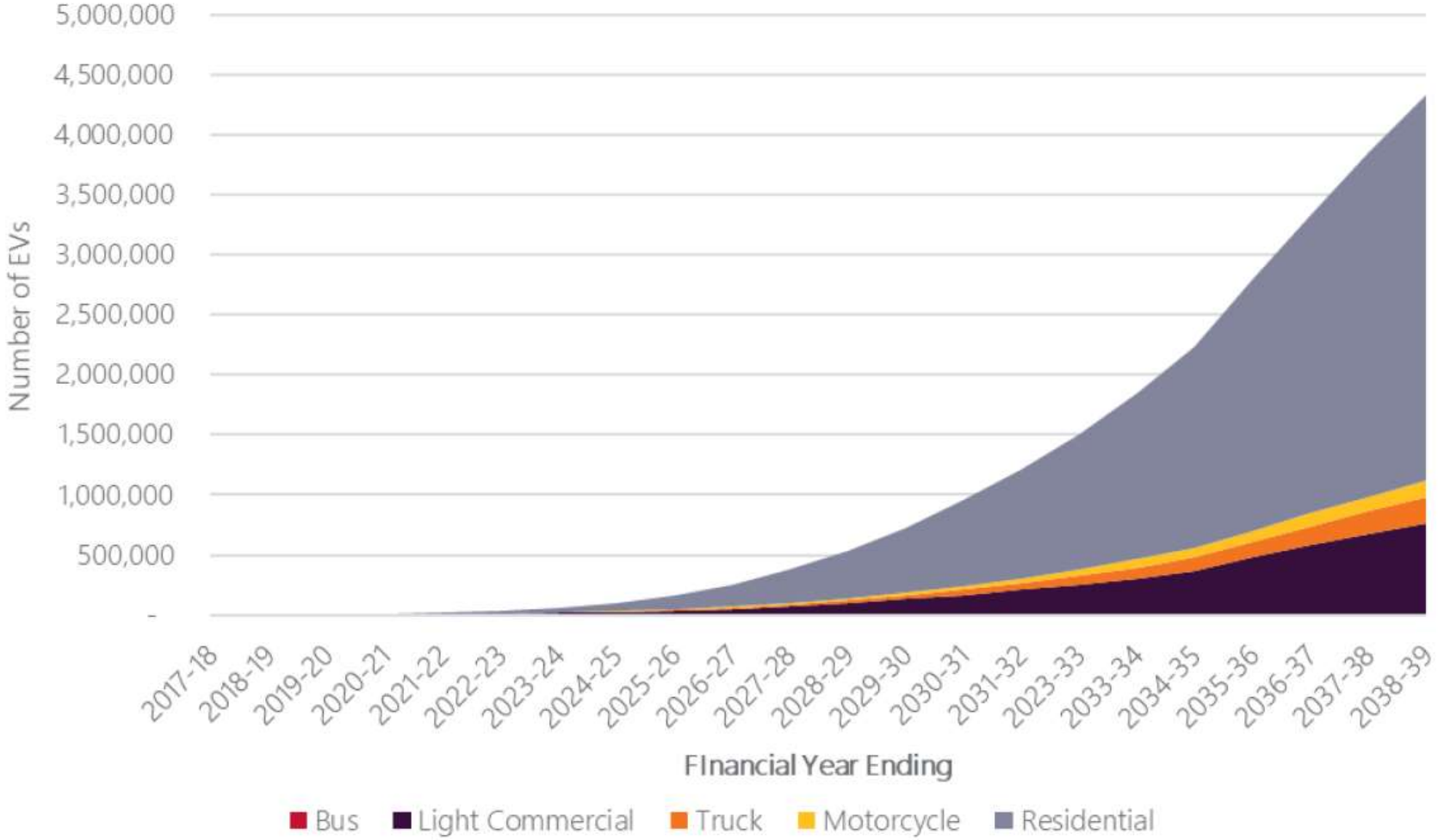
The impact of growing roof top solar PV – a large "hollowing out" of demand during the day – the "duck curve"



Source: AEMO, *AEMO observations: Operational and market challenges to reliability and security in the NEM*, March 2018, p. 7
Note: This figure shows average operational demand in South Australia. These trends are emerging in other NEM regions

Electrification of the transport sector – forecast EV take up

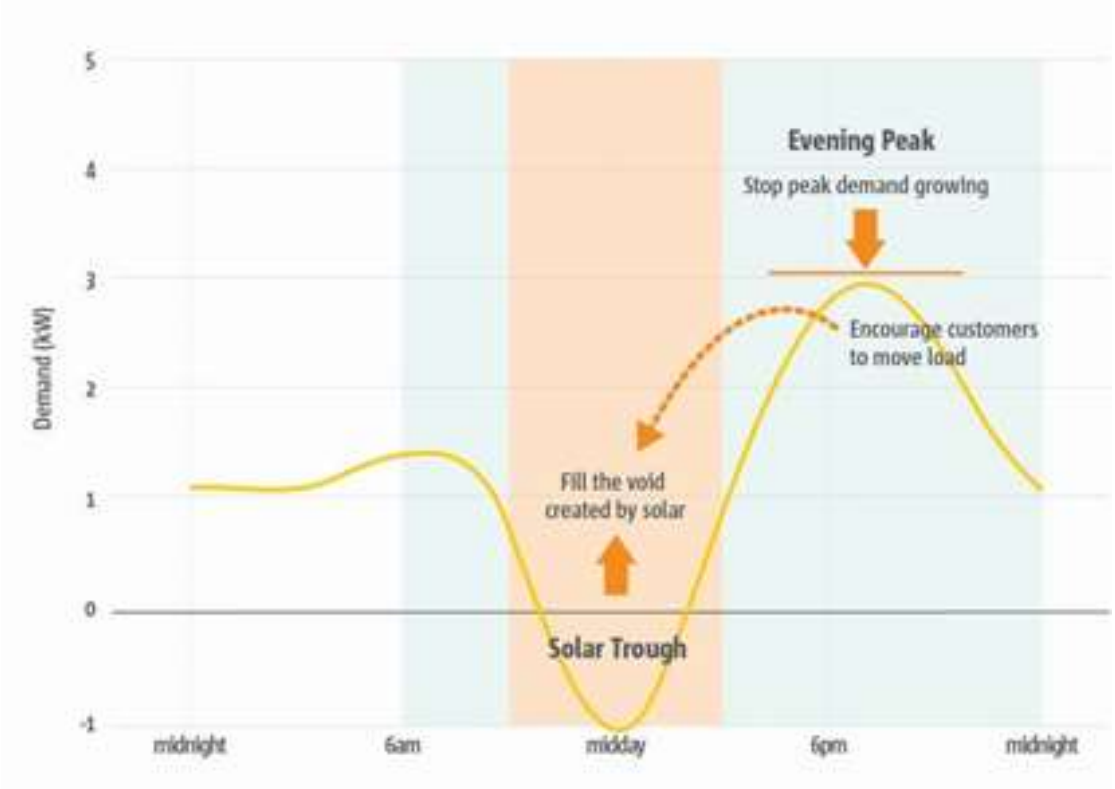
Figure 9 NEM forecast number of EVs by vehicle type, Central scenario, 2017-18 to 2038-39



- EV take up currently slow
- Absence of policy initiatives to drive take up
- Lack of charging infrastructure
- Higher relative costs
- Less than 1% of car sales are Evs
- But significant growth forecast
- Will have significant impacts on electricity networks and electricity demand

Electricity Network Tariff Reform

- Electricity network tariffs in the NEM are volume based – there is no incentive to consume or generate (from solar PV) at times when this could benefit the system - the “duck curve” effect
- Peak/demand/time of use tariffs should encourage the rational use of storage - resulting in reductions to peak demand and flatter load curves – driving efficient take up of solar PV and batteries/new retail business models
- Tariff reform particularly important if Electric Vehicle take up increases creating pressure on networks



Tariff design will be critical to driving efficient behaviour

Recapping the purpose of network tariff reform

- Network tariff reform can provide cost reflective tariffs that encourage more efficient network utilisation
- As the penetration of distributed energy resources increases, efficient network pricing becomes more important
- Retailers are the focus of network tariffs - retailers don’t have to pass them through but can chose to respond in different ways

Tariff Structure Statements

First round

Pre 2019

- Assignment to cost reflective network tariffs largely initially relied on opt-in approaches
- Varied approach to transition of network tariff designs

Second round

2019-25

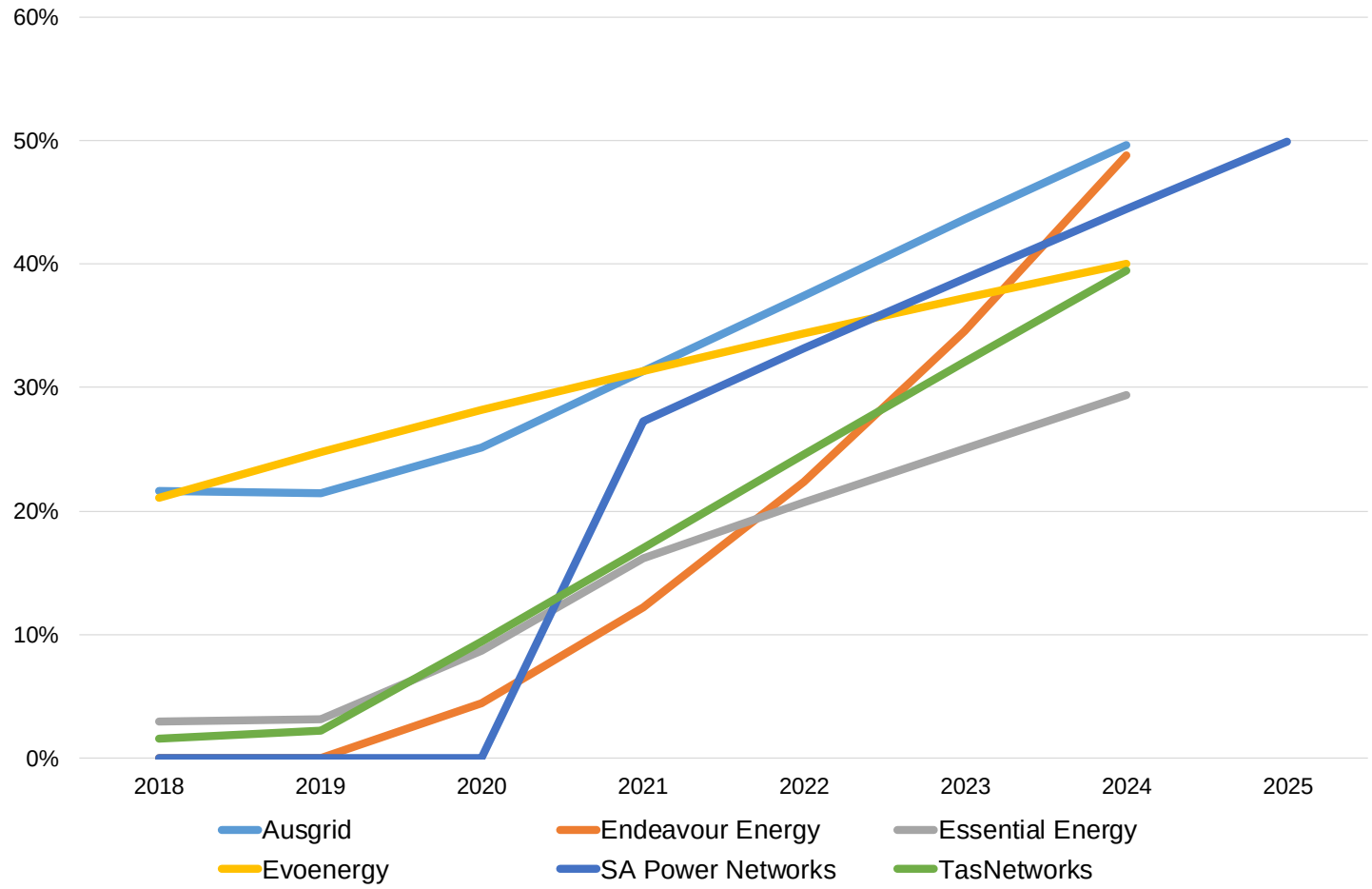
- Shift to opt-out tariff assignment policies adopted
- Network tariff designs progress to time of use energy and demand tariffs

Second round outcomes

	Default tariff structure	12 month data sampling	Opt–out to flat tariff?	Opt–out to cost reflective
Ausgrid	Fixed charge + seasonal demand + time of use energy	No, but existing customers with replacement meter placed on a transitional demand tariff for 12 months.	No - flat tariff has been closed.	Yes - opt-in to seasonal TOU tariff Yes - opt-in to TOU demand tariff
Endeavour Energy	Fixed charge + seasonal demand + flat energy	No because of transitional demand tariff	Yes, but flat tariff must be more expensive than cost reflective tariff	Yes - opt-in to seasonal TOU tariff Yes - opt in to cost reflective demand tariff
Essential Energy	Fixed charge + time of use energy	No because cost reflective tariff required to set at a discount.	Yes, but flat tariff must be more expensive than cost reflective tariff	Yes - opt-in to demand tariff
Evoenergy	Fixed charge + daily maximum demand + flat energy	Yes but only for replacement meter customers	No - flat tariff has been closed.	Yes - opt-in to seasonal TOU tariff
Power and Water	Fixed charge + seasonal demand + flat energy	No, because customers do not see cost reflective tariff at retail level.	No - flat tariff has been closed.	No - because customers are not impacted at retail level by introduction of cost reflective pricing
TasNetworks	Fixed charge + time of use energy	Yes	Yes	Yes - opt-in to demand tariff

† SA Power Networks and Energy Queensland under review, Victoria review commencing next year

Current projected transition for residential customers



Source: AER analysis of data provided by distributors during recent regulatory determinations. Energy Queensland figures unavailable

Tariff reform is an enabler of energy market transition

- Tariffs will evolve as distributors' long run marginal costs are refined and charging windows are adapted to customer behaviour
- Learnings from tariff trials will be key to how these develop, trial mechanism is available under Rules
- Further integration of network pricing and network operation/investment decisions in the future
- Continued monitoring transition rate to cost-reflective network tariffs and appropriateness of opt-out tariff assignment policy needed
- Strengthened analysis to better understand the balance between efficiency and customer impacts necessary