Powerlink Customer & Consumer Panel

18 May 2017

Welcome and Introductions

Agenda

- AER Final Decision
- Electricity Network Transformation Roadmap
- Afternoon tea
- Active discussion on ENTR implementation priorities

AER Final Decision









2018-22
POWERLINK QUEENSLAND REVENUE PROPOSAL

Overview

- Final Decision Summary
- Key issues from Revised Revenue Proposal
- Rate of return
- Forecast capital expenditure
- Incentive schemes
- Consumer engagement

Final Decision Summary

Key component	Powerlink Revenue Proposal	AER Draft Decision	Powerlink Revised Revenue Proposal	AER Final Decision
Total Revenue ($m, nominal)	4,017.2	3,720.8 (-7.4%)	3,742.2 (-6.8%)	3,940.2 (-1.9%)
Total capital expenditure ($m, 2016/17)	957.1	772.6 (-19.3%)	886.3 (-7.4%)	832.9 (-13%)
Total operating expenditure ($m, 2016/17)	976.7	976.7 (Nil)	976.7 (Nil)	976.7 (Nil)
Rate of return (%)	6.04	5.48	5.48	6.02% (-2 bps)

- The AER's Draft Decision **reduced indicative transmission price by 28.5% in 2017/18**, with price growth remaining within CPI over the balance of the regulatory period
- This equated to **savings of between $23 and $38 per annum** for the average residential electricity bill.

Key matters raised in Revised Revenue Proposal

Revised Revenue Proposal – Key Issues	AER Final Decision
Capex Forecast	Accepted all categories of forecast capital expenditure, except network reinvestment. For network reinvestment, made a $53.4m reduction from RRP by extending the mean replacement lives of transmission line assets.
Contingent Projects	Accepted six of seven contingent projects in Powerlink's RRP, with a total indicative capital cost of $445.9m. • Rejected Galilee South Area contingent project. • Accepted additional Qld – SA Interconnection project.
STPIS Service Component (SC) Market Impact Component (MIC) Network Capability Component (NCC)	Accepted Powerlink's RRP for the SC and NCC elements of the STPIS but made a further minor reduction to the MIC target.
Efficiency Benefit Sharing Scheme (EBSS)	Rejected Powerlink's proposal to exclude non-controllable costs from the EBSS for 2018-22, in particular redundancy costs, insurances and the AEMC Levy.

Rate of Return

Key component	Powerlink Revenue Proposal	AER Draft Decision	Powerlink Revised Revenue Proposal	AER Final Decision
Return on equity	7.30%	6.50%	6.50%	7.40%
Return on debt	5.20%	4.79%	4.79%	5.10%
Nominal WACC	**6.04%**	**5.48%**	**5.48%**	**6.02%**

- Significant impact on total revenue between Draft and Final Decisions
- Increases due to combination of equity and debt, in particular upward movement in CGS 10 year bond rates since Draft Decision.

Forecast Capital Expenditure

- AER accepted all categories of Powerlink's revised forecast capex, except network reinvestment.
- The AER reduced Powerlink's revised network reinvestment capex of $728.0m by $53.4m to $674.6m. This is a reduction in reinvestment capex of 7.3%.
- Driven by changes in mean replacement lives for transmission lines:

Asset type	Mean Replacement Life (years)			
	Revenue Proposal	Draft Decision	Revised Revenue Proposal	Final Decision
Transmission lines refit (zone B)	66.5	75.0	66.5	73.2
Transmission lines refit (zone C) ~75% of structures	52.9	60.5	52.9	56.1
Transmission lines refit (zone DEF)	35.3	41.6	40.0	40.8

Incentive Schemes

- STPIS (Network Performance)
  - AER Final Decision accepted Powerlink's revised proposal for the Service Component and Network Capability Component.
  - AER made a further reduction to the Market Impact Component target.
  - Strengthening of targets and financial incentives under STPIS occurred as part of the AER's decision on the STPIS published in late 2015, prior to Powerlink submitting its Revenue Proposal

- Efficiency Benefits Sharing Scheme (EBSS)
  - Applies to operating expenditure, incentive for delivering ongoing incremental efficiency improvements
  - AER rejected Powerlink's proposal to exclude specific categories of non-controllable operating expenditure (Eg. insurances, redundancy costs, AEMC Levy)

Stakeholder Engagement

- In its Final Decision overview document, the AER reinforced its view that Powerlink had taken steps to engage with its customers in a very positive manner

- The AER stated that is considers Powerlink has shown a willingness to continue and to further develop its consumer engagement. It also noted CCP submissions that Powerlink's stakeholder engagement may not have captured an appropriate breadth of stakeholders or addressed all stakeholder issues raised.

- In its media release, AER Board member Jim Cox stated:

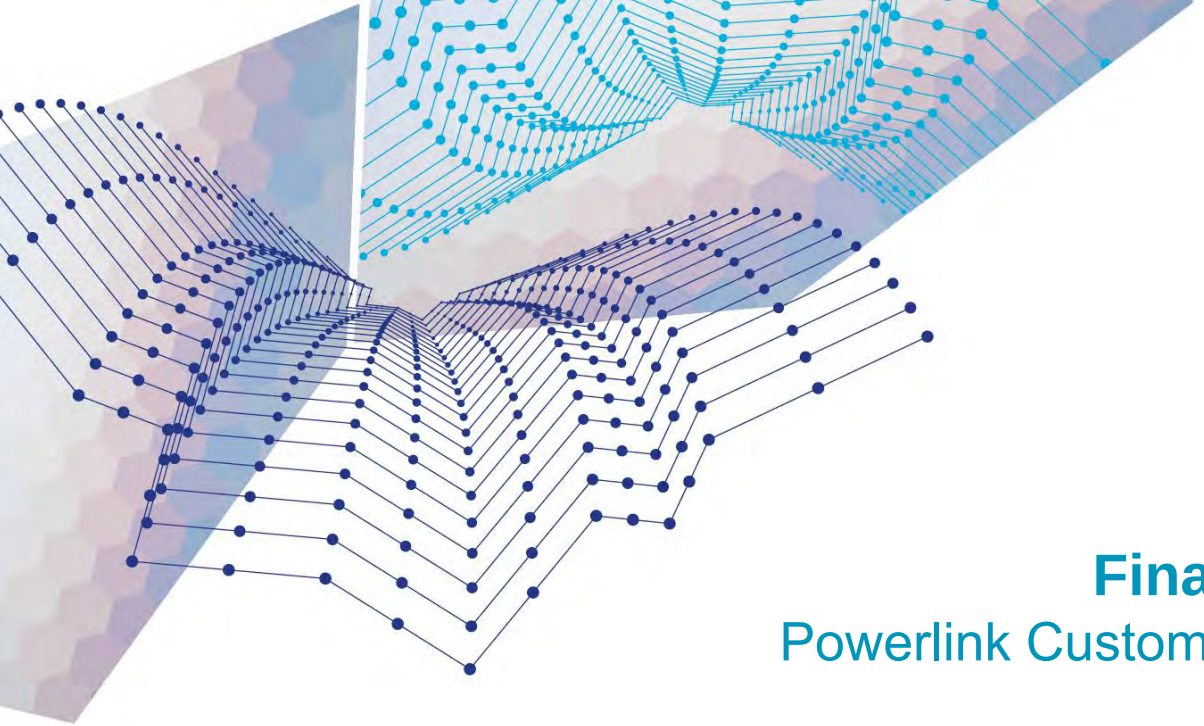
  "Powerlink consulted with its customers and proposed substantial savings in operating its network. As a consequence, in our final decision we have been able to accept most of Powerlink's regulatory proposal, including its capital and operating expenditure forecasts."

  "Powerlink demonstrated a genuine desire to put the interests of its customers first. This customer focus has allowed for a constructive approach in our scrutiny of the proposal."

Acceptance of Final Decision

- Powerlink accepts the AER's Final Decision and will not pursue Limited Merits Review of the Final Decision

Questions



ELECTRICITY NETWORK TRANSFORMATION ROADMAP

2017-27

Final Roadmap Report

Powerlink Customer & Consumer Panel

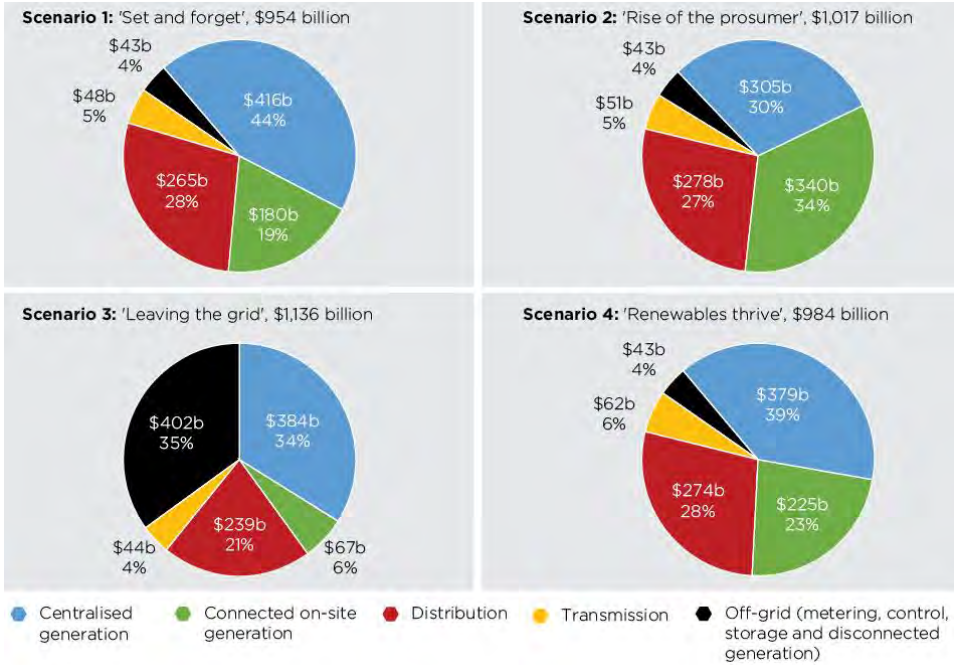
18th May 2017

Energy Networks Australia

CSIRO

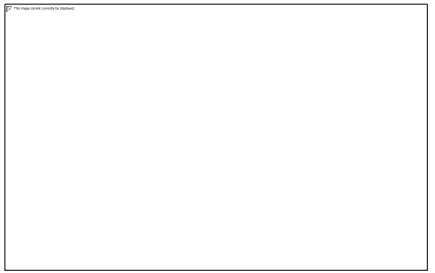
Why a Roadmap – resilience to diverse futures

Customers or their agents will make **25% to 40% of all investment decisions** in the energy supply system out to 2050 - up to $400 billion.



CSIRO & ENA – Network Transformation Roadmap Interim Program Report

Seven reflections from the Future Grid Forum of 2012/13



1. Network-centric → Customer-centric
2. Centralised → Hybrid/Decentralised
3. Fossil fuel generation → Continuous decarbonisation and greater intermittency
4. Regulated natural monopoly → Increasing exposure to competition
5. 20 – 50% of electricity generated locally by 2050
6. Under every scenario the electricity grid continues to play a critical (but evolved) role in 2050
7. **2017-27 decade characterised by profound transition**

2017-27 Electricity Network Transformation roadmap

- ✓ **CSIRO- ENA public facing collaboration**
- ✓ **Evidence-based** (Qual + Quant)
- ✓ Informs **specific, purposeful actions** (‘Milestones’ + ‘Actions’)
- ✓ Central focus on **balanced outcomes** for **customers and society**

ENTR Supporting Report Library

Program Quantification

- *Economic benefits of the Electricity Network Transformation Roadmap: Technical report.* (Forthcoming - 2017)

Customer-oriented Networks

- Electricity Network Transformation Roadmap: Interim Program Report (2015)
- *Electricity Network Transformation Roadmap: Customer Engagement Handbook* (2016)
- Network business model evolution
  - Network business model evolution: an investigation of the impact of current trends on DNSP business model evolution. Accenture (2015)
  - Insights from Global Jurisdictions, New Market Actors & Evolving Business Models, Accenture (2016)

Customer Safety Net

- External: Consumer Action Law Centre, *Power Transformed* (2016)

Carbon & Renewable Policy Options

- *Enabling Australia's Cleaner Energy Transition*, Energy Networks Association (2016)
- *Australia's Climate Policy Options – Modelling of Alternate Policy Scenarios.* Jacobs (2016)

Efficient Capacity Utilisation

- *Efficient capacity utilisation: transport and building services electrification.* (2016)
- *Gas-electricity substitution projections to 2050.* ClimateWorks Australia (2016)

Pricing & Incentives

- Energeia, *Price and Incentives Report*. (2016)
- Energeia *Stand Alone Power Systems and Microgrids Report* (2016)

Regulatory & Policy Frameworks

- Cambridge Economic Policy Associates F*uture Regulatory Options for Electricity Networks,* 3 August 2016

Power System Security

- *Embedded Generation Report*. Marchment Hill Consulting (2015)
- *Grid Design, Operation, Platform & Telecoms Report.* EA Technology (2016)

Intelligent Networks

- *Network Transformation Roadmap: Innovation Gap Analysis and Plan.* EA Technology (2016)

DER Markets & Orchestration

- *Grid Design, Operation, Platform & Telecoms Report.* EA Technology (2016)
- *Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight.* Lawrence Berkeley (2015)

Future Workforce Requirements

- *Changing Industry, A Changing Workforce: Electricity National Transformation Roadmap Workforce Skilling Impacts* (Energy Skills Queensland), October 2016.

Technical Standards and Regulations

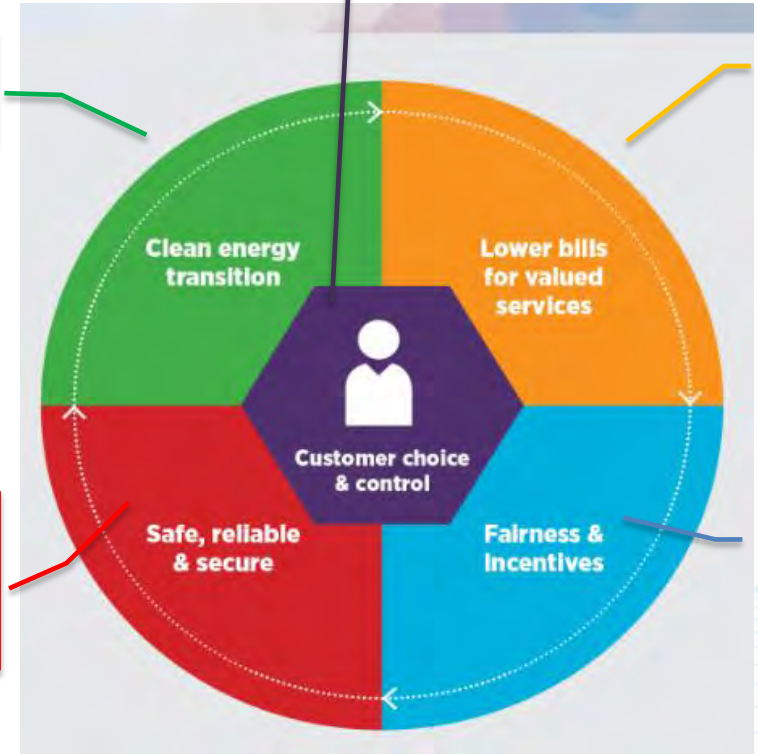
- *Standards and the Future of Distributed Electricity (Standards Australia)*, November 2016.

Status today …

1.5 million microgenerators, 15% average Solar PV penetration

Highest per capita emissions, generation sector reliant on coal

Significant increase in av. retail bills since 2008



System security and stability challenges with with loss of synchronous generation and millions of DER

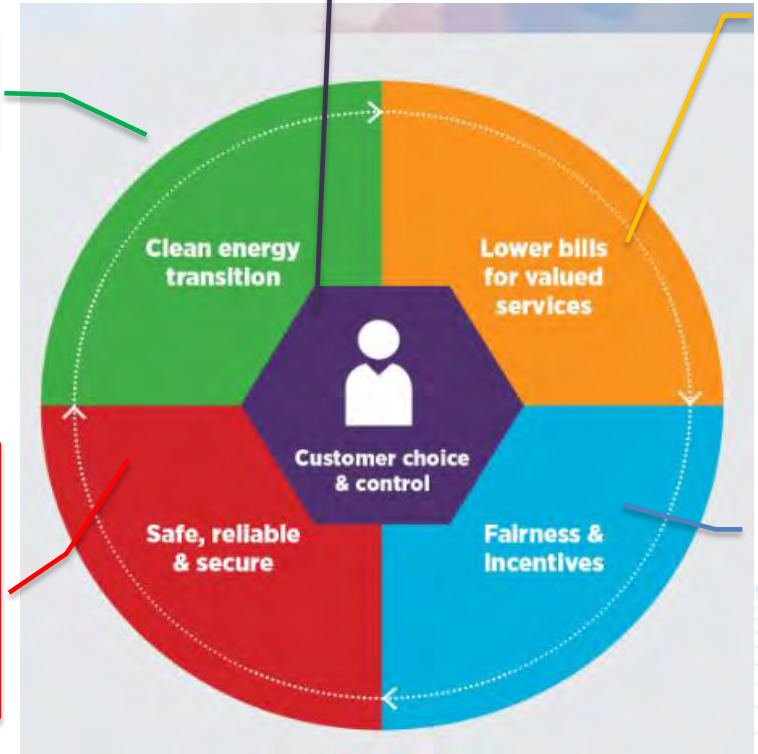
Cross-subsidies between customers drive by technology (A/C, solar) and diverse use.

Blunt incentives to DER, regardless of location, time.

A better future…

- Almost 2/3 of customers have DER
- 1/3 customers on ‘stand alone power system’ tariff
- Customer protection and concession schemes fit for purpose.

- COP 21 aspiration of Zero Net Emissions by 2050 is met



- Reduce total system spend by $101 BN by 2050
- Save Households $414 pa
- Network charges 30% lower than 2016

- Efficient solutions for new NEM services avoid security & stability risks.
- Real time balancing, reliability & quality of supply with millions of DER participants

- Avoid over $18 BN in cross subsidies
- Means $600 pa. for mid size family without DER
- Networks pay over $2.5 BN pa for DER services

Overview of the Electricity Network Transformation Roadmap

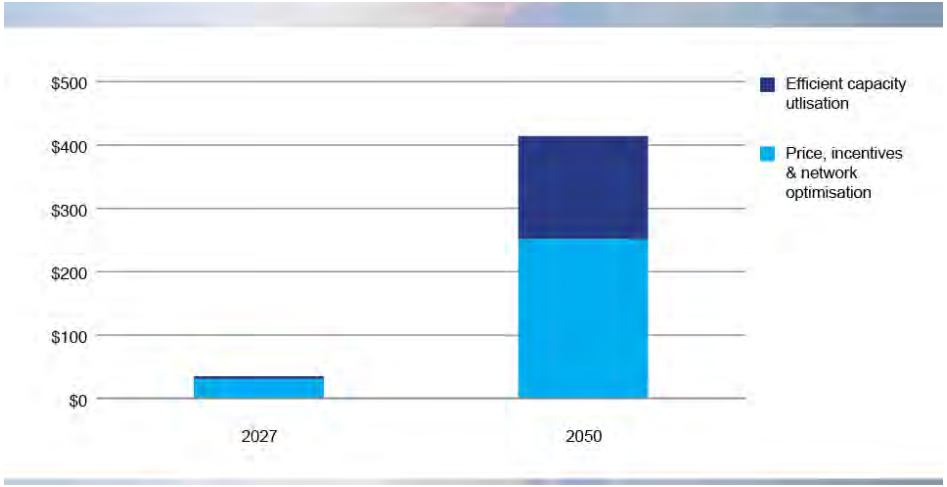
	FOUNDATION 2017–2022	IMPLEMENTATION 2023–2027+
CUSTOMER ORIENTED ELECTRICITY	**Improve Trust with Customers** » Enhanced customer engagement and collaboration » Customised choices, better information on services and new connection and advisory services » Demonstrate investment reflects customer value while improving service performance and response times » Review of Consumer Protection and concessions	**Networks provide a service platform** » Open network platforms embrace diverse customer needs and aspirations » Collaborate with customers and market actors to create new value with streamlined connections » Leverage network information and digital services for personalised innovation in a dynamic market
POWER SYSTEM SECURITY	**New systems to support diverse generation** » Update Transmission Interconnection test » Review frameworks for protection systems, efficient capacity and balancing services » New market frameworks for ancillary services » Develop new power system forecasting and planning approaches to anticipate system constraints » Enhanced intelligence and decision making tools » Close focus on physical & cyber security	**Harmonised System Operations at all levels** » Transmission networks support system stability with new services. » Distribution networks provide visibility of DER and potentially Frequency Control Ancillary Services (FCAS) and delegated balancing services. » Real-time communication and controls
CARBON ABATEMENT	**A stable Carbon Policy for higher targets** » Develop nationally integrated carbon policy framework » Implement emissions Baseline & Credit Scheme » Set Light Vehicle emissions standard policy to provide incentives for electric vehicle uptake, supporting climate goals » Review Australia's emissions reduction target » Agile network connections and integration of large and small scale renewable technologies	**Reviewing scope for greater efficiency** » Review technology specific incentive schemes to focus on least cost abatement » Review scope for more efficient economy wide carbon pricing where consensus » Review Australia's emissions reduction target (2027)
INCENTIVES & NETWORK REGULATION	**Incentivising efficiency and innovation** » Ensure extensive smart meter penetration » Assign customers to new range of fairer demand-based network tariffs, with a choice to Opt Out » Enable standalone systems and micro-grids as a substitute for traditional delivery models » New innovation incentives in Regulation and Competition frameworks	**Unlocking value of distributed energy resource orchestration** » Networks pay for distributed energy resource orchestration to provide system support in the 'right place at right time' » New network tariffs that provide beneficial incentives for standalone systems and micro-grids to stay connected to the grid » New and more adaptive regulatory approaches that are customer focused
INTELLIGENT NETWORKS & MARKETS	**Essential information for an integrated grid** » Establish open standards and protocols to enable secure system operation, management and exchange of information and interoperability with distributed energy resources » Networks enhance current system monitoring and models to inform advanced system planning » Build distributed energy resource maps and feeder hosting analysis to support locational valuation of distributed energy based services	**Networks optimised with distributed energy resources** » Active network management for technical stability, enabling distributed energy resource markets and efficient optimisation. » Networks provide a suite of grid intelligence and control architectures to animate distributed energy resource markets, as well as providing system security. » Establish a new network optimisation market to procure DER services for network support. » A flexible and agile workforce to support the new optimised energy system.

Overall Customer outcomes by

	2027	2050
CUSTOMER CHOICE AND CONTROL	» Over 40% customers use onsite resources: 29 GW solar and 34 GWh of batteries. » Concessions to support those who need it most.	» Almost 2/3 customers use onsite resources, including 1/3 customers on a new stand alone system tariff.
LOWER BILLS FOR VALUED SERVICES	» Avoid over $1.4 BN in network investment. » Average network bills 10% lower than 2016.	» Total system spend is $101BN lower to 2050. » Save households $414 pa by 2050. » Network charges 30% lower than 2016.
FAIRNESS & INCENTIVES	» Networks pay over $1.1 BN pa for DER services. » Over $1.4 BN in cross subsidies avoided, saving $350 pa for med size family without DER.	» Networks pay over $2.5 BN pa for DER services. » Over $18 BN in cross subsidies avoided, saving $600 pa for med size family without DER.
SAFETY, SECURITY, RELIABILITY	» Planned and efficient market response avoids security & stability risks. » Robust physical & cyber security management.	» Real time balancing, reliability and quality of supply at small and large scale, with millions of market participants.
CLEAN ENERGY TRANSITION	» Electricity sector carbon abatement to reach 40% by 2030 - greater than current national target of 26-28%.	» Electricity sector achieves Zero Net Emissions by 2050.

Comparing the roadmap Outcomes

Projected savings in average residential bills under the roadmap scenario



Cumulative electricity system total expenditure to 2050 – Roadmap & counterfactual

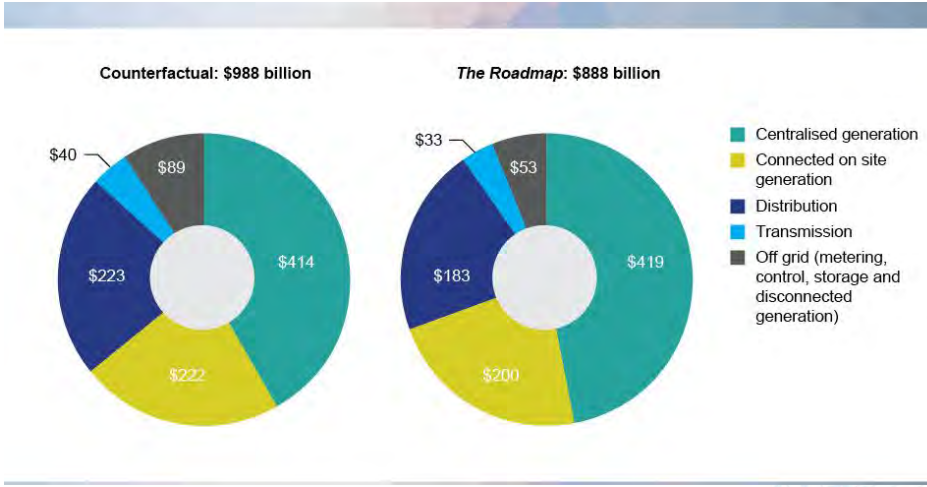
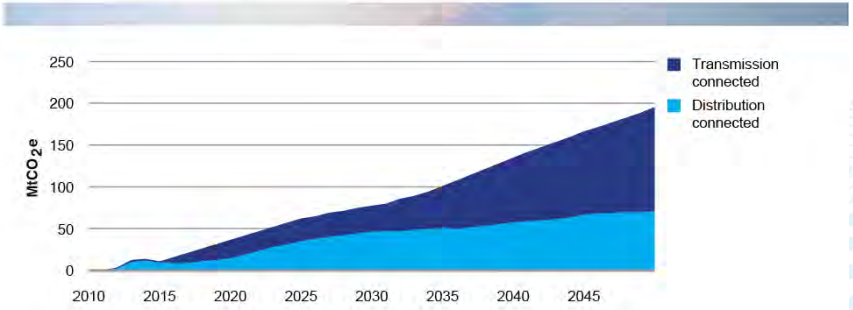


Figure 4: Historical and projected quantity of electricity sector abatement by location on the network (*Roadmap* Scenario)



Comparing the Roadmap Outcomes

Figure 6: Residential bill outcomes for selected Australian household types in 2050 under the counterfactual and *Roadmap* scenarios

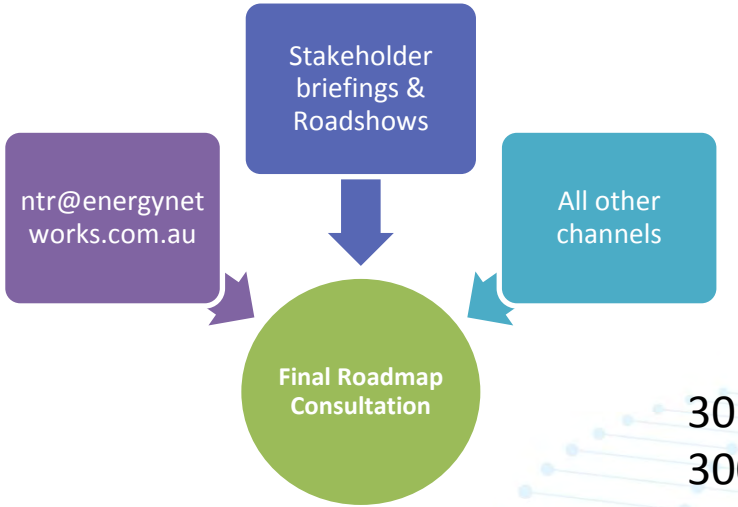
	Counterfactual			*The Roadmap*		
	Active $	**Passive $**	**The Gap $**	**Active $**	**Passive $**	**The Gap $**
Working Couple 	$1,346	$1,811	**$465**	$1,123	$1,422	**$299**
Medium Family 	$1,816	$2,601	**$785**	$1,428	$1,988	**$560**
Large Family 	$2,794	$3,950	**$1,156**	$2,346	$2,734	**$288**
Single, Retired 	$1,058	$1,730	**$672**	$883	$1,355	**$472**

Collaboration/Co-design in developing the Final *Roadmap*

The final report is the product of more than two years of collaborative work carried out by Energy Networks Australia and CSIRO.

More than 200 different industry representatives contributed at over 14 workshops and webinars held as part of the public consultation process.

Information on the Roadmap has been viewed more than 30,000 times during the development process.



30 briefings to
300+ people

Roadmap Implementation Planning

Detailed Planning underway to guide implementation of the Roadmap's 45 Milestones and 145 Actions.

Projects are being scoped across three broad categories:

1. **Coordinated Implementation** – activities which require coordination both nationally across network businesses, as well as between network businesses and other key stakeholders such as retailers, researchers and regulators.
2. **Network Business Implementation** – activities which will be led by individual network businesses, as they represent changes to their own operational or business practices as driven by their own business needs or regional challenges.
3. **Influenced Implementation –** activities where network businesses cannot drive outcomes, but will play a key role in providing important input to key stakeholders.

Coordinated Implementation – Flagship Projects

Projects identified as being critical to support optimal Roadmap Pathways in the shorter term:

	Flagship Program Title	NTR Domain/s
1	Advanced Customer Engagement	Customer Orientated Networks
2	Distributed Energy Resources Connection Guideline	Customer Orientated Networks
3	Tariff Implementation Plan	Incentives and network regulation
4	Metering penetration monitoring & intervention	Incentives and network regulation
5	Second wave incentives – Trials and implementation	Incentives and network regulation and Intelligent networks and markets
6	New regulatory models - Trials and implementation	Incentives and network regulation and Intelligent networks and markets
7	Unlocking transmission capacity for system security	Power System Security
8	Distributed Energy Resources visibility for AEMO	Power System Security
9	Advanced Grid Architecture	Intelligent Networks and Markets
10	Network hosting capacity and Distributed Energy Resources valuation	Power System Security and Intelligent Networks and Markets
11	Prioritised Standards Development	Power System Security and Intelligent Networks and Markets

Flagship Projects: Transmission focus

1. Advanced Customer Engagement - Implement collaborative strategies for continuous improvement in network customer engagement with customers

Finding 1: Networks need to enhance relationships with customers built on improved data analytics capabilities and a deeper understanding of increasingly diverse customer needs.

Finding 2: Networks should seek to expand information services to enhance interactions with customers.

Finding 3: Networks will play a key role in the delivery and connection of an expanding range of innovative products and services to customers.

Source: Plausible 2025 customer segments were informed by an international literature review, commissioned expert papers and structured stakeholder worksho
In particular, Rosemary Sinclair of Energy Consumers Australia is acknowledged for employing the market curve device to graphically represent customer segmer
(adapted with permission). For more detail on the process undertaken, see Appendix C: Customer-oriented segmentation.

Figure 1.5: Proposed market segmentation curve for non-residential end customers

3. Tariff Implementation Plan - Develop a sector wide strategy, including timetable for transitioning retail and small business customers to cost reflective tariffs

Figure 15: Projected reductions in average residential electricity bills due to electric vehicle adoption under alternative electricity pricing and incentive reform environments

Figure 16: Comparison of customers on fair and efficient tariffs (%)

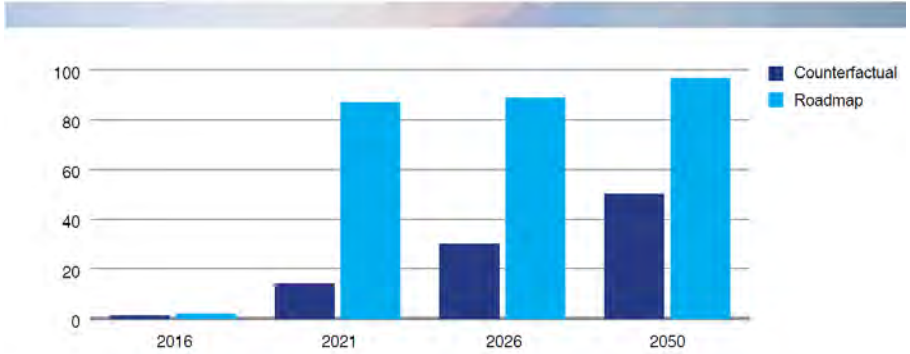


Figure 17: Forecast penetration of smart meters in Australia

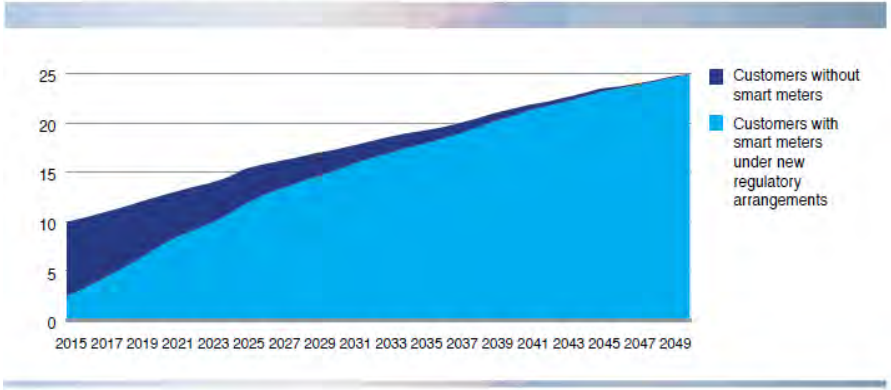
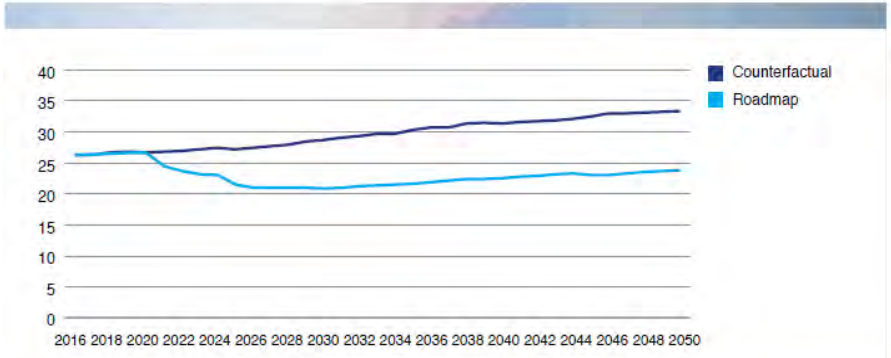


Figure 18: Non-coincident substation peak demand



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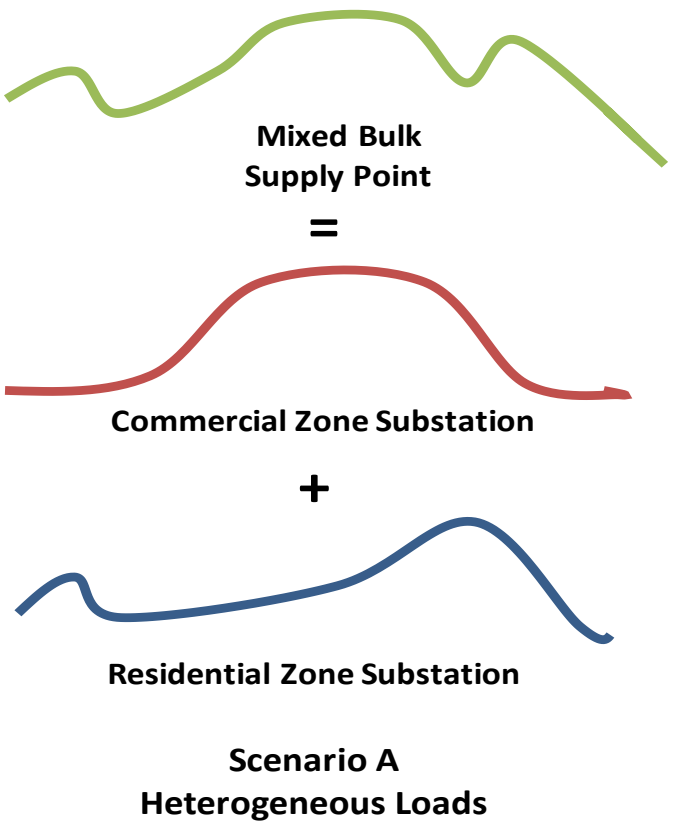
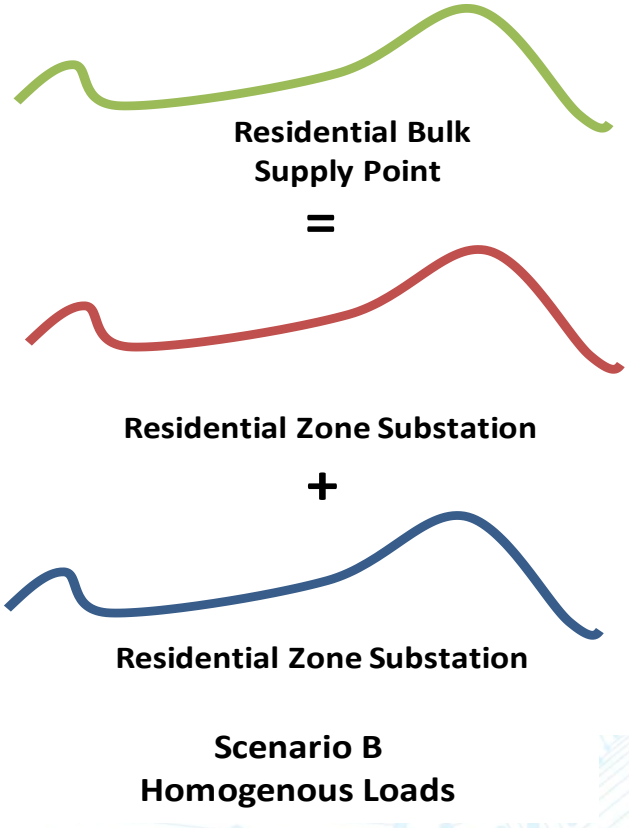
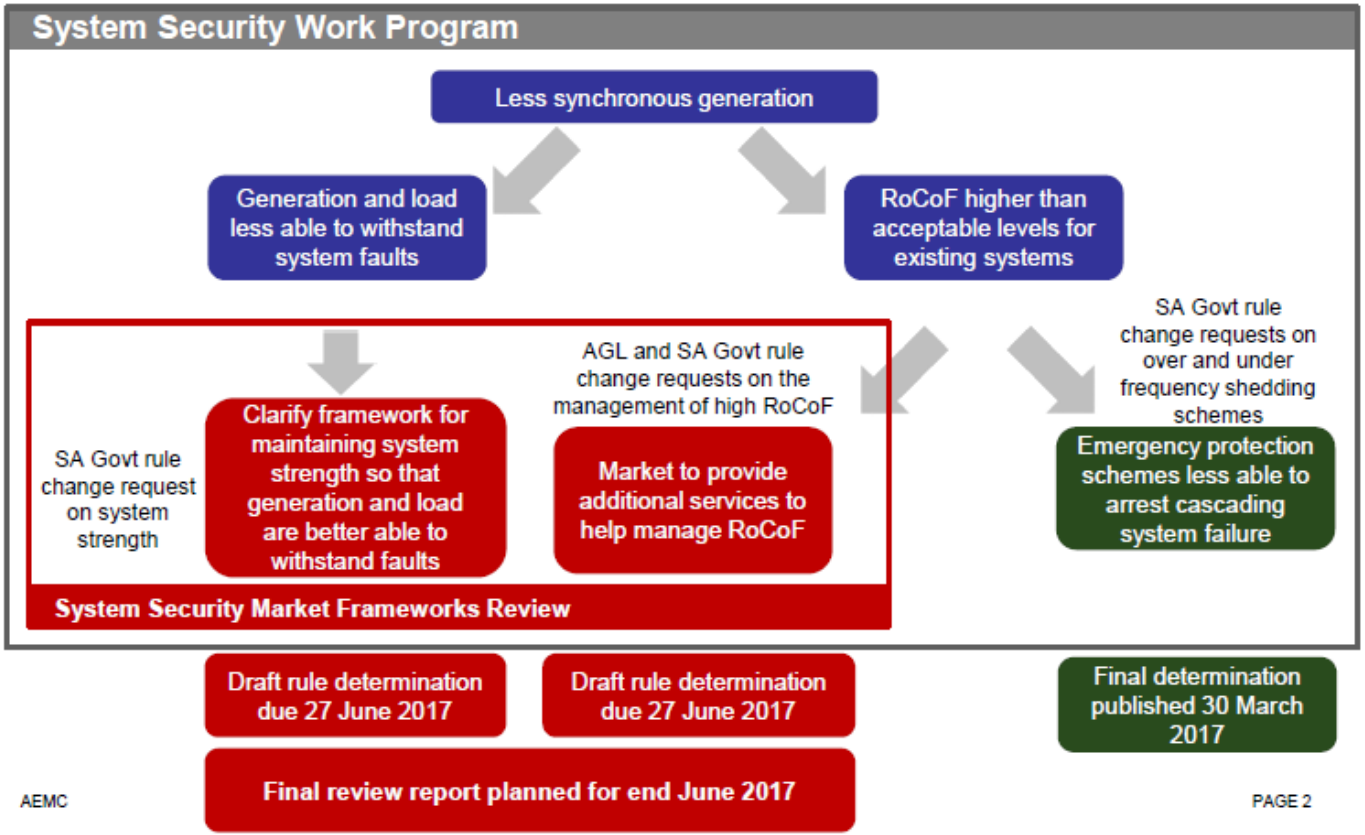


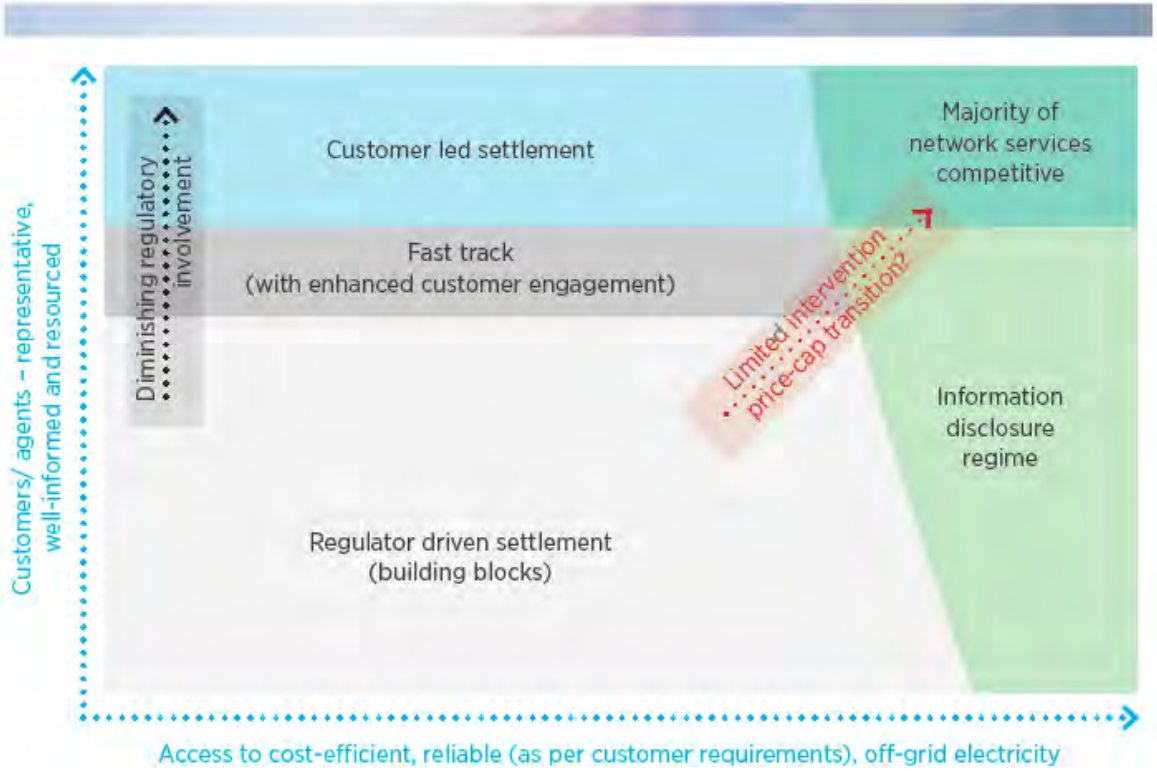


Overview of progress on the system security work program



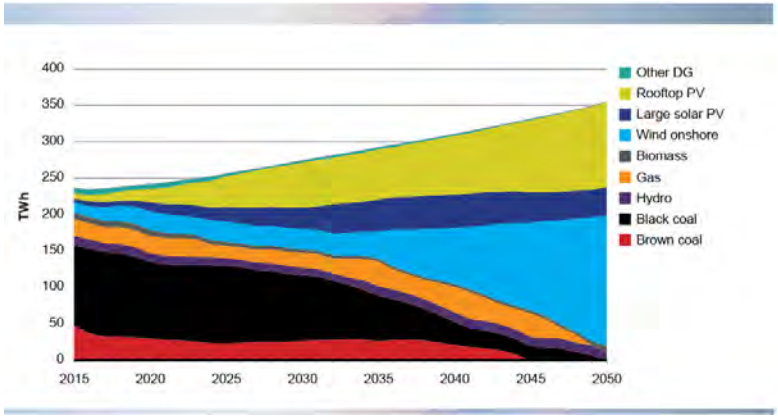
6. New Regulatory models

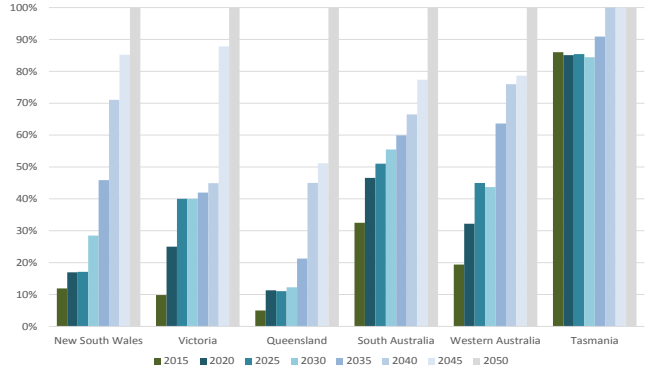
Figure 1: Framework evolution driven by customers and off-grid options



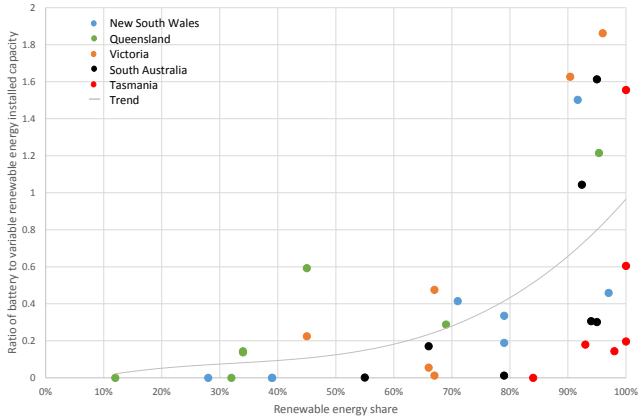
e.g. TOTEX trials to test a rebalancing of CAPEX and OPEX to incentivise networks for being efficient and encouraging more payments to customers in return for DER services as a non-network alternative. (i.e. a 'sand box approach')

7. Unlocking transmission capacity for system security – Define the central and transformed role for the transmission system to support power system security

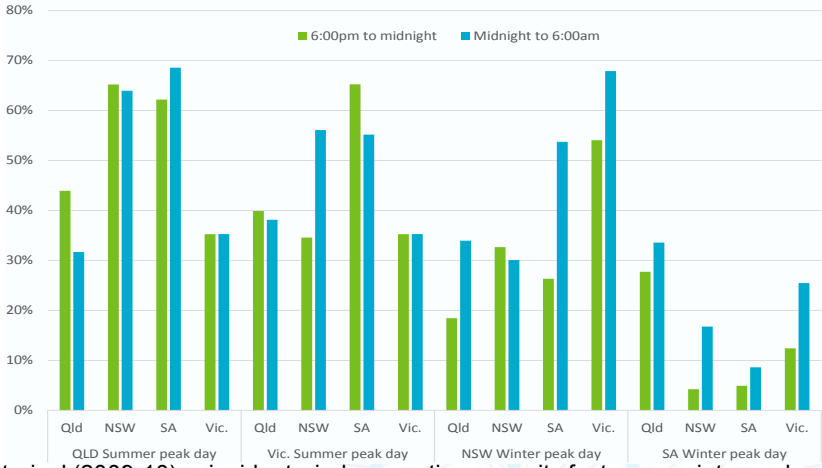




Projected renewable generation as a share of state generation under the Roadmap scenario



Projected ratio of battery capacity to variable renewable generation capacity to achieve energy balancing for a given renewable energy share, by state



Historical (2009-10) coincident wind generation capacity factors on winter and summer maximum demand days in selected states

Milestones: Transmission focus

- From a transmission perspective, we have identified three key milestones:
  - By 2018, network customer engagement and collaboration has regular, credible processes, underpinned by greater access to shared information
  - By 2018, the customers' role is central to regulatory processes covering core regulated services for agreeing network outputs and risk allocation (including reforming regulatory determination processes)
  - By 2018, the central and transformed role for the transmission system to support power system security has been defined (developing new operational techniques and measures for dealing with variable generation resources and market mechanisms to ensure the transmission system plays a key role in addressing power system security in the NEM)

Stakeholder Engagement and Roadmap Monitoring

The Roadmap aims to continue the significant engagement and collaboration achieved through the Roadmap development process by:

- Continuation of wide Roadmap Stakeholder engagement across a wide range of Roadmap projects
- Concept being considered for establishment of an External Stakeholder Reference Group to guide Roadmap Implementation activities and projects
- Program Monitoring and Reporting on a regular basis to keep industry abreast of Roadmap progress and key milestones

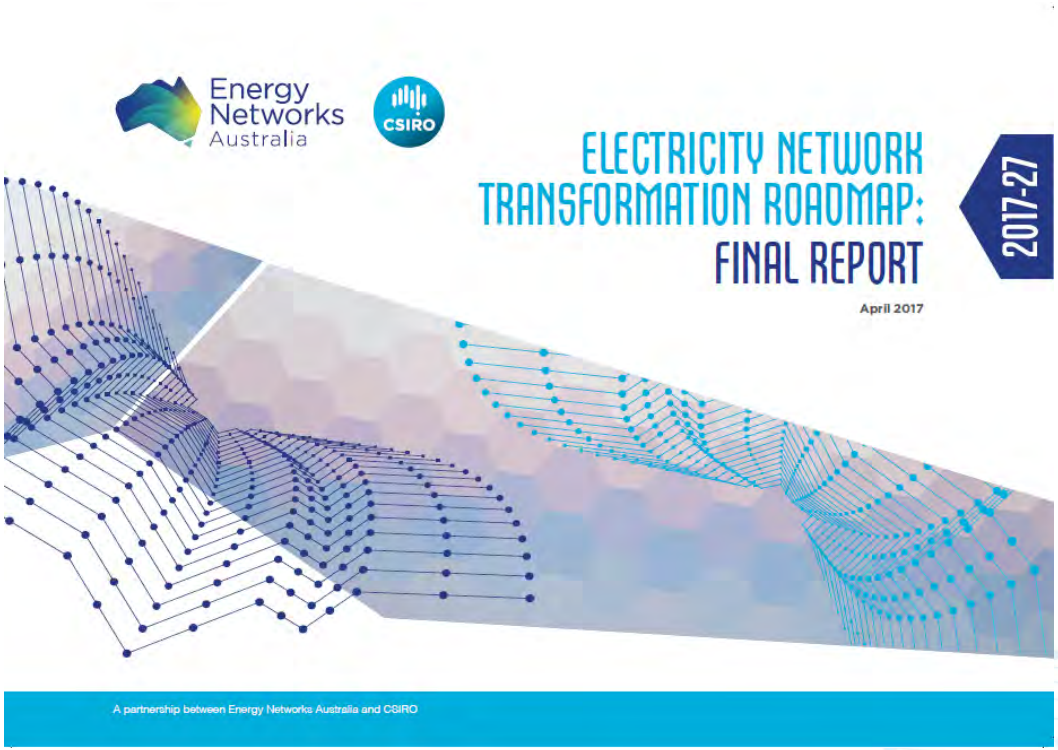
Alignment with other programs

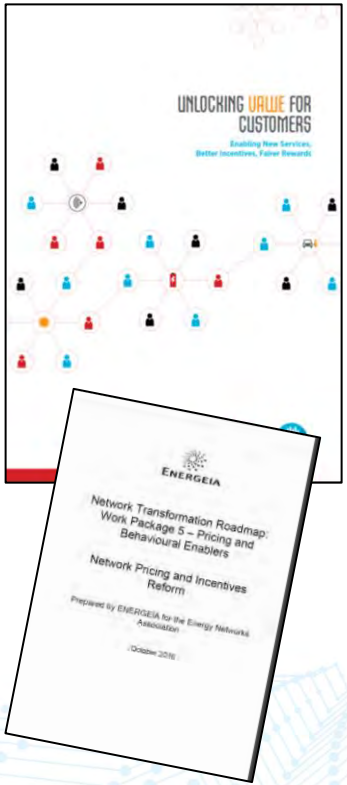
Recognising that ENTR has been prepared at the same time as the NEM Security ('Finkel') Review, we acknowledge that we will need to:

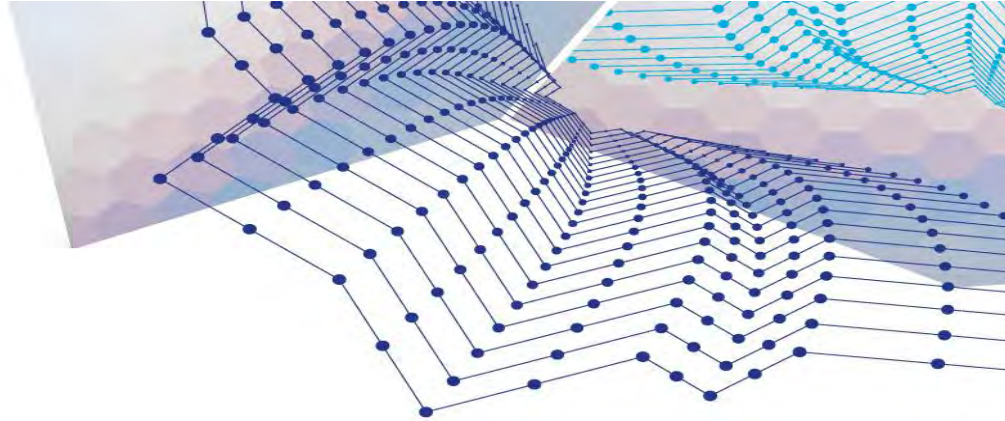
- Cross reference the ENTR findings with the findings of that process
- Seek to align the roadmap implementation around common points of action.

Note: Individual businesses across different jurisdictions are looking at their own state or business specific implementation plans as a way of making the information from the *Roadmap* more explicit for their own planning.

For More Information: http://www.energynetworks.com.au/roadmap-final-report







Questions & Discussion

http://www.energynetworks.com.au/roadmap-publications

Afternoon tea break

Electricity Network Transformation Roadmap

1. Are there any other priorities Powerlink should focus on in implementing the ENTR?
2. How can Powerlink best undertake customer engagement using credible processes and providing greater transparency and access to information?
3. What changes to regulatory processes will help ensure that the customers' role is central?
4. How should the transmission system be transformed to support power system security?
5. What transmission pricing arrangements would better incentivise connections in specific areas?

Thanks and close