



# 2023 Transmission Network Forum

#PQForum



# Acknowledgement

Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular, the lands on which we operate. We pay our respect to their Ancestors, Elders and knowledge holders and recognise their deep history and ongoing connection to Country.

# Agenda

- 1 Official address video - The Hon. Mick de Brenni MP
- 2 State of the Network - Prof. Paul Simshauser AM
- 3 Engaging with Queensland communities
- 4 Break
- 5 Community Panel | Social licence to operate
- 6 Queensland Renewable Energy Zones and interactive table discussions
- 7 Break
- 8 Transmission Annual Planning Report Technical Session and Panel
- 9 Chair address

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# State of the Network

Prof. Paul Simshauser AM  
Chief Executive





# Energy as the foundation to the economy

Communication

Energy

Transport



# Electricity as the foundation to the economy

Communication

Transport

Electricity





# Investment



# SuperGrid and Renewable Energy Zones

## Renewable Energy Zones - Inflight

- Far North Queensland
- Southern Downs
- Western Downs

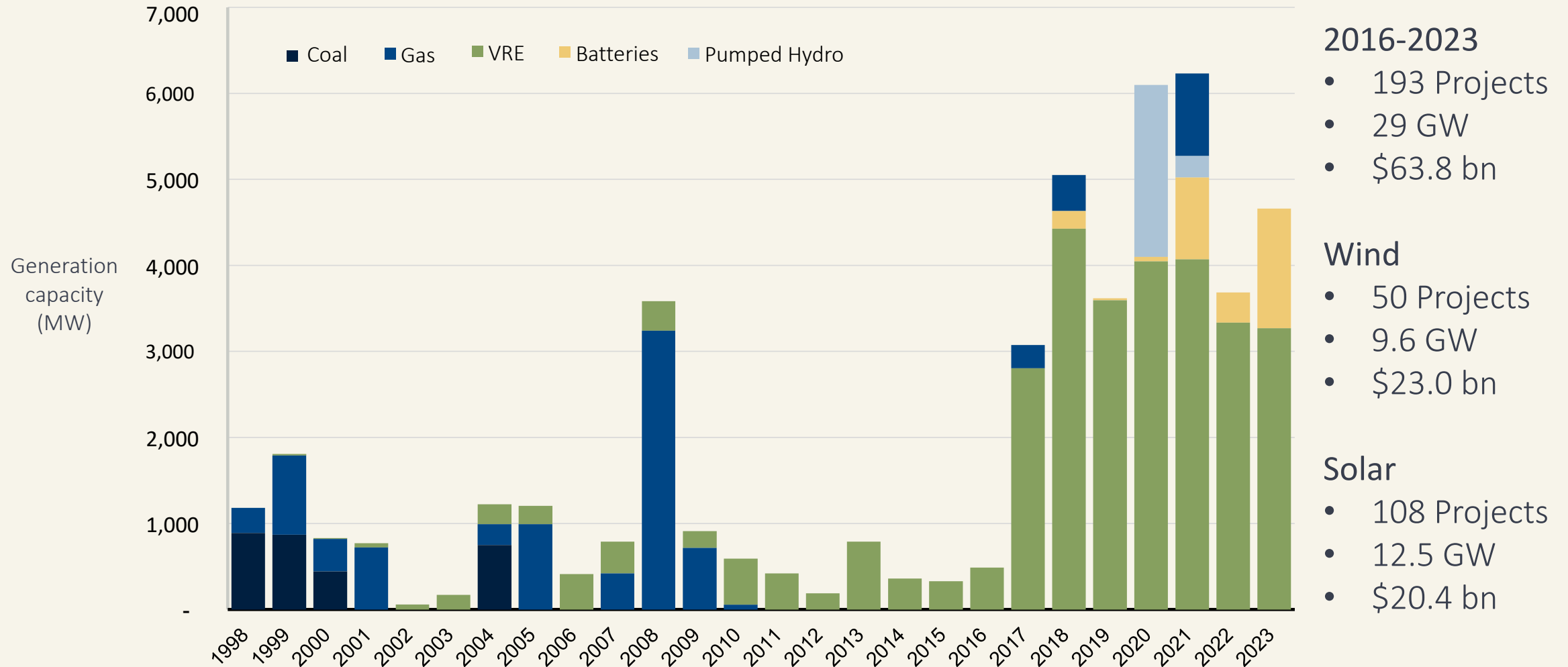
## Strengthening Gladstone

## Renewable Energy Zones - Phase 1: 2022 to 2024

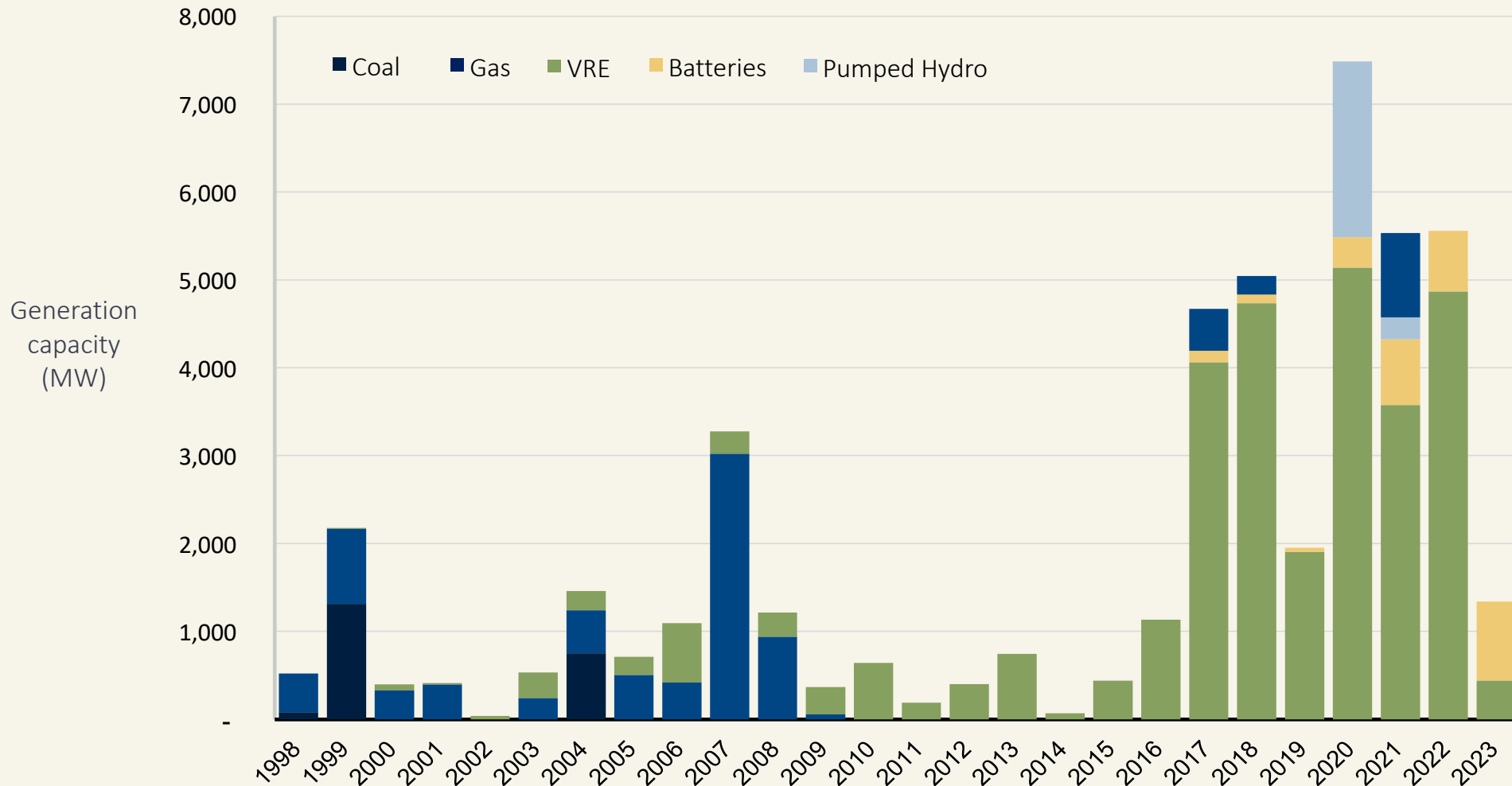
- Calliope
- Callide



# NEM 'plant commitments' by financial year



# NEM 'plant commitments' by calendar year



## 2016-2023

- 193 Projects
- 29GW
- \$63.8 bn

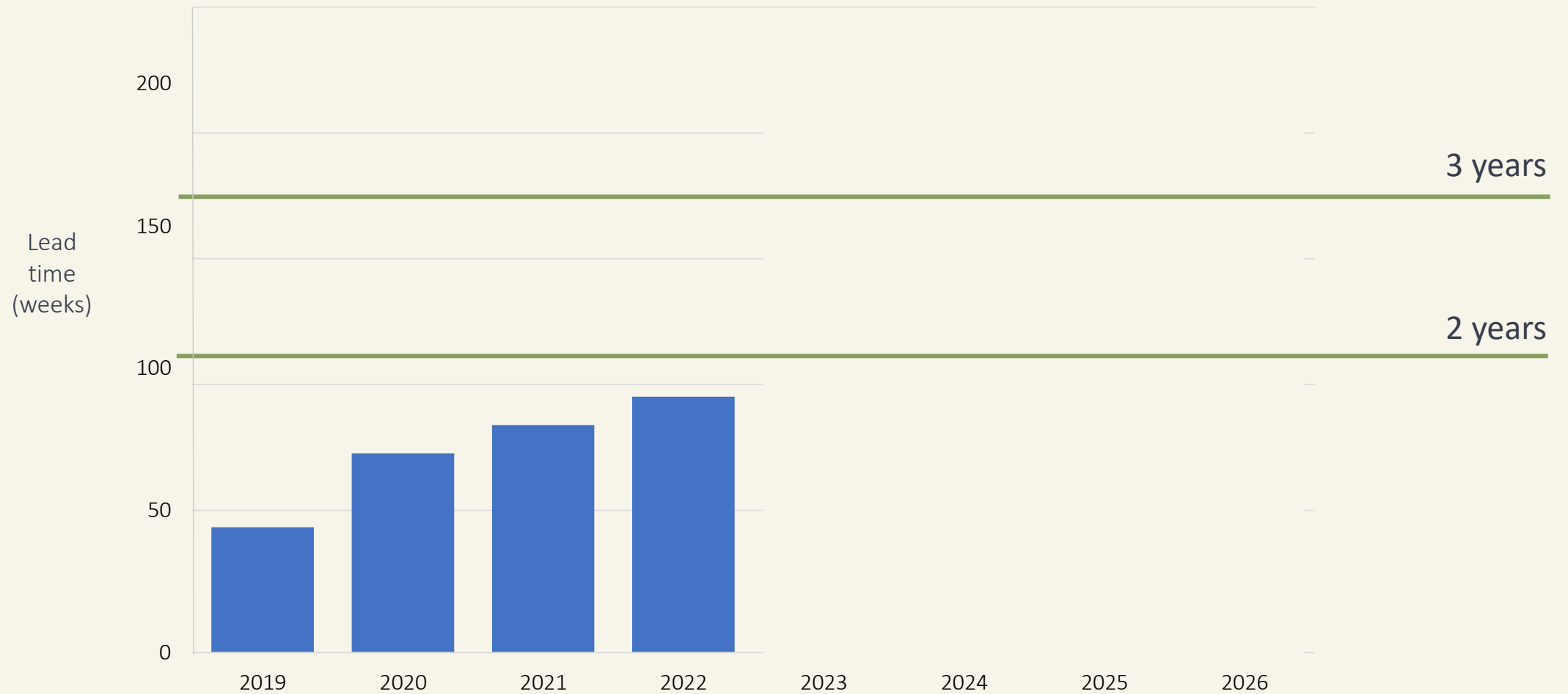
## Wind

- 50 Projects
- 9.6GW
- \$23.0 bn

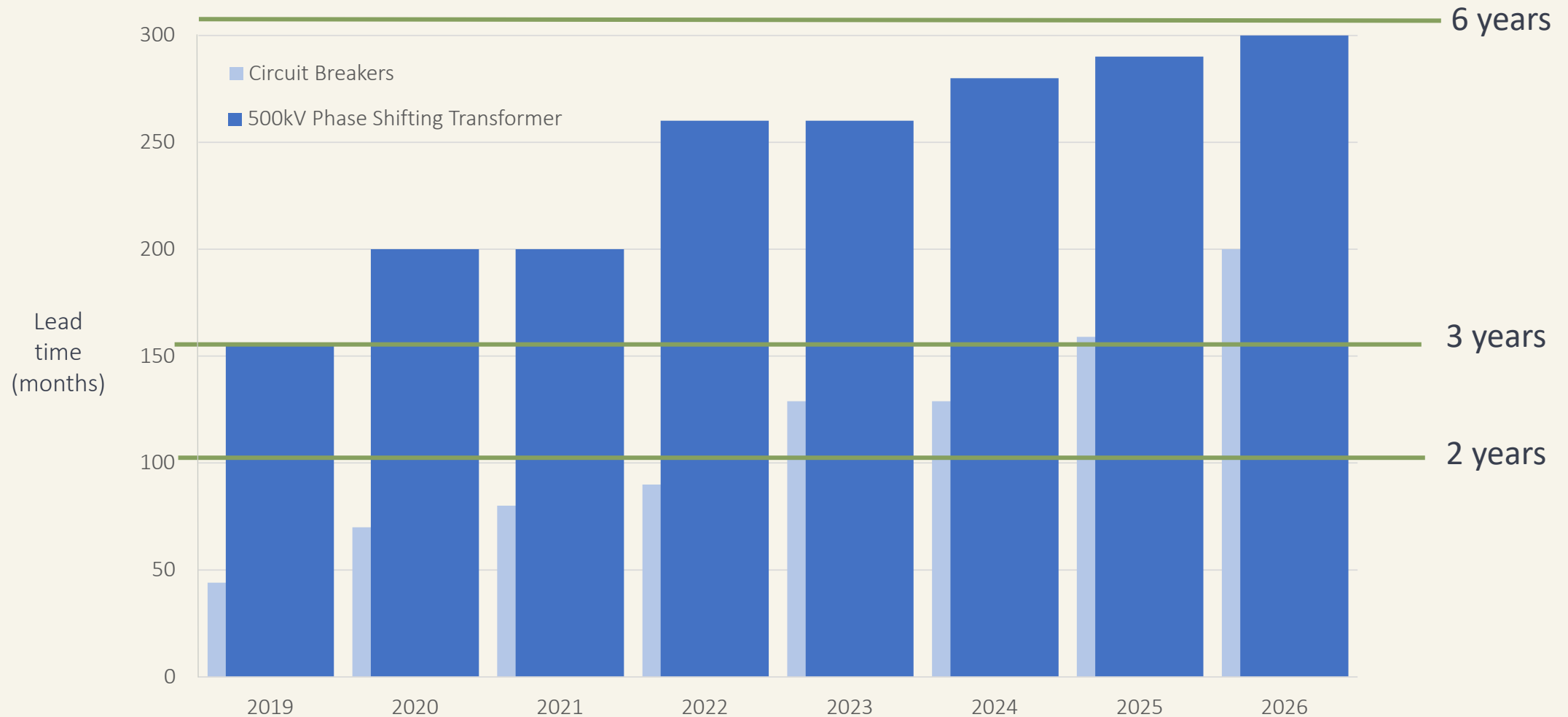
## Solar

- 108 Projects
- 12.5GW
- \$20.4 bn

# Circuit breakers - lead order time

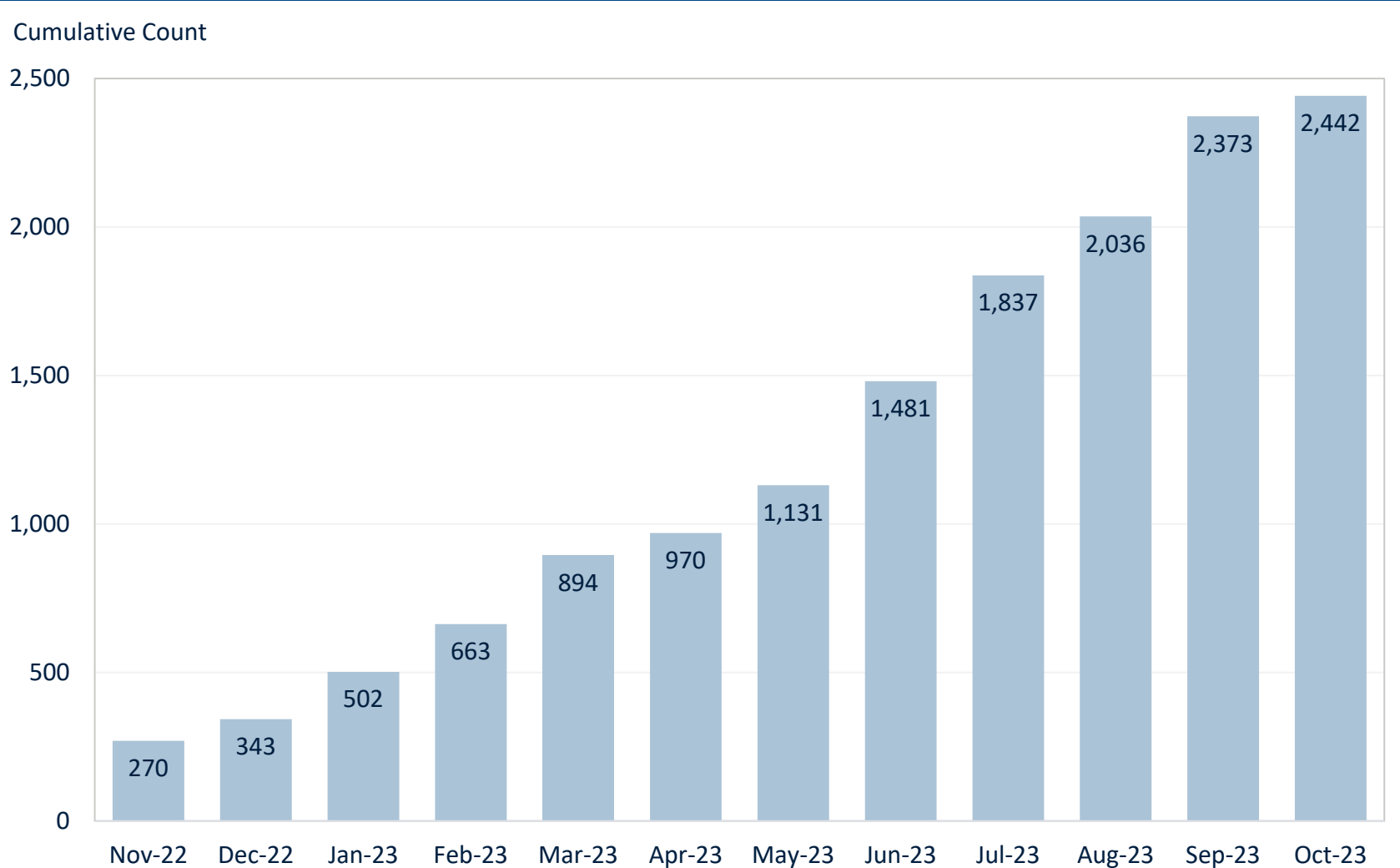


# Phase shifting transformers - lead order time



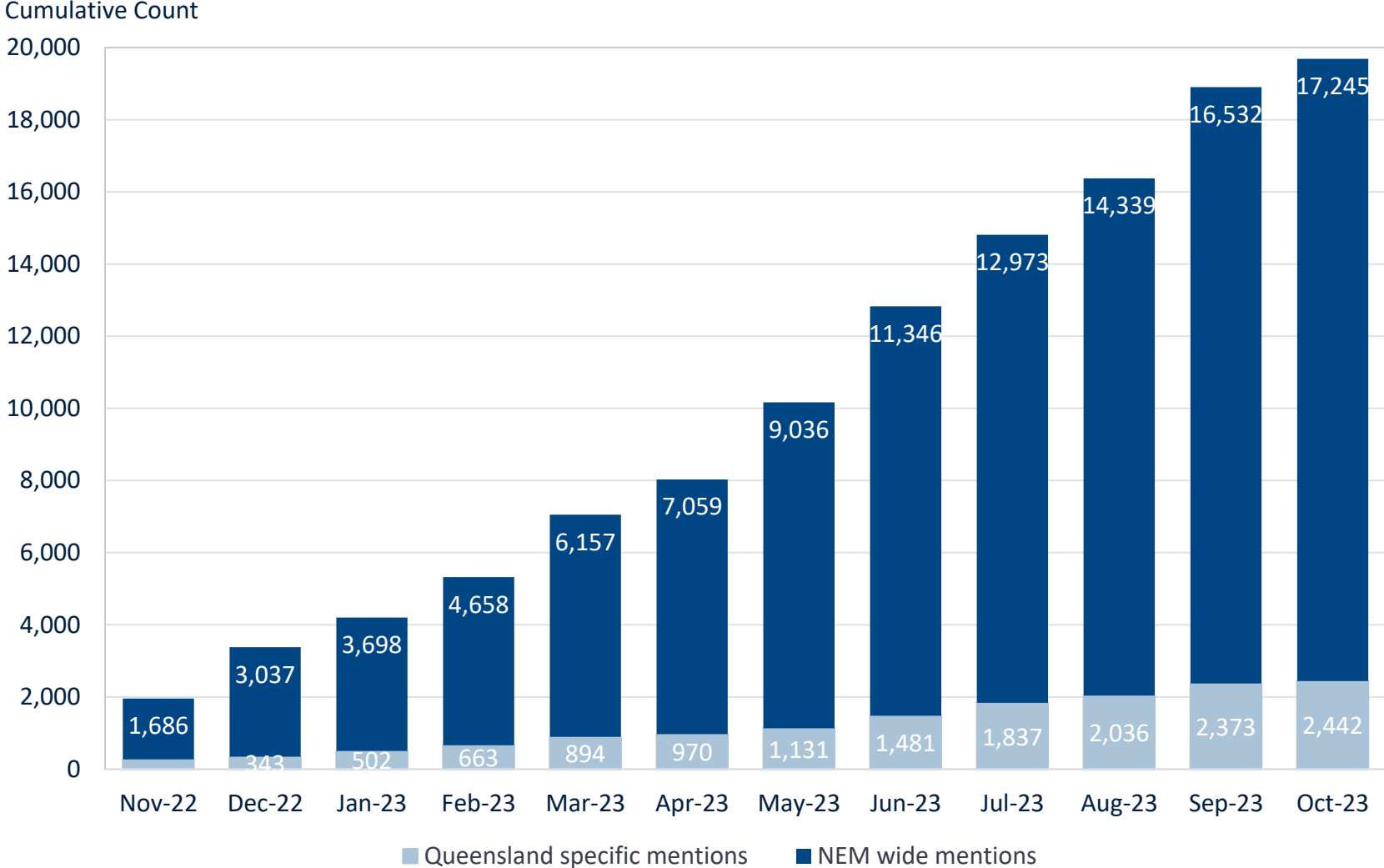
# Media count: Queensland specific mentions

Social licence to  
operate + community  
engagement + energy  
+ Queensland



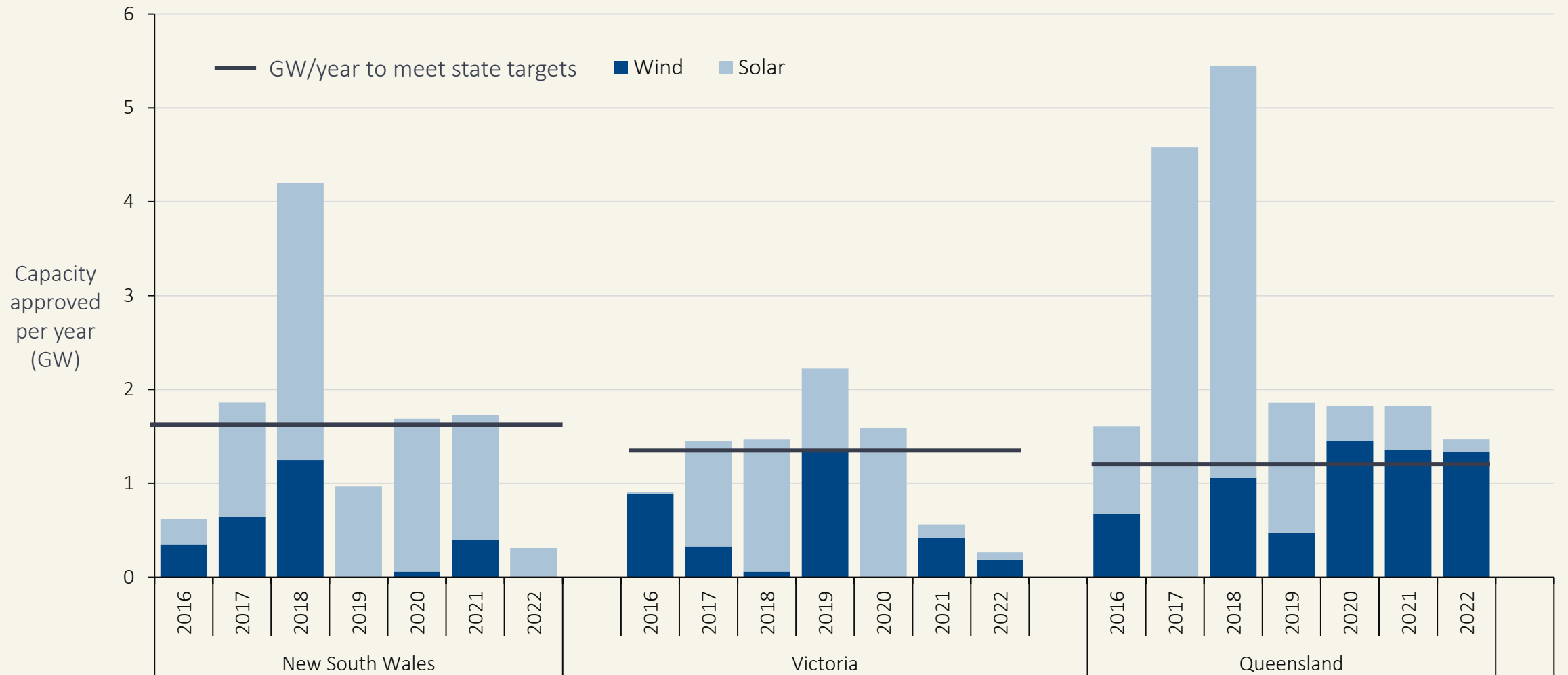
# Media count: Queensland specific mentions v NEM wide mentions

Social licence to  
operate + community  
engagement + energy





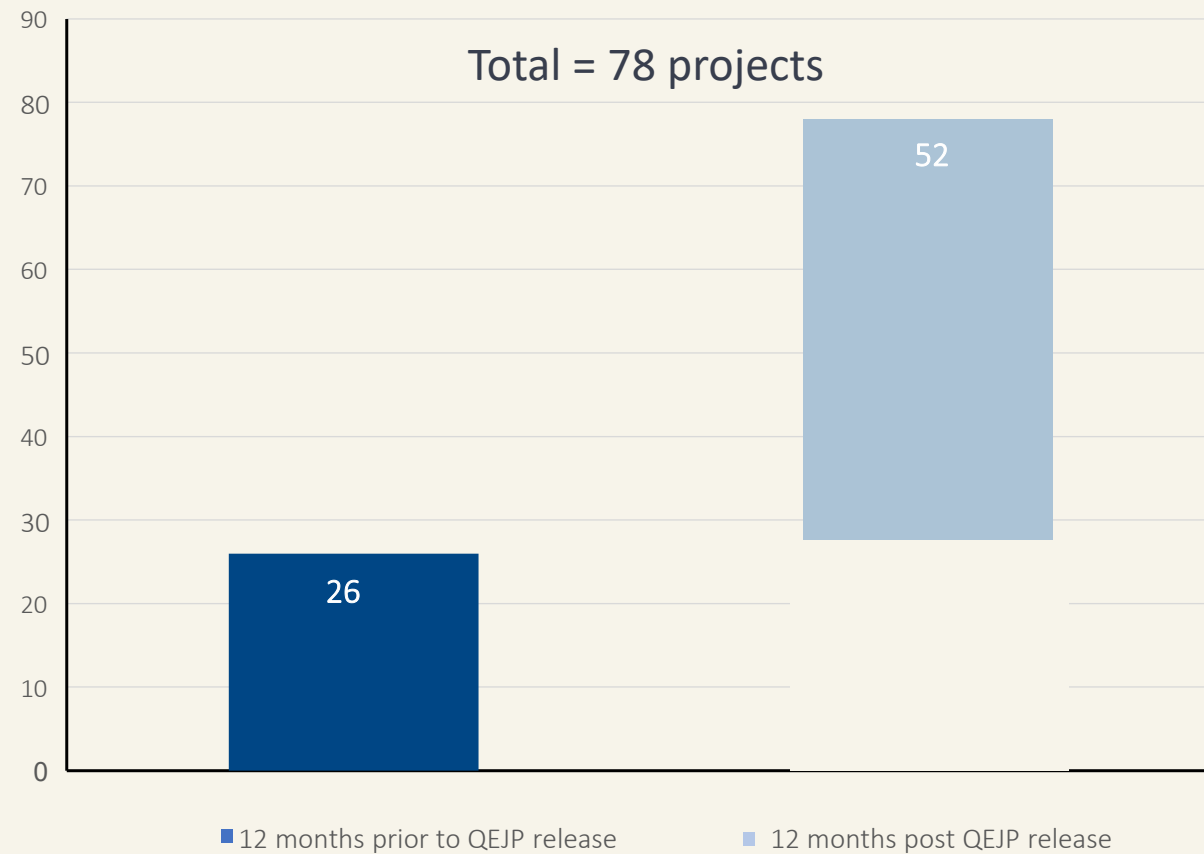
# Renewable DAs by State



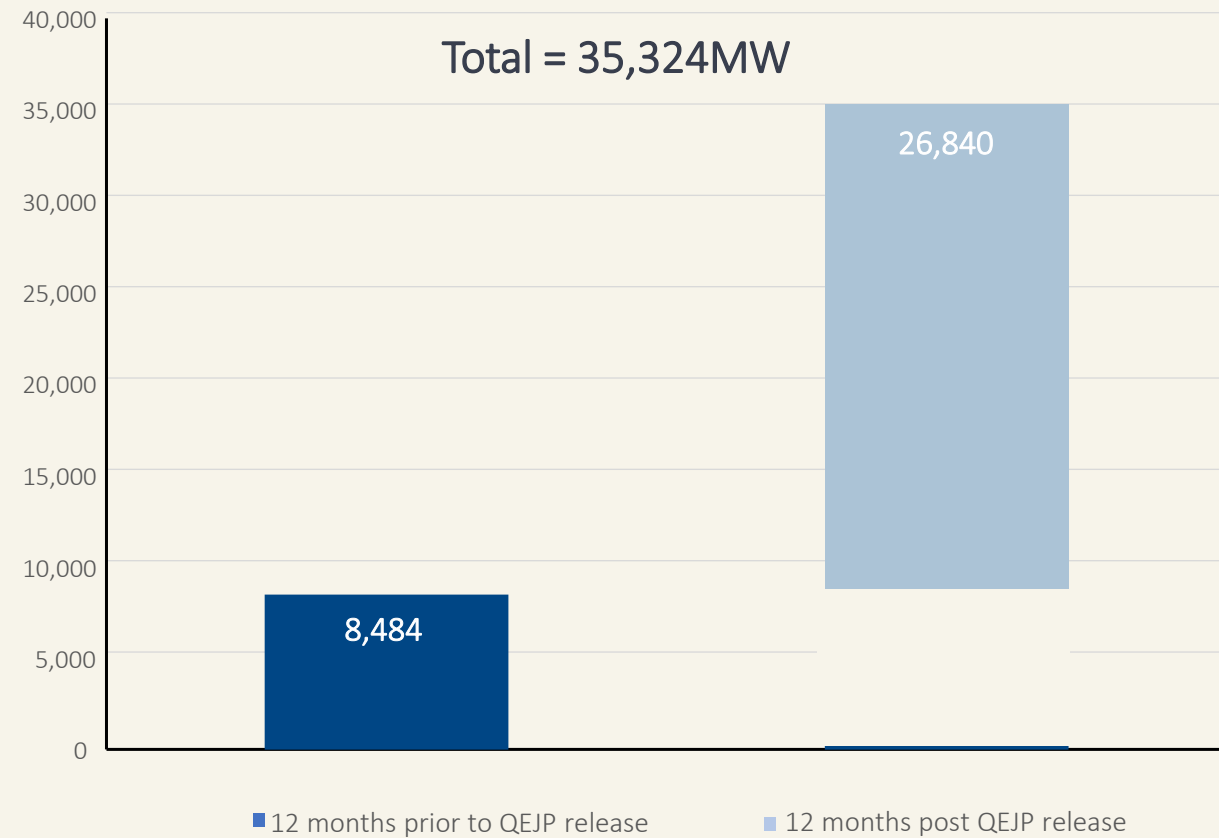
Source:  
Rystad  
Energy

# Connection enquiries prior and post QEJP release

Number of Projects



Capacity (MW)



# Queensland Renewable Energy Zones

## Our REZ approach

- Merchant
- Fast
- Low capital cost
- Innovative financings which lowers user charges
- Divisible

	Far North Queensland	Southern Downs	Western Downs
Network capacity	~500MW	~ 2,000MW	~1,800MW
Contracted capacity	157MW	1,026MW	500MW
Application date	September 2019	December 2020	January 2021
Energisation date <sup>1</sup>	October 2022	December 2023	October 2024
Cycle time <sup>2</sup>	3.2 years	3.0 years	3.7 years

<sup>1</sup> Energisation of first generator

<sup>2</sup> Connection application to connection of first generator

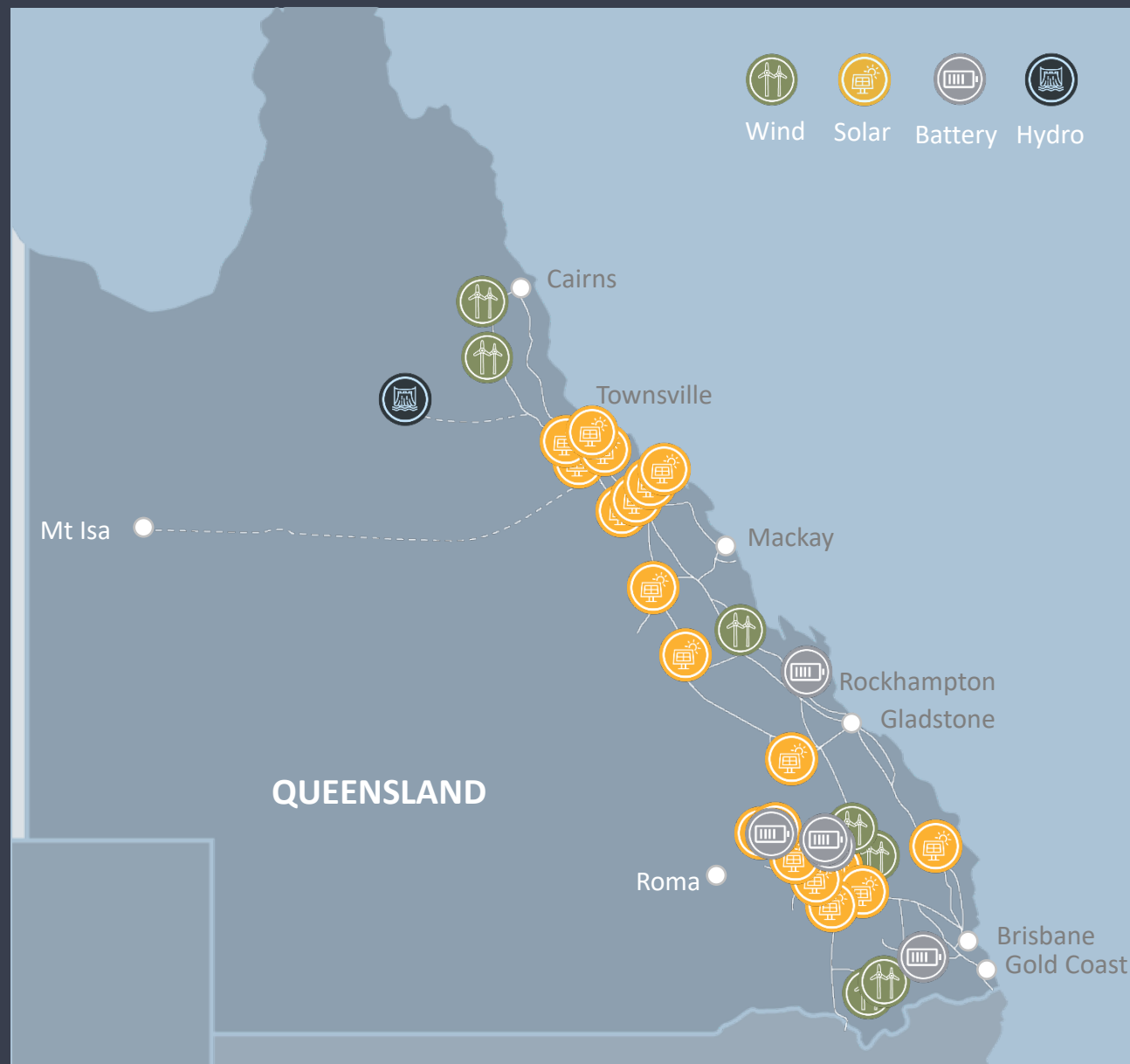
# Queensland connections

**32 renewable & storage projects operational or under construction** with combined maximum output of **5,730MW**

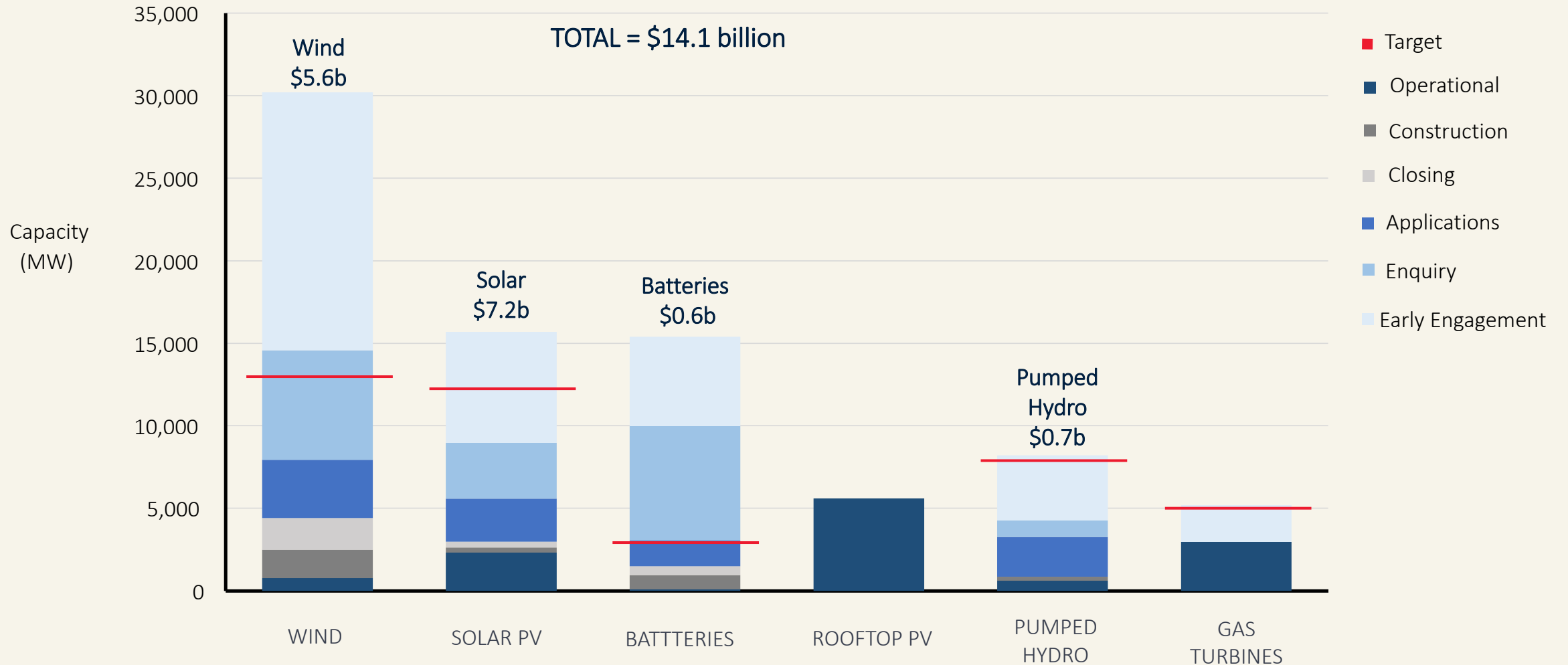
As at September 2023, **52 renewable applications** being processed representing **~19,036MW**

Projects at the enquiry stage (including early engagements) with combined max output of **~74,100+MW**

More than **30,000MW** of renewable generation projects in initial project development stage



# Queensland forward pipeline

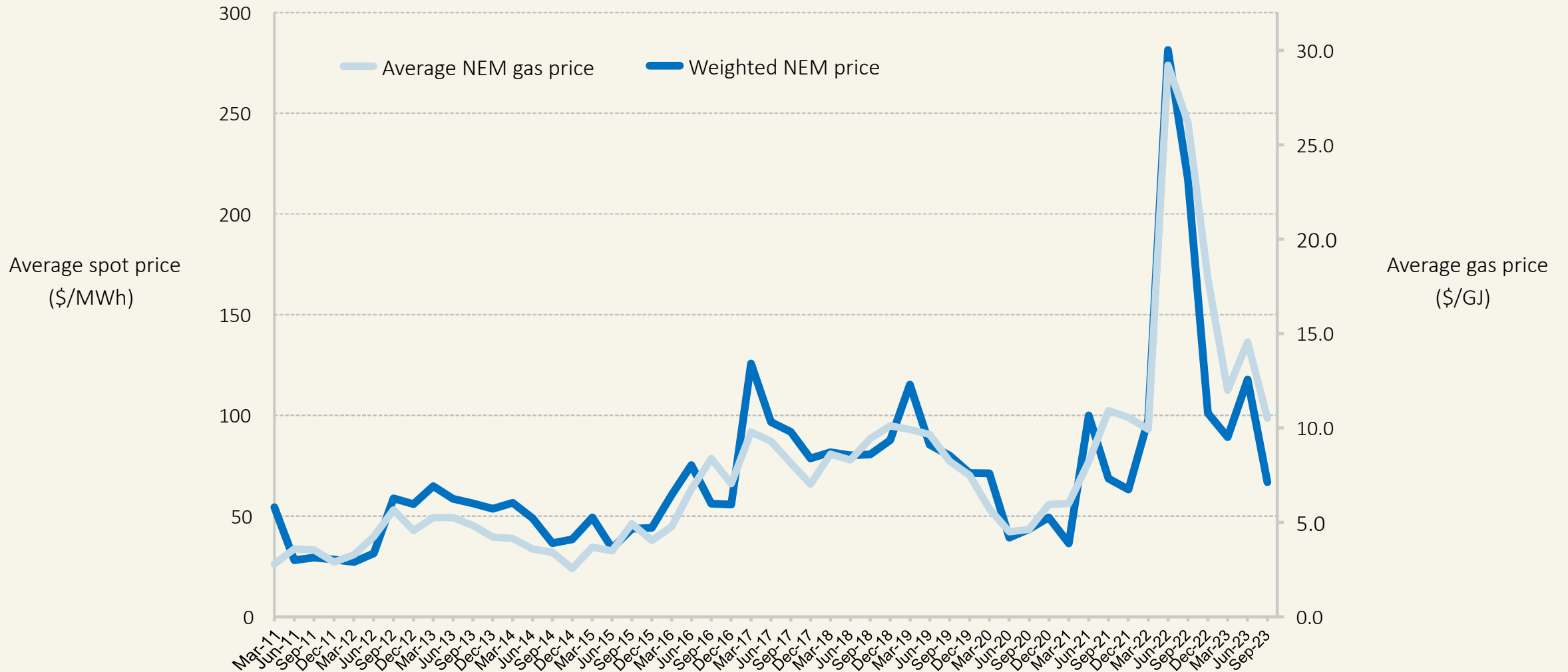




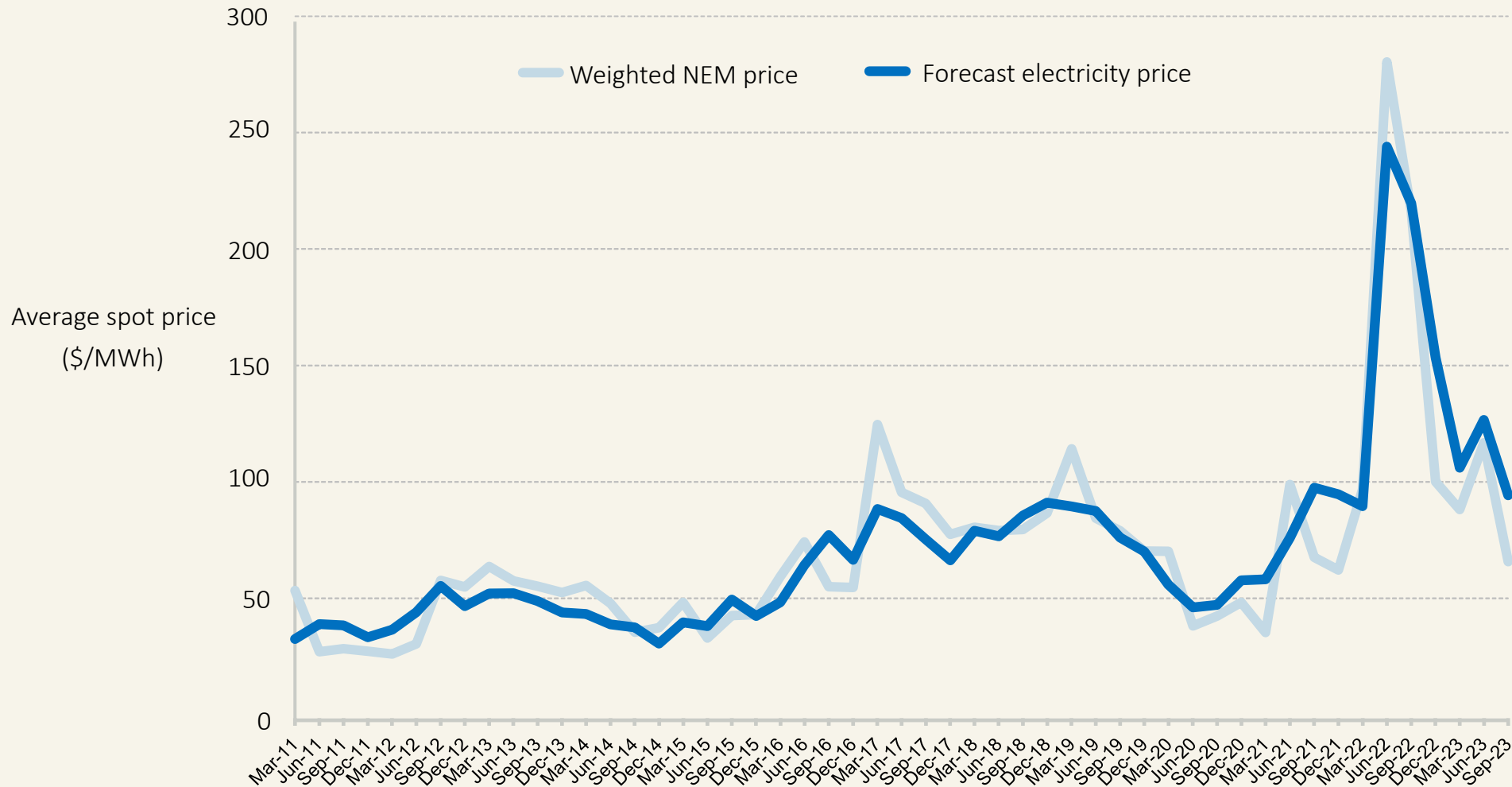
# Prices



# Wholesale prices (gas and electricity)

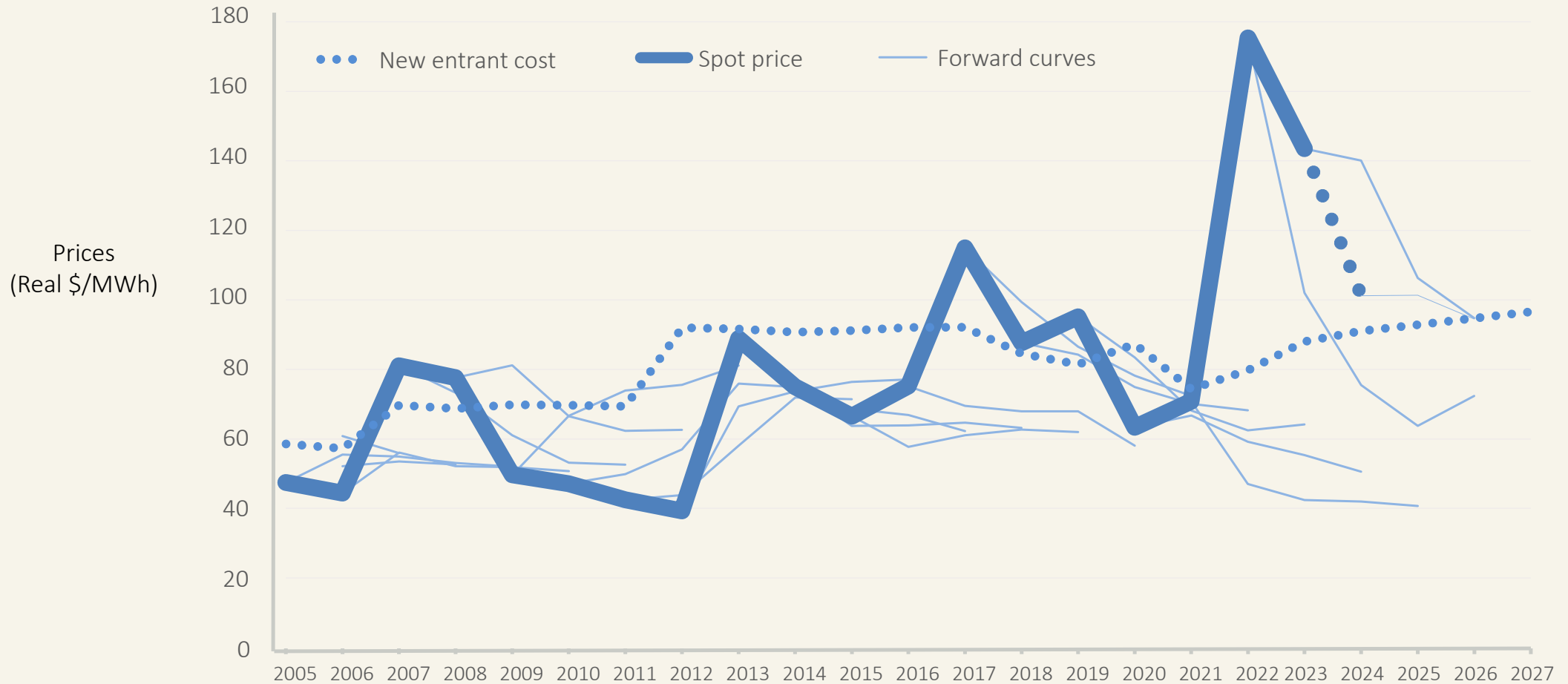


# Electricity price forecast = \$11/MWh + (8 x Gas Price)

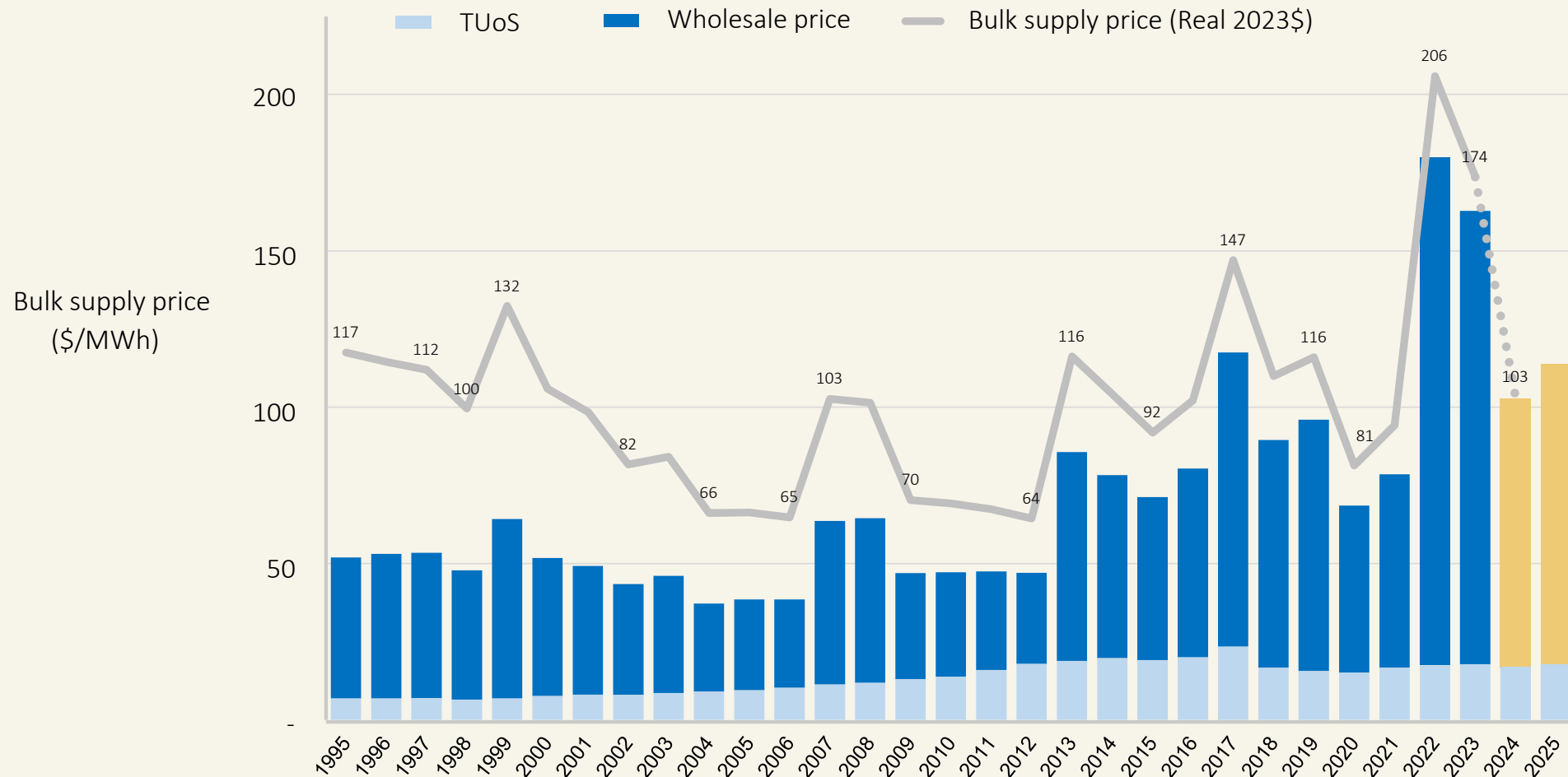




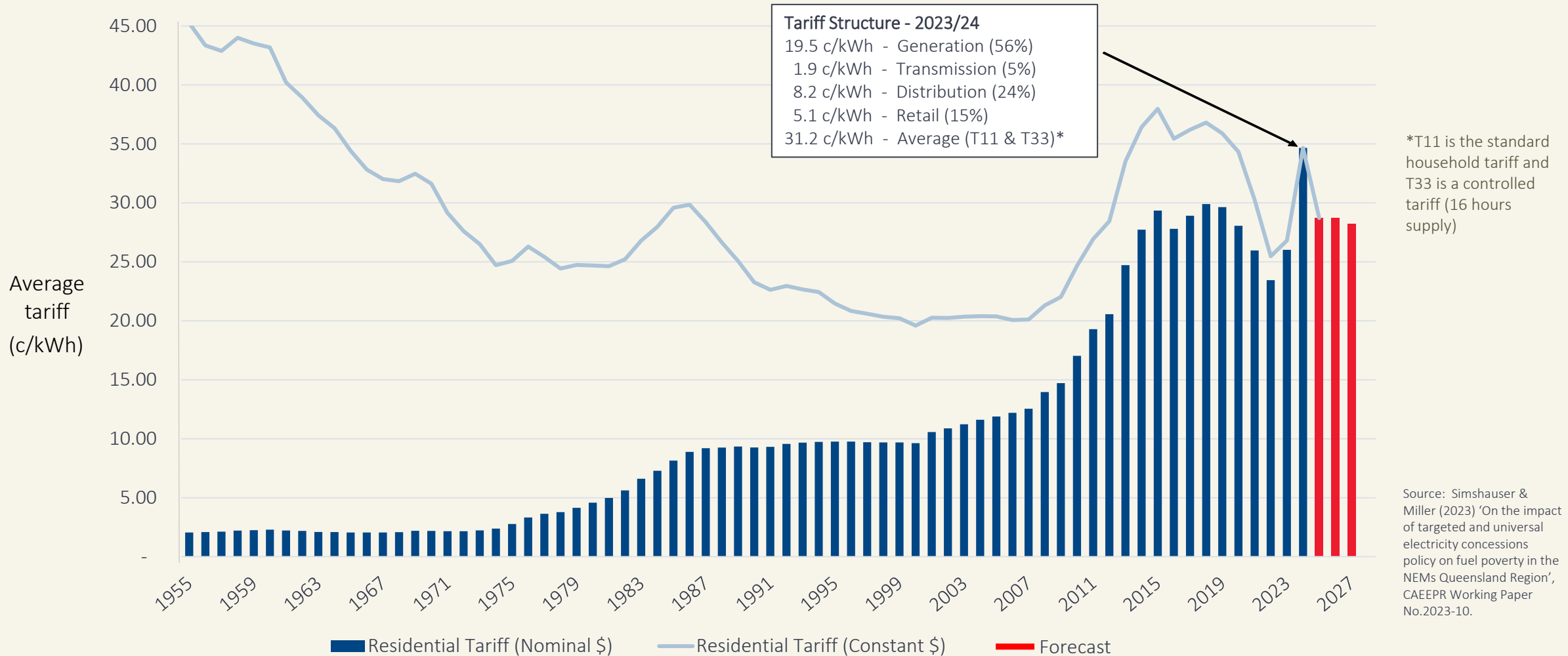
# Forward prices – mean reverting



# Bulk supply price

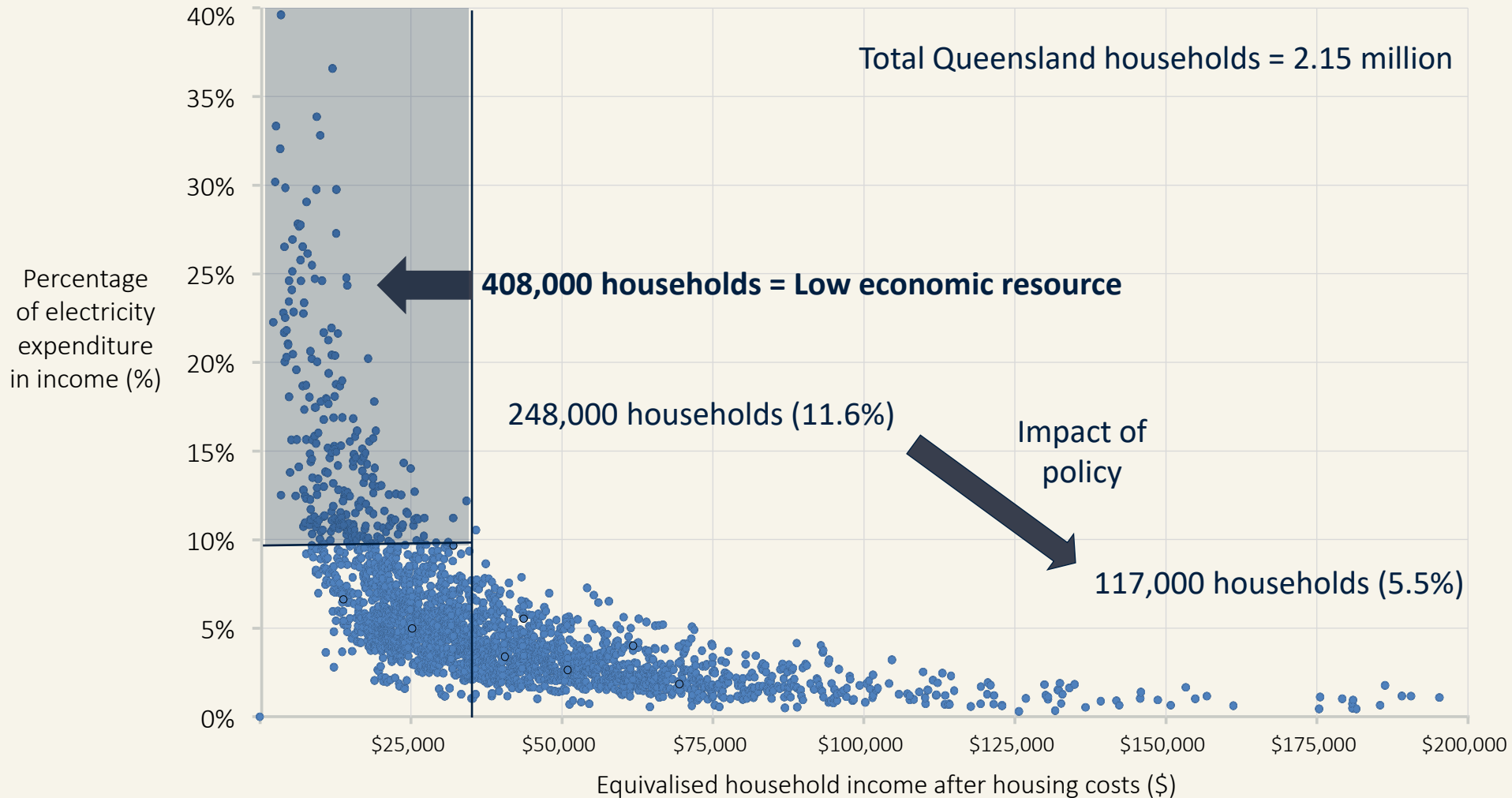


# Queensland residential tariff (1955-2023)



# 2023 Queensland household electricity expenditure v Income

Engel curve (electricity)



Source: Simshauser & Miller (2023) 'On the impact of targeted and universal electricity concessions policy on fuel poverty in the NEMs Queensland Region', CAEEPR Working Paper No.2023-10.



# Queensland Renewable Energy Zones



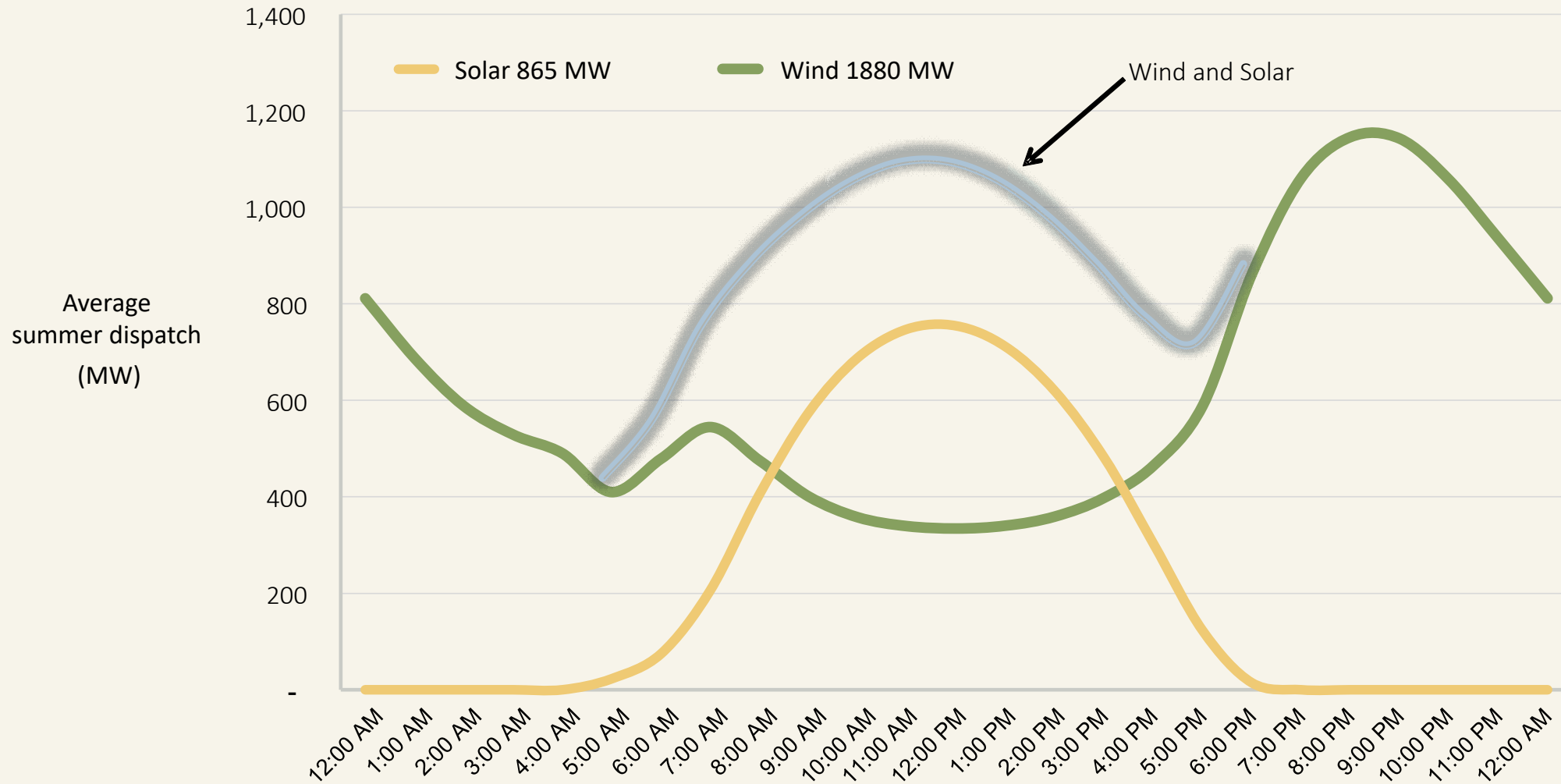
# REZ – Network v RE capacity

## REZs are a lead indicator of renewable investment

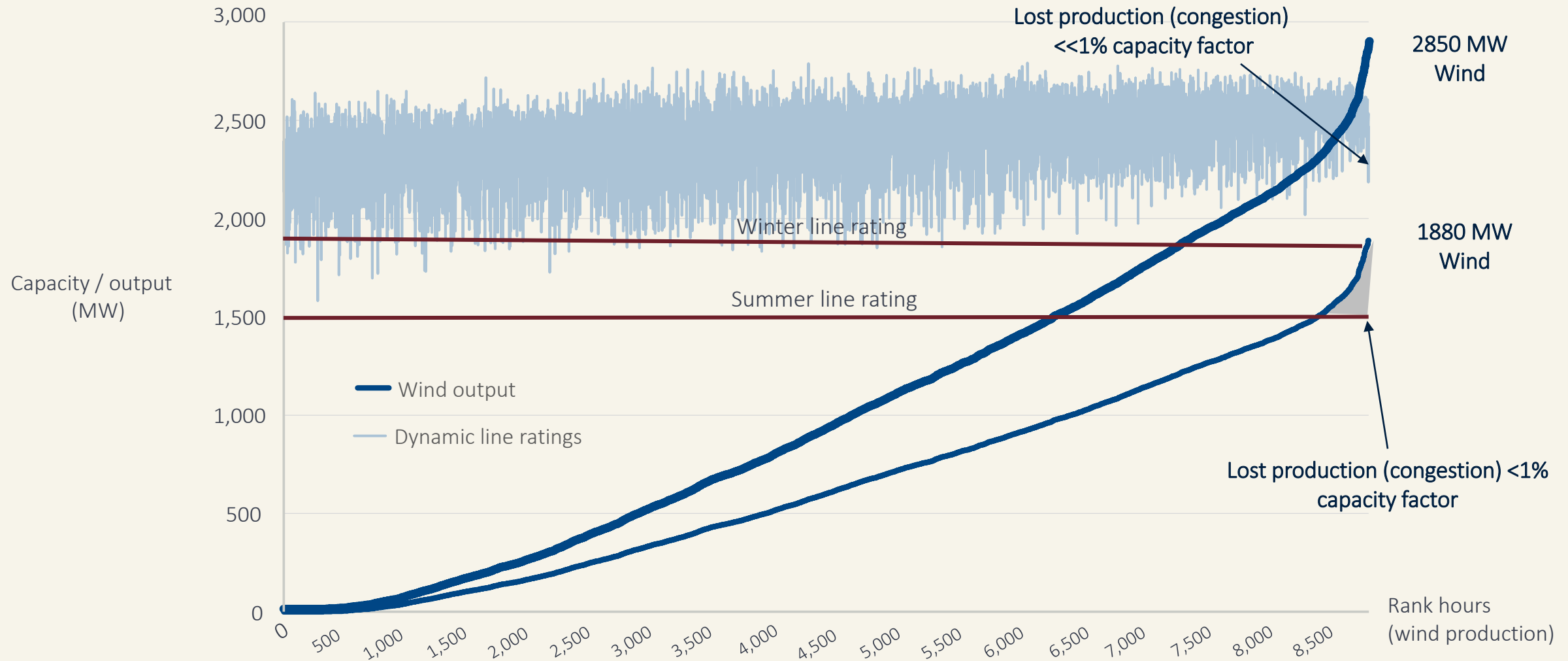
- There are three critical drivers:
  - The complementarity of wind and solar resources in Queensland REZs
  - Peak-to-average (wind) production ratios
  - The NEM's non-firm access regime
- Non-firm access means congestion is shared
- Priority access forces curtailment from average to marginal



# Queensland wind and solar (Western Downs)

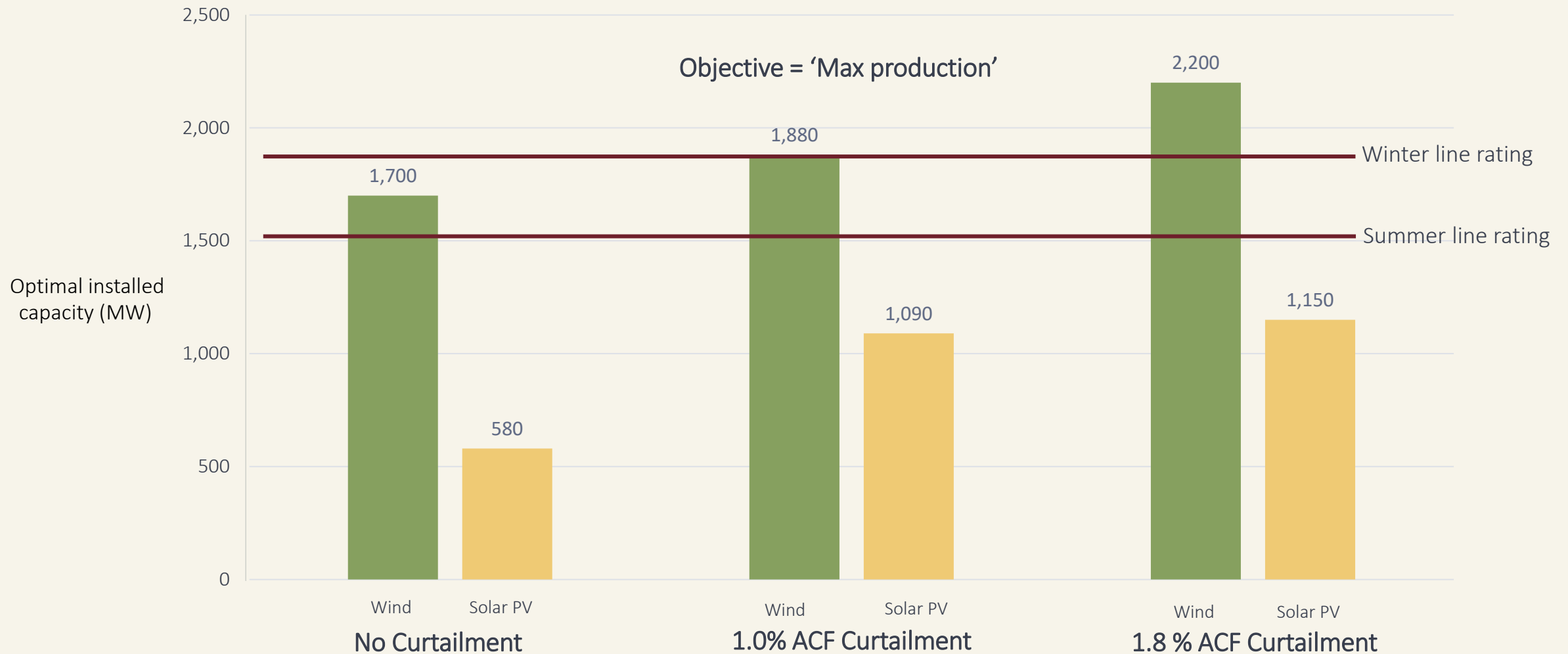


# Line ratings v Peak-to-average production

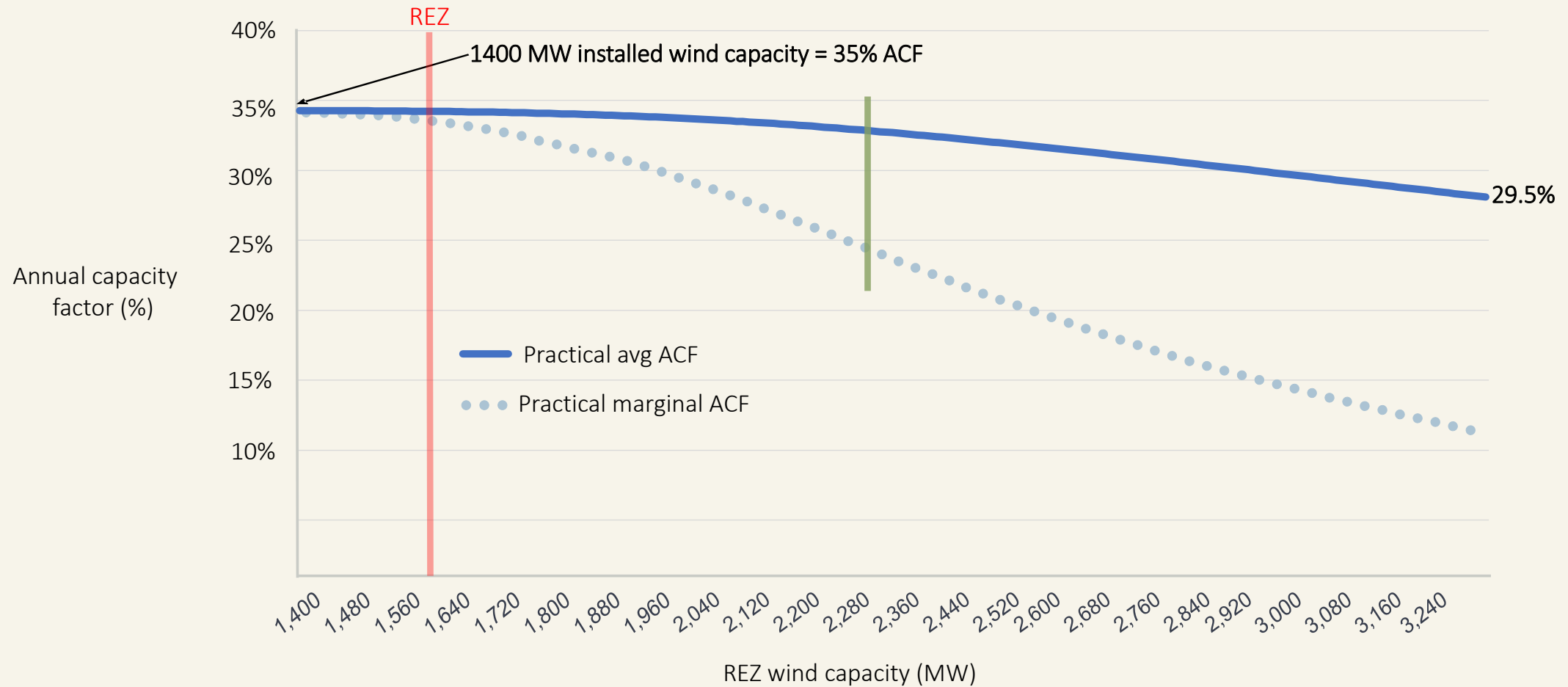




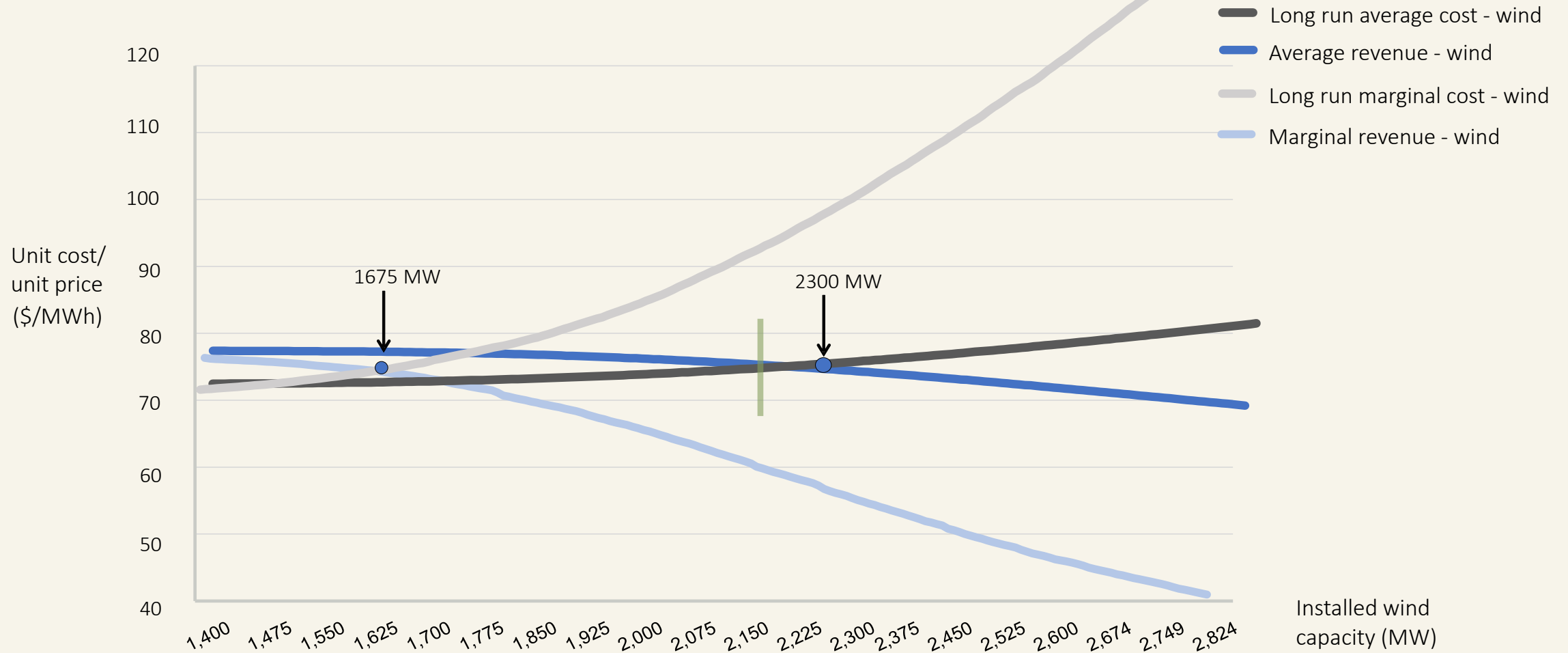
# REZ network capacity v Renewable plant capacity




# Average v Marginal curtailment rates - wind



# Average v Marginal costs and revenues - wind





“ One of our stated objectives is to *‘guide the market’* but we’re not smarter than the market...”

# The market is smarter than we are...

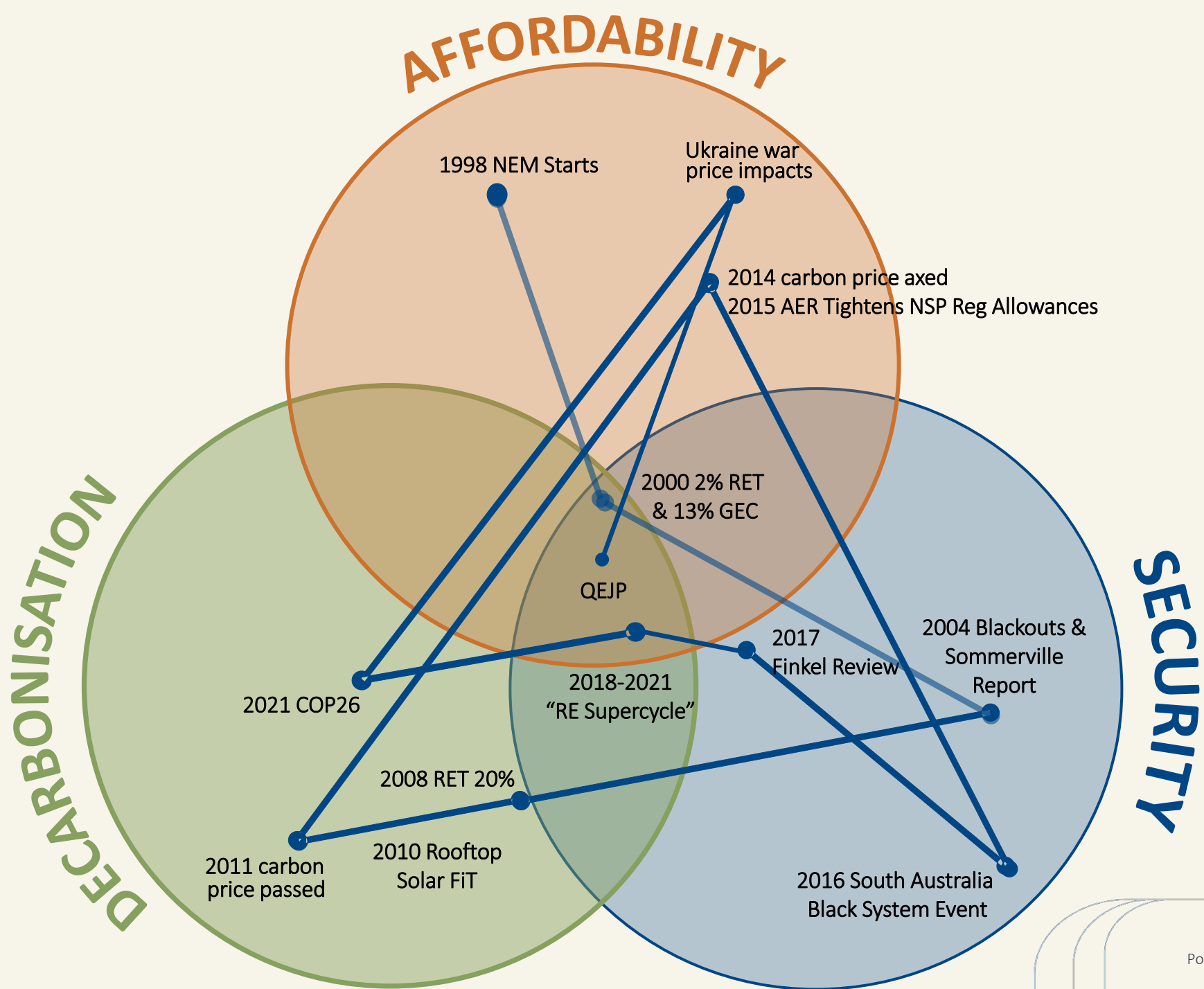


Our first REZ  
will be at  
Western  
Downs...

Market  
investment is  
trending  
towards  
'underweight  
wind'...

We need to  
undertake an  
EOI process for  
batteries...

Synchronous  
condensers  
are too big for  
individual VRE  
projects...



# Question time

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# Engaging with Queensland communities

Dr Kieren Moffat  
CEO, Voconiq



# Community sentiment research

Substantive social research across three Queensland REZ areas:

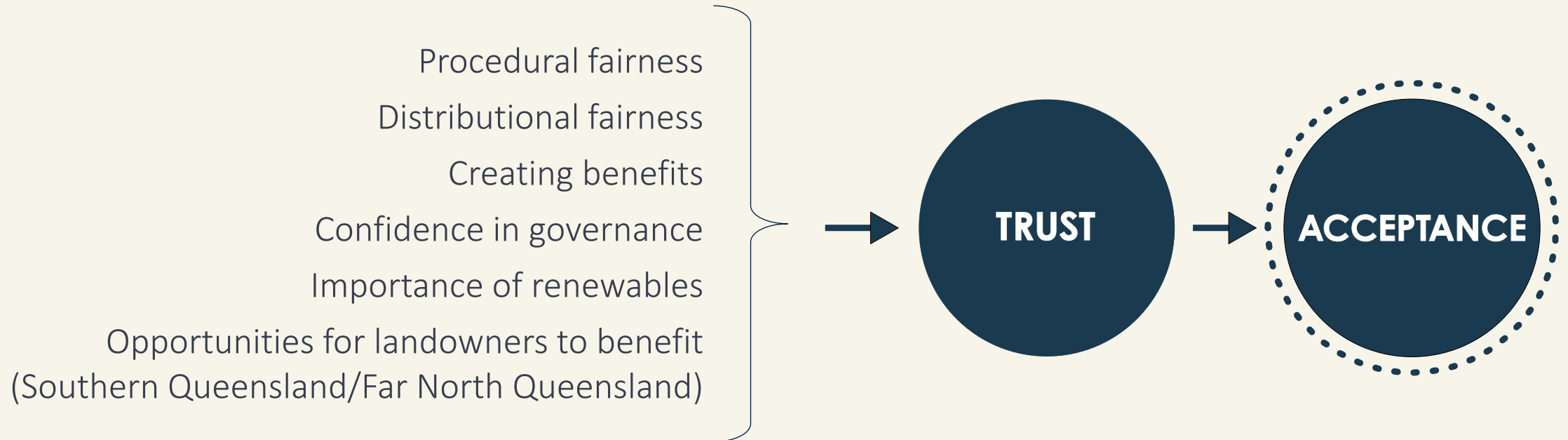
- what drives trust and acceptance of Powerlink?
- community sentiment on these drivers and other issues
- change over time

Region	2021/22	2023
Far North Queensland	651	644
Central Queensland	582	609
Southern Queensland	528	381
<b>Total</b>	<b>1,761</b>	<b>1,849</b>

Characteristic	2021/22	2023
Landholder	27.4%	26.3%
Aboriginal/Torres Strait Islander status	11.5%	9.7%

# Community sentiment research

Drivers of social licence remain stable





# Value proposition remains strong

Queensland residents across the regions surveyed remain consistent in their:



Agreement that 50% renewable target by 2030 is important



That new development will support their region's future prosperity



That development will provide jobs for local people



Resilient communities:

- Strong support for infrastructure investment
- Strong community identity
- A desire for more opportunities for young people and support for the most vulnerable

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# Engaging with Queensland communities

Dana Boxall  
General Manager  
Community & Delivery Services





# Transmission Easement Engagement Process

- |  |                        |                            |                      |                            |   |  |  |
|--|------------------------|----------------------------|----------------------|----------------------------|---|--|--|
| 1.<br>Introduce project and determine <b>corridor selection</b> criteria | 2.<br>Corridor options | 3.<br>Recommended corridor | 4.<br>Final Corridor | 5.<br>On-site land studies | 6.<br>Easement alignment and negotiations | 7.<br>Planning and environmental approvals | 8.<br>Ongoing engagement and commitments |
|--|------------------------|----------------------------|----------------------|----------------------------|---|--|--|

COMMUNITY INSIGHTS

# Powerlink's New SuperGrid Landholder Payment Framework

Launched May 2023



Significantly boosts payments to hosting landholders



First transmission company in Australia to offer payments to adjacent landholders



Flexibility in timing of payments to hosting landholders

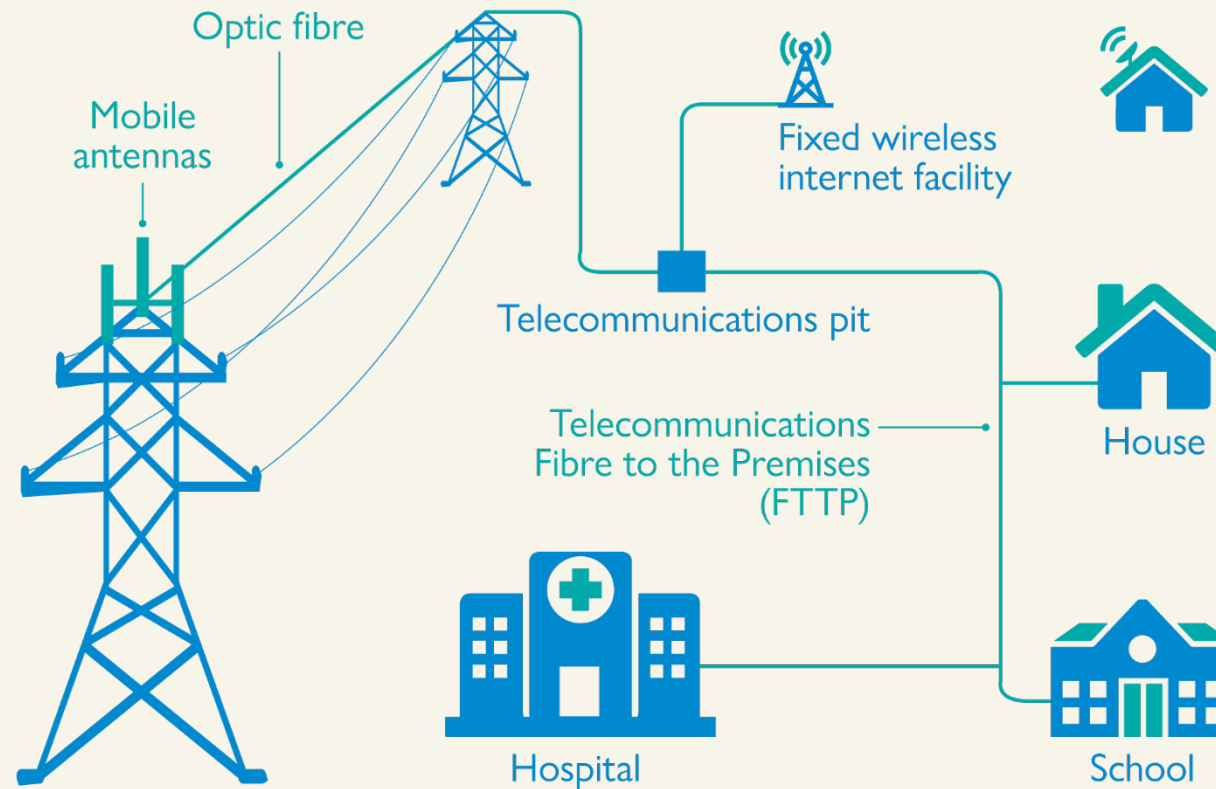


Provide payment estimates to landholders earlier in the process



# SuperGrid Telecommunications Program

Queensland communities to benefit from improved digital connectivity



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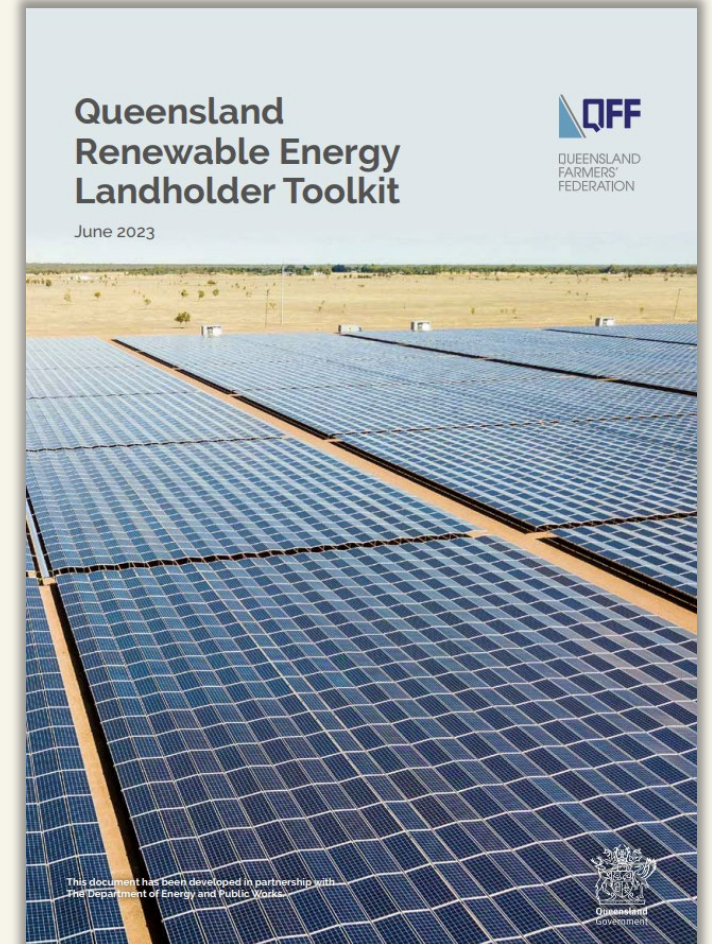
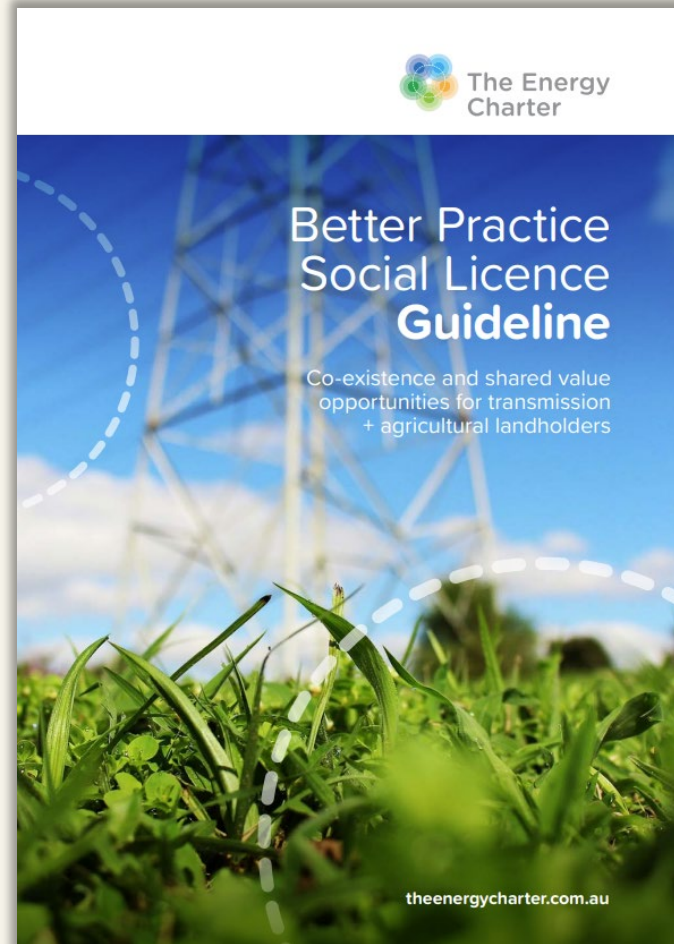
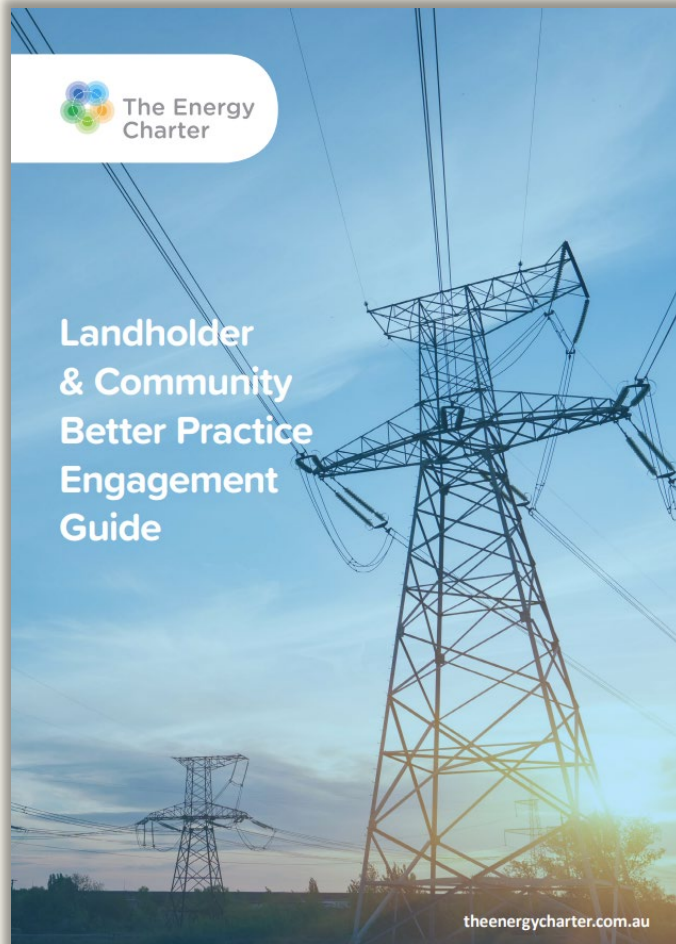


Time for a break

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# Resources for communities



# Community Panel | Social licence to operate



**Andrew Bray**

National Director  
RE-Alliance



**Dana Boxall**

General Manager  
Community & Delivery  
Services



**Jo Sheppard**

CEO  
Queensland  
Farmers' Federation



**Dr Kieren Moffat**

CEO  
Voconiq

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# Renewable Energy Zones

Leanne Caelers

Executive Director, Transmission and Transformation, DEPW



**Queensland  
Government**



# Acknowledgement of Country

I would like to acknowledge the Traditional Owners of the land on which we meet today, and pay my respects to Elders past, present and emerging.

# Energy Transformation in Queensland



**\$19 billion down payment**

## SuperGrid Infrastructure Blueprint

- Optimal infrastructure pathway to transform Queensland's electricity system
- Investment large-scale infrastructure:
  - Renewables
  - Storage and firming
  - Transmission and system strength
  - Clean Energy Hubs
- Framework to manage risk and uncertainty – updated every 2 years from 2025

# Where we are today



**Sep 2022**  
QEJP and  
Blueprint



**Oct 2022**  
Draft  
Partnerships  
Framework



**Jun 2023**  
Draft  
Legislation



**Jul 2023**  
Draft REZ  
Roadmap

**We are here**



**Late 2023**  
Outcomes from  
consultation  
including Local  
Energy  
Partnerships



**2024**  
Legislation in  
place



**2025**  
First Blueprint  
update

# New legislation

## Commitments

- ✓ Renewable Energy Targets
- ✓ Job Security Guarantee
- ✓ Public Ownership

## Frameworks

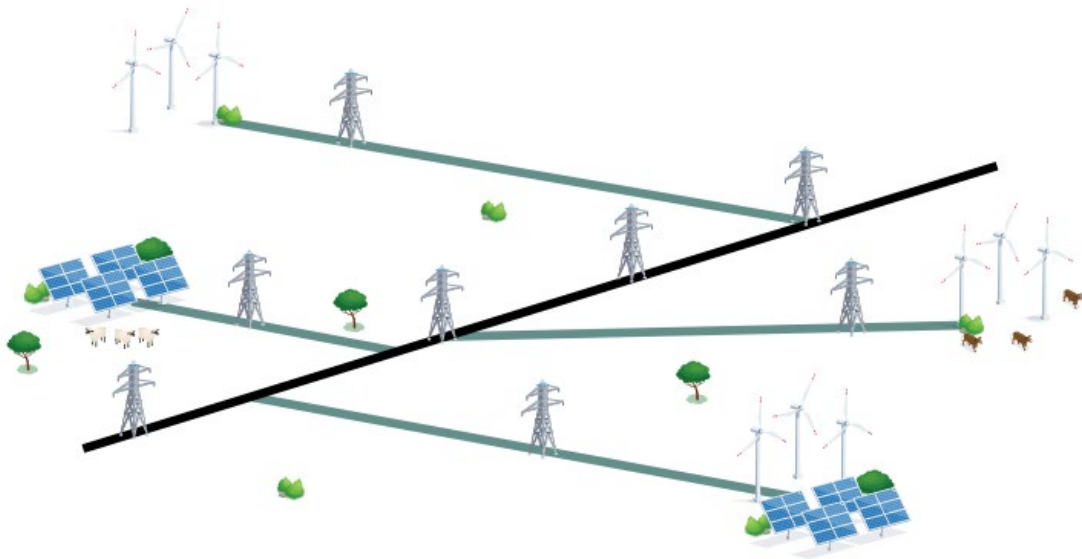
- ✓ Infrastructure Blueprint
- ✓ Priority Transmission Investments
- ✓ Renewables Energy Zones

## Governance

- ✓ Qld Energy System Advisory Board
- ✓ Energy Industry Council
- ✓ Renewable Energy Jobs Advocate

# Renewable Energy Zones

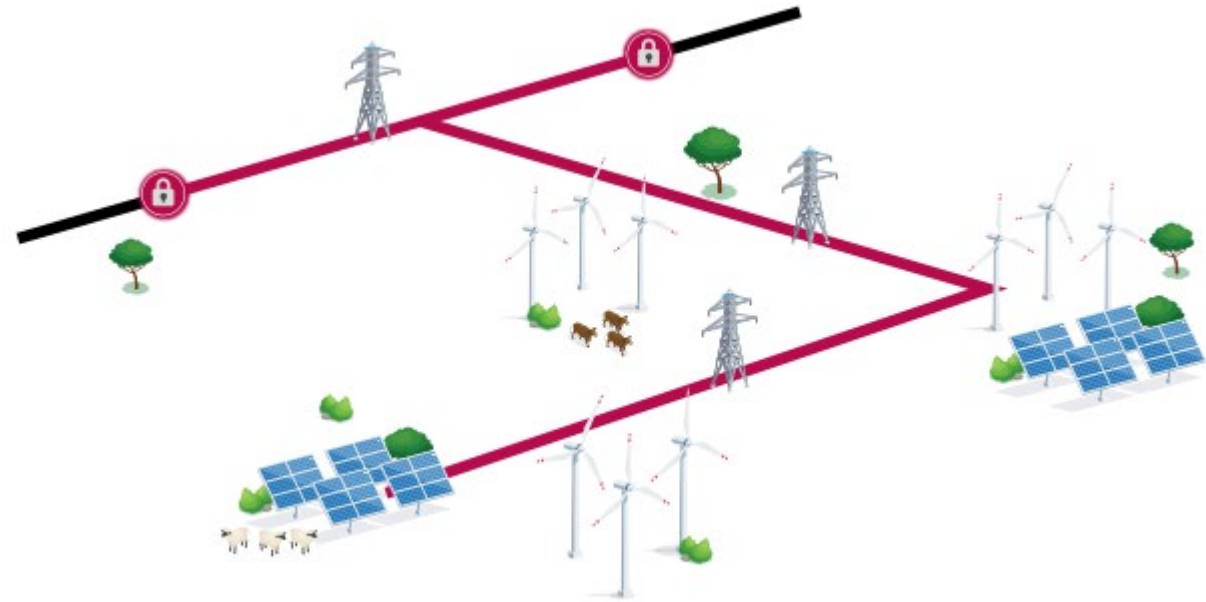
## Uncoordinated development



Uncoordinated network development

Existing transmission network

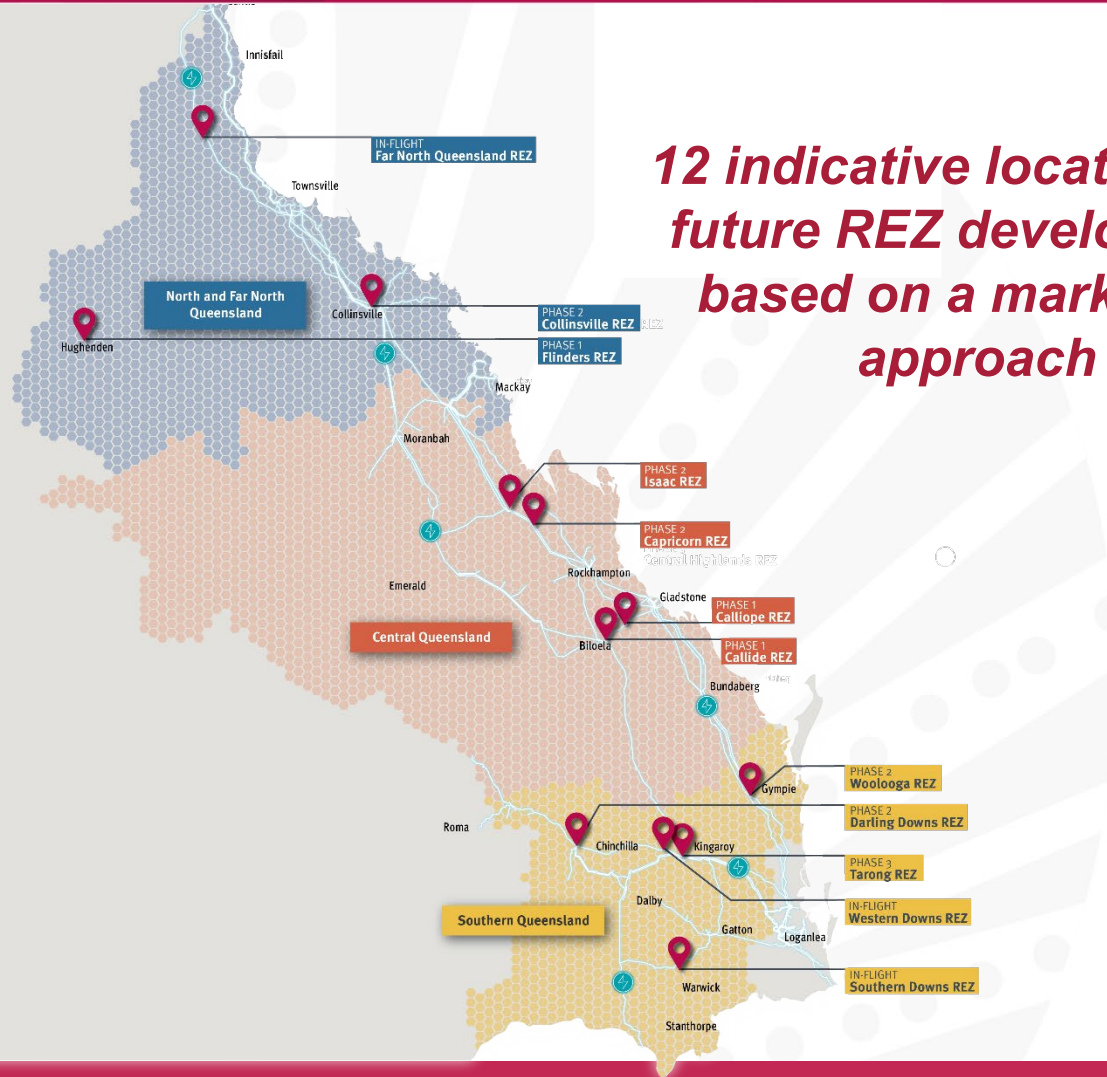
## Coordinated REZ development with declared REZs



Access controlled by REZ Delivery Body

Coordinated REZ network

# Draft REZ Roadmap



*12 indicative locations for future REZ development based on a market led approach*

REZ Readiness Assessments

Engagement with communities

Coordinated benefits

# Components of the REZ Legislation

## Planning

- REZ declarations
- REZ Management Plans (RMP)
- REZ Readiness Assessments

## Access and Connection

- Role of REZ Delivery Body (RDB)
- Modifications to open access regime and application of the RMP (relevant criteria for eligible projects)

## Cost Recovery

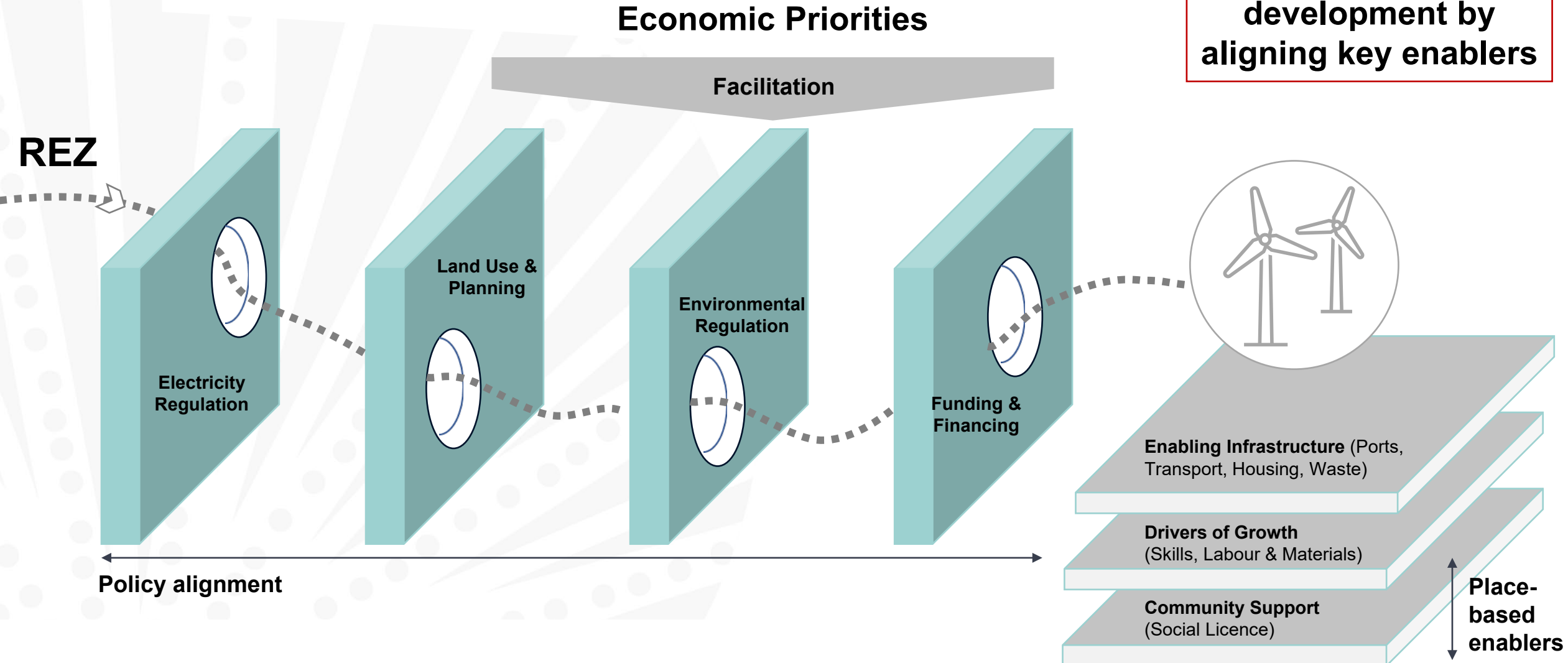
- REZ participants contribution on commercial basis
- Shortfall may be recovered through prescribed transmission services (subject to Ministerial decision)

## Transitional and Other Arrangements

- Rights associated with connection and access to the shared network and DNAs are preserved to the extent necessary to provide investors with certainty.

# Alignment on priorities

**Government is supporting REZ development by aligning key enablers**





# Benefits of REZ development...

**For  
communities**

**For  
developers**

**For the  
energy system**

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# Queensland Renewable Energy Zones

Daniel Andersen  
General Manager, Energy Markets



# Tailored REZ Management Plans





# Eligibility criteria

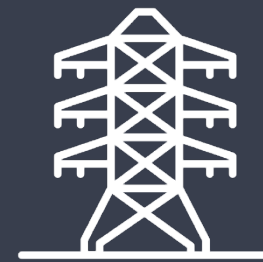
Focusing on maximising REZ benefits



Community



Developers



Energy system



What renewable generator eligibility criteria do we need to maximise the benefits and create the best outcomes for:



Community



Developers



Energy system

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# Transmission Annual Planning Report 2023

Stewart Bell  
Executive General Manager  
Network and Business Development

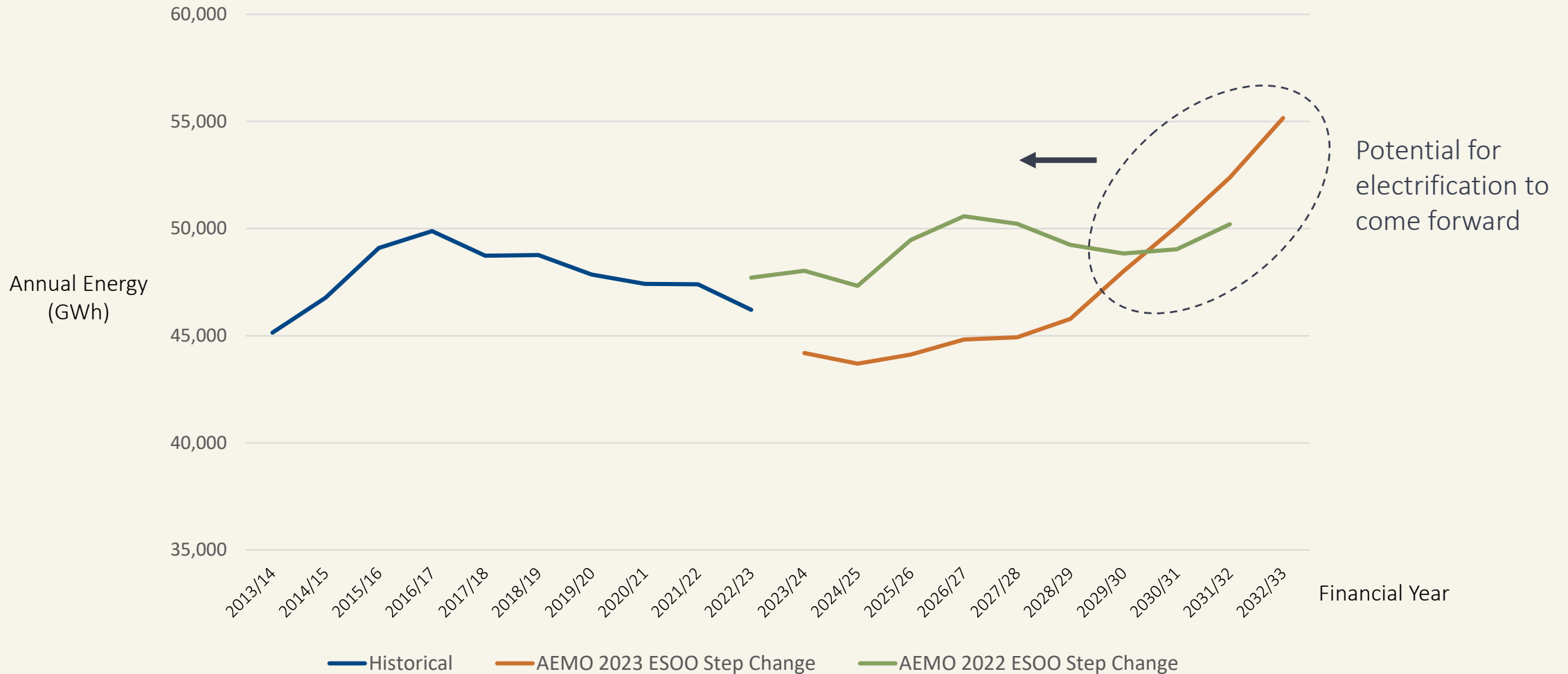


# Guiding the market

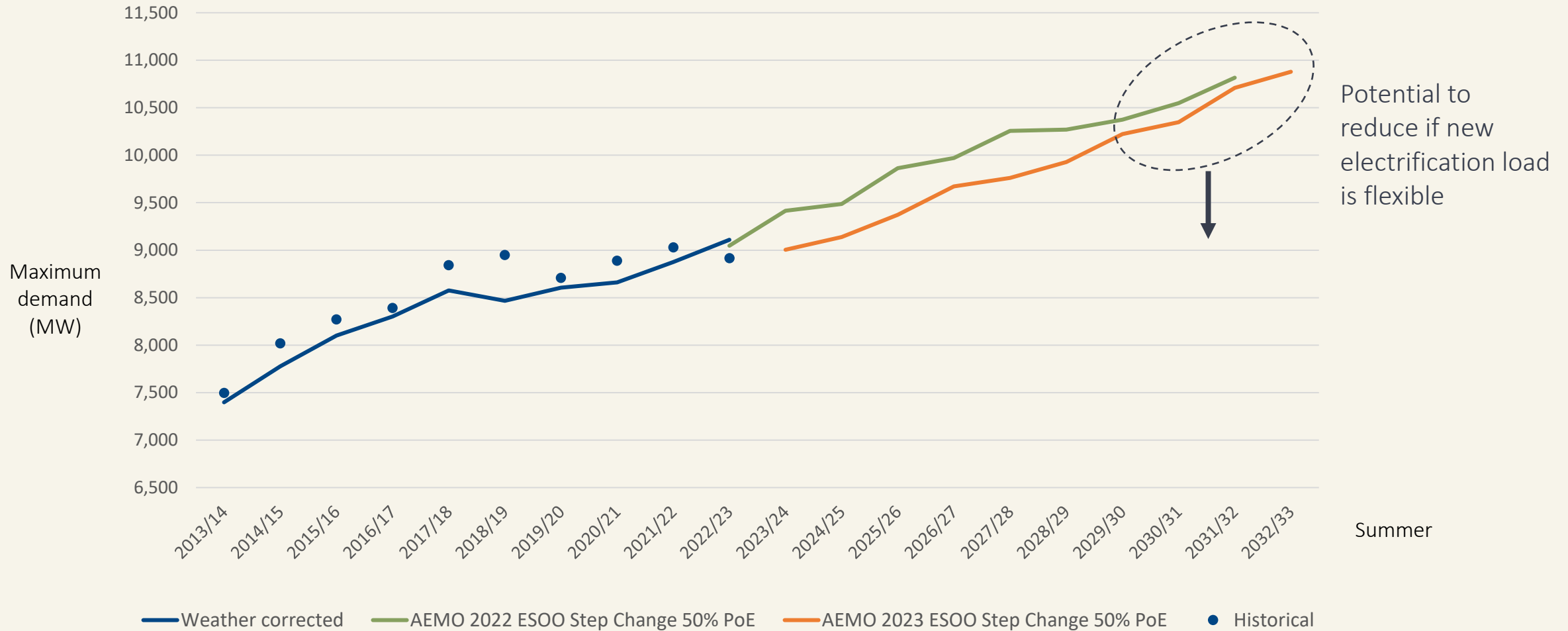
- Playing an active role in shaping the future power system and strategically planning the transmission network to enable 80% renewables by 2035
- Continuing to work closely with the Queensland Government in actioning the Queensland Energy and Jobs Plan (QEJP) and the establishment of Renewable Energy Zones (REZ)
- Working closely with load and generator developers to facilitate cost effective connections
- Engaging with local communities who are front and centre in Powerlink's planning and decision-making
- Ongoing collaboration with AEMO in the development of the Integrated System Plan (ISP) and the provision of System Security Services



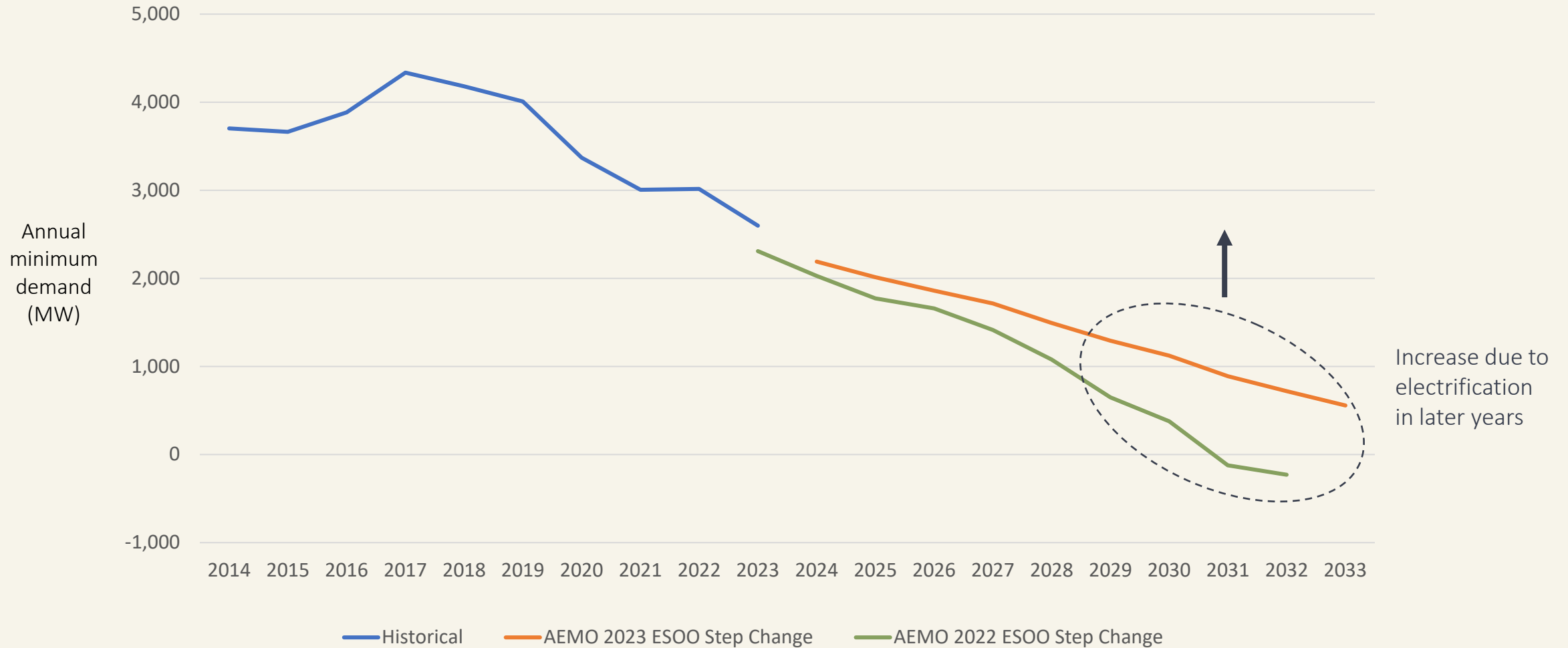
# Queensland energy forecast



# Queensland maximum demand forecast



# Queensland minimum demand forecast



# Asset Reinvestment Review

- Review focused on approach to transmission line reinvestments
- Identified improvements in the bundling approach across modelled projects to benefit future reinvestment decisions
- Working Group members included members from:
  - Customer Panel
  - Consumer Challenge Panel
  - Australian Energy Regulator
  - Powerlink subject matter experts

## CASE STUDY: Refit of Ross to Chalumbin 275kV transmission line

Bundling approach	Net present cost	Variance to base case cost
Single intervention <sup>1</sup>	\$24.8m <sup>2</sup>	\$0m
Two bundled interventions	\$23.4m	(\$1.4m)
Three bundled interventions	\$23.2m	(\$1.6m)
Annual interventions	\$36.4m	\$11.6m

<sup>1</sup> Base case

<sup>2</sup> Base case cost

# Project update

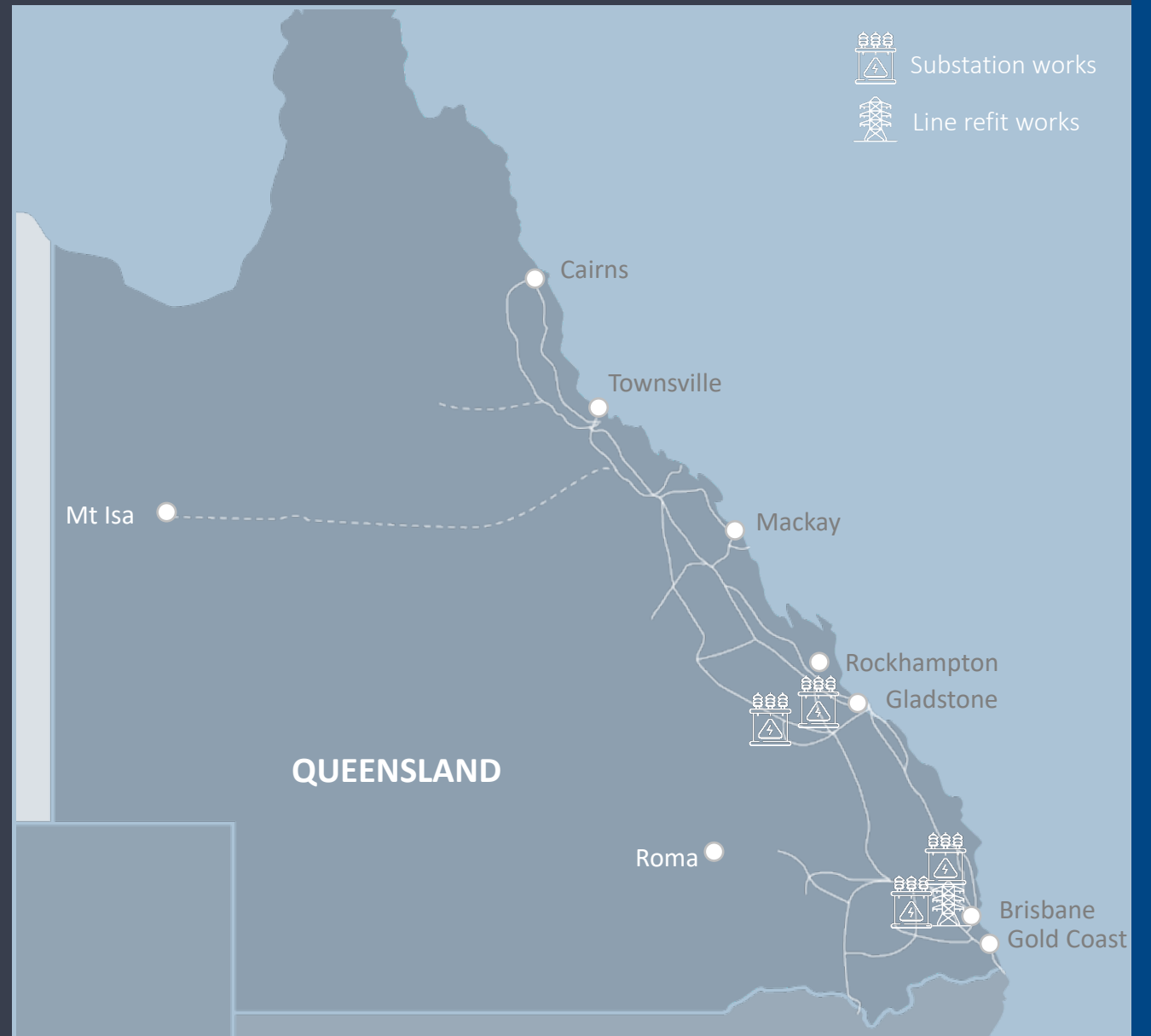
## Completed in the last 12 months

### Substation works:

- Baralaba secondary systems
- Bouldercombe primary plant
- Palmwoods secondary systems
- Tarong secondary systems

### Line refit works:

- Between South Pine and Upper Kedron





# Project update

## Currently underway

### Augmentation works:

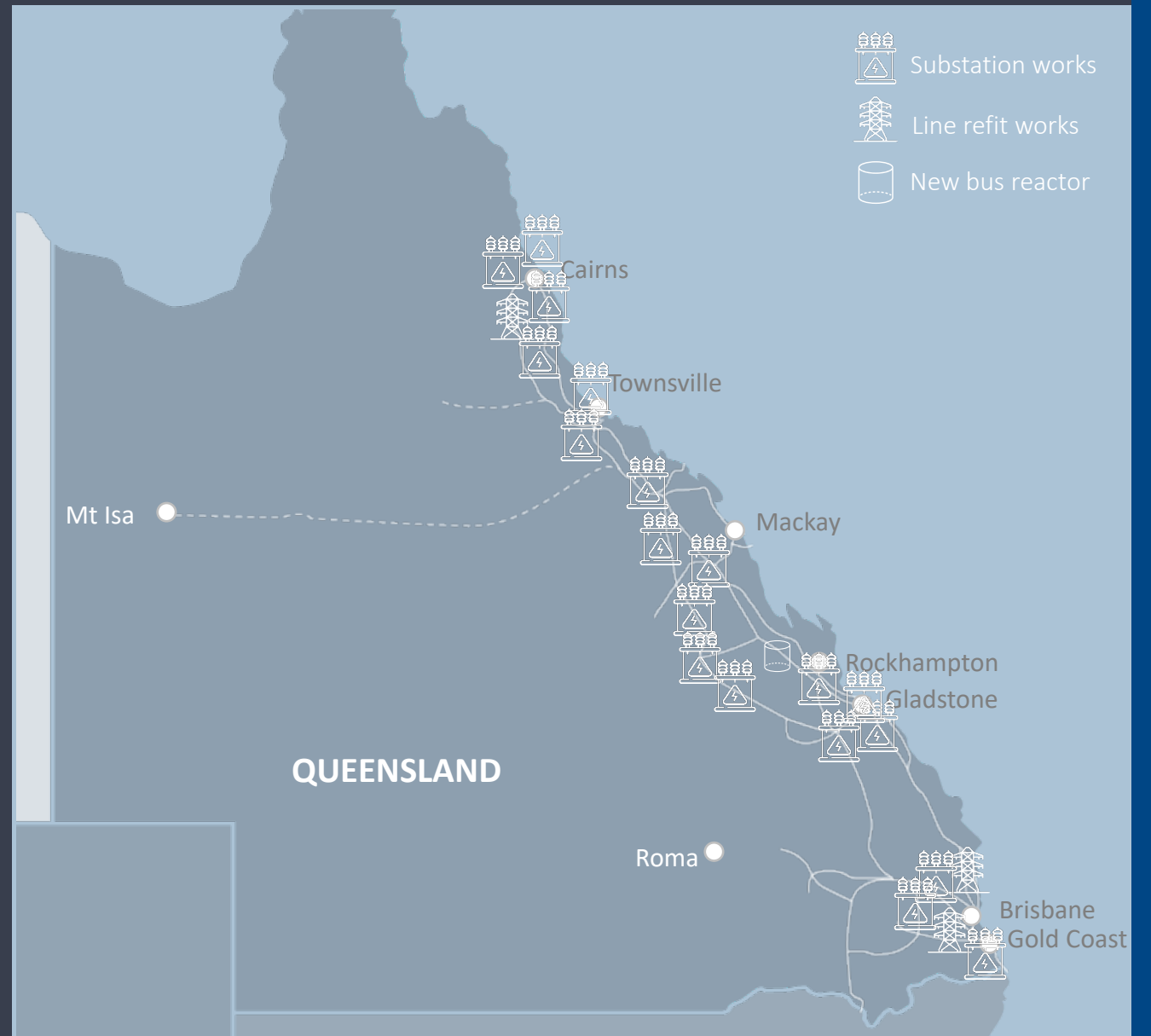
- Broadsound bus reactor

### Line refit works:

- Chalumbin and Woree (between Davies Creek and Bayview Heights)
- Between Woolooga and Palmwoods
- Between West Darra, Sumner and Rocklea

### Statewide secondary systems replacements:

- **North:** Woree, Chalumbin, Cairns, Townsville, Ross, Strathmore, Nebo, Kemmis, Newlands
- **Central:** Dysart, Calvale, Blackwater, Lilyvale, Wurdong, Egans Hill, Gladstone
- **South:** Abermain, Mt England, Mudgeeraba



# Queensland SuperGrid

Transmission backbone to enable large-scale efficient transportation of renewable energy and storage across the State



01

## STAGE 1

Borumba Pumped Hydro Connections

02

## STAGE 2

Central Queensland Connection

03

## STAGE 3

Pioneer Burdekin Pumped Hydro  
North Queensland Connection





04

## STAGE 4

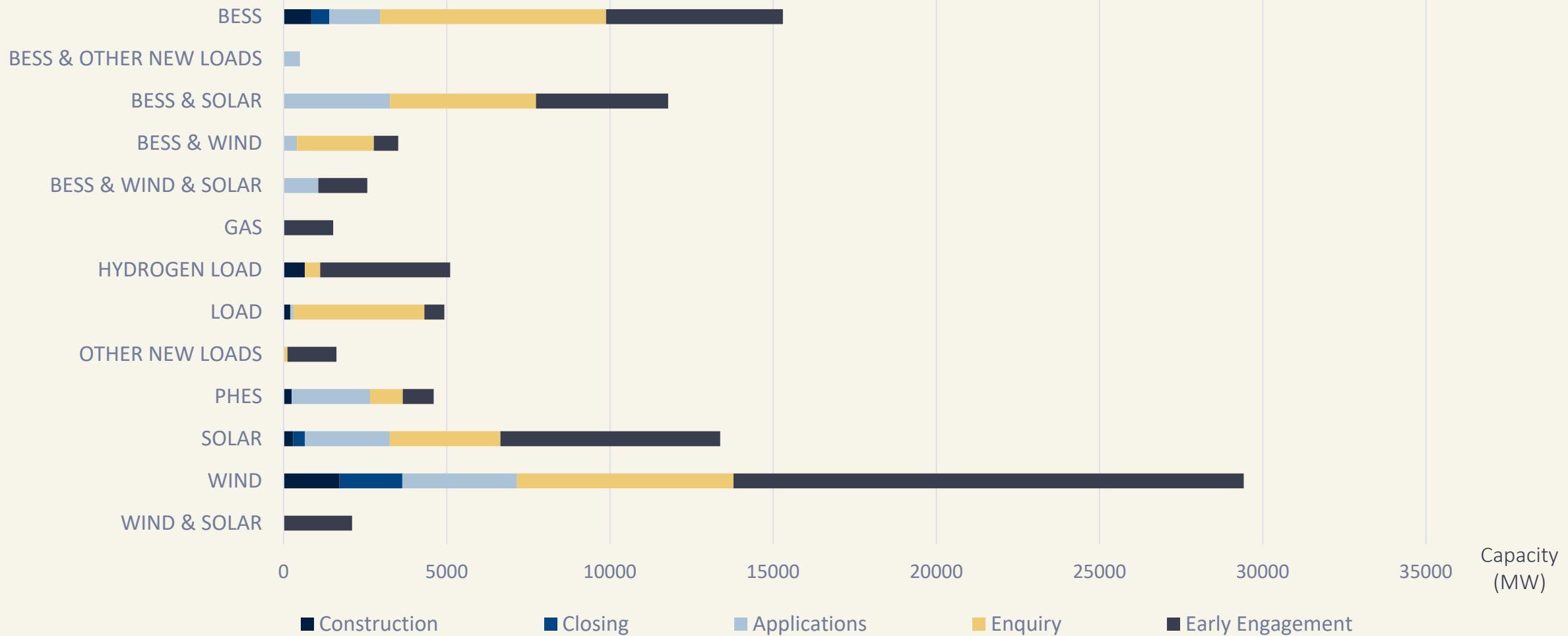
Townsville to Hughenden Connection

# Queensland Renewable Energy Zones



	 In-flight	 Phase 1 (NOW – 2024)	 Phase 2 (2024 – 2028)	 Phase 3 (POST 2028)
North	500	500	5,100	5,100
Central	0	4,600	8,200	8,200
South	4,000	4,000	9,200	11,600
<b>Total</b>	<b>4,500 MW</b>	<b>9,100 MW</b>	<b>~ 23 GW</b>	<b>~ 25 GW</b>

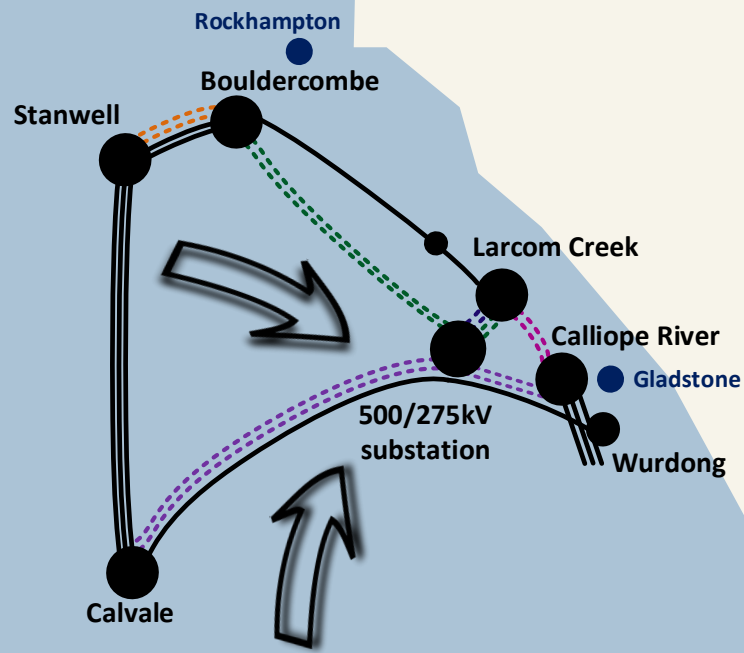
# Queensland connection pipeline



# Enabling Supply to Central Queensland

10GW of new loads and electrification in Central Queensland by 2035

## High-Capacity Transmission Development Plan:



Stage 1

Calvale to Calliope River

Stage 2

Bouldercombe to Larcom Creek

Stage 3

Calliope River to Larcom Creek

Stage 4

Stanwell to Bouldercombe

Stage 5

500/275kV substation establishment

# Growing non-network solutions

**2022-2023**

Non-network solution with CleanCo to address the immediate absorbing reactive gap in South East Queensland.



**2023-2024**

Install a network reactor and CleanCo network support agreement followed by incremental Battery Energy Storage System network support agreements to support longer term voltage control in South East Queensland.



# Building an efficient transmission network through optimisation



## Increasing capacity

- Improve Frequency Control Ancillary Services (FCAS)
- Dynamic line ratings
- High temperature conductors
- Static compensators
- Phase shifting transformers



## Customer value through efficiency

- Intelligent digital substation
- In-panel replacements
- Reinvestment approach

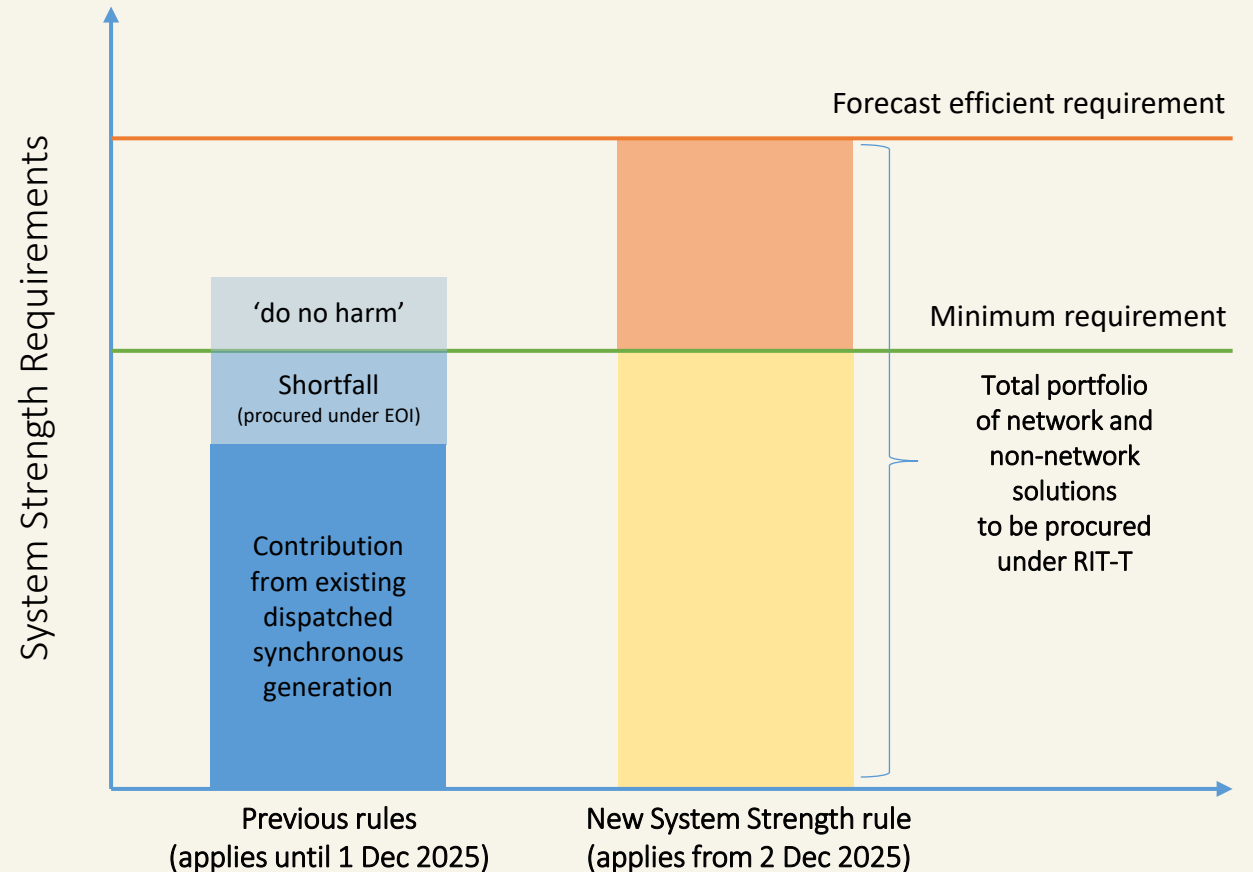


## WAMPAC (Wide Area Monitoring Protection & Control)

- Outage planning
- Virtual transmission
- Runback schemes

# System Strength Services

- Powerlink is seeking a portfolio of services that meet the forecast requirements from December 2025
- It is expected that non-network solutions will materially contribute to the portfolio of system strength solutions, such as:
  - synchronous generation plant
  - synchronous condensers
  - pumped hydro energy solutions
  - grid-forming batteries and/or
  - other technologies that can support stable voltage waveforms





# Update on System Strength

- Targeting a lower System Strength Unit Price (SSUP)
- We are actively engaging with the market and industry bodies
- System strength environment has changed significantly and many of the drivers for a centralized approach no longer hold
  - Synchronous condenser the main solution
  - 3+ years to implement
  - Economies of scale
- Please speak with the Powerlink team to explore options for your system strength needs



# Transmission Annual Planning Report Panel



**Enrique  
Montiel**

Principal Engineer  
Network Planning



**Nathaniel  
Dunnett**

Manager  
Portfolio Planning



**Peta  
Starkey**

Senior  
Market Specialist



**Sachin  
Goyal**

Manager Power System  
Performance and Connection

# Agenda

- 1 Official address video - The Hon. Mick de Brenni MP
- 2 State of the Network - Prof. Paul Simshauser AM
- 3 Engaging with Queensland communities
- 4 Break
- 5 Community Panel | Social licence to operate
- 6 Queensland Renewable Energy Zones and interactive table discussions
- 7 Break
- 8 Transmission Annual Planning Report Technical Session and Panel
- 9 Chair address



# Chair Address

Kathy Hirschfeld AM  
Chair





# 2023 Transmission Network Forum

#PQForum

