Customer Panel Meeting

1pm – 4pm

March 2023

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

Time	Topic	Presenter	Duration
1.00pm	Welcome Overview of agenda	Gerry & Wendy	5 mins
1.05pm	Customer focus areas & strategic customer priorities for PQ – Energy Charter	Wendy Miller	25 mins
1.30pm	Working group projects: Network Development Review update	Brandon Kingwill	15-20 mins
1.50pm	Focus Area: Changing network ops context	Emma Rogers	40 mins
2.30pm	Break		10 mins
2.40pm	Copperstring – information sharing	Darryl Rowell	15 mins
2.55pm	Working group projects: Asset Reinvestment Review (ARR) update	Roger Smith	10 mins
3.05pm	Focus Area: Powerlink Supergrid Strategy: expectations and approach to non-RIT-T investments	Roger Smith	50 mins
3.55pm	Wrap-up and close	Gerry & Wendy	5 mins

Customer Strategy & Energy Charter

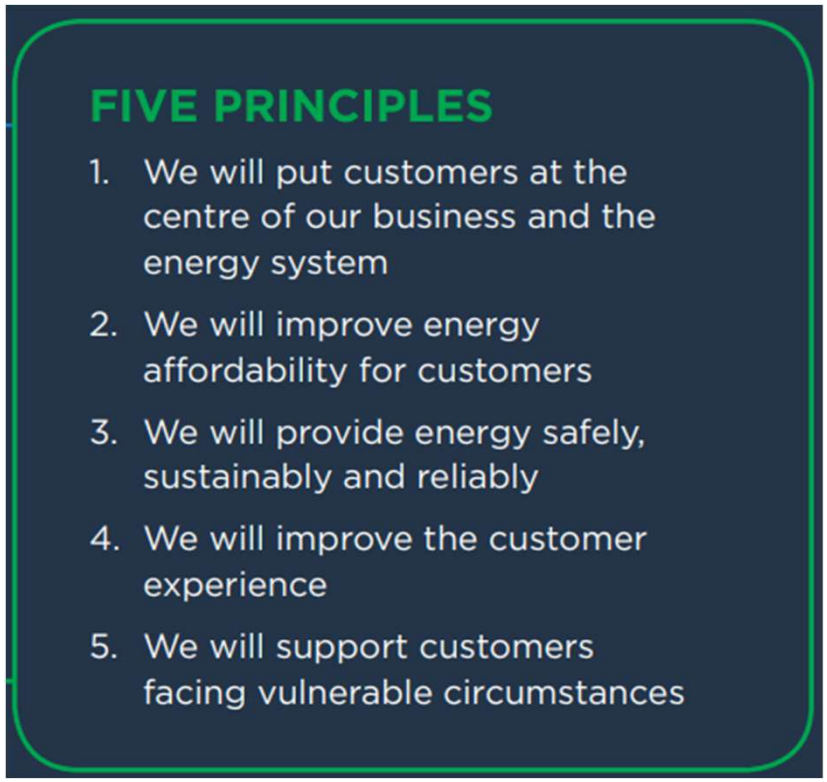
Focus priorities, fy23 Disclosure

March 2023

What we'll cover

- Energy Charter & Annual Disclosure background
- FY23 Priorities and Measures: check-in
- FY23 Disclosure approach and roles
- Invitation for input

The Energy Charter



*As part of their commitment to the Energy Charter, Full Signatory CEOs agree to publicly disclose how they are delivering against the Energy Charter Principles through **public Disclosures** and engagement with their customer/community councils or stakeholder forums, highlighted in **Feedback Summaries**.*

Disclosure focus uplift areas | Status

1. Develop and implement 2022-25 Customer Strategy.
2. Finalise co-designed customer metrics and reporting processes
3. Target a 5 per cent improvement in responses to customer focused questions from our 2023 Staff Engagement Survey ***Pending***
4. Reduce the number of generation constraint events on our network below 2021/22 levels to minimise impacts on wholesale market prices. ***Adapt***
5. Encourage cheaper renewable generation to connect in an efficient and coordinated way to ensure we remain on track to reach the Queensland 50 per cent Renewable Energy Target by 2030.
6. Drive productivity and efficiency initiatives to ensure our regulated capital expenditure and operating expenditure are aligned with our AER allowances. ***Report-back September Panel meeting***
7. Help deliver detailed studies for the Borumba Pumped Hydro Project, on time and on budget, to allow for an investment decision by the Queensland Government in 2023.

On track or complete
Adapt
Other

Disclosure focus uplift areas | Status

8. Increase the generation capacity across multiple Queensland REZs.
9. Complete the QREZ Community Engagement Pilot and implement lessons learned to deliver local benefits for communities impacted by our infrastructure and operations. ***Adapted***
10. Embed new account management and information management functions, to provide a more streamlined experience for new and existing directly-connected customers.
11. Complete our community sentiment research in Central and Northern Queensland by December 2022 to better understand community needs and concerns associated with renewable development.
12. Finalise Powerlink's employee volunteer program which will allow all employees one day a year to volunteer their time to support communities and customers in need.
13. Double the number of vulnerable customers we support through our initiatives with Uniting ~~and the Thriving Communities Partnership~~.

+ Energy Charter Panel Scorecard

On track or complete
Adapt
Other

Customer Panel – accountability role

As we develop the annual disclosure, we will engage you through the disclosure process.

You holding us to account will help us achieve our customer outcomes.

Your accountability role:

- Our focus aligns with customer priorities
- Our maturity assessment is credible
- Our aspirations are SMART
- We are demonstrating addressing your customer input
- Our process for disclosure is clear & fit-for-purpose

Engagement and accountability flow

Panel Meeting
Mar 30

- Context & key info
- Focus areas
- Scorecard update
- *Feedback 1*

Internal engagement
Apr – May

- Engagement across the org
- Draft Maturity self-assessment, engage with SLT
- Shaping scorecard & focus areas

Panel Meeting
June 8

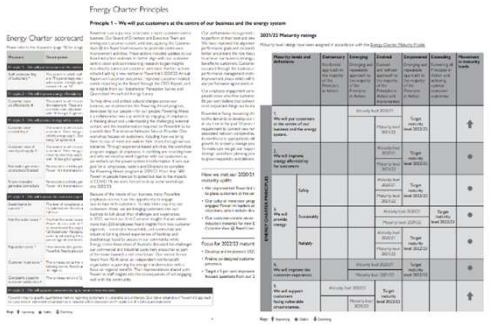
- Maturity assessment & disclosure statement esp. focus areas and measures
- *Feedback 2*
- Disclosure internal review, approvals

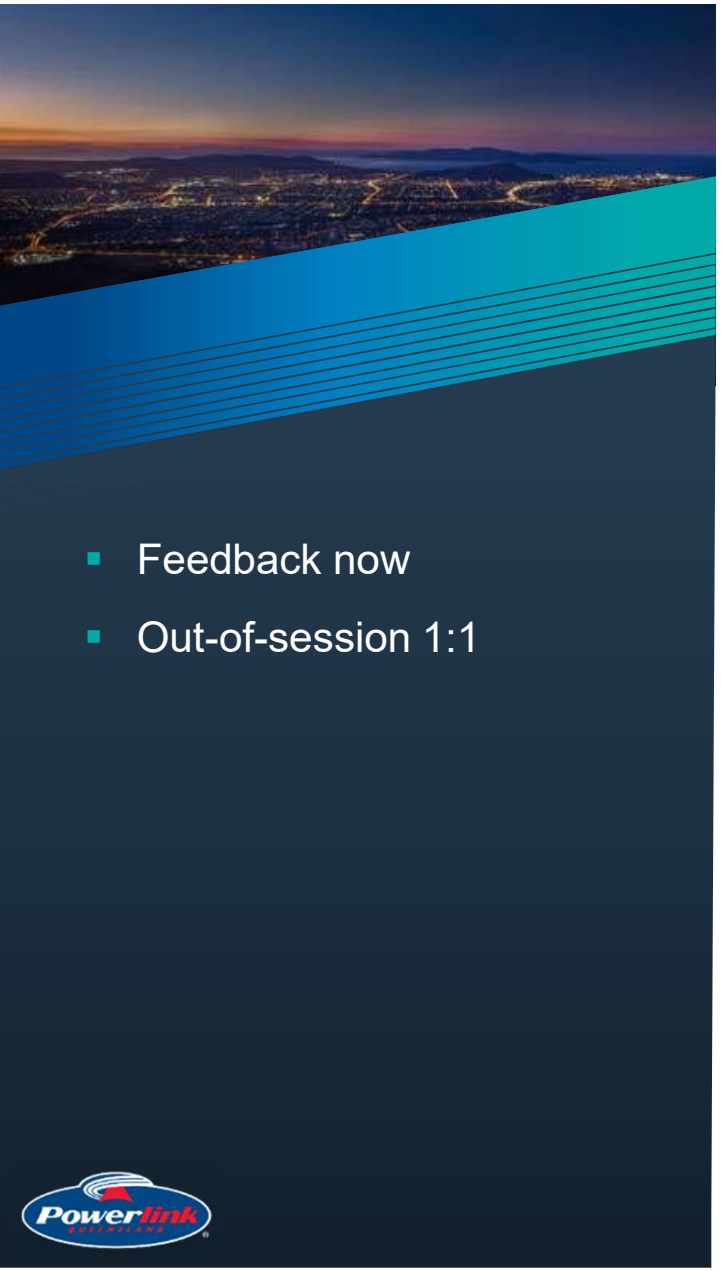
Panel Meeting
Sept 21

- Disclosure circulated
- Affordability focused panel
- *Feedback 3*
- End Sept Disclosure lodged

CEO engagement & final feedback
by Nov

- Joint accountability forum, CEO engagement
- *Feedback 4*
- End Nov Customer feedback and engagement summary lodged





- Feedback now
- Out-of-session 1:1

Discussion & questions for reflection

Process and roles:

- Feedback on the planned engagement and accountability process
- Clarity and suitability of the example attributes of ‘accountability’ responsibilities of the panel
- Do you need additional support

Priorities and issues:

- Are we focusing on the right priority areas from your perspective?
- What priorities are you working through in your organisation / customer cohort that our actions impact?
- What questions do you want explored, examples highlighted and why?

Network Development Process (NDP) and Compensation Framework Review

January 2023

Review scope

Network Development Process Elements

1. **Engagement (Landholder, Community, Traditional Owner and other Stakeholder engagement)**
2. **Corridor selection**
3. **Land access**
4. Environmental assessment – aligned with legislation
5. Cultural heritage management – aligned with legislation
6. Easement acquisition
7. **Compensation**
8. Planning approval

Purpose: To ensure we have an NDP that is contemporary and socially accepted, and achieve a revised NDP that will drive higher community and stakeholder acceptance

Key recommendations

Main areas for improvements identified to date include

- New Step:
  - Social Impact Assessment prior to project announcement and engagement
- Engagement;
  - Conduct awareness campaign across Qld on QEJP, REZ and increased transmission
  - Consult earlier with Traditional Owner groups
- Corridor Selection
  - Being more open and transparent on the corridor selection design parameters during the engagement and consultation phase
- Land Access
  - Implement an organisational wide dispute resolution and complaint management process to decrease risk to project delivery time frame, building trust and improving reputation
  - Establish online portal where landholders may log in and see the status of their agreements, any planned access, and historical record of access

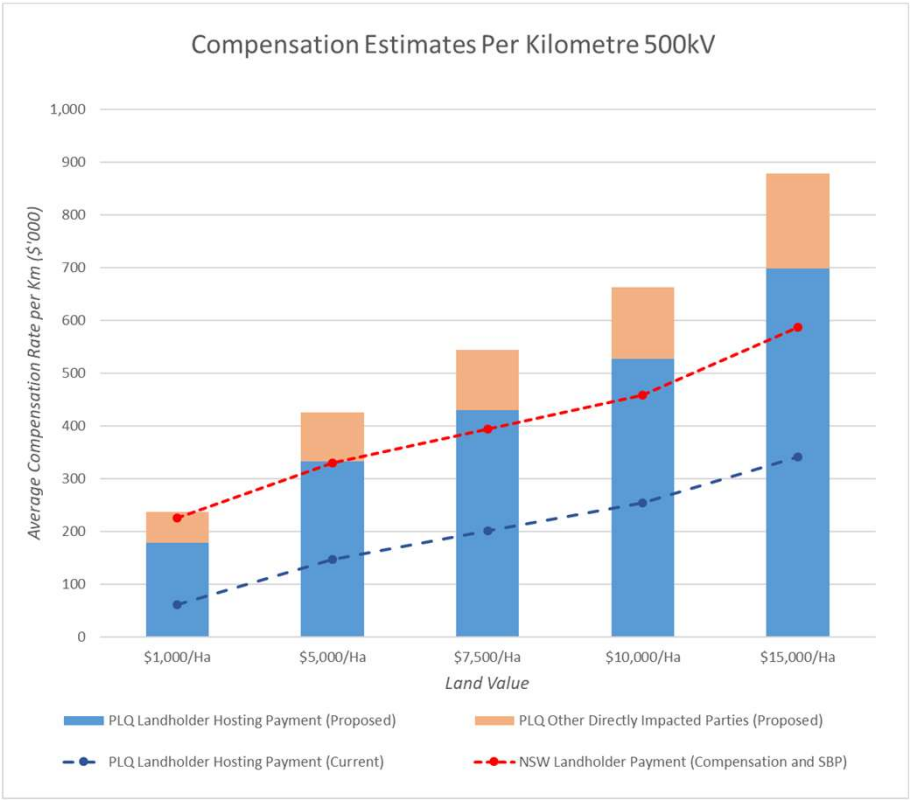
Compensation Framework – April Approval

We are bringing the approval of the compensation framework early

KB(6

Our approach aims to realise the following benefits:

- Improves ability to adequately compensate hosting landholders and reach negotiated settlements more efficiently
- Ensures compensation recognises property specific value and impacts
- Provides options for timing of compensation payments
- Increases transparency through provision of compensation estimates to landholders earlier
- Recognises impacts to other directly impacted parties in the area, including neighbouring landholders and Traditional Owner Groups.



Slide 15

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KINGWILL Brandon (Powerlink), 28/03/2023

Questions and discussion

Changing Network Operations

Emma Rogers

30 March 2023

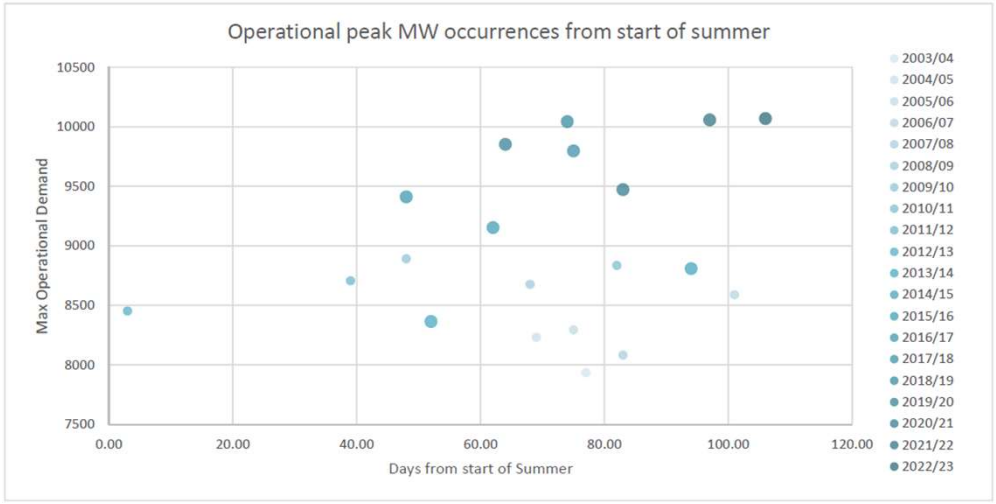
Consumption Observations

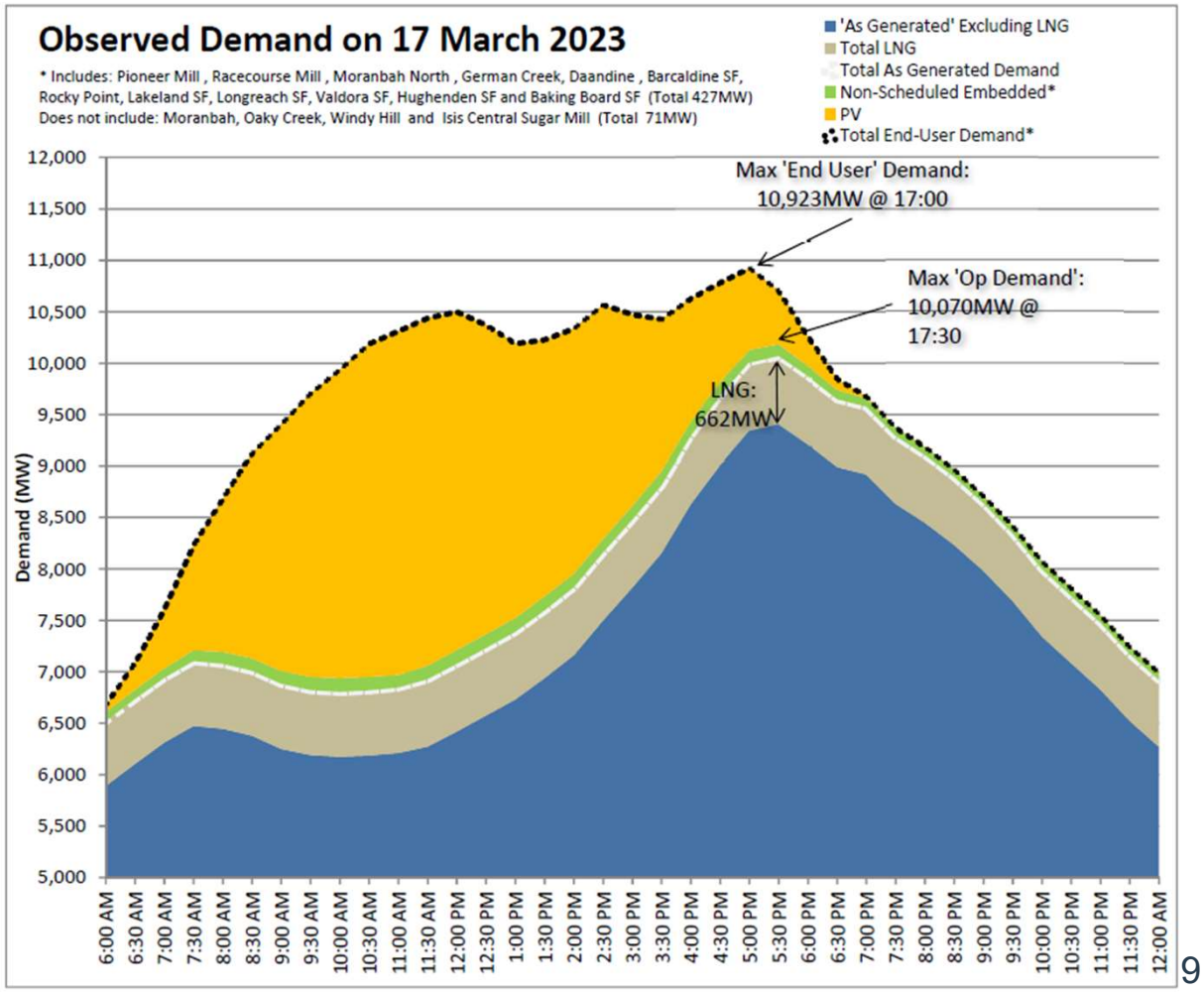
Record Breaking 12 months

Season	Date	Time	MW	Record Reason
Winter	9 June 2022	19:00	8,255MW	Maximum Operational Winter Demand *(now superseded record*)*
Winter	4 July 2022	18:00	8,716MW	Maximum Operational Winter Demand
Winter	7 August 2022	13:00	3,672MW	Minimum Operational Demand *(now superseded record*)*
Winter	14 August 2022	12:30	3,490MW	Minimum Operational Demand
Summer	3 February 2023	13:30	11,260MW	Maximum End User Demand (includes customer side Solar forecast)
Summer	17 March 2023	17:30	10,070MW	Maximum Operational Summer Demand

Load Trends

- Variability of Summer maximum demands is highly variable dependent on humidity and ‘feels like’ temperatures.
- Underlying End User demand is increasing and gives indication of potential Operational Demands in adverse solar output days.



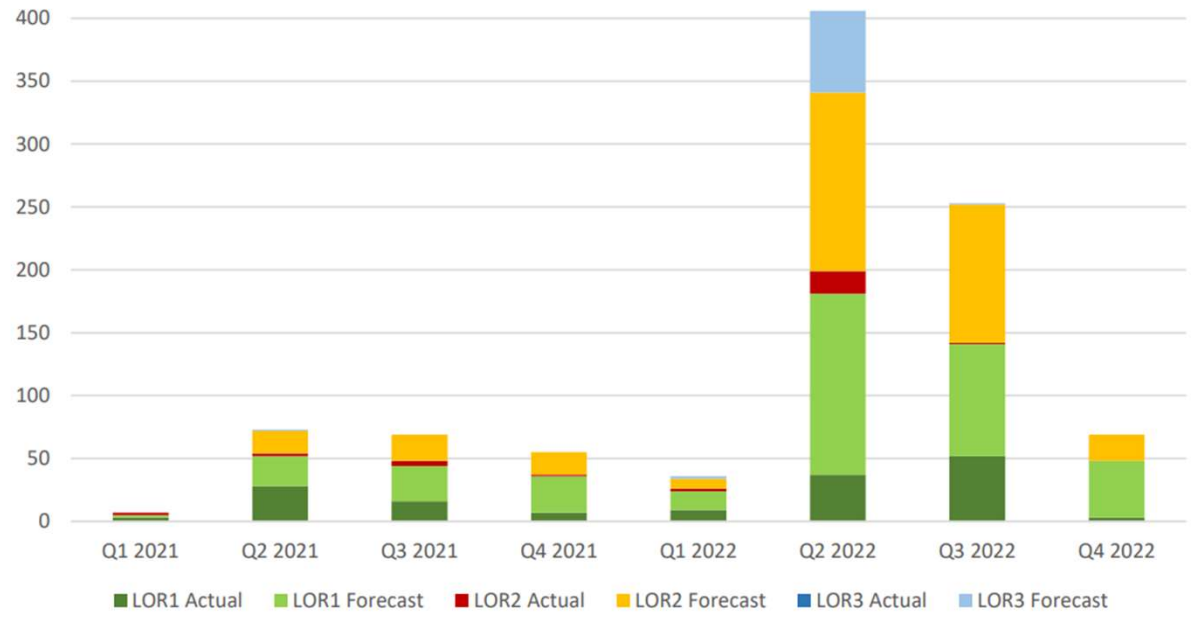


NEM Indicators

Broader Market Activity

- 2022 was an active year in the NEM with significant market events and volatility, with a 200% increase in market notices issued for Queensland than previous years, including 15 forecast Lack of Reserve (LOR) Level 3 LOR3 conditions.
- Market suspension period from 15-24 June 2022
- 2 Voluntary load reductions in QLD were sought to assist in supply/demand balance
  - 1 February 2022
  - 13-14 June 2022

Figure 7 Quarterly comparison of actual and forecast LOR conditions, Q1 2021 to Q4 2022



Source: AEMO 2022, Quarterly Lack or Reserve Report

Natural Environment Conditions

Fire Activity in Qld

- Fire risk is expected to continue to increase with the BOM issuing a change to the La Nina, now indicating an El Nino watch status, which is expected to cause drier weather conditions.
- Heightened awareness and monitoring to ensure resilient operations.

Photos of 330kV feeders 8M/8L QNI Interconnector from recent fire hazards in March 2023

Natural Environment Conditions

Network Impact from Snakes in Qld

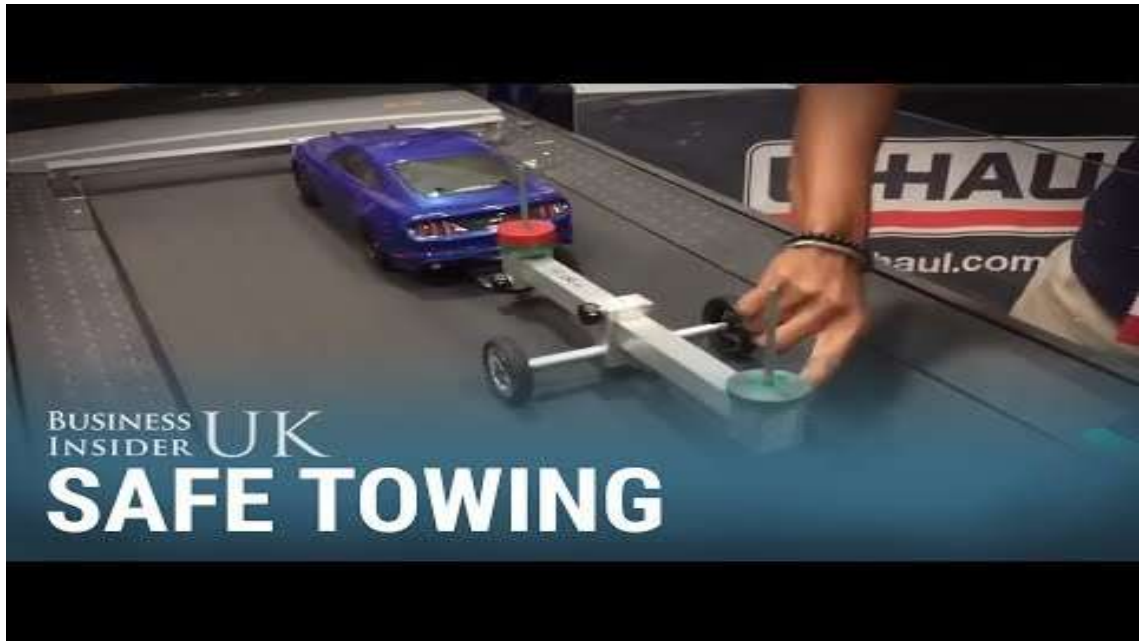
- There have been 9 separate unplanned events on network equipment due to snakes since September 2022 ranging from impacts to 275kV lines, to SVC equipment.
- This is a notable increase in impact from previous years and is hypothesised that this is due to the favourable breeding periods of successive La Nina years.
- Previous tower design and snake behaviour research has been reviewed and further specialist advice is being sought to further understand if any technologies have advanced that can deter snakes from critical assets .

Photos of 132kV tower with Snake who caused fault, and loss of supply to Edmonton and Innisfail substations

System Strength

What is System Strength?

- System strength is a characteristic of an electrical power system *[the size and weight of the engine/car]* and relates to the size of the change in voltage following a fault or disturbance on the power system. *[tapping the trailer]*
- Without sufficient System strength a transmission network cannot be run in a steady, stable and secure state. *[out of control trailer]*
- Synchronous generators naturally provide system strength as they are electro-mechanically coupled to the power system. *[a car towing and a car pushing]*
- Inverter Based Resources, such as grid-following solar /wind farms do not contribute to system strength. *[weight on the trailer]*
- The system strength at a given location is proportional to the fault level at that location, and inversely proportional to effective grid-following IBR penetration seen at that location. *[position of the weight on the trailer]*



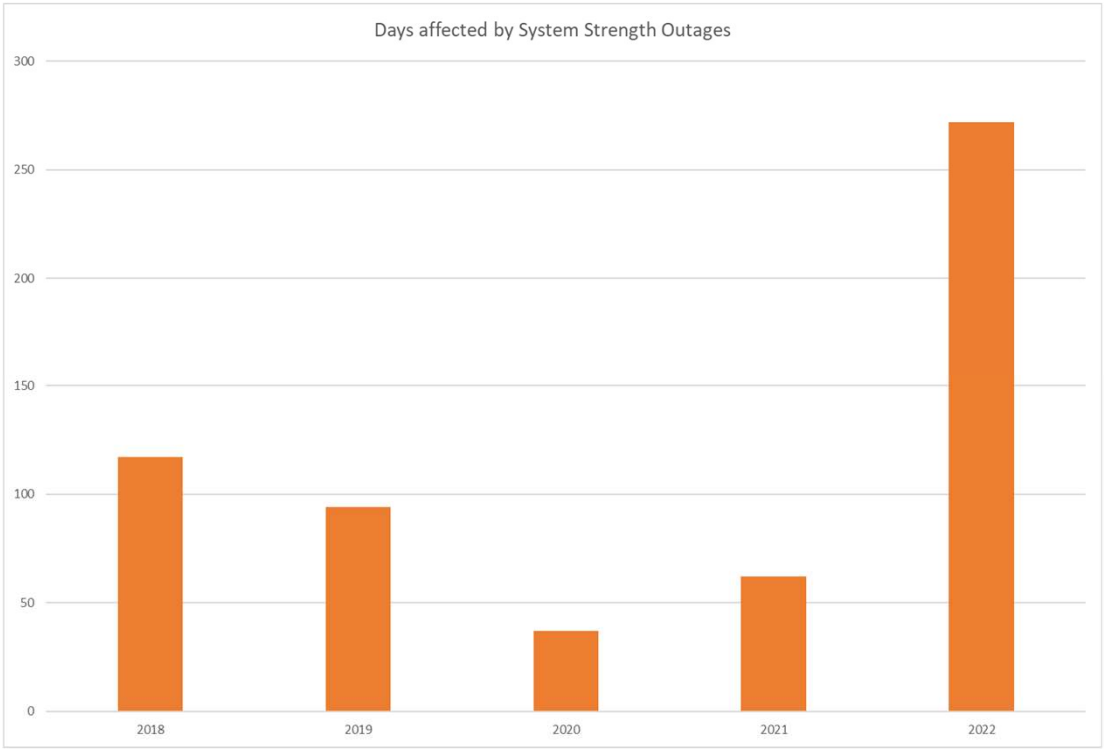
System Strength

Current

- AEMO Declared shortfall at Gin Gin node
- Impacts largely felt in CQ & NQ
- Dependent on Generation Patterns
- 7C2K – 7 central, 2 Kareeya units base strength equation.

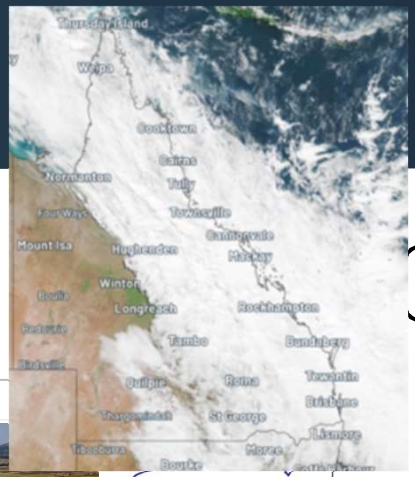
Future

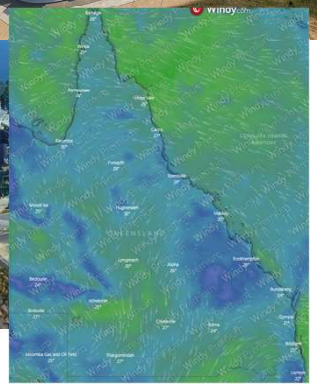
- Conversion of Thermal Generation into Synchronous Condensers in QEJP.
- Pumped Hydro provides Synchronous source
- Innovation & Optimization in strength studies could unlock higher renewable outputs for different operating conditions.



To transition the network we need to take outages to connect new things and upgrade our network…
…The network is never intact…

Change in Operating Equation



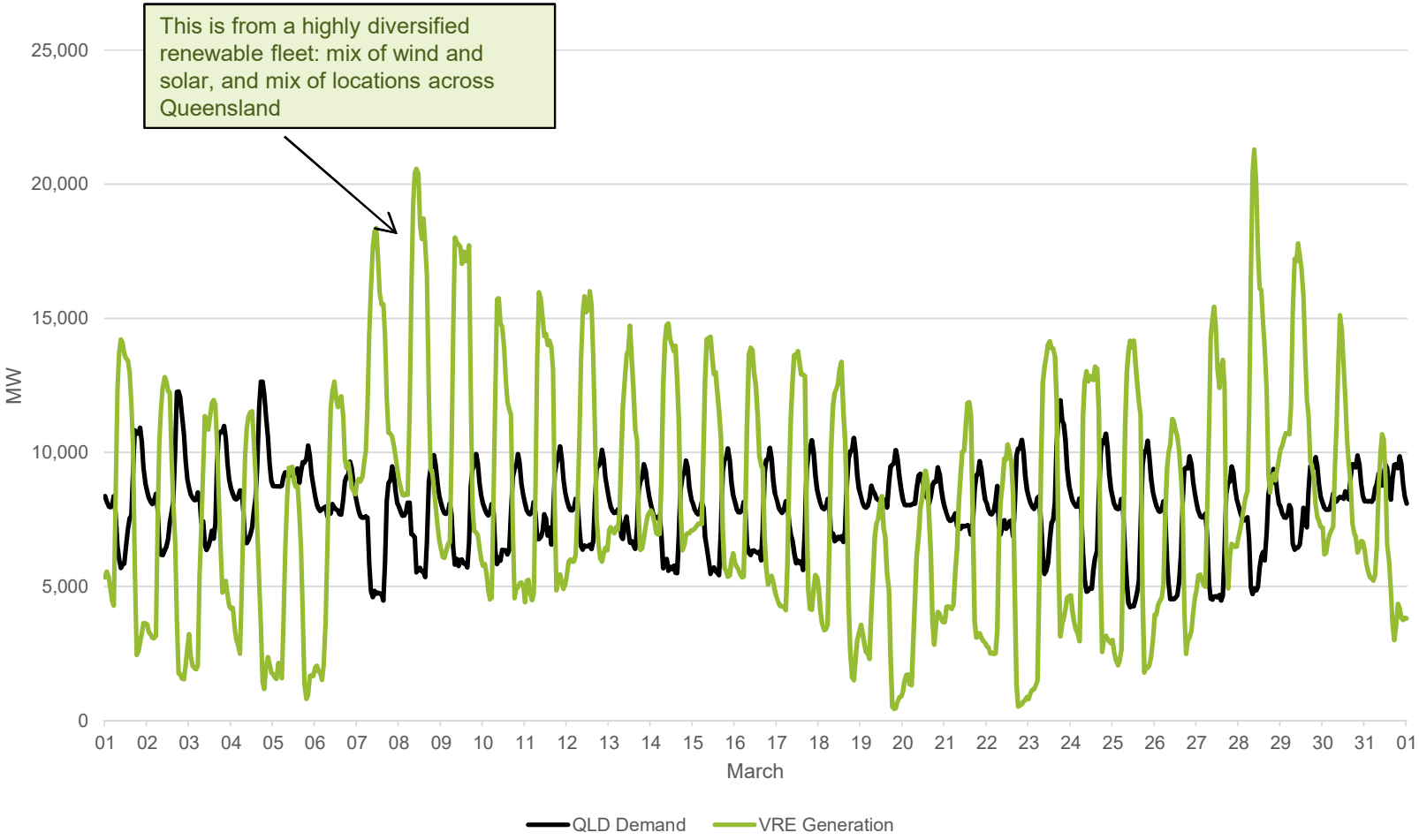


$$\vec{E} = f(t, T, w, \$, E)$$

$\vec{E} = Energy$
$t = time\ of\ day\ load$
$T = Temperature$
$w = weather\ (solar\ irradiation, wind, cloud\ cover)$
$\$ = Market\ Price$
$E = Stored\ Energy$

Queensland system operation:

Effect of variability in supply (simulation of March circa 2035)



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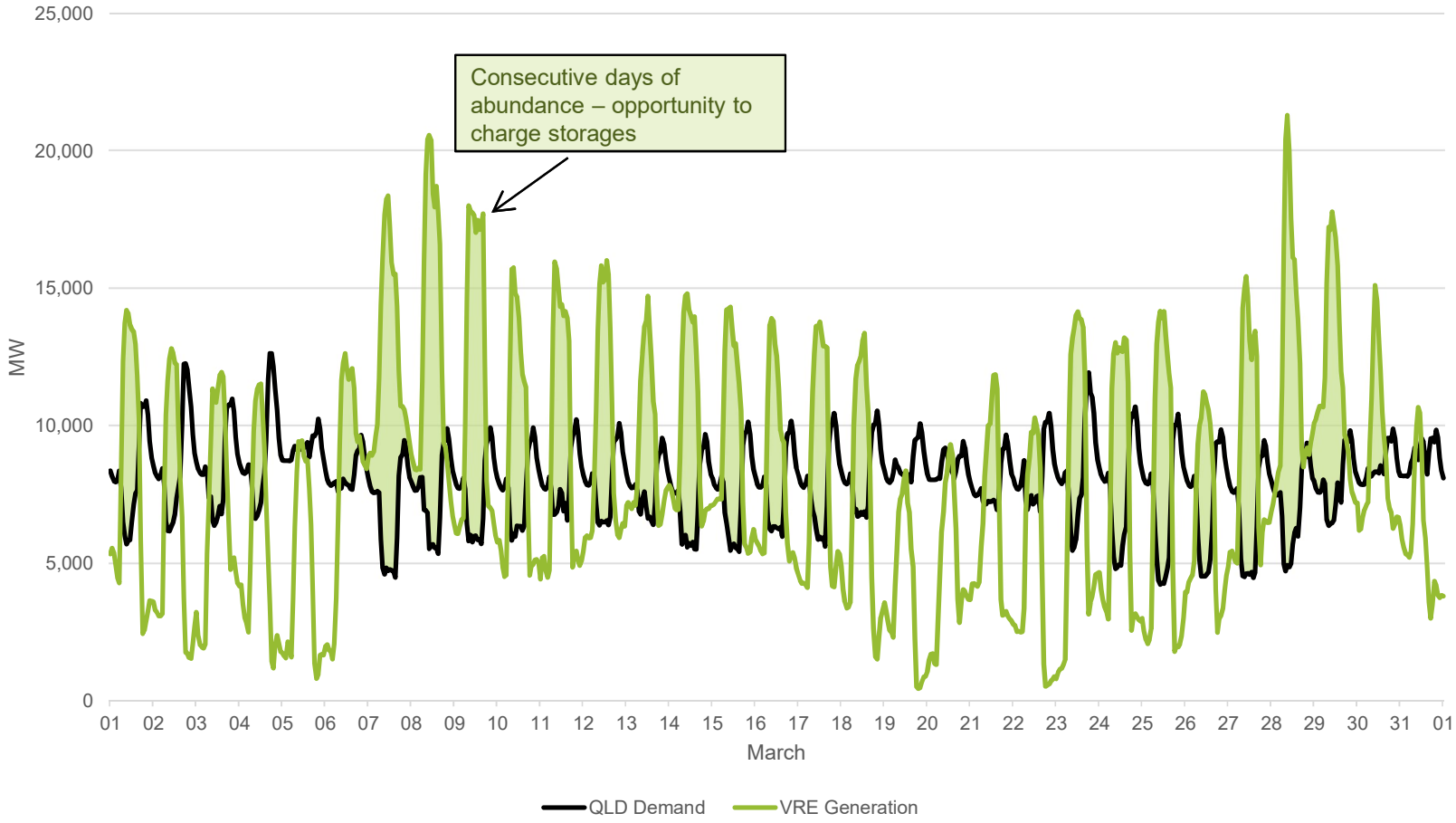

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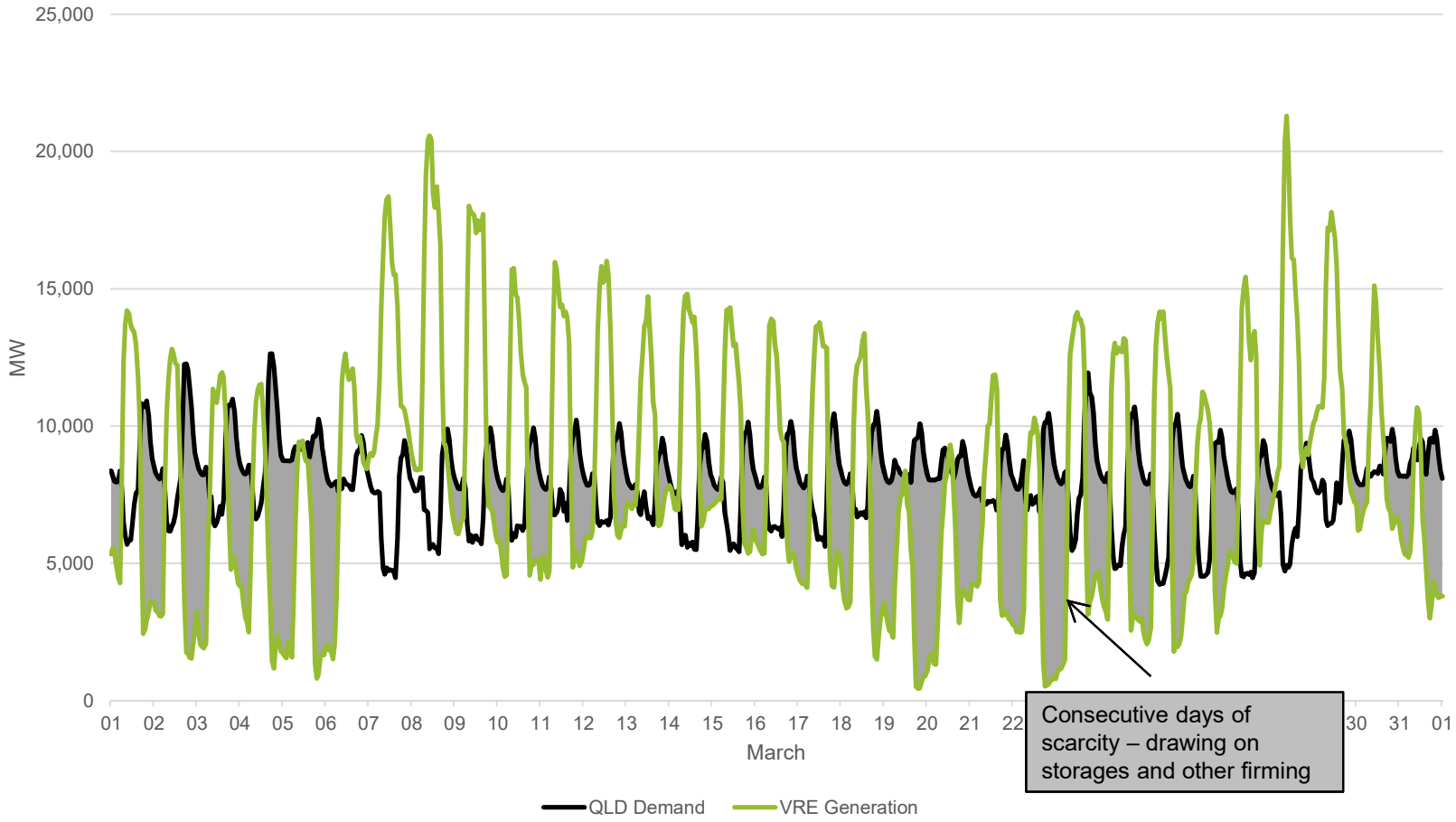


Questions and discussion

BREAK

Copperstring 2032

Brief update

March 2023

Copperstring 2032

Copperstring 2032 map (proposed)

Copperstring 2032

- The role of this project in unlocking wider economic benefits as part of the Government's vision for Queensland
- A significant amount of work has already been undertaken on the project.
- Our next steps will include early works activities to better understand:
  - project scope
  - delivery timeframes
  - resourcing plans etc.
- As part of our work we will analyse a range of potential financing and user-charges models.
- Planning and management will also be contextual to our portfolio of work so as to ensure minimised impact on the development and delivery of the current SuperGrid, REZ plans, and Operational work.

Questions and discussion

Asset Reinvestment Review

Asset Reinvestment Review - Update

Purpose

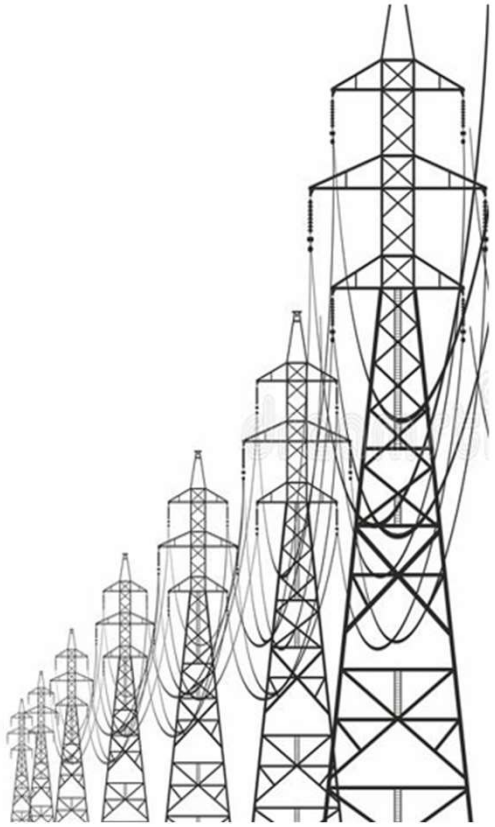
Consider whether there is an alternative approach to defining assets and/or bundling works that drives a materially better outcome for customers

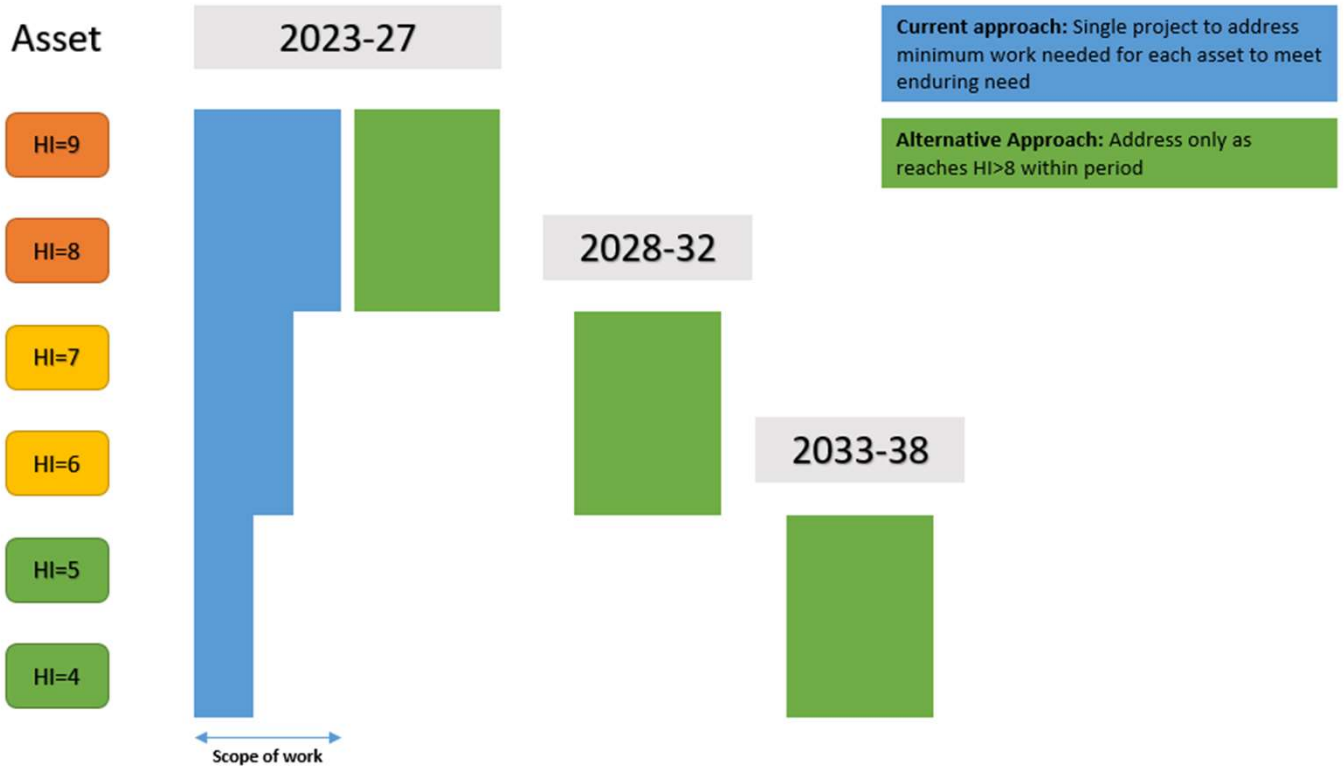
Status

- Scenario modelling complete
  - four scenarios modelled across three asset definitions for Ross to Chalumbin
  - two scenarios modelled across three asset definitions for three additional projects
- Preliminary findings
  - asset definition made no difference to economic outcomes in almost all cases
  - no single most efficient option for all cases – suggests need to compare single and potential multiple staged approach
  - potential benefit to defer works for longer built sections – improved view of trade-offs after initial condition assessment

Alternative Bundling Approach

Visualisation of Bundling Options (example for 15 year enduring need)





Asset Reinvestment Review - Update

Preliminary recommendations

- Apply to RIT-T assessments for future refit projects with immediate effect to trial approach
  - only carry out compliance works on structures where condition based work is to be performed
  - consideration of both current and alternative bundling approach in economic assessment based upon detailed condition information and estimates
- No change proposed to asset definition

Next steps

- Report being drafted:
  - circulation to working group members in April
  - finalise report by end May

Supergrid Strategy

Overview of session

- Refresher on the targets and Powerlink's Supergrid Strategy
- Overview of RIT-T
- The limitations we see on relying solely on RIT-T in the National Electricity Rules (NER)
- Specific considerations in formulating the Supergrid Strategy, including timeframes
- Your view on what appropriate engagement and consultation looks like

The QEJP and Infrastructure Blueprint

2022

3GW transmission-connected wind & solar generation

8.1GW coal generation

Firming & storage mainly comes from coal & gas

Low demand growth

High amount of rooftop solar

2035

25GW wind & solar generation

Some coal-fired generation remains, repurposed for system strength & inertia

Firmed by at least 6GW of long-duration storage, 3GW of utility-scale batteries, 3GW of hydrogen-ready gas-fuelled plant

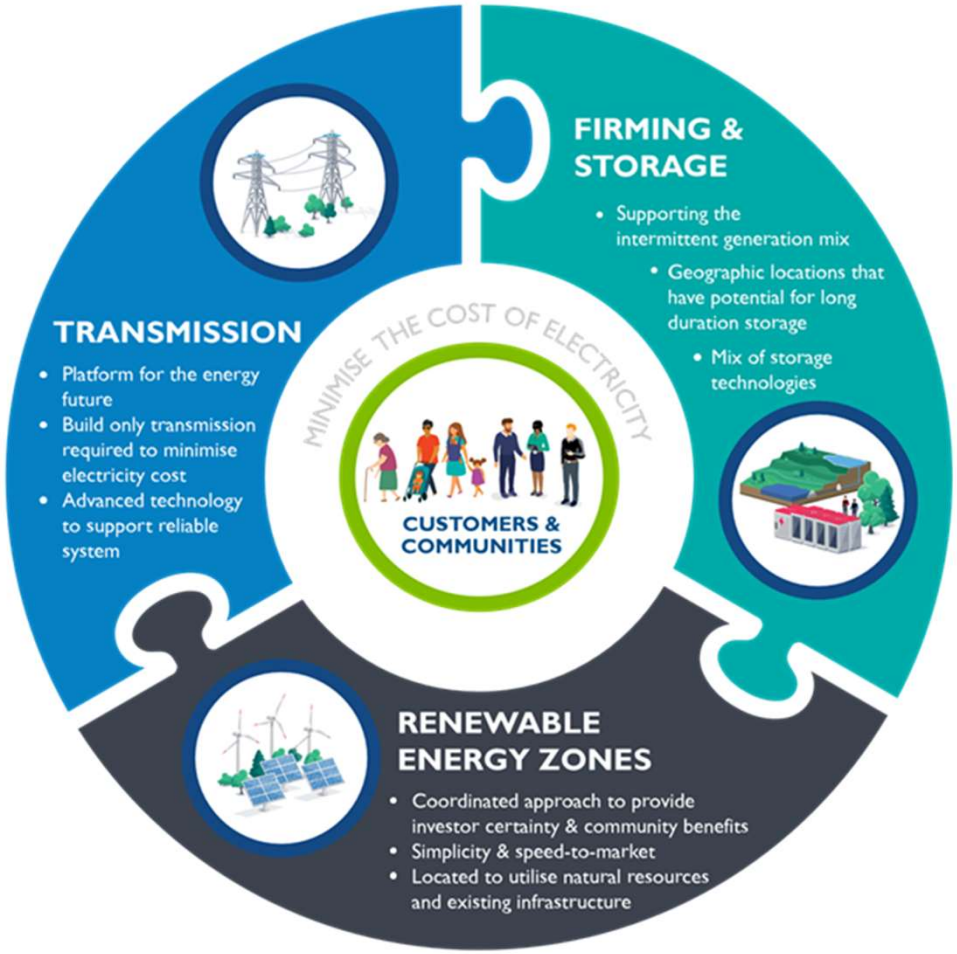
Electrification of heavy industry

Opportunities for greater flexibility on the demand side

Continued rooftop solar growth

Three Interdependent Elements

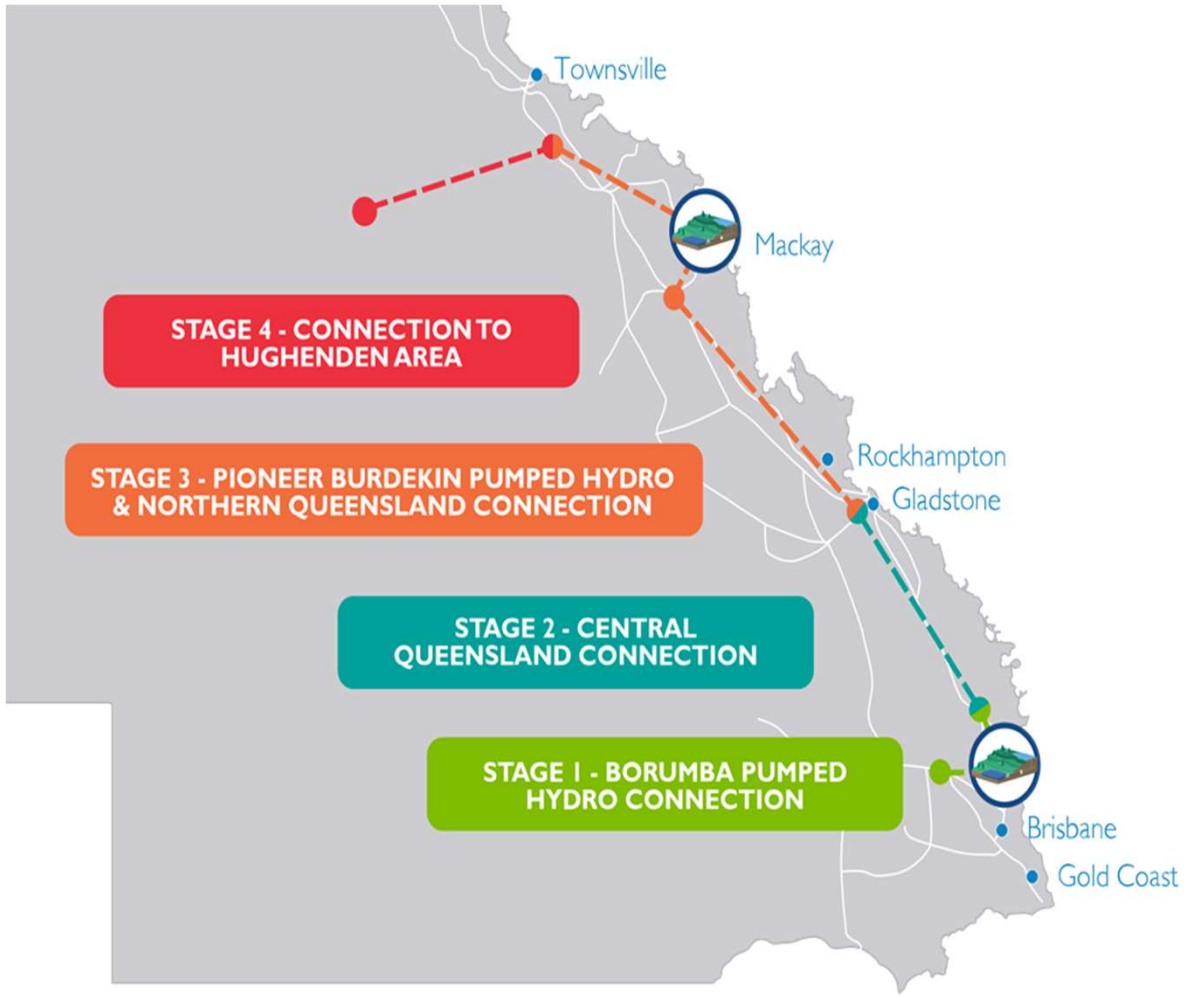
- Three interdependent elements to achieve the targets set out in the QEJP
- To progress the backbone transmission element we are developing a Supergrid strategy
- By 2035, expect power flows of 15GW to meet a 10GW demand due to need to charge batteries and PHES pumping loads.



Powerlink's Supergrid Strategy

- Powerlink has developed its Supergrid Strategy to support
  - the objectives and timeframes of the QEJP and Infrastructure Blueprint
  - our planning and investment decision making processes for the establishment of the backbone infrastructure
- The Supergrid strategy
  - is based on original EY modelling for QEJP, plus subsequent additional modelling (including sensitivities)
  - presents options that support the network transfers required for the optimal generation development in QEJP
  - applies a whole-of-system planning lens to determine the most cost effective development path
  - presents the rationale and preliminary economic assessment in establishing a preferred development path – leveraging existing RIT-T processes
  - considers alternative variants (underground/overhead, AC⚡DC transmission, etc.)
  - provides the strategic foundation for individual, staged decisions for sections of the backbone infrastructure – which can be advanced within this whole-of-system plan.

Transmission Backbone Development



Overview of RIT-T

- Powerlink must undertake a RIT-T when potential solutions to reinvest in network assets or increase the capacity of Queensland's high voltage transmission network are over a $7 million threshold
- There are two RIT-T processes, depending on the planning process which has identified the need for an investment:
  - projects identified through Powerlink's internal planning processes – this is the most common type of RIT-T undertaken – not actionable ISP projects
  - projects identified in AEMO's draft and final Integrated System Plans (ISP) – actionable ISP projects

Overview of RIT-T

not actionable ISP projects

Project Specification Consultation Report
Consultation period: minimum of 12 weeks.

Project Assessment Draft Report
Consultation period: minimum of 6 weeks.
Where applicable, a Project Assessment Draft Report exemption may be applied as per the NER cost threshold.

Project Assessment Conclusions Report
Publish as soon as practicable after the Project Assessment Draft Report consultation period has ended.

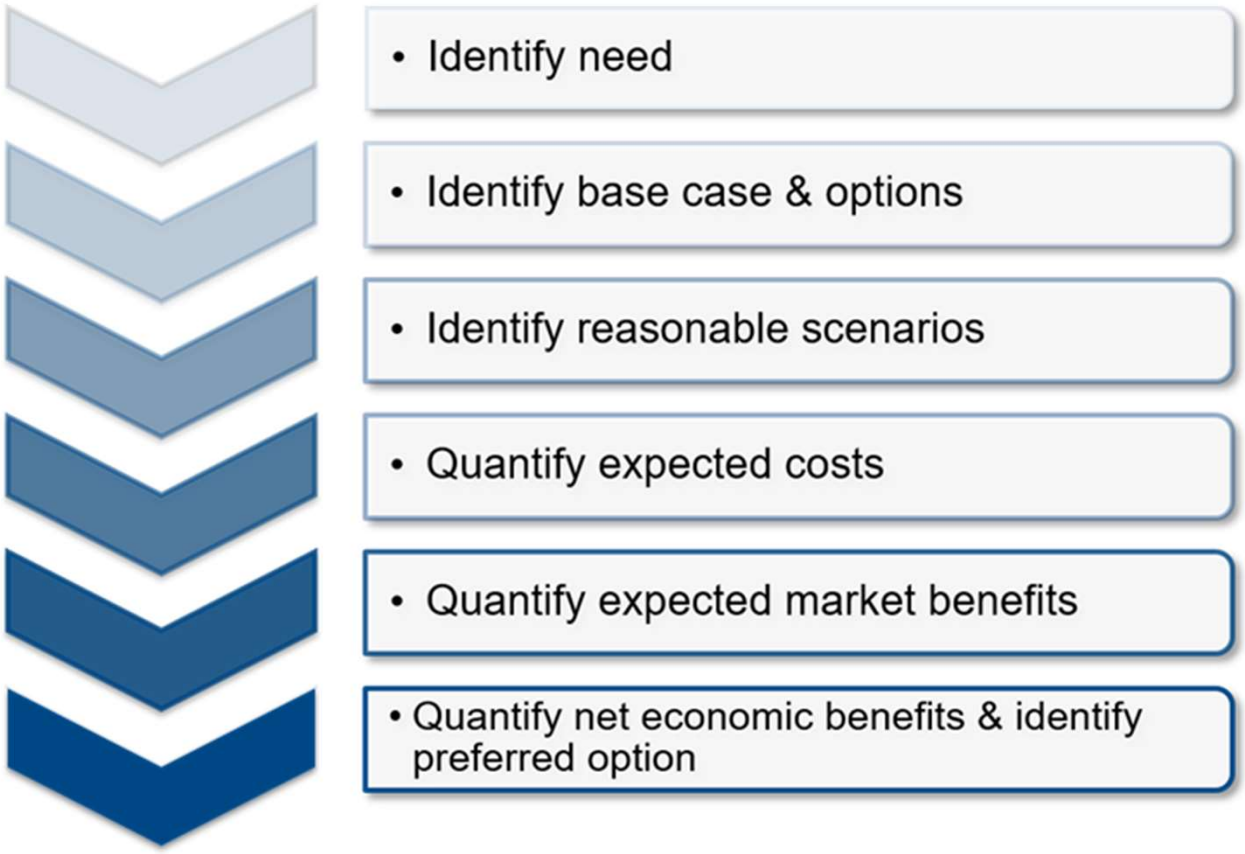
actionable ISP projects

AEMO's Draft Integrated System Plan
Consultation period: 12 weeks

Project Assessment Draft Report
(May be subject to confirmation of the identified need and timing in the Final ISP)
Consultation period: minimum of 6 weeks.
Where applicable, a Project Assessment Draft Report exemption may be applied as per the NER cost threshold.

Project Assessment Conclusions Report
Publish as soon as practicable after the Project Assessment Draft Report consultation period has ended.

Overview of RIT-T



Limitations of RIT-T for QEJP Projects

Limited scope of the purpose of the RIT-T in the NER

The purpose of the RIT-T is to identify the credible option that maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the market

- The QEJP transmission investments are driven by specific emissions reduction targets
- The National Energy Objective (NEO) within the National Electricity Law (NEL) is being updated to include an emissions reduction objective
  - although the Bill is being fast-tracked, it is not clear when consideration will be included within the NER and RIT-T process
  - hence the projects would need to demonstrate a positive net economic benefit
- The RIT-T is well suited to identifying the best investment to meet the next increment of capacity; it is not suited charting a course through wholesale transformation.

Limitations of RIT-T for QEJP Projects

Defined market benefits considered in RIT-T

- Changes in fuel consumption arising through different patterns of generation dispatch
- Changes in voluntary and involuntary load curtailment
- Changes in costs for parties, other than the RIT-T proponent
- Differences in the timing of expenditure
- Changes in network losses
- Changes in ancillary services costs
- Competition benefits
- Option value from implementing the credible option with respect to the likely future investment needs of the market
- Other classes of market benefits that are agreed to by the AER in writing
  - emissions reduction may be added as an additional ‘market benefit’ following update of the NEL and subsequent AEMC Rule Change processes.

Limitations of RIT-T for QEJP Projects

- The AER RIT-T guidelines state that an identified need may consist of:
  - an increase in the sum of consumer and producer surplus in the NEM
  - reliability corrective action, as defined in NER 5.10.2
- Reliability corrective action means
  - investment by a TNSP in respect of its transmission network for the purpose of meeting the service standards linked to the technical requirements of schedule 5.1 or in applicable regulatory instruments
- We know the transformation is happening, but in the absence of firm commitments from customers, e.g. increased demand / reduced generation – we would be required to demonstrate an increase in the sum of consumer and producer surplus in the NEM
  - Queensland Government economic modelling in support of QEJP consider more than an increase in the sum of consumer and producer surplus in the NEM
  - likely that for any ‘reasonable’ scenario no market benefit would be identified.

Supergrid Strategy Considerations

- Powerlink's Supergrid Strategy considered
  - economic assessment of credible options that met the defined outcomes of the QEJP
  - intangible benefits / challenges of credible options
  - least regret analysis of the credible options
- Additional modelling requirements were identified to
  - quantify relative losses of credible options
  - identify specific reasonable scenarios to enhance certainty of cost outcomes
- Under the current NER, the QEJP transmission investments would need to demonstrate an increase in the sum of consumer and producer surplus in the NEM.

Supergrid Strategy Considerations

- The QEJP transmission investments are driven by specific emissions reduction targets
  - these necessitate strategically timed investment staging to ensure transmission infrastructure is ready at times needed for a successful transformation
  - these can be achieved by developing a new energy system of three integrated elements: renewable energy (via REZs); firming (via PHES in particular) and the enabling Supergrid backbone transmission investment
- The forthcoming legislation from the Queensland Government may include some new requirements for disclosure, process and engagement for QEJP-related transmission network investments – these may leverage existing RIT-T processes
- However, the timeframes in the QEJP require work on transmission investments to commence immediately
  - some works have already commenced underwritten by Government.

Discussion Points

Breakout Questions

- The purpose of today's engagement is to seek to ensure we are providing the necessary confidence and transparency to the customer panel that we are pursuing the most cost-effective pathway to achieve the benefits of a renewables-based power system.
- Key questions we would like your perspectives on are
  - There's going to be a lot of decisions along the way: how do you want to be engaged as part of this, how does this look for you?
  - How do we best give you confidence on these investments and that they are the most cost-effective for whole-of-system transformation?
  - How do we best communicate and show benefits, noting benefits of the transformation span a wide range of factors across society and time?

MEETING CLOSE