



Victoria to New South Wales Interconnector West (VNI West)

Project Assessment Draft Report
(PADR) | Information Session

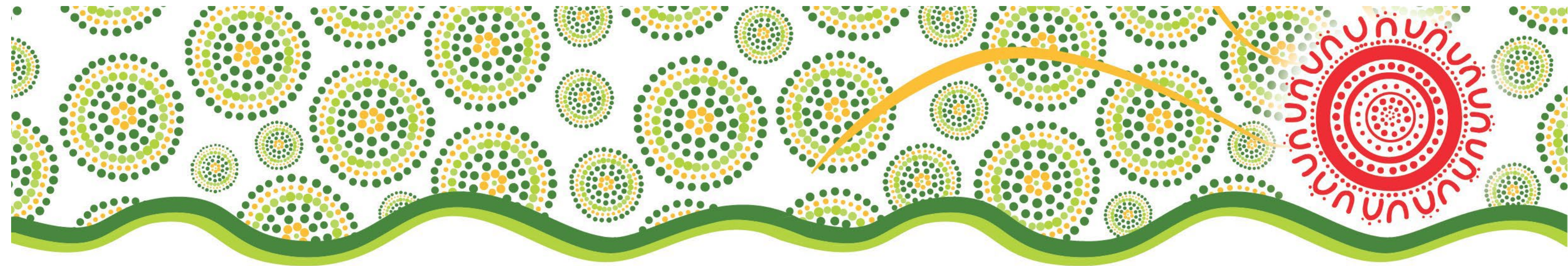
25 August 2022

Please Note

This session is being recorded.

**The recording will be published on
AEMO's and Transgrid's website,
along with this presentation.**

ACKNOWLEDGEMENT OF COUNTRY



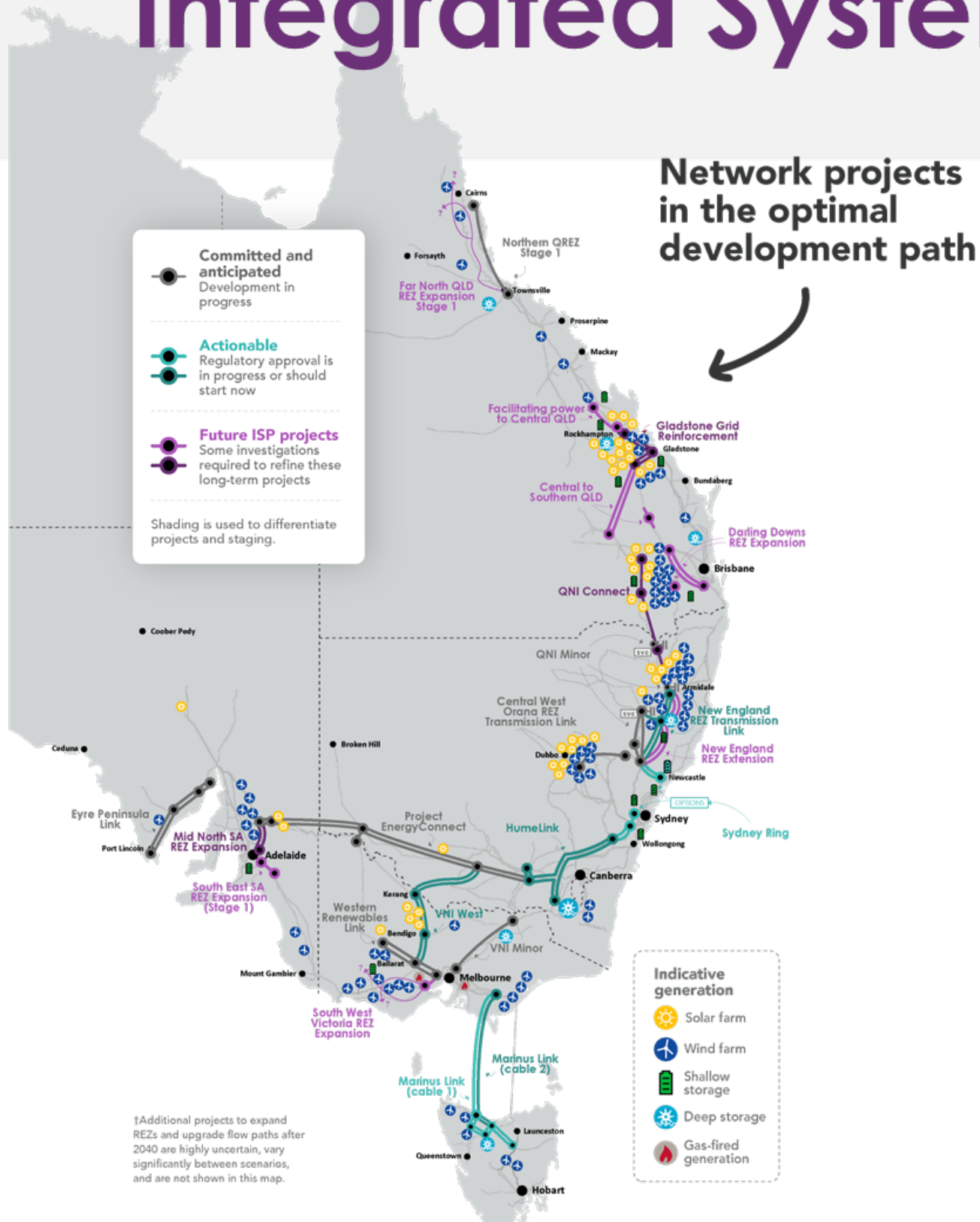
Introductions and Agenda

Agenda item	Presenter	Organisation
Welcome	Mark	Transgrid
Broader Energy Market Context	Nicola	AEMO Victorian Planning
Identified Need / Credible Options / Cost Estimation	Jason	AEMO Victorian Planning
Social and Environmental Considerations	Taryn	Transgrid
NPV Results	Ann	HoustonKemp
Market Modelling Overview	Nadali	EY
Q&A Session	Louisa	AEMO Victorian Planning
Thank you and close - submissions closing date reminder	Mark	Transgrid

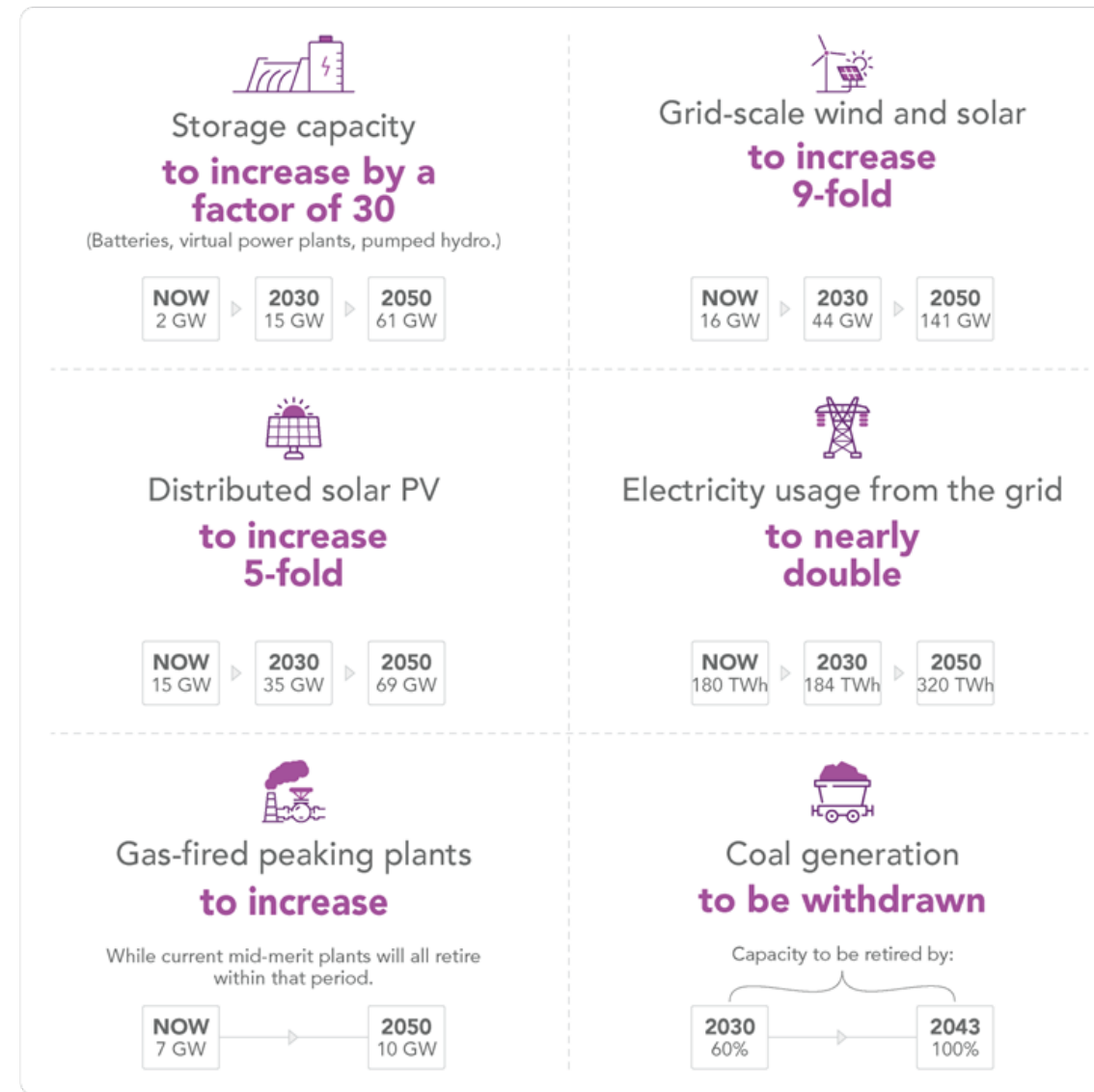
Broader Energy Market Context



Integrated System Plan



Expected energy transition to 2050 (‘Step Change’ scenario)



Identified Need / Credible Options / Cost Estimation

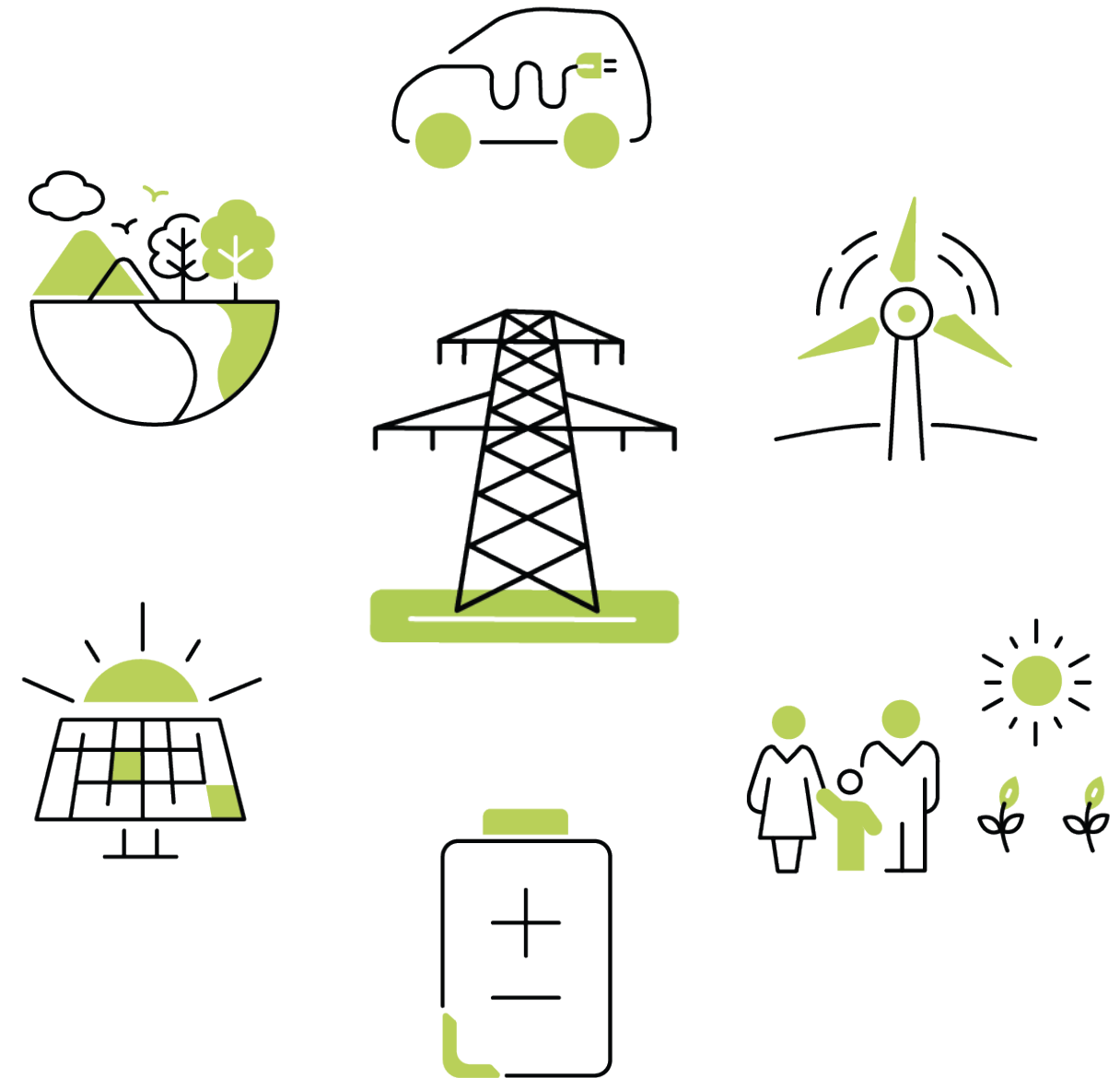


Identified Need

The identified need for the VNI West project has not changed since the 2020 ISP:

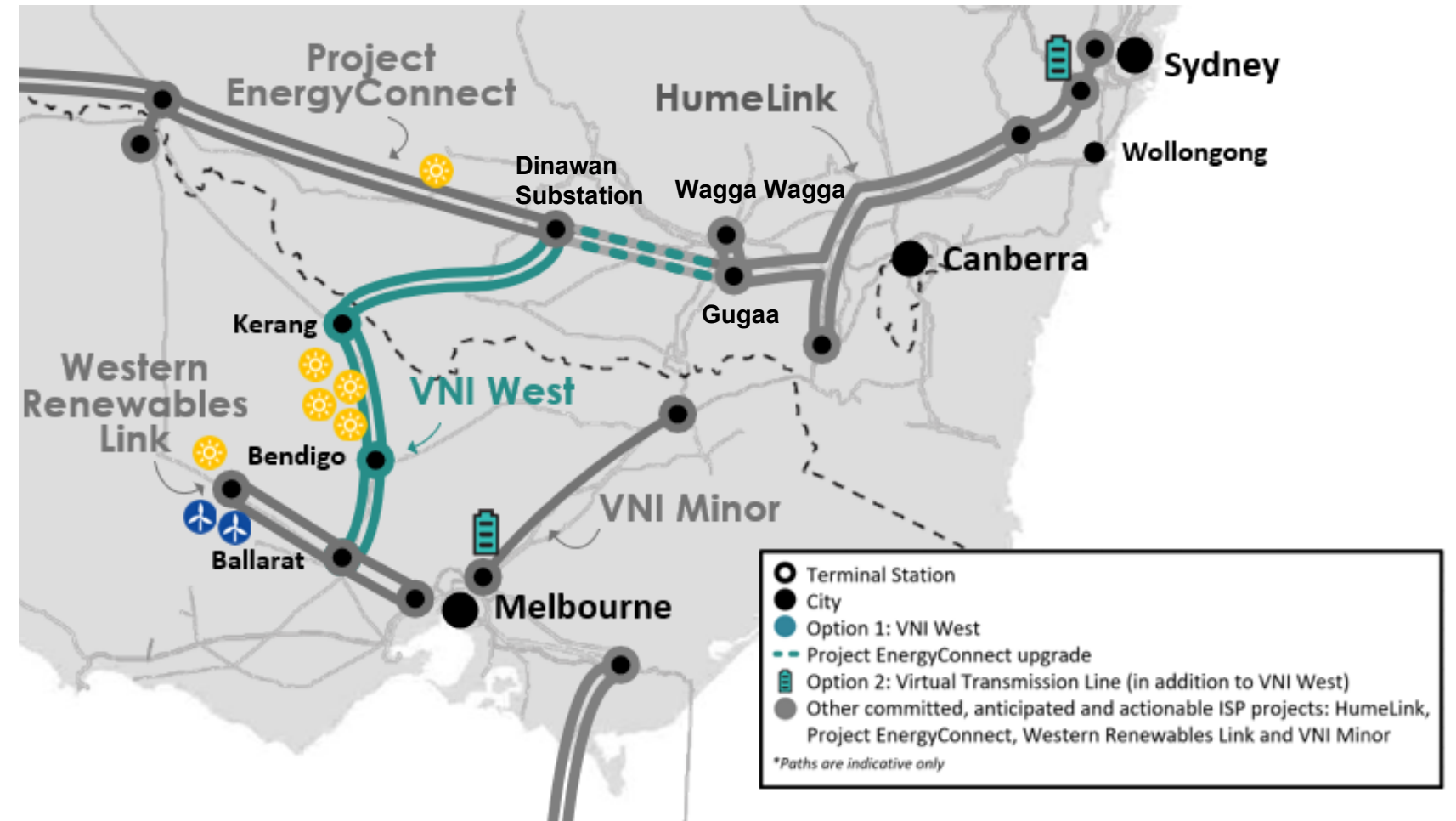
To increase transfer capacity between New South Wales and Victoria to realise net market benefits by:

- efficiently maintaining supply **reliability in Victoria** following the closure of further coal-fired generation and the decline in aging generator reliability – including mitigation of the risk that existing plant closes earlier than expected,
- facilitating efficient development and dispatch of generation in areas with high quality **renewable resources** in Victoria and southern New South Wales through improved network capacity and access to demand centres, and
- enabling more efficient **sharing of resources** between NEM regions.



Credible Options

- **Option 1:** 'VNI West' via new terminal stations near Bendigo and near Kerang
 - Actionable ISP project in 2022 ISP
 - Estimated to cost \$3.26 billion
- **Option 2:** Combination of VNI West with a non-network Virtual Transmission Line (VTL) comprising battery storage near Sydney and Melbourne - enabling the existing interconnector to be operated at a higher capacity, like System Integrity Protection Scheme (SIPS)
 - Estimated to cost \$3.87 billion
- **VNI West relies on the timely delivery of EnergyConnect, HumeLink and Western Renewables Link.**



*paths on this map are indicative only, detailed route selection to be conducted

Cost Estimation

- Significant work done to develop more accurate cost estimates
- Accuracy of +/- 30%, considered 'class 4'
- Greater level of transparency
- Differs from 2022 ISP by approx. \$300 million to account for remediation of social and environmental concerns
- Level of cost accuracy will be further refined and developed through more detailed early works if justified under the RIT-T process

Table 4 Summary of the credible options assessed in this PADR – capital costs, \$m in FY2020-21 dollars

Cost component	Option 1 VNI West		Option 2 VTL ahead of VNI West	
	NSW	VIC	NSW	VIC
Stage 1 – Early works				
Early works – Property/land access/easements	66	56	83	73
Early works – other	50	88	50	88
Project EnergyConnect enhanced (incremental line build cost)	182	0	182	0
Stage 2 - Implementation				
Substation works	354	641	354	641
Line works	751	708	751	708
Battery costs	0	0	288	295
Modular power flow controllers	183	89	183	89
Biodiversity offset costs	66	24	66	24
Total (by state)	1,651	1,605	1,957	1,918
Total (all states)	3,256		3,874	

Data Source: Table 4 from the Section 6.1 - VNI West PADR - 29 July 2022

Consideration of Undergrounding

- Recognise stakeholders and communities desire to minimise social and environmental impacts
- Preferred technology selected for VNI West is high voltage alternative current (HVAC) overhead transmission
- This provides network flexibility for new connections and overall efficiency in cost and delivery
- A HVAC undergrounding solution was found to be uneconomical under the RIT-T, costing in the order of 10-20 times more than overhead
- Partial undergrounding of short distances may be practical in exceptional circumstances: this would be considered in early works stage (route selection).
- If partial undergrounding is required, this would increase capital cost allowance, and reduce benefit.

Social and Environmental Considerations



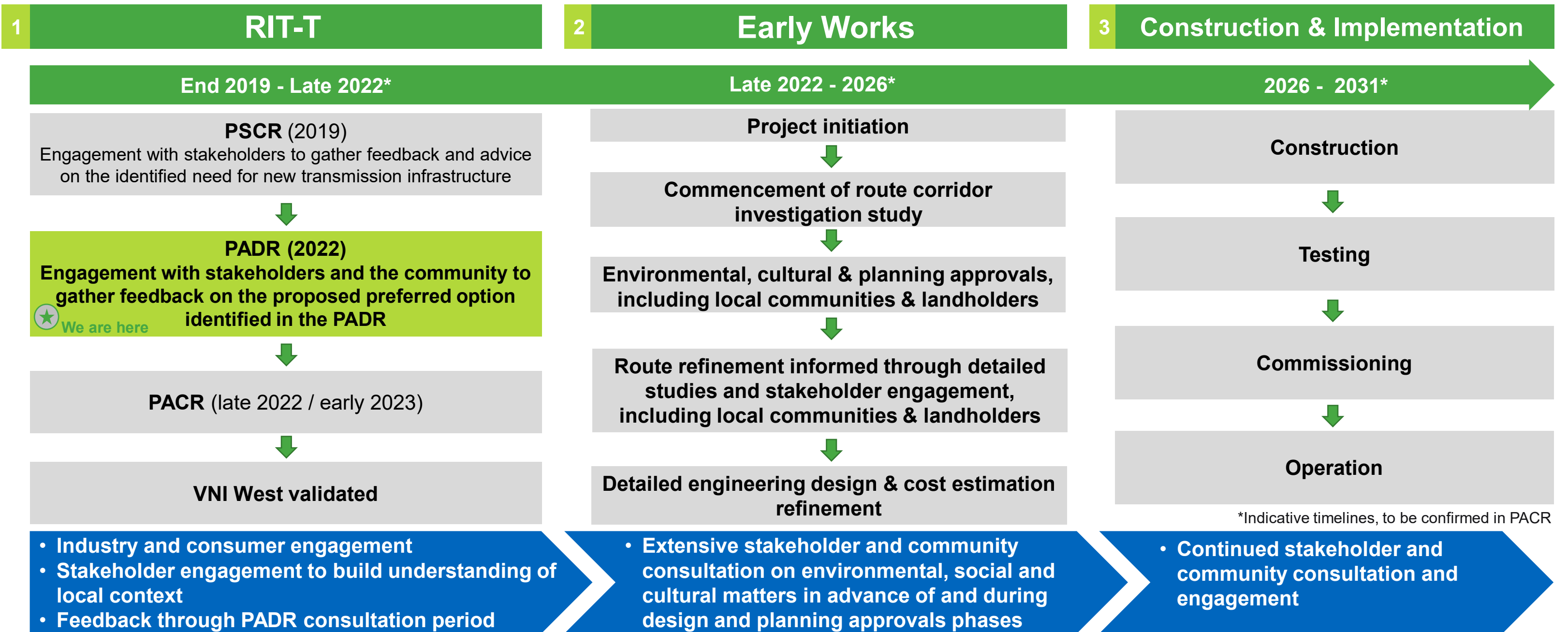
Social and Environmental Considerations

- AEMO Victorian Planning and Transgrid recognise the vital role of communities and landholders in major transmission projects.
- Recent RIT-Ts reinforced the importance of early and meaningful engagement to find mutually beneficial solutions, where possible.
- We are dedicated to continuously improving engagement practices.
 - Engaging with regional stakeholder representatives to facilitate early community input on potential social and other impacts
- Significant environmental, social and cultural matters have been considered to the extent possible, with a range of desktop analysis completed during the RIT-T process to date and some early stakeholder and community engagement.
- During completion of the RIT-T and early development works, project route and terminal station locations will be determined through a rigorous engagement process with communities and landholders in support of final detailed designs for the project.

Community and Landowner Considerations

- The RIT-T process is a technical process, limited in its ability to explore benefits sharing options.
- Collaborating earlier with communities to understand needs and opportunities to co-exist that enable better outcomes is vitally important.
- VicGrid, the NSW Government and others are looking at how to deliver social and economic benefits in ways that are fair, meaningful and participatory and which both Transgrid and AEMO Victorian Planning support.
- Outcomes and principles of potential future frameworks should be incorporated into the various phases of the project, where possible.
- We acknowledge and support the Energy Charter's work in developing social licence guidelines for co-existence of transmission infrastructure and agriculture.

Project Phases



*Indicative timelines, to be confirmed in PACR

NPV Results

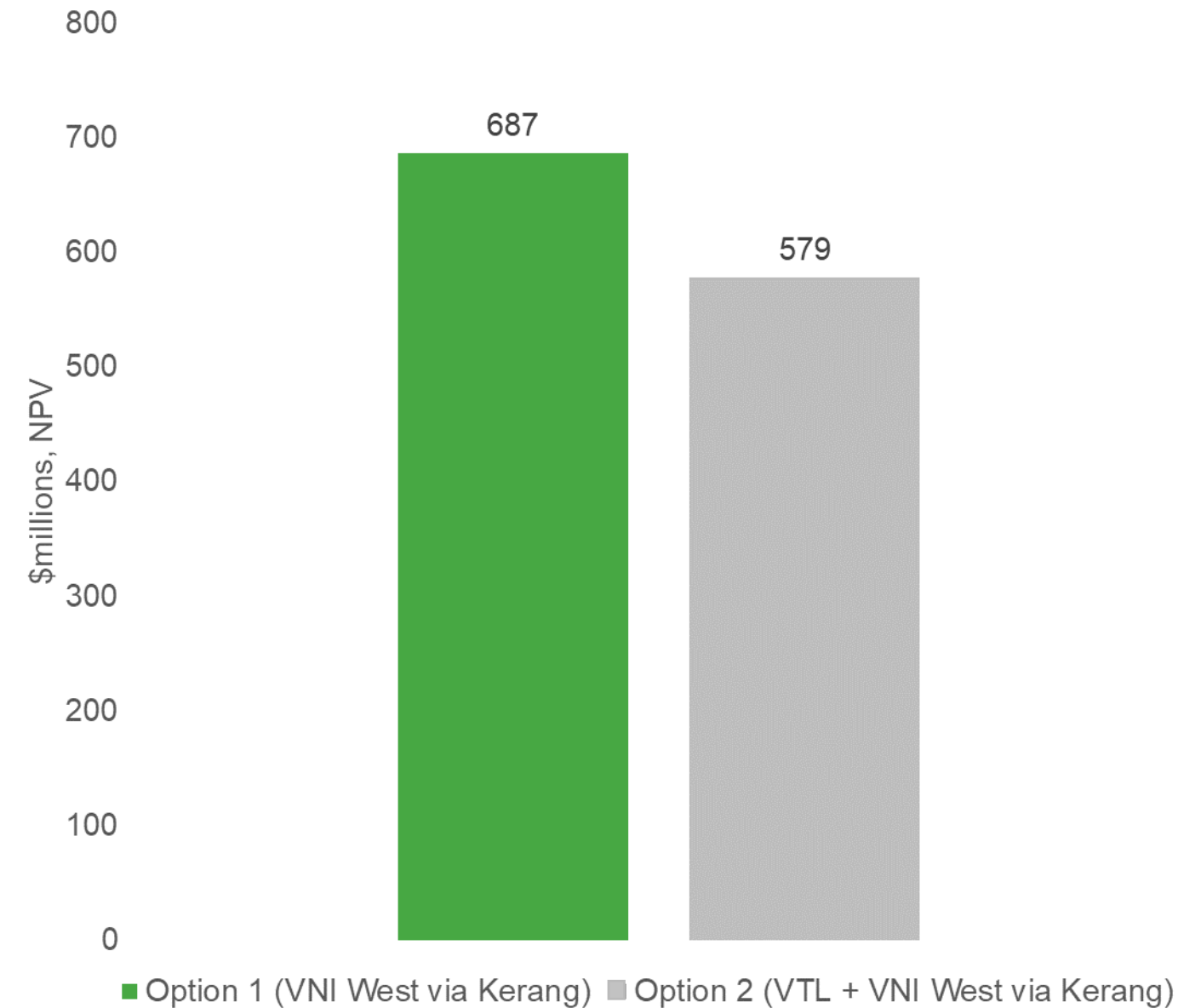


Framework for the NPV analysis

The NPV assessment brings together the assessment of the costs and benefits of each option

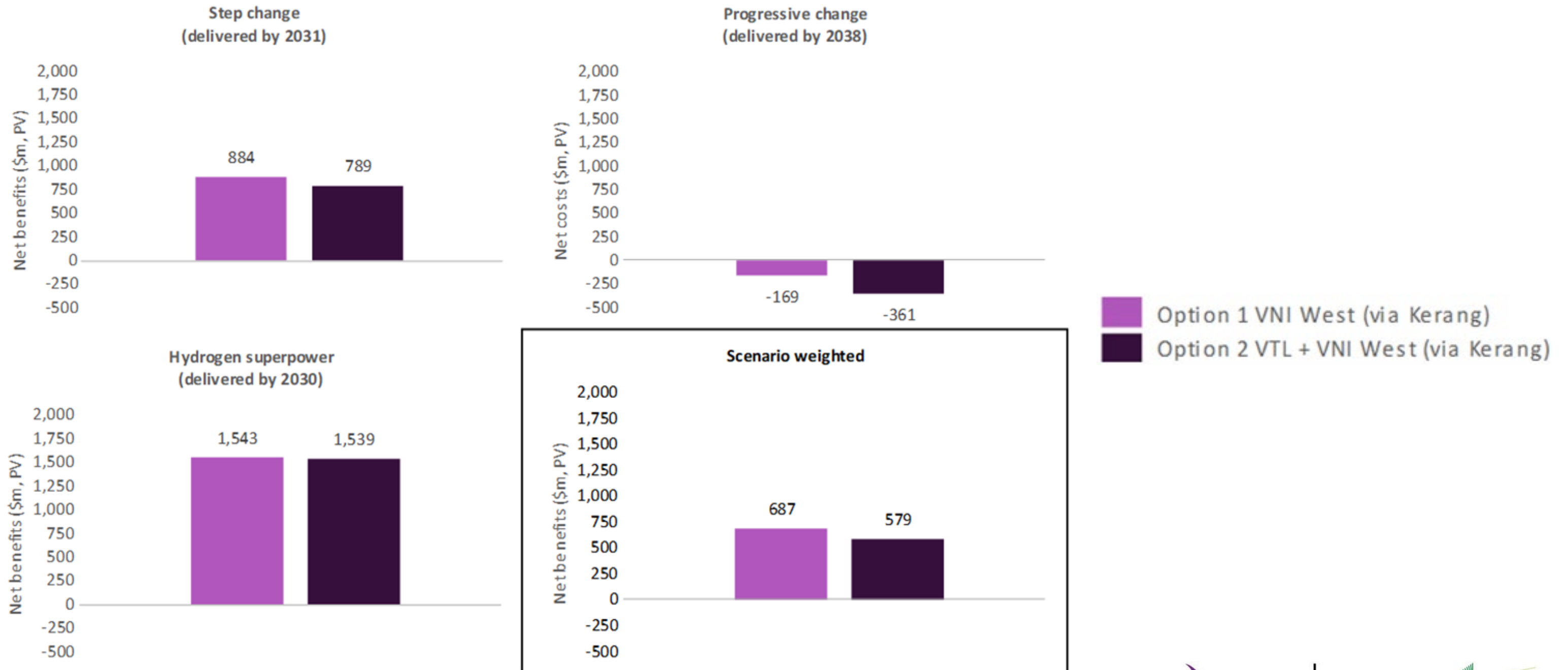
The assessment is relative to a 'base case' in which there is no investment.

- VNI West is an actionable ISP project, and therefore the NPV assessment adopts assumptions from the ISP, including scenarios.
- Assessment period is 27 years (2021-22 to 2047-48)
 - Captures the period of early works as well as the construction timetable
 - Includes 25 years of wholesale market modelling
 - Terminal value included to reflect assets life beyond the assessment period
- Discount rate 5.50% real, pre-tax (ISP assumption)
- Assessment undertaken for each ISP scenario and then weighted
 - Tests the robustness of the option NPV rankings

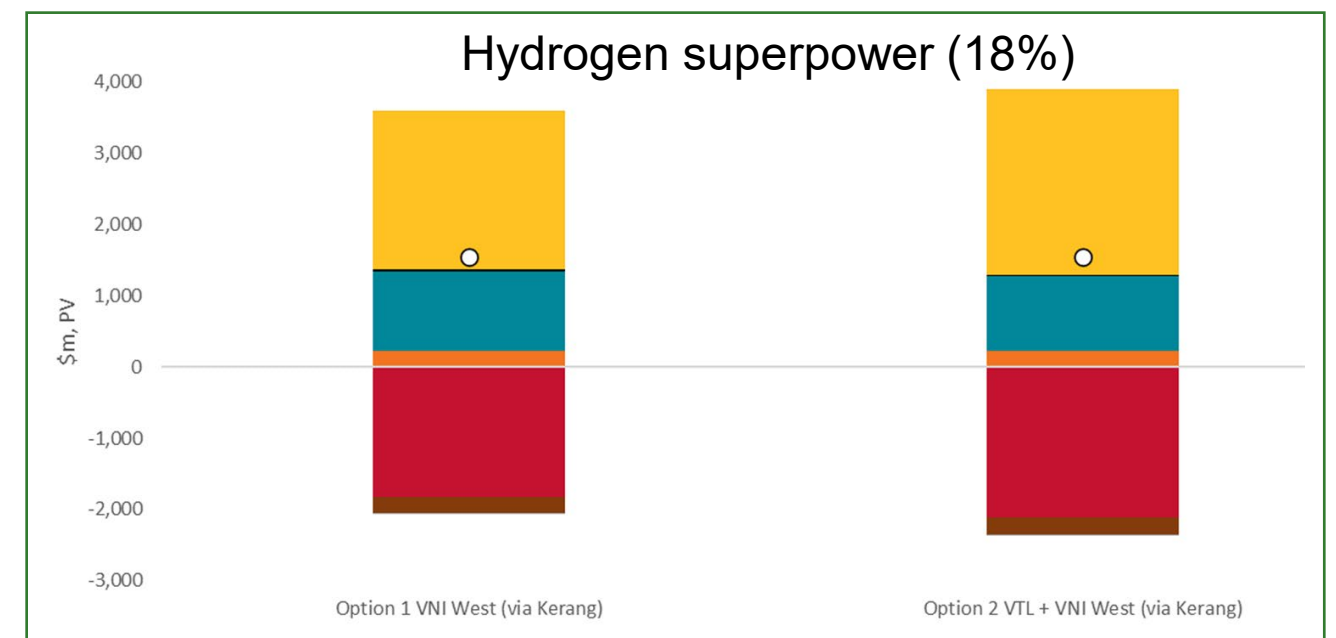
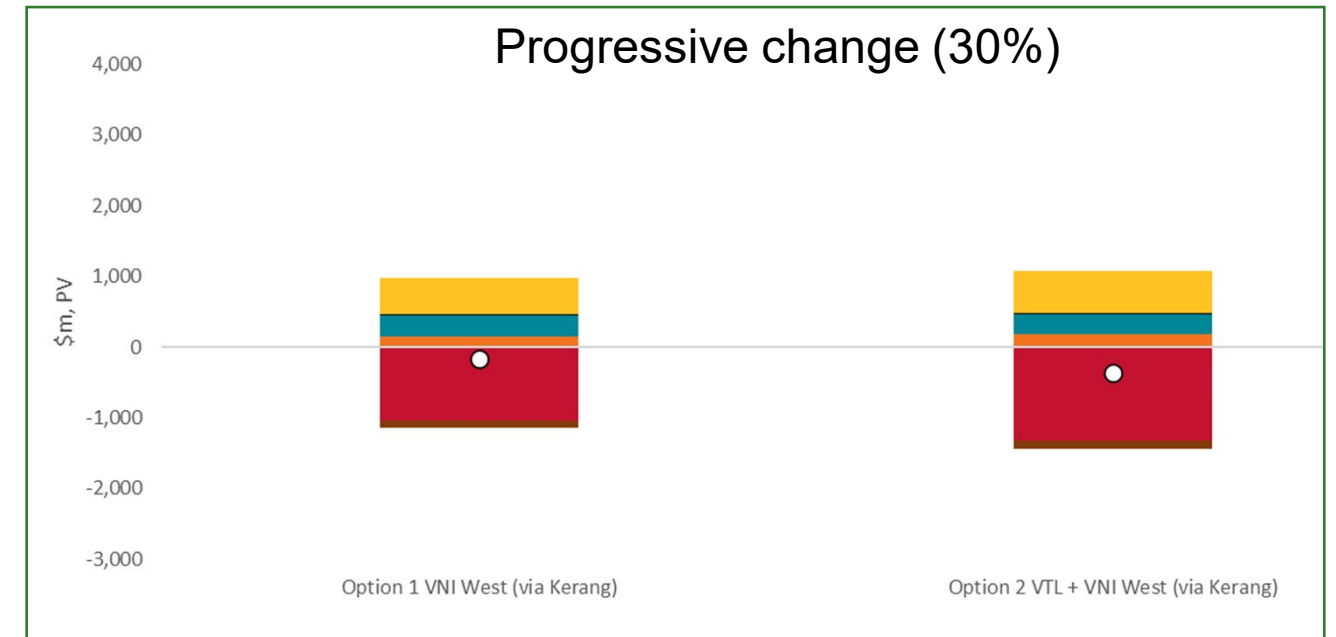
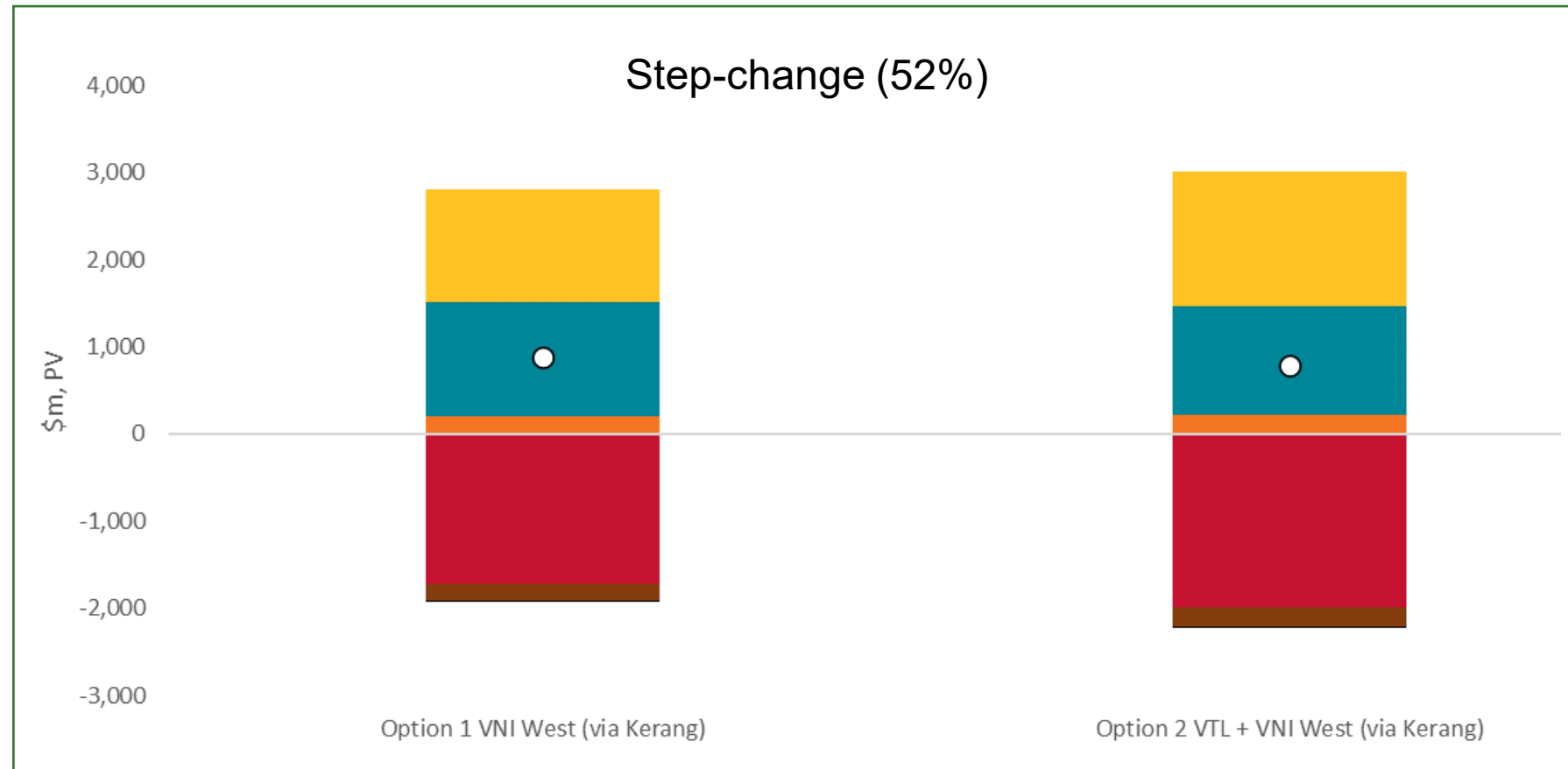


Option 1 (VNI West via Kerang) has 19% (\$108m) greater net benefits than Option 2 (VTL+VNI West via Kerang) on a weighted basis

VNI West is highest ranked option in all scenarios and on a weighted basis

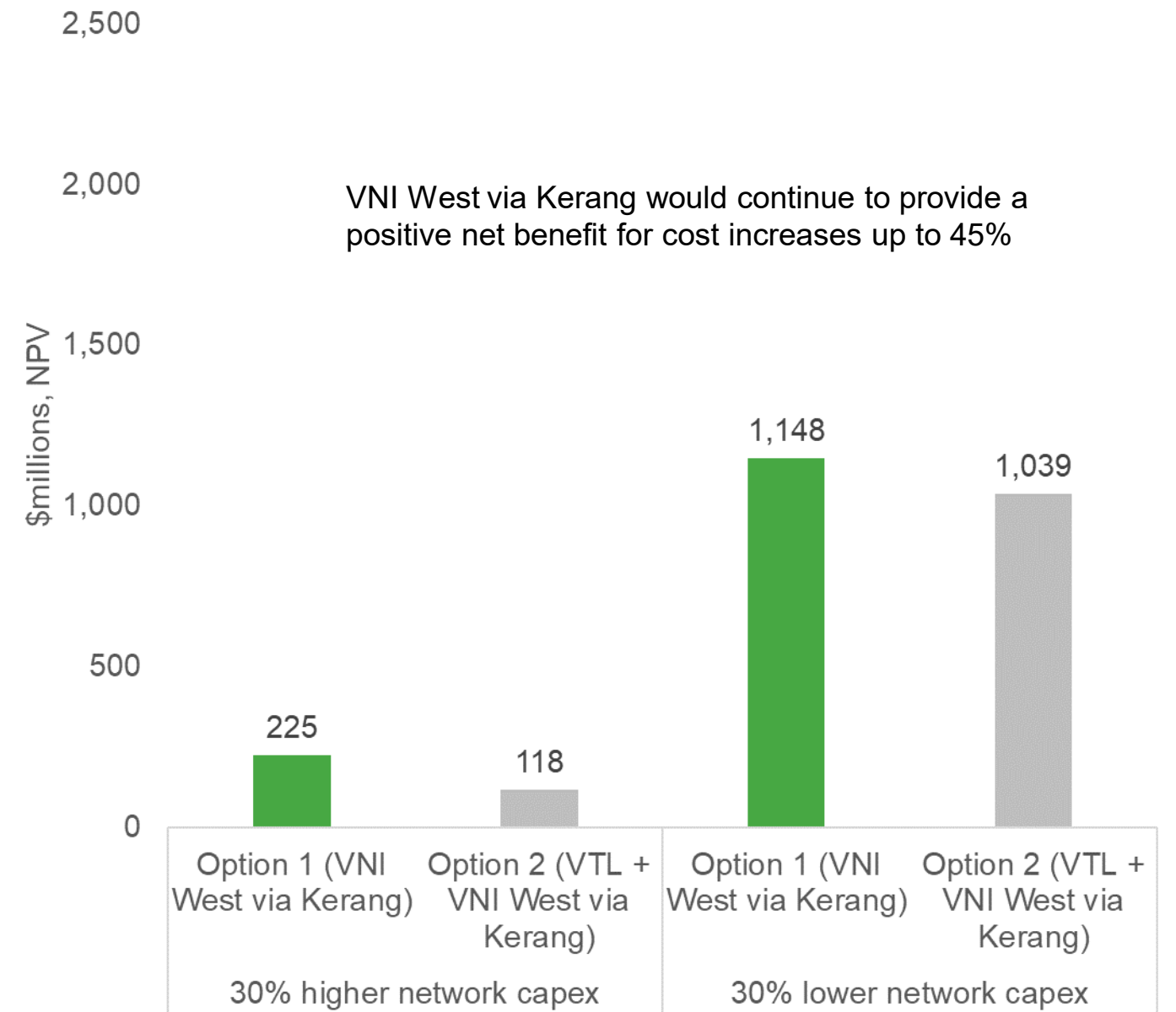
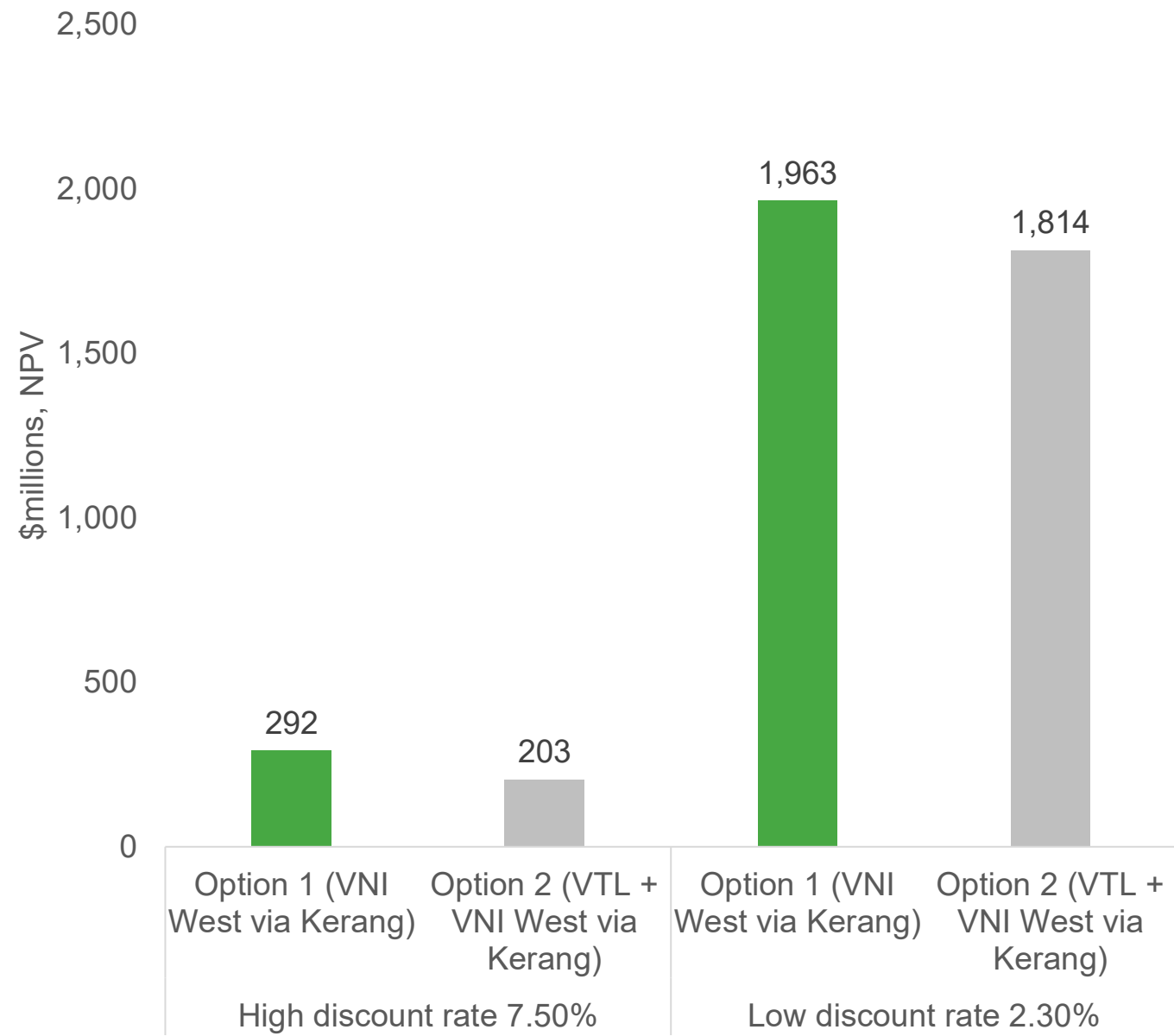


Benefits are driven by avoided generation/storage costs and avoided fuel costs



- Transmission capex
- Transmission opex
- Avoided unserved energy
- Avoided REZ transmission capex
- Avoided fuel costs
- Avoided voluntary load curtailment
- Avoided generation/storage costs (excl. fuel costs)
- NPV

Preferred option is robust to discount rate and capex sensitivities



Market Modelling Overview



Victoria to NSW Interconnector West (VNI West)

Market modelling report forecasting gross market benefits for
the PADR

25 August 2022

Notice

Ernst & Young (“EY”) was engaged on the instructions of NSW Electricity Networks Operations Pty Limited, as trustee for NSW Electricity Networks Operations Trust (“Transgrid”), to undertake market modelling of system costs and benefits to assess two options for the Victoria to NSW Interconnector West (VNI West) Regulatory Investment Test for Transmission (“VNI West RIT-T”).

The results of EY’s work, including the assumptions and qualifications made in preparing the slides (“Slides”), are set out in EY’s report (“Report”) dated 26 July 2022. The Slides and the Report should be read in conjunction with each other and in their entirety including any disclaimers and attachments, this notice and the notice included in the Report. A reference to the Slides includes any part of the Slides. No further work has been undertaken by EY since the date of the Slides to update it.

EY has prepared the Slides for the benefit of Transgrid and has considered only the interest of Transgrid. EY has not been engaged to act, and has not acted, as advisor to any other party. Accordingly, EY makes no representations as to the appropriateness, accuracy or completeness of the Slides for any other party’s purposes. Our work commenced on 22 September 2021 and was completed on 4 May 2022. Therefore, our Slides does not take account of events or circumstances arising after 4 May 2022 and we have no responsibility to update the Slides for such events or circumstances.

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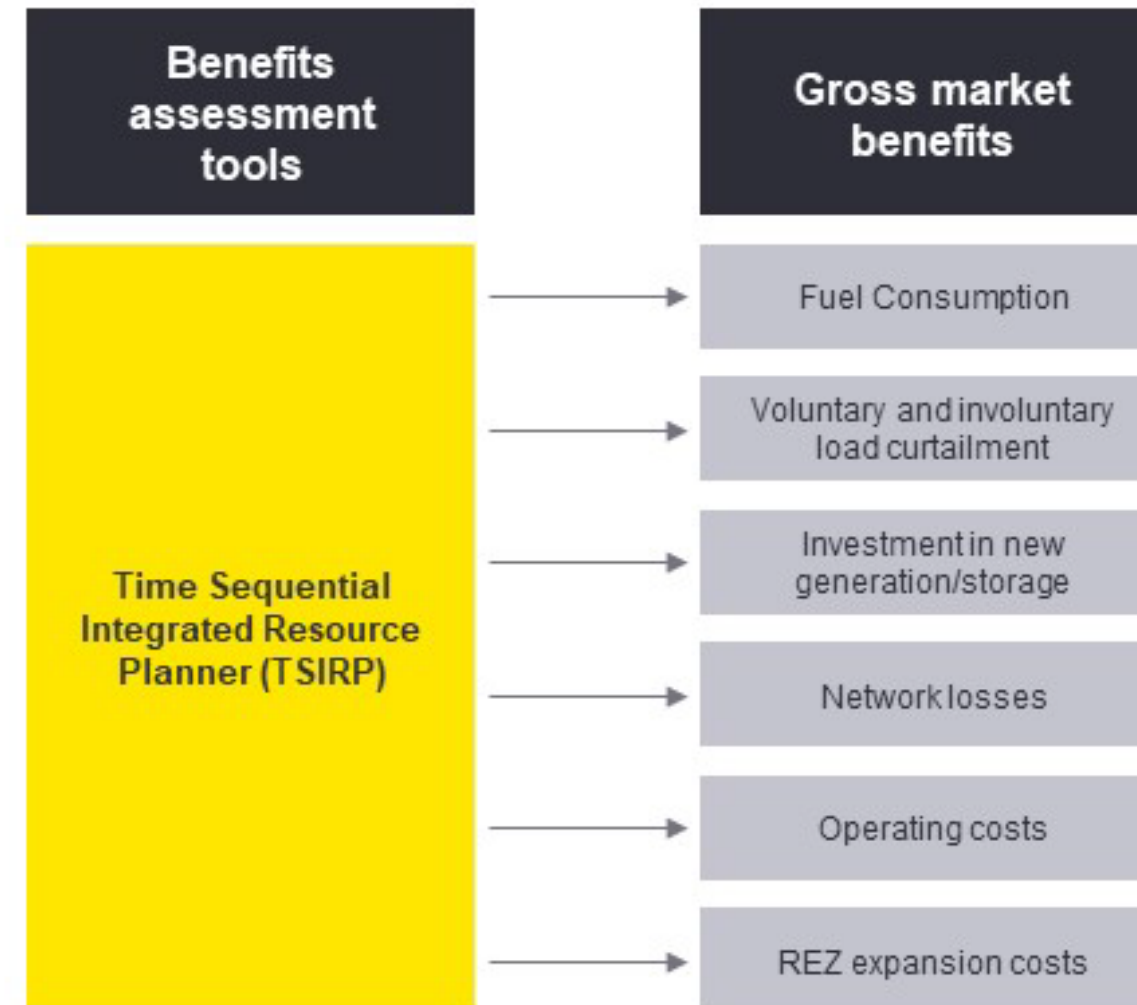
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Readers are advised that the outcomes provided are based on many detailed assumptions underpinning the scenario, and the key assumptions are described in the Slides. These assumptions were selected by Transgrid after public consultation. The modelled scenario represents one possible future option for the development and operation of the National Electricity Market, and it must be acknowledged that many alternative futures exist. Alternative futures beyond those presented have not been evaluated as part of this Slides.

EY’s liability is limited by a scheme approved under Professional Standards Legislation.

Modelling methodology

- Least-cost NEM generation expansion model in accordance with AER cost benefits analysis (CBA) guidelines.
- Modelling conducted at hourly time-sequential granularity utilising a least-cost planning model that solves dispatch intervals for 25 years (FY2023-24 to FY2047-48) simultaneously.
- Least cost solution minimises cost of supply to meet demand and other constraints:
 - Generation of each plant including charging and discharging of storage
 - Commissioning new plant installed “linearly”
 - Withdrawing existing plant in the least cost model considering carbon budget constraint
 - Other constraints include minimum loads, generator availability, network, hydro.
- Model utilises 9 year historical trace for hydro inflows, wind and solar availability and demand shape. These traces include concurrent wind and hydro drought years.



The difference between the costs of the Base Case (without VNI West augmentation) and the VNI West option represents gross market benefits

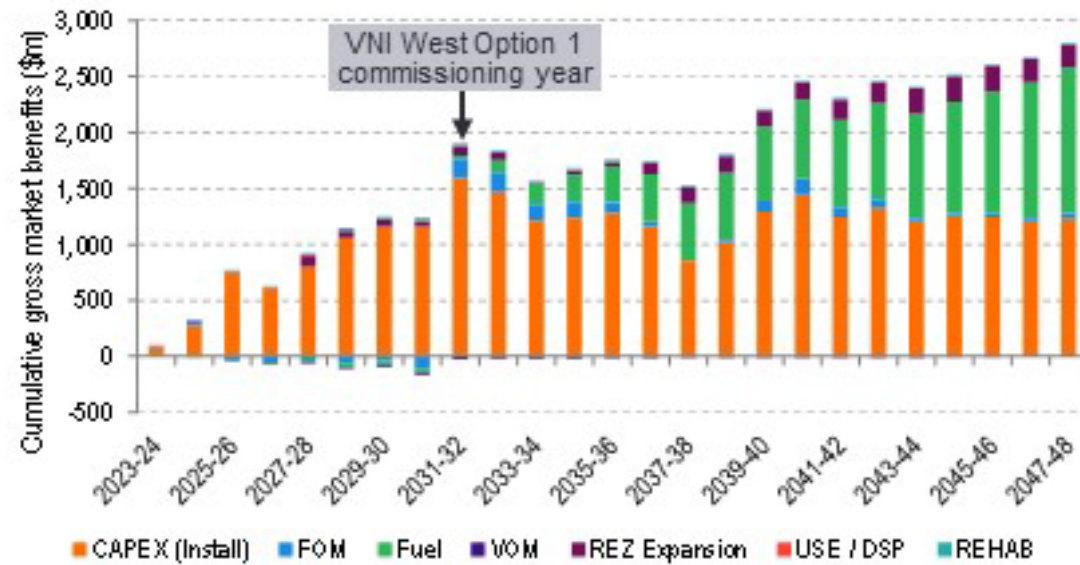
Scenarios

- Three 2022 ISP scenarios assessed, as assigned by AEMO in the ISP:
 - Step Change
 - Progressive Change
 - Hydrogen Superpower
- Input and assumptions:
 - Generally from the 2021 IASR published in December 2021:
 - 2022 ISP demand forecast
 - Carbon budget constraints
 - Capex, fixed and variable operation and maintenance costs
 - Fuel costs
 - State government renewable energy targets and policies
 - Major augmentation timing based on draft 2022 ISP (*generally consistent with the final 2022 ISP*)
 - Latest list of committed and anticipated generators based on February 2022 version of AEMO Generation Information data (*also used in final 2022 ISP*)
- Major changes in the assumptions in the final 2022 ISP:
 - REZ transmission for some REZs including SWNSW REZ

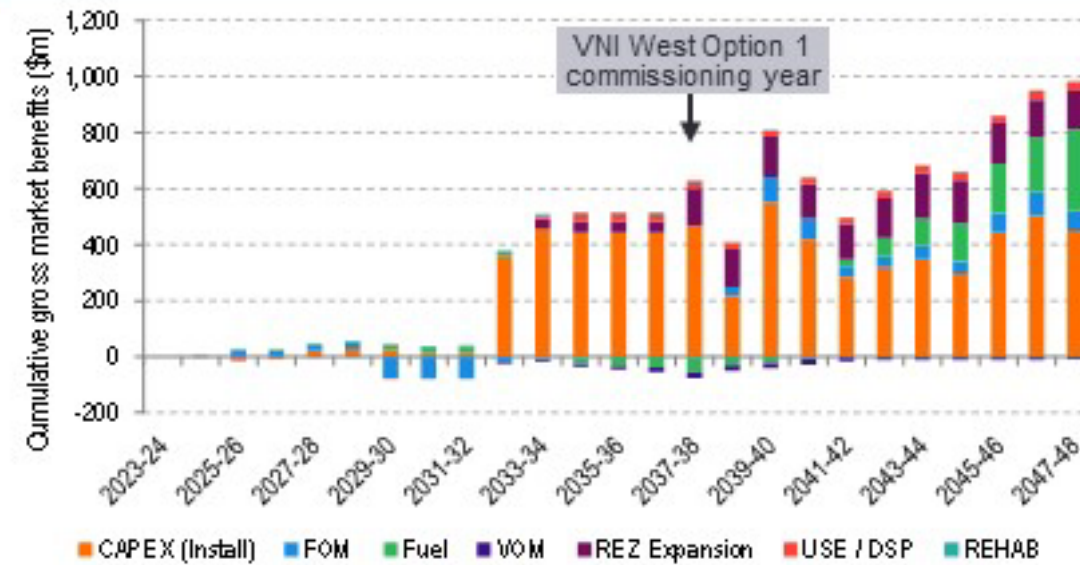
Forecast gross market benefits - Option 1

Millions real June 2021 dollars discounted to June 2021

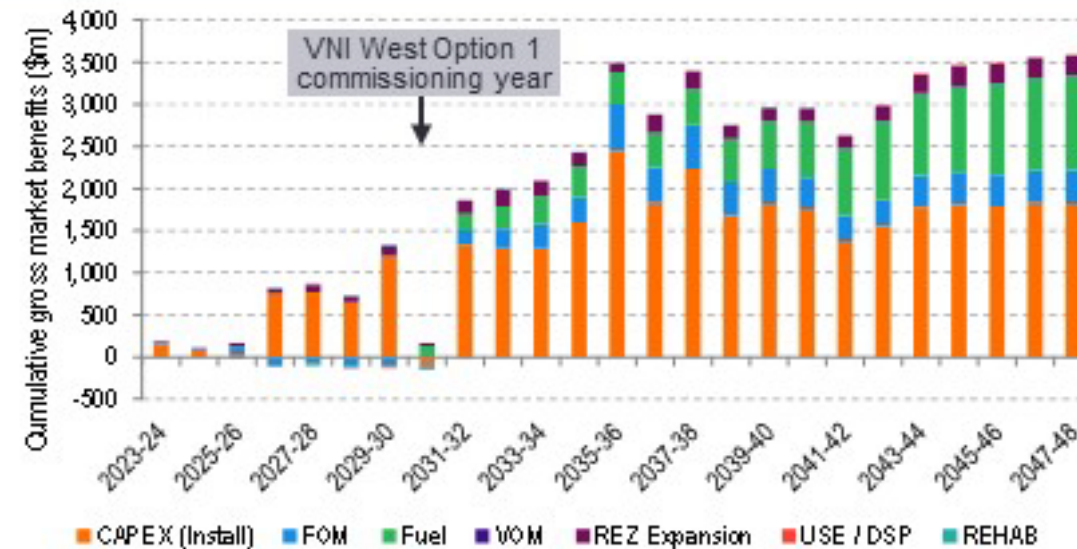
Step change



Progressive change



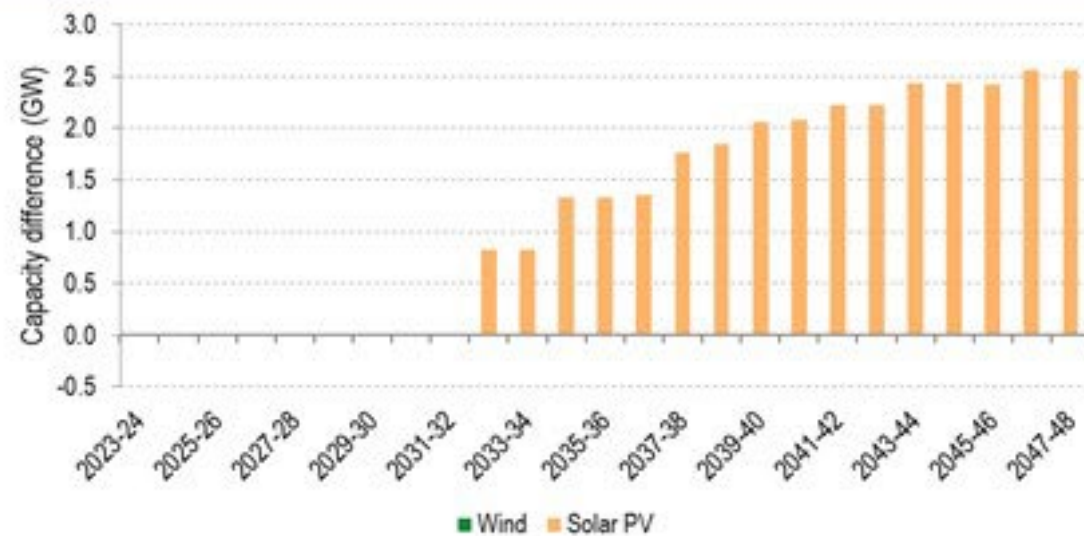
Hydrogen superpower



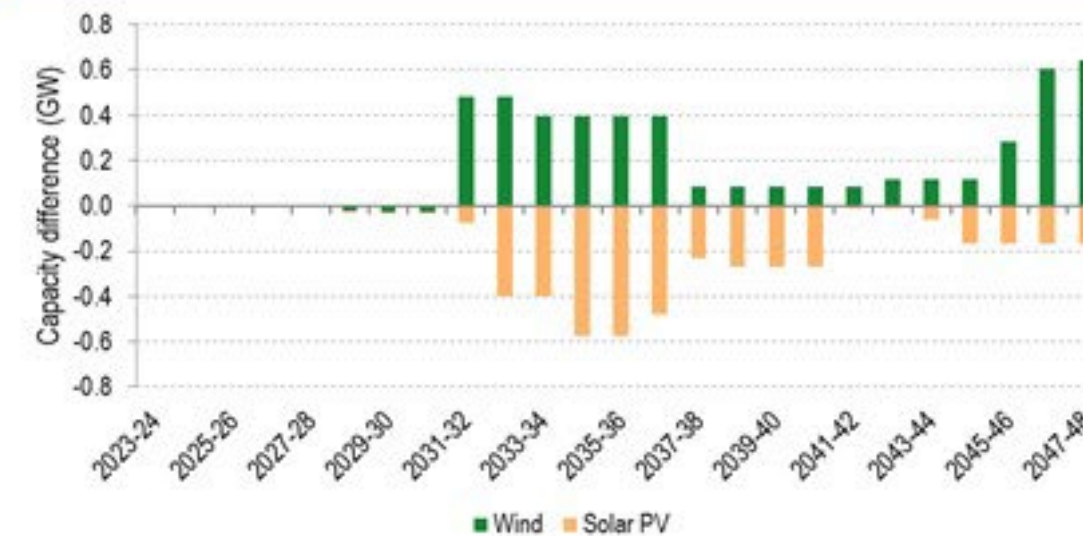
Renewable Energy Zones (REZ) - Step Change scenario

Changes in capacity with Option 1 relative to the Step Change Base Case

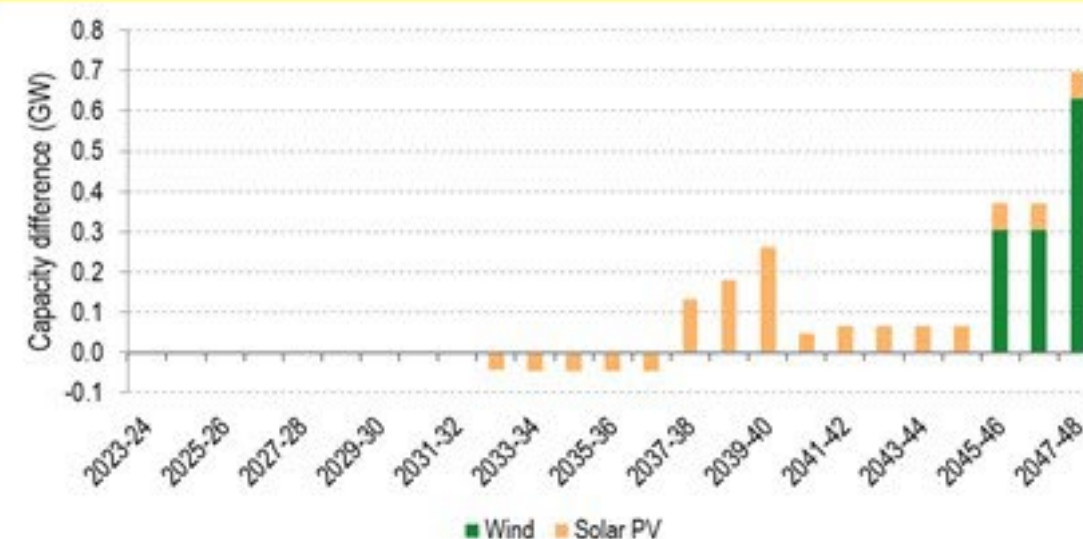
Murray River REZ



Western Victoria REZ



SWNSW REZ



Question and Answer Session



Key Matters of Interest

- Project timing
- Route selection
- Compulsory acquisition
- Existing 220kV
- Terminal station (Mt Prospect)

Thank you and closing comments



Make a Submission

- All stakeholders, including community members, are encouraged to provide written submissions on the PADR.
- Any matters raised through the consultation that are outside of the RIT-T parameters will be noted, then considered and addressed through community and stakeholder consultation as part of early works, and design and planning approvals processes.

More Information

Visit the Transgrid and AVP websites to:

- view a copy of the [PADR](#)
- read the latest [project update](#) and other supporting materials
- find details for email and phone enquiries

PADR Submissions

Written submissions are welcome until 5.00pm, Friday 9 September 2022

E: VNIWestRITT@aemo.com.au



Thank you

