

AUSTRALIAN EXPERIENCE IN TRANSMISSION PLANNING

THOMAS LONGDEN

CRAWFORD SCHOOL OF PUBLIC POLICY
ANU ICEDS



Australian
National
University

Overview

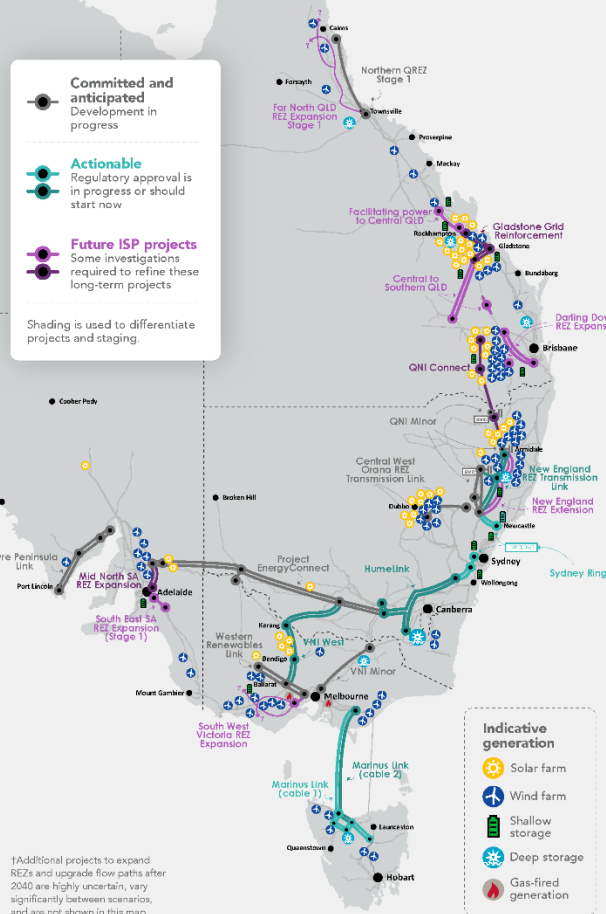
- Key planning exercise for planning transmission needs is the Australian Energy Market Operator (AEMO) Integrated System Plan (ISP)
 - Produced every two years,
 - Combines stakeholder engagement and power system expertise to develop a roadmap for future developments,
 - Includes projections for many dimensions of future energy needs:
 - Energy demand,
 - Energy supply (from many sources, esp. renewables),
 - Roof top solar PV, and
 - Electric vehicle deployment.

2022 Integrated System Plan (ISP)

The Australian Energy Market Operator (AEMO) has published the 2022 ISP, a 30-year roadmap for essential and efficient investment in the National Electricity Market (NEM).

The 2022 ISP supports Australia's highly complex and rapid energy transformation, switching from higher-cost, high-emission energy to lower-cost renewable energy, doubling capacity to power transport and industry, and at all times providing consumers with reliable, secure and affordable power.

Network projects in the optimal development path

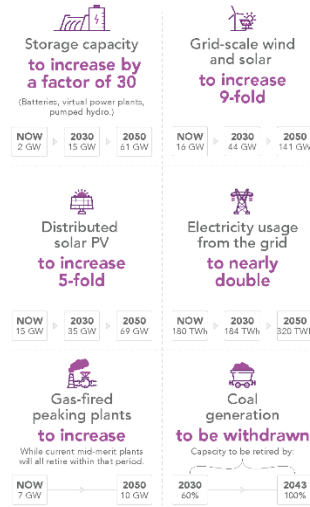


Consultation

The 2022 ISP is based on rigorous economic and engineering analysis, and almost two years' in-depth stakeholder engagement with energy consumers and providers, State and the federal governments, and energy regulators and analysts.

- Over **1,500** individual stakeholders
- Discussions convened through **31** webinars and **39** reports
- Detailed feedback received through **198** submissions

Expected energy transition to 2050 ('Step Change' scenario)



Considerations

- Market reforms
- Government policies
- Economic growth
- Emission targets
- Grid technologies and services
- Consumer investment in DER

Optimal development path (ODP)

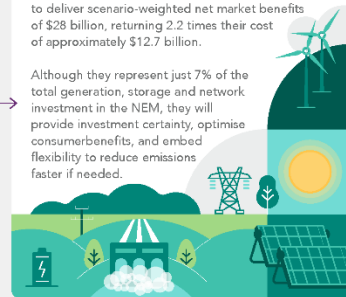
The ODP identifies five projects as immediately actionable which should progress as urgently as possible – HumeLink, VNI West, Marinus Link, Sydney Ring and New England REZ Transmission Link.

While delivery dates are as advised by project proponents, earlier delivery would provide valuable insurance for any faster transition or additional benefits to consumers. Supporting policies and mechanisms from the Commonwealth and jurisdictional governments may be able to assist in earlier delivery.

Net benefits

The transmission projects within the ODP are forecast to deliver scenario-weighted net market benefits of \$28 billion, returning 2.2 times their cost of approximately \$12.7 billion.

Although they represent just 7% of the total generation, storage and network investment in the NEM, they will provide investment certainty, optimise consumer benefits, and embed flexibility to reduce emissions faster if needed.

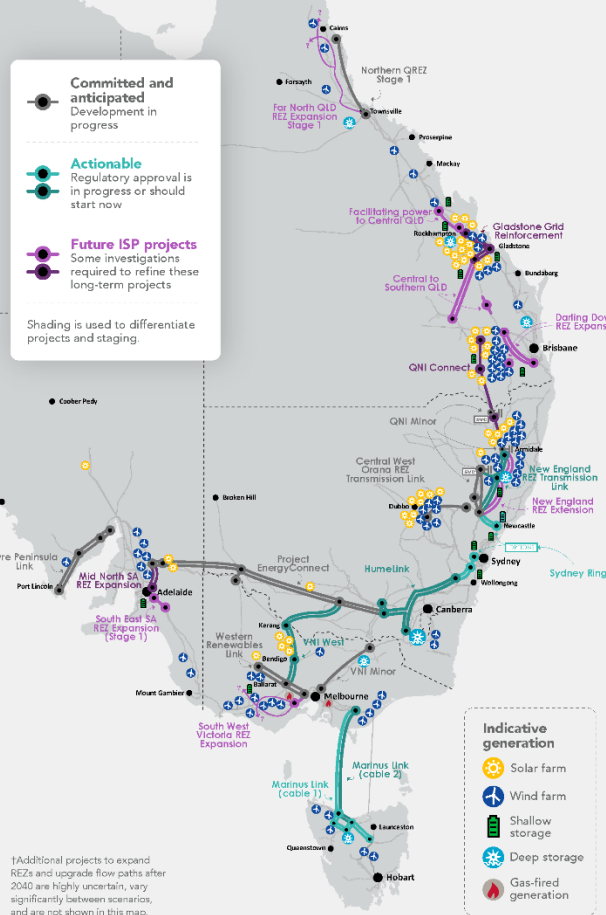


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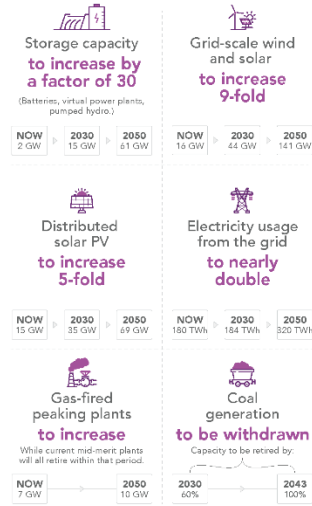
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Transition to renewable energy rests upon better inter-connectivity

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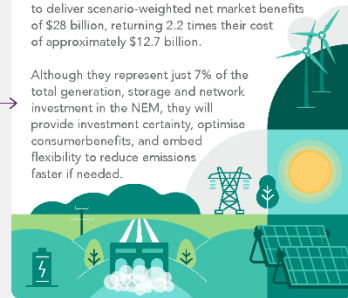
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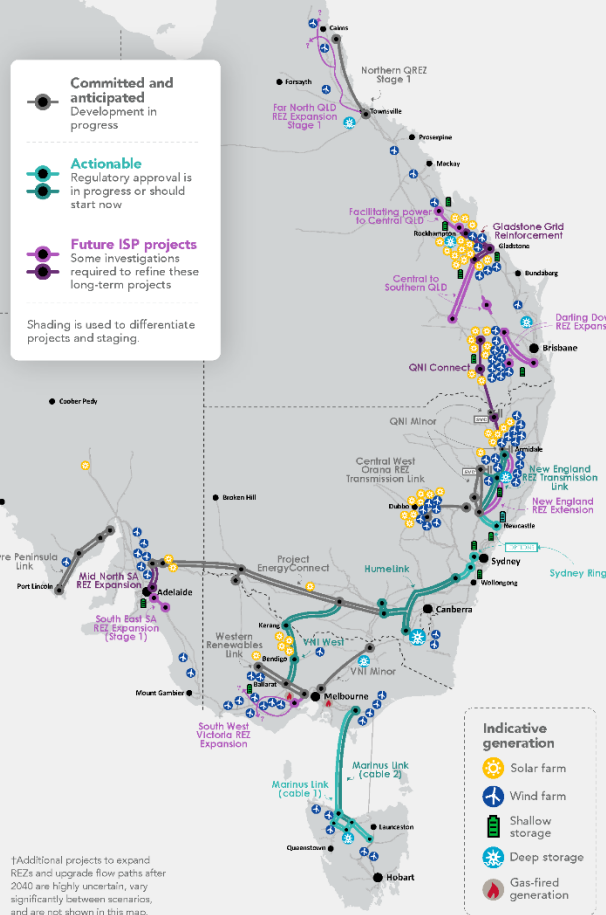


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To understand the future grid, AEMO model:

- demand,
- grid scale renewables,
- storage,
- roof top PV,
- gas/coal.

Optimal development path (ODP)

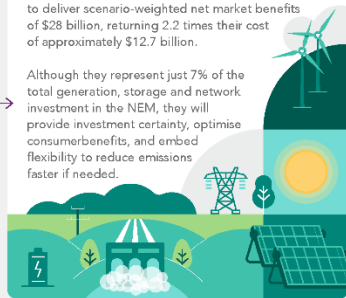
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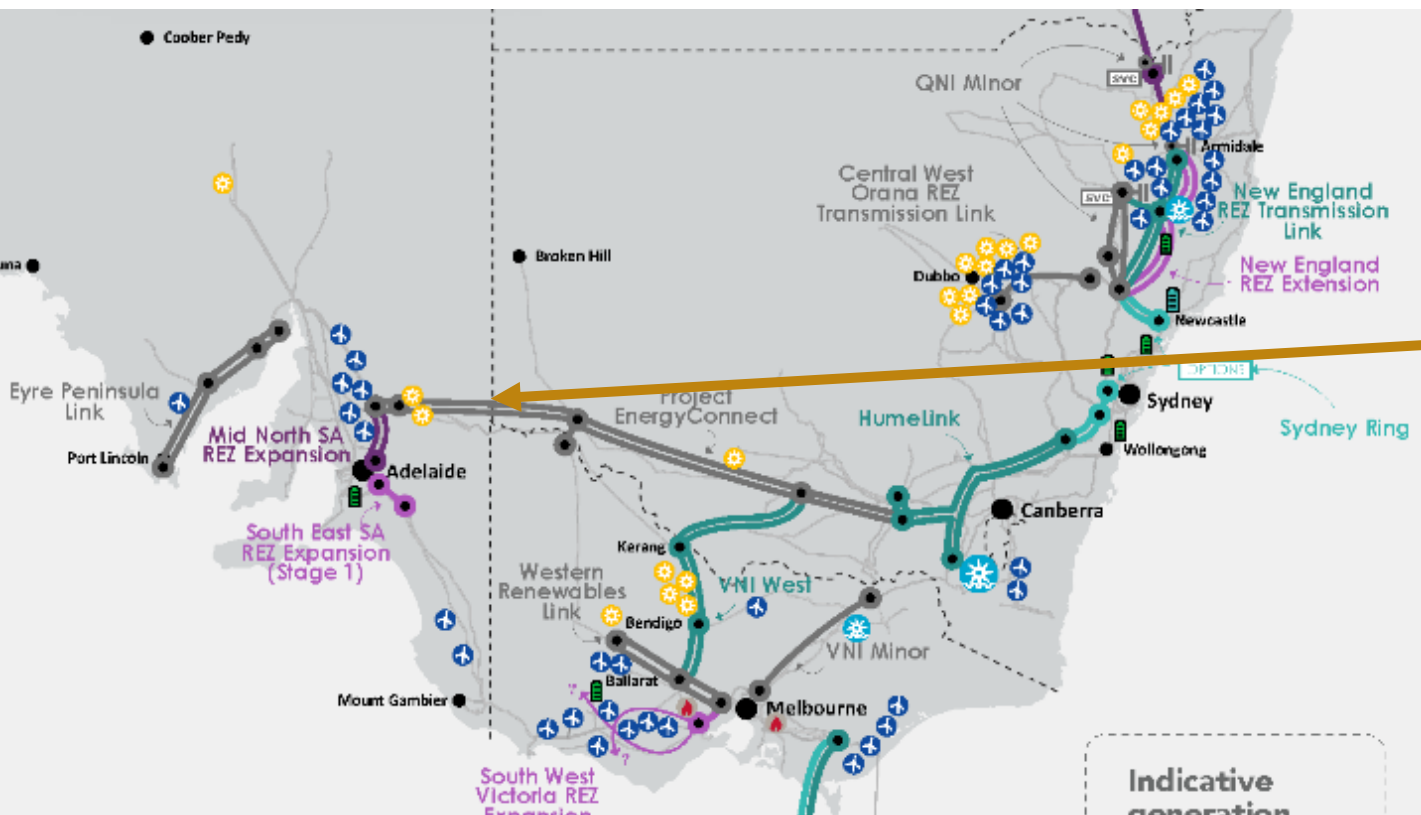
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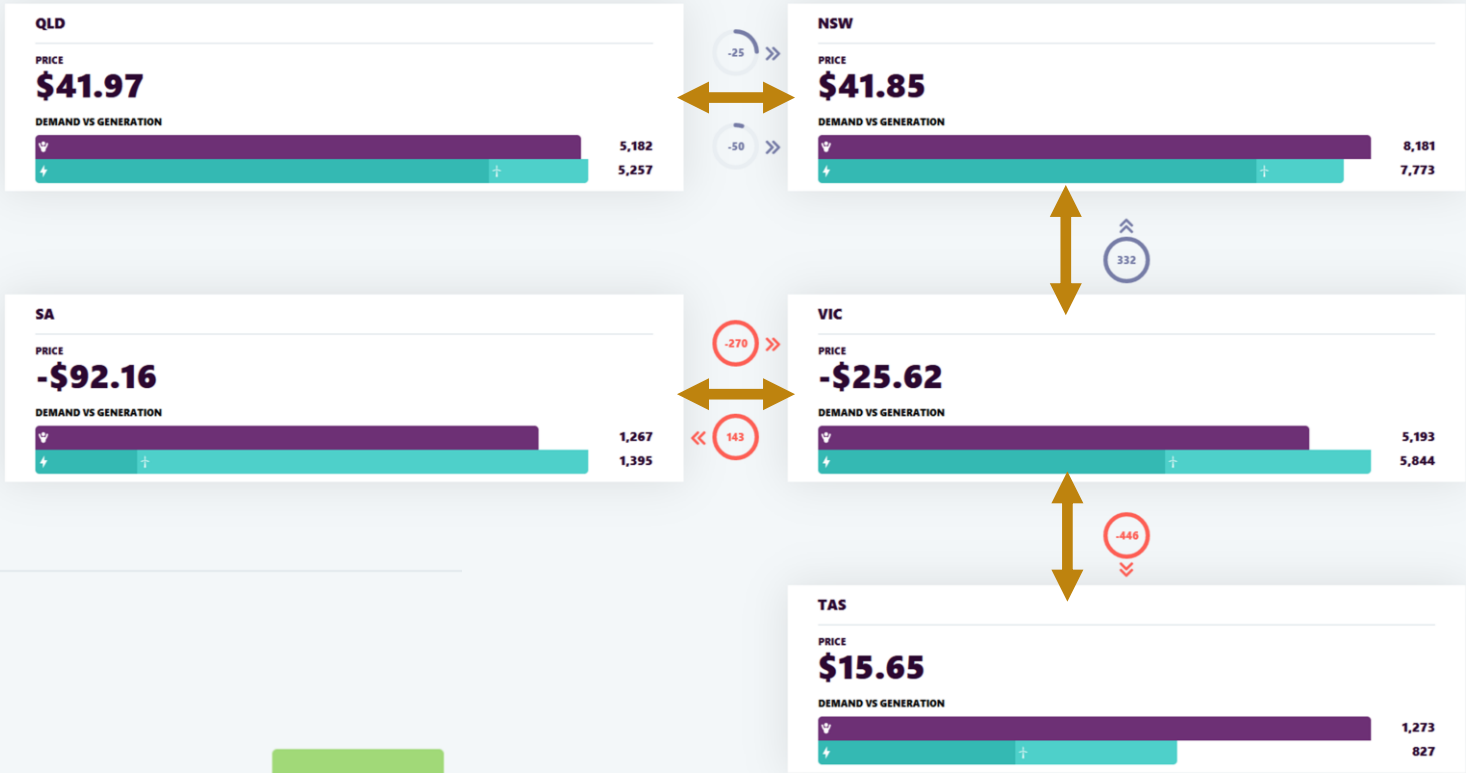


**System failure/s
in Sept. 2016
reinforced the
need for better
interconnectivity
between South
Australia,
Victoria and
New South
Wales**

One grid with competition and electricity flow between regions

Real-time data:
<https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/data-nem/data-dashboard-nem>

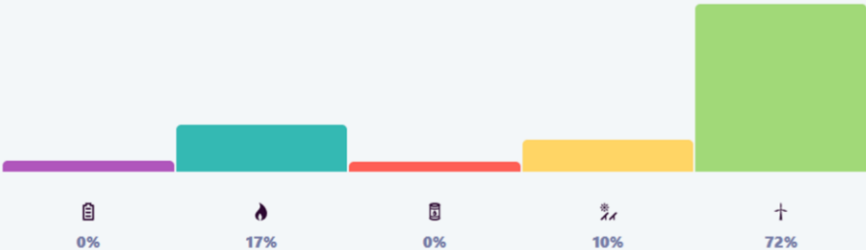
7 June 2021 - 11:35

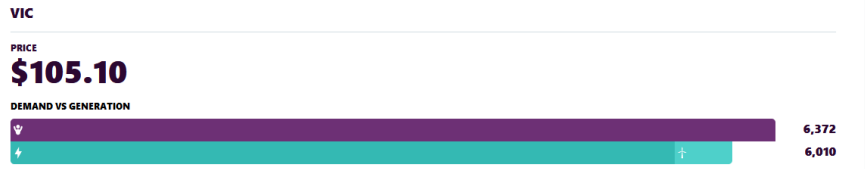
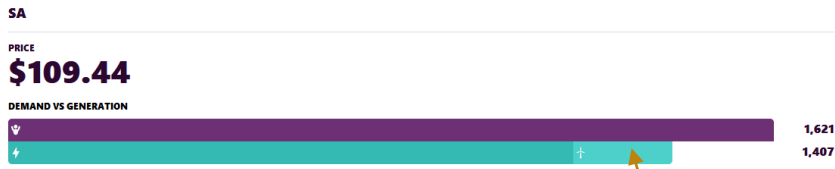
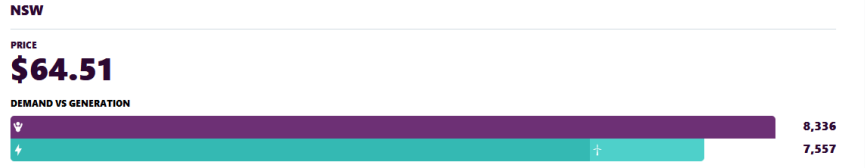


NSW QLD VIC SA TAS NEM

Mix Summary (7 June 2021 - 11:35)

Total breakdown of fuel used

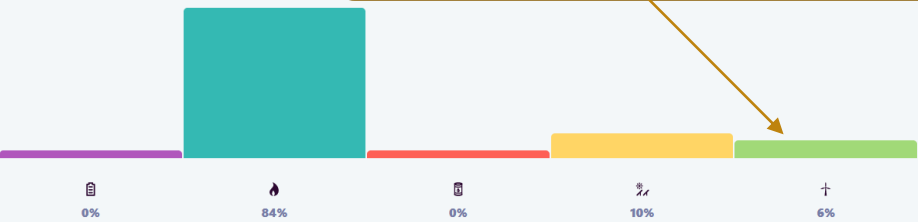




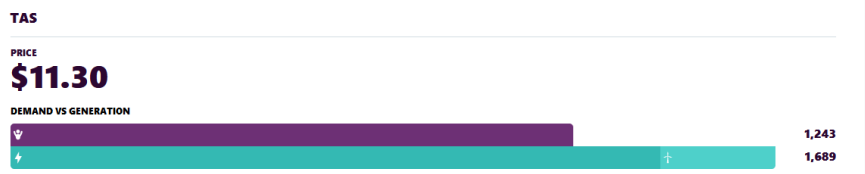
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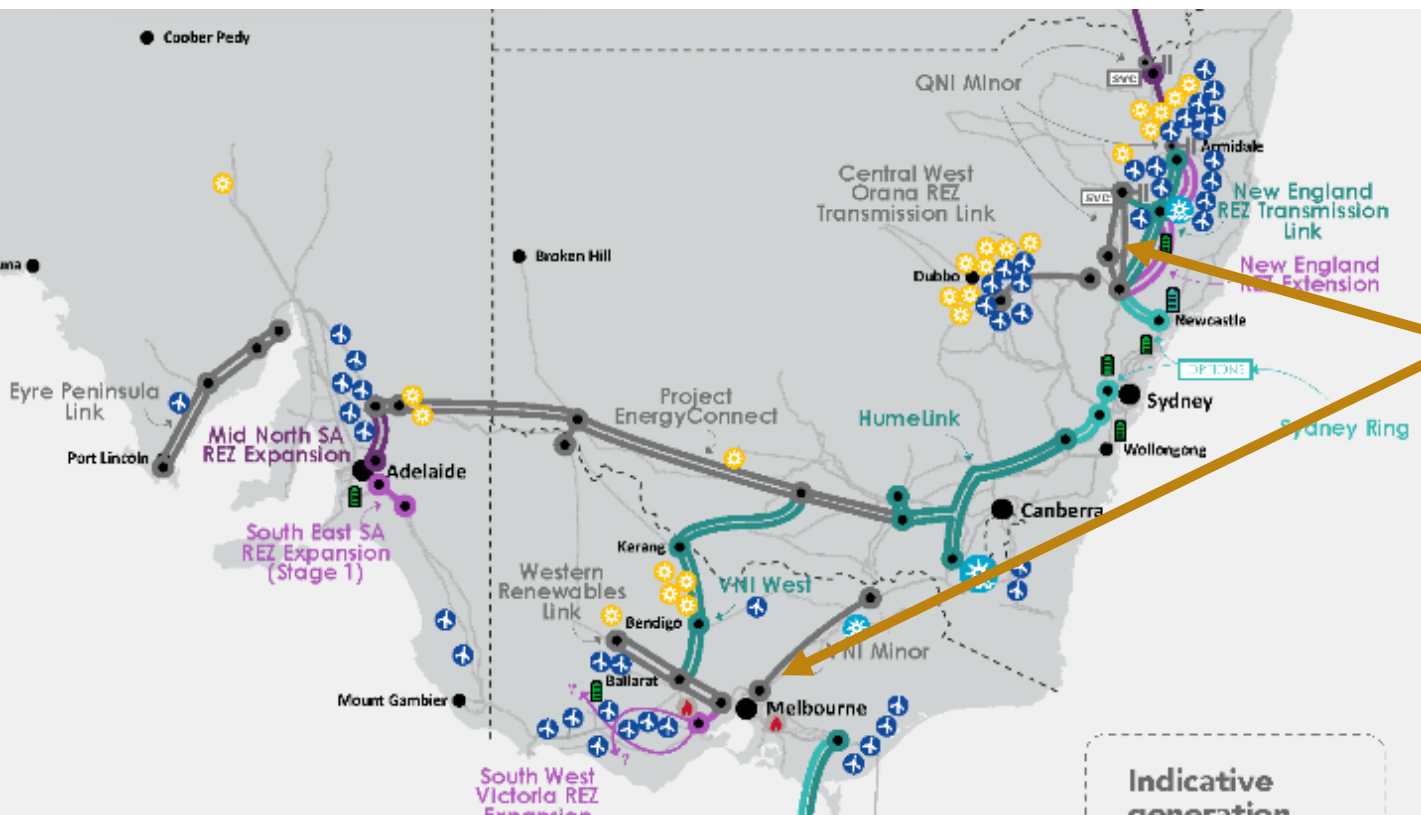
Mix Summary (5 July 2021 - 14:00)

Total breakdown of fuel used

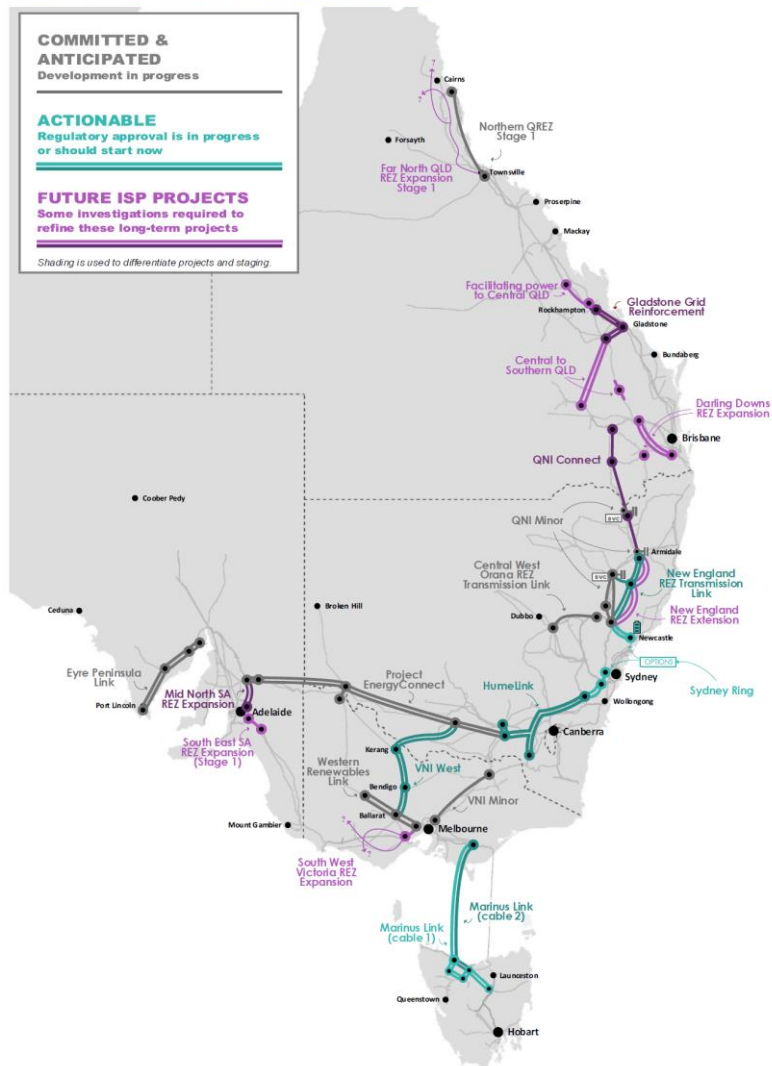


Amount of renewables matters – needs to have flexible generation and storage for low RE days





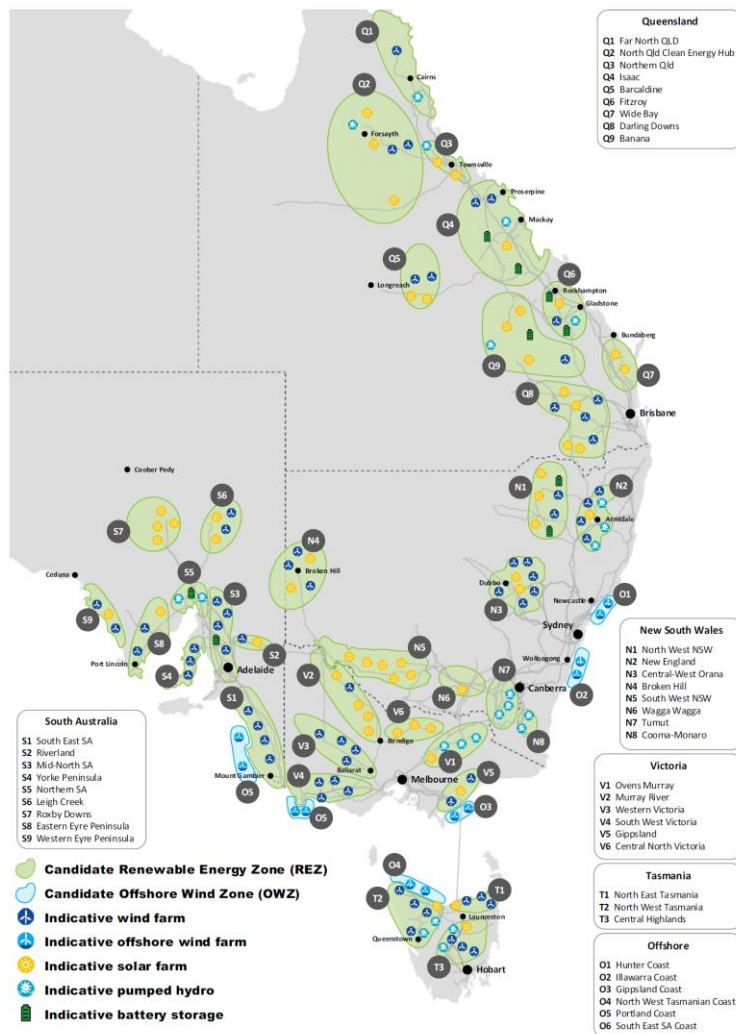
Other projects better link renewables with high demand centres (i.e. major cities, Newcastle, Sydney, Melbourne)



- Optimal development path for network transmission projects
 - Committed and anticipated – are those where the development is in progress,
 - Actionable – regulatory approval has started or should commence,
 - Future project – long-term projects that will be needed in the future.

<https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/a5-network-investments.pdf?la=en>

Figure 1 2022 REZ including OWZ candidates



- Part of the forecasting involves selecting candidate Renewable Energy Zones
 - Some sites are mainly solar,
 - Others are onshore wind,
 - The latest version (2022) has offshore wind.

<https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/a3-renewable-energy-zones.pdf?la=en>



- Deal signed to fund Marinus Link power cable between Tasmania and Victoria
 - Two 750-megawatt undersea cables between Tasmania and Victoria,
 - Improves link between mainland and Tasmania's renewable energy projects (both hydro and wind).

<https://www.abc.net.au/news/2022-10-19/tasmania-victoria-federal-funding-deal-marinus-link-power-cable/101549876>