Transmission Annual Planning Report Update

31 May 2023

ElectraNet

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Executive Summary

As the owner and operator of South Australia's electricity transmission network, ElectraNet plays a vital role in powering the homes, businesses and communities of South Australia and enabling the transition to a clean energy future.

Each year, ElectraNet reviews the capability of South Australia's electricity transmission network to ensure it can meet the ongoing demand for electricity transmission services, forecast under a range of future operating scenarios. The results are published in ElectraNet's Transmission Annual Planning Report (TAPR).

Since the most recent publication of the TAPR in October 2022, interest in large new load connections to the South Australian electricity transmission system has risen sharply. Proponents are seeking to take advantage of South Australia's low-cost and low-emission electricity from renewable sources and transition to a clean energy future.

These potential new demand developments fundamentally change the outlook for South Australia's transmission network.

As a result, we are releasing this publication to provide stakeholders with a timely update on the changing outlook for South Australia's transmission network, based on the potentially higher demand forecasts and customer interest described in this report. We are seeking feedback from stakeholders and proponents to support our planning and inform potential transmission developments for the 2023 TAPR, which will be published in October.

Key developments that could, if they occur, drive a significant increase in maximum electricity demand include:

- The potential connection of large new customer loads such as new or expanded mines, new industrial loads, other energy-intensive opportunities such as data centres and the production of "green steel"
- The development of hydrogen facilities near Whyalla and other large hydrogen hubs in accordance with the South Australian Government's hydrogen strategy
- The widespread adoption of electric vehicles, and the electrification of sectors that currently utilise other fuel sources.

This update presents ElectraNet's latest thinking about network options to address proposed large new customer loads, along with the Renewable Energy Zone (REZ) developments that would be needed to supply the projected increase in demand, while maintaining the South Australian Government's target of 100% net renewable electricity generation by 2030.

In developing these options we have:

- Built on the high-level potential network expansion projects presented in our 2022 TAPR
- Considered the outcome of recent strategic studies into the feasibility of interconnector expansion and the prioritisation of South Australian REZs.

Each of the project options identified in this TAPR Update was previously identified in the 2022 TAPR (as per Appendix A of this Update). These project options have been further developed and are discussed in more detail in section 4.

This TAPR Update is focused on the large-scale transmission developments that may be needed to support the connection of potential large new loads and renewable generation in South Australia. We are also working with SA Power Networks to assess the impact of recent load forecasts on the capability of connection points to the distribution network. We plan to provide an update about any connection point impacts in our 2023 TAPR.

Request for feedback

This TAPR Update forms a key input to AEMO in response to its Draft Transmission Expansion Options Report released for consultation on 2 May 2023, as it works with stakeholders to develop its next Integrated System Plan by June 2024.

It also forms a key input to our TAPR which we will publish in October 2023.

We therefore invite feedback on this TAPR Update.

Your feedback will help us to serve you better and ensure we can provide the reliable and affordable electricity transmission services customers expect into the future.

We seek feedback on the following questions:

1 How representative is the current new connection interest (Table 2) of future demand growth in South Australia? Are there other emerging load developments we should be considering? To what extent should potential electrification be considered in developing forecasts of future grid demand in South Australia?

2 Are there other options for increased supply from renewable generation sources, including REZ options, that we should be considering as part of our planning?

3 What are your views on the near-term priorities and next steps proposed to address emerging constraints and unlock benefits for customers?

4 Do you have any views on the future potential options for network development? Are there other options we should consider for future network development?

Feedback on the above questions and any other issues you wish to raise can be directed to:

consultation@electranet.com.au

+61 8404 7966

www.electranet.com.au

Feedback received by 30 June 2023 will be considered in the development of our 2023 TAPR.

Key near-term priorities to address emerging constraints and proposed next steps are described in Table 1. These priority project options are also shown on Figure 1, together with future potential project options.

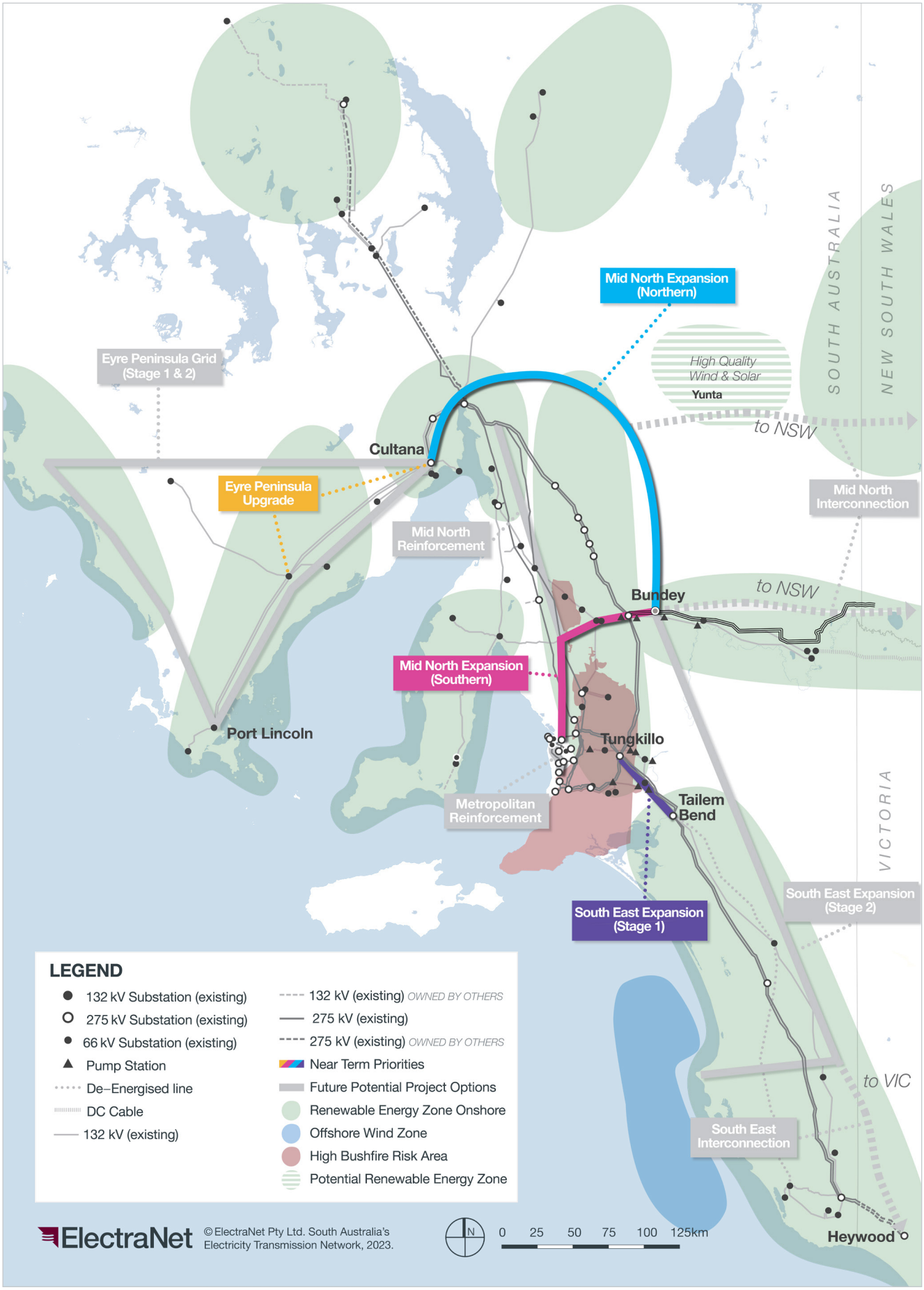
We are mindful of the upward pressures on transmission project costs in the current environment, and continue to review these cost assumptions in our analysis. We are also conscious of the growing challenges for our supply chains and we are factoring this into the potential timing of project options.

Table 1 Near term priorities and proposed next steps

Project Option	Description	Customer Benefits	Proposed next steps
Mid North Expansion (Southern)	Construct new high-capacity lines from Bundey to Para or to a new site between Parafield Gardens West and Torrens Island	Enable higher transfers of energy from the Mid North to the Adelaide Metropolitan load centre, unlocking potential for increased connection of low-cost renewables in the Mid North SA, Riverland and Northern SA REZs Improve geographical diversification of transmission corridors to improve security of supply to customers in Adelaide, which will become increasingly important as Adelaide's dispatchable gas generation retires and as climate change increases bushfire risk to transmission corridors in the Eastern Hills	We are currently undertaking Preparatory Activities to support AEMO's consideration of this project in its 2024 ISP AEMO's 2022 ISP identified that this project would be needed by the late 2020s in the Hydrogen Superpower scenario and by the early 2030s in the *Step Change* scenario Given the updated demand outlook it is likely that the need for this project will be brought forward, and we believe it should be considered for actionable status in AEMO's 2024 ISP If identified as an actionable project in AEMO's 2024 ISP, we will undertake the applicable Regulatory Investment Test for Transmission (RIT-T) and contingent project processes
South East Expansion (Stage 1)	String the vacant 275 kV circuit between Tailem Bend and Tungkillo	Increase transfer capacity between the South East region and the rest of South Australia, unlocking potential for increased connection of low-cost renewables near Tailem Bend	We are currently undertaking Preparatory Activities to support AEMO's consideration of this project in its 2024 ISP AEMO's 2022 ISP identified that this project would be needed by the mid-2020s in the *Hydrogen Superpower* scenario and by 2029 in the *Step Change* scenario Given the updated demand outlook it is likely that the need for this project will be aligned with the earlier timing, and we believe it should be declared as an actionable project in AEMO's 2024 ISP If identified as an actionable project in AEMO's 2024 ISP, we will undertake the applicable RIT-T and contingent project processes
Eyre Peninsula Upgrade	Upgrade the Cultana to Yadnarie transmission lines from 132 kV to 275 kV	Increase the capacity to supply large new loads on the Eyre Peninsula, unlocking potential for increased connection of low-cost renewables in the Eastern Eyre Peninsula REZ Increase the ability for low-cost renewable generation on the Eyre Peninsula to supply proposed Hydrogen facilities near Whyalla	Earlier this year we completed Eyre Peninsula Link, which delivered a new double-circuit 132 kV transmission line between Cultana and Port Lincoln. The Cultana to Yadnarie section was built 275 kV capable to enable it to be cost effectively upgraded to 275 kV operation when needed in the future Based on the current level of customer interest on the Eyre Peninsula, we will commence a RIT-T to investigate increasing the capacity of the Cultana to Yadnarie section of Eyre Peninsula Link If found to deliver net market benefits, and with the commitment of sufficient additional load on Eyre Peninsula, we will seek approval of the Eyre Peninsula Upgrade contingent project that is included in our 2023-24 to 2027 28 revenue determination[1]
Mid North Expansion (Northern)	Construct new high capacity lines between Bundey and Cultana	Unlock potential for development of a good quality wind and solar zone near Yunta that has not yet been identified as a REZ due to its distance from the existing grid Unlock potential for increased connection of renewables in the Mid North SA, Northern SA, and Eastern Eyre Peninsula REZs Provide capacity to supply developing iron ore deposits in the Braemar region (near Yunta) Provide a new high-capacity transmission path connecting the Adelaide load centre and emerging hydrogen hub major load centres on Eyre Peninsula (e.g. at Port Bonython or Cape Hardy) with sources of renewable energy generation	We see this project as a priority option for further investigation given the extent of the higher potential electricity demand discussed in this TAPR Update We are currently progressing these investigations to support AEMO's consideration of this project in its 2024 ISP

[1] Australian Energy Regulator, ElectraNet 2023-28 Determination, 2023

Figure 1 Project options to meet future supply requirements in South Australia



1

Towards net-zero emissions

South Australia is a leader in the clean energy transition and we continue to experience a rapid transformation of our electricity supply.

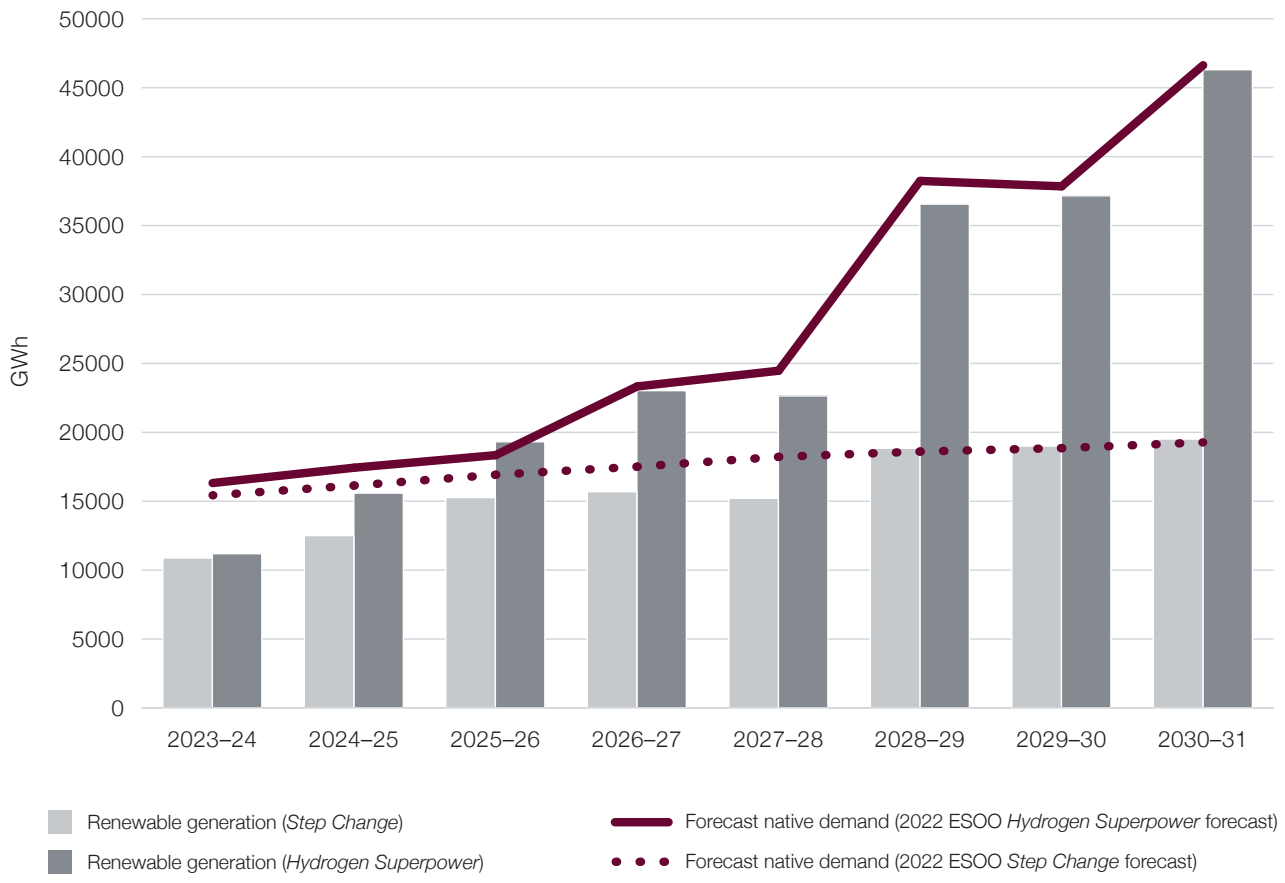
The pace of the transition to renewable energy and decarbonisation of the economy has consistently exceeded expectations.

ElectraNet is actively supporting almost 3,000 MW of connection enquiries and applications to the South Australian transmission network, including potential renewable generators, Battery Energy Storage Systems (BESSs), and loads.

Renewable energy sources such as wind, solar, and batteries, and small-scale renewables in homes and businesses, continue to displace thermal generation such as gas. Energy from renewable sources in South Australia is forecast to grow strongly in AEMO's *Step Change* scenario, and very rapidly in AEMO's *Hydrogen Superpower* scenario (Figure 2).

Increases in demand may dramatically increase the need for transmission in South Australia to connect and transport renewable generation and ensure supply is met at least overall cost.

Figure 2 South Australian electricity consumption and renewable generation output forecasts



Sources: Forecast native demand (including load supplied by rooftop solar PV) from AEMO's forecasting data portal, 2022 ESOO Central (*Step Change*) scenario; forecast generation data from AEMO's 2022 ISP – *Step Change* and *Hydrogen Superpower* scenarios.

The forecasts provided in Figure 2 are based on the latest available settled inputs, assumptions and scenarios, as published in AEMO's December 2022 ISP. We will continue to review and incorporate future modelling updates in our planning.

2

Electricity demand update

South Australia's Demand Outlook is changing rapidly

As reported in our 2022 TAPR, South Australia's energy transformation is impacting not only on the supply of electricity but also the connection of new loads.

Key developments that could, if they occur, drive a significant increase in maximum demands include:

- The development of hydrogen facilities near Whyalla and other large hydrogen hubs in accordance with the South Australia Government's hydrogen strategy
- The development of large iron ore mining operations and the production of "green steel" in keeping with South Australian Government's Magnetite Strategy[2]
- The potential connection of large new customer loads such as new or expanded mining operations, new industrial loads, other energy-intensive opportunities such as data centres
- The widespread adoption of electric vehicles, and the electrification of sectors that currently utilise other fuel sources.

Proponents are increasingly seeking to take advantage of South Australia's low-cost and low-emission electricity from renewable sources.

SA Power Networks is also forecasting a step increase in demand on the distribution network, with record numbers of load connection enquiries and interest in Electric Vehicle charging stations, electrified residential and commercial developments with no mains gas connections, and increased uptake of non-registered small BESS connections in the distribution network.

We plan to provide an update on the impact of increased load forecasts on connection points to the distribution network in our October TAPR.

Mining and large industrial loads

South Australia is rich in the minerals the global economy increasingly requires as it decarbonises. This includes BHP's existing Olympic Dam facility, one of the world's most significant deposits of copper, gold and uranium, along with other known copper and mineral resources throughout the state.

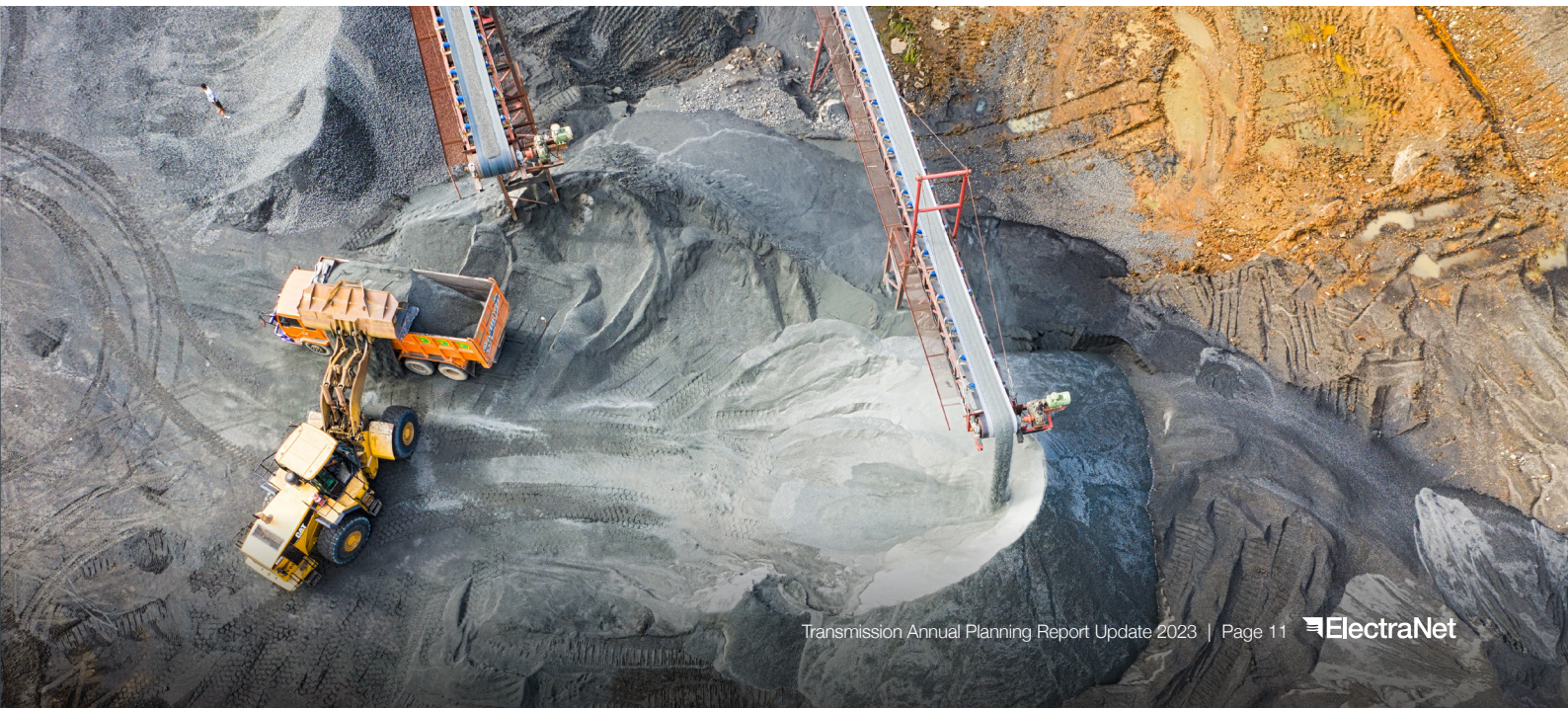
The South Australian Government's Magnetite Strategy seeks to unlock 50 million tonnes of magnetite production per annum, with 90% of the resource located in the Braemar region and Eyre Peninsula.

South Australia also has the conditions required for the connection of other potential large flexible loads that benefit from connection to a renewable energy system, including data centres and hydrogen production.

We are actively engaged with a range of proponents from the mining sector, hydrogen industry, data centres and processing facilities seeking to connect to the transmission network. This could, in total, potentially equate to an additional 2,000 MW of demand and a doubling of South Australia's electrical energy usage by 2030.

South Australia remains at the forefront of gigawatt scale zero emission electrical systems globally. Discussions with customers are highlighting growing interest in developing new projects in South Australia and the importance of a renewable electrical grid in de-risking long-term investments and meeting their Environment, Social and Governance (ESG) objectives. This trend can be expected to continue to drive demand growth in the years to come.

[2] SA Government, Magnetite Strategy



Hydrogen

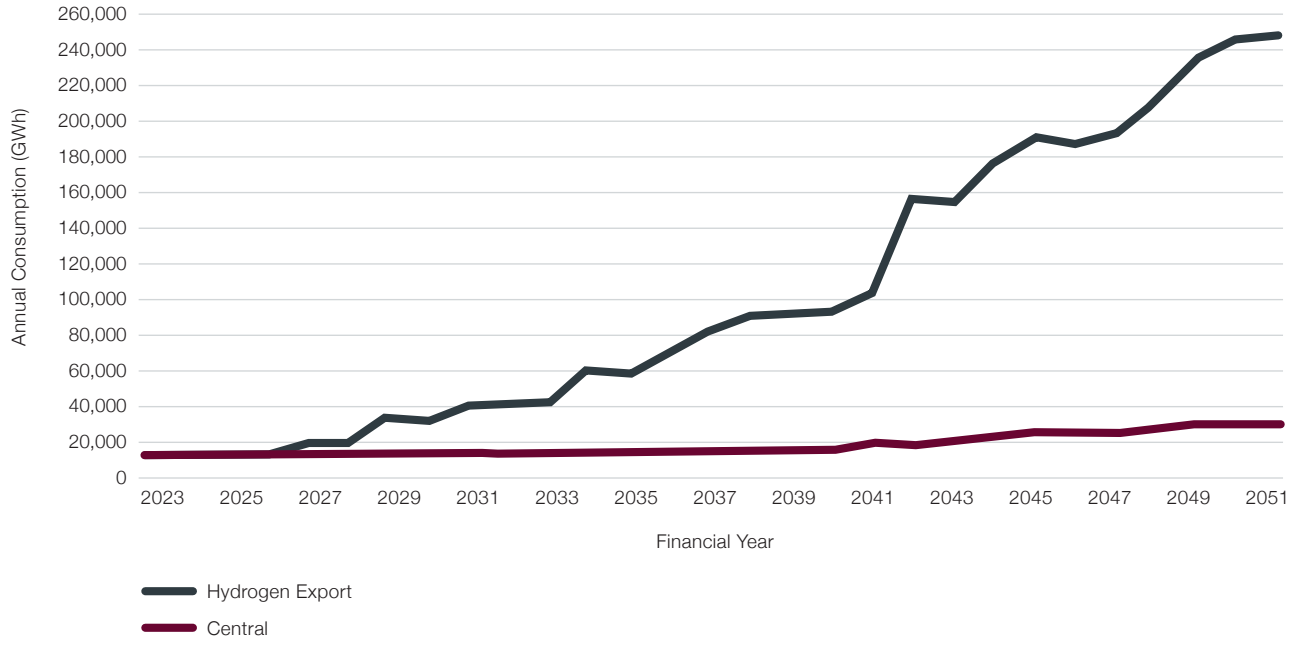
The South Australian Government has created the Hydrogen Jobs Plan3 which will realise the construction of a world-leading hydrogen power station, electrolyser, and storage facility within the Whyalla City Council area of South Australia. The proposed facilities are composed of 250 MW of electrolysers, 200 MW power generation and storage for hydrogen and are expected to be operational by 2026.

The Hydrogen Jobs Plan and hydrogen export hubs[4] are setting up South Australia for an initial development of the hydrogen industry that is aligned with the *Hydrogen Superpower* scenario in the 2022 ISP.

There are multiple hydrogen projects under consideration within South Australia, with an ambition that aligns with the *Hydrogen Superpower* scenario[5] in the 2020s. These include the Port Bonython Hydrogen Hub, the Green Hydrogen Project at Port Pirie, Cape Hardy Hydrogen Hub, and others.

Forecasts published with AEMO's 2022 Electricity Statement of Opportunities (ESOO) show that consumption growth in the Hydrogen Export scenario (*Hydrogen Superpower* ISP scenario) far exceeds growth in the *Central* scenario (Figure 3).

Figure 3 Comparison of 2022 ESOO Central and Hydrogen Export electricity consumption forecasts



Source: AEMO's 2022 ESOO

The extent of network expansion required to support the demand growth indicated in the Hydrogen Export scenario will depend on the number, timing and locations of proposed major hydrogen industry developments. Network expansion to support a large-scale hydrogen industry will be most efficient if coordinated to ensure that major hydrogen demand centres are developed near major generation centres (e.g. REZs).

[3] SA Government, Hydrogen Jobs Plan

[4] SA Government, hydrogen export hubs

[5] Hydrogen Superpower scenarios

Electrification

Electrification of South Australia's transport, building and industrial sectors involves the replacement of fossil fuels with electricity. AEMO's *Step Change* scenario is projecting that South Australia's electricity sector will achieve net zero carbon operation before 2030.

AEMO's 2022 ISP forecasts electrification (including batteries and plug-in EVs) to increase electricity consumption in South Australia by 2050 across the various future scenarios from 12 TWh by between 3 TWh to 26 TWh, representing an increase in operational demand of between 26% to 212% from 2022. The *Step Change* scenario, considered the most likely scenario, forecasts demand to increase by 19 TWh (154%).

The equivalent values in AEMO's draft 2023 Inputs, Assumptions and Scenarios Report (IASR), which underpin AEMO's 2024 ISP, forecast a narrower and lower range of electrification futures. These range from 9 TWh (67%) to 18 TWh (140%) across the four proposed scenarios.

Electrification relates to more than just the forecast uptake of domestic Electric Vehicles. It includes the replacement of fossil fuels with electricity across all sectors of Australia's economy, including the transport, building, agricultural, mining, industrial and residential sectors.

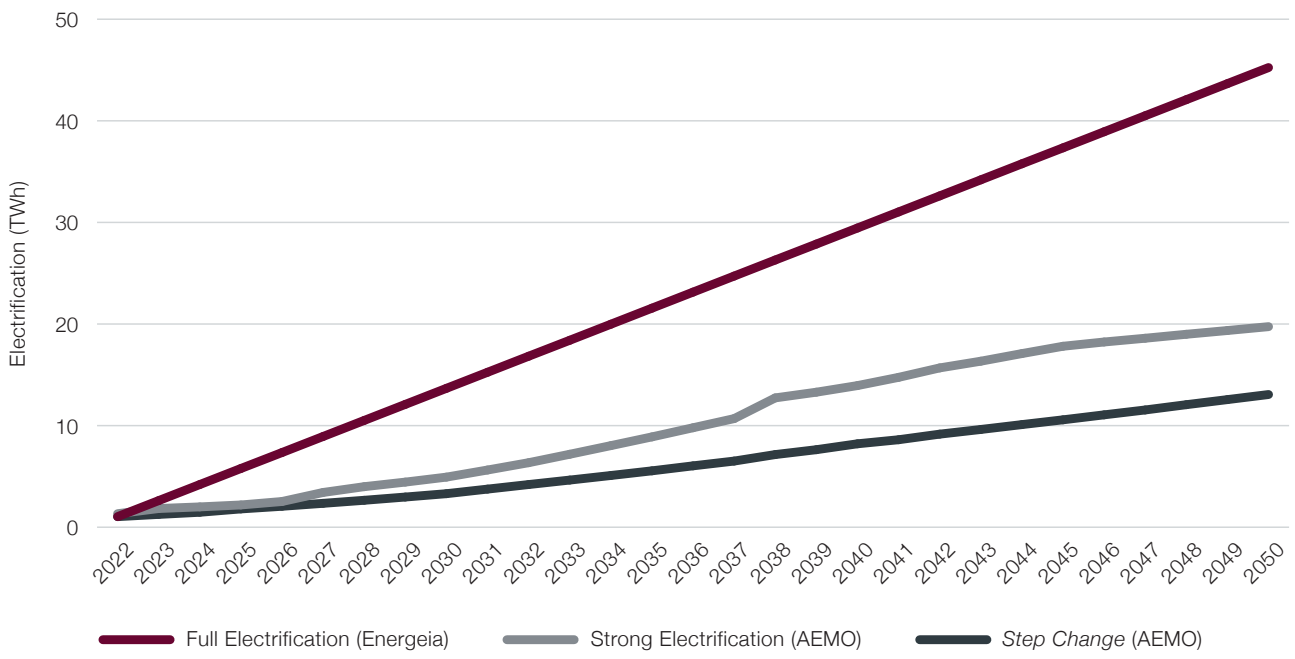
Work commissioned by ElectraNet from consultant Energeia has estimated that electrification – a component of increasing electrical energy demand – could substantially exceed the levels estimated in the draft 2023 IASR and the 2022 ISP. This may have a material impact on the speed and quantum of renewable developments and enabling transmission investments required in South Australia.

Energeia's indicative "full electrification" scenario reflects the following key inputs and assumptions:

- All consumption is steadily converted to electricity by 2050
- 2.5% year-on-year growth in energy demand to reflect long-term economic growth and energy efficiency improvements over time
- Electricity for transport is 300% more efficient than internal combustion on a tank to wheel basis
- Electricity for heat pumps is 300% more efficient than combustion.

Energeia's forecast of full electrification significantly exceeds the quantum of electrification-related consumption that is in each of AEMO's ISP scenarios (Figure 4).

Figure 4 Scenarios of the increased component of demand due to electrification



Source: Energeia

Based on those projections, we believe that AEMO's draft 2023 IASR forecasts significantly underestimate the potential impacts of electrification in South Australia. This modelling projects that electrification of the South Australian economy could occur faster than previously estimated, delivering potentially much larger growth.

Summary of current new customer interest

Table 2 and Figure 5 provide an indicative summary of current interest of new load to connect to the transmission network.

These potential new connections are typically not yet included in AEMO's demand forecasts. They are expected to further increase the amount of renewable generation that needs to be connected in South Australia to meet supply, while maintaining 100% net renewable generation.

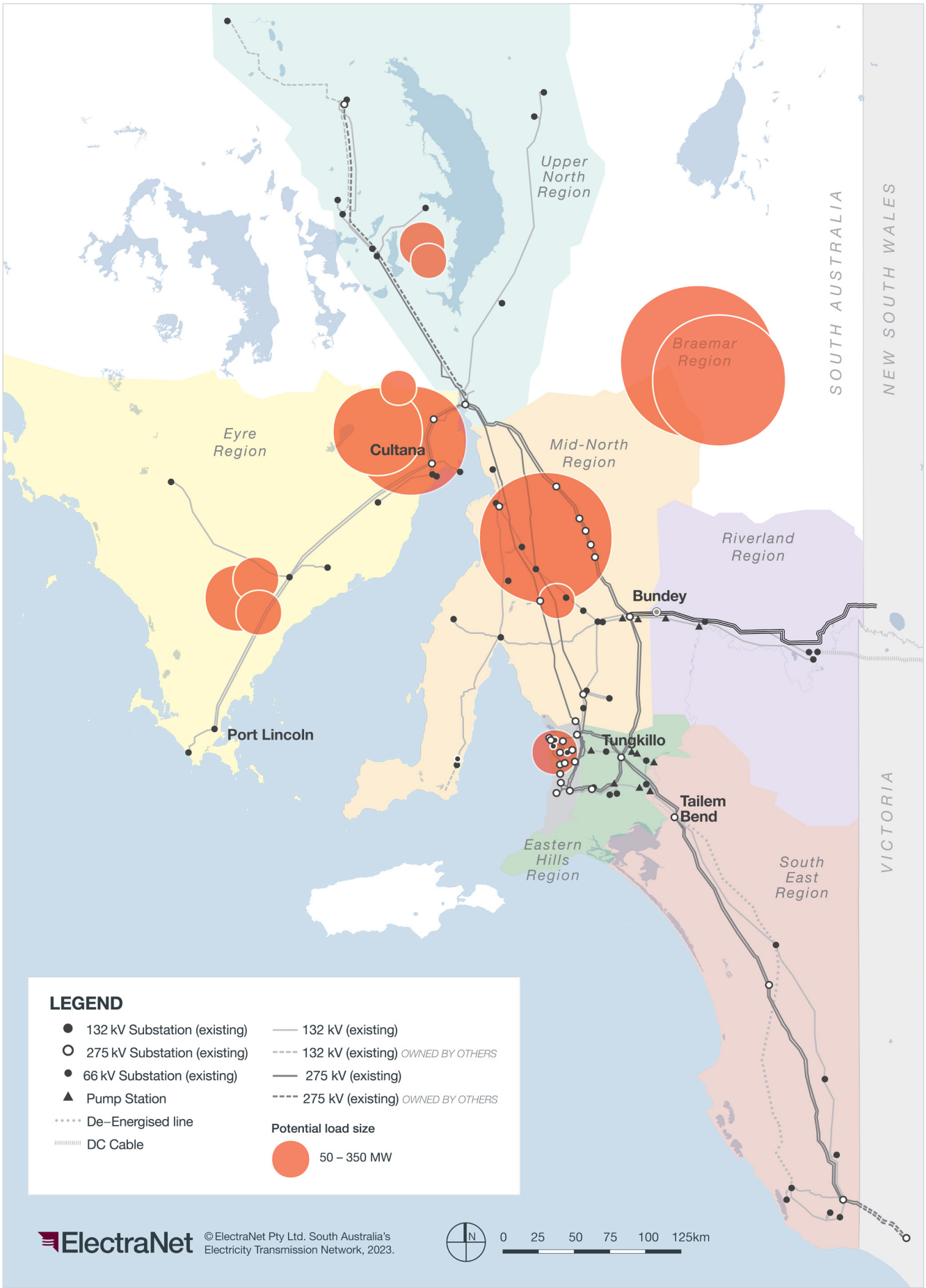
Table 2 Current new connection interest

Customer	Approximate Load (MW)	Load Type	Region	Status
Customer 1	100	Mine	Upper North	Advanced activity, connection increase, enquiry or application
Customer 2	50	Electrification	Mid North	
Customer 3	<50	Electrification	Whyalla	
Customer 4	300	Hydrogen	Mid North	
Customer 5	150	Data Centre	Eyre Peninsula	
Customer 6	<100	Processing Facility	Metropolitan	
Customer 7	350	Mine	Braemar	Engagement on connection options
Customer 8	100	Mine	Eyre Peninsula	
SA Government	250	Hydrogen	Whyalla	
Customer 10	300	Mine	Braemar	
Customer 11	<50	Processing Facility	Upper North	
Customer 12	200	Electrification	Whyalla	
SA Government	100	Desalination	Eyre Peninsula	
TOTAL	**2,000**			

1

How representative is the current new connection interest (Table 2) of future demand growth in South Australia? Are there other emerging load developments we should be considering? To what extent should potential electrification be considered in developing forecasts of future grid demand in South Australia?

Figure 5 Current new load connection interest



3

Enabling increased supply

To meet the projected significant increases in demand, additional sources of supply will be needed.

To meet the South Australian Government's 100% net renewable generation target, additional supply will need to come from new sources of renewable generation and be supported by energy storage.

This projected additional supply in South Australia could be provided from interstate generation through increased interconnector capability, additional generation developed within South Australia, or from a combination of both these sources.

Interconnector expansion feasibility assessment

Following the commissioning of Project EnergyConnect there will be two major high voltage AC transmission links from South Australia: Project EnergyConnect and the Heywood interconnector. These will have a combined import capability of up to 1,300 MW and a combined export capability of up to 1,450 MW.

ElectraNet engaged consultant Jacobs to assess the potential capability of Project EnergyConnect and Heywood interconnectors, to:

- Determine whether there is any opportunity to increase the combined Heywood and Project EnergyConnect interconnector transfer capability beyond the designated import and export limits without substantial capital expenditure
- Determine whether there is any opportunity to increase exports specifically to 750 MW on the Heywood interconnector and 800 MW on Project EnergyConnect simultaneously. This is an increase of 100 MW above the currently defined transfer limits
- Provide comments on the effectiveness and viability of the use of Special Protection Schemes (SPSs) to augment network transfer capability.

To perform the feasibility study, Jacobs performed a high-level review of the network and studied the performance of the interconnectors at multiple South Australian import and export values under a range of operating conditions.

Key findings of the Jacobs study are:

- The presently defined combined capability of both the Heywood and Project EnergyConnect interconnectors, at 1,450 MW export from and 1,300 MW import to South Australia, is essentially the maximum feasible transfer limit across these interconnectors
- Potential upgrade options such as building new BESSs for inclusion in the planned SPS are unlikely to expand the capability of the interconnectors as the speed of response is not fast enough to support increased power transfer or to address underlying constraints in the NSW network
- BESS options may help improve interconnector utilisation and preserve existing transfer capability over time rather than increase capability.

These findings confirm that there are no feasible opportunities to expand the capacity of the Heywood and Project EnergyConnect interconnectors.

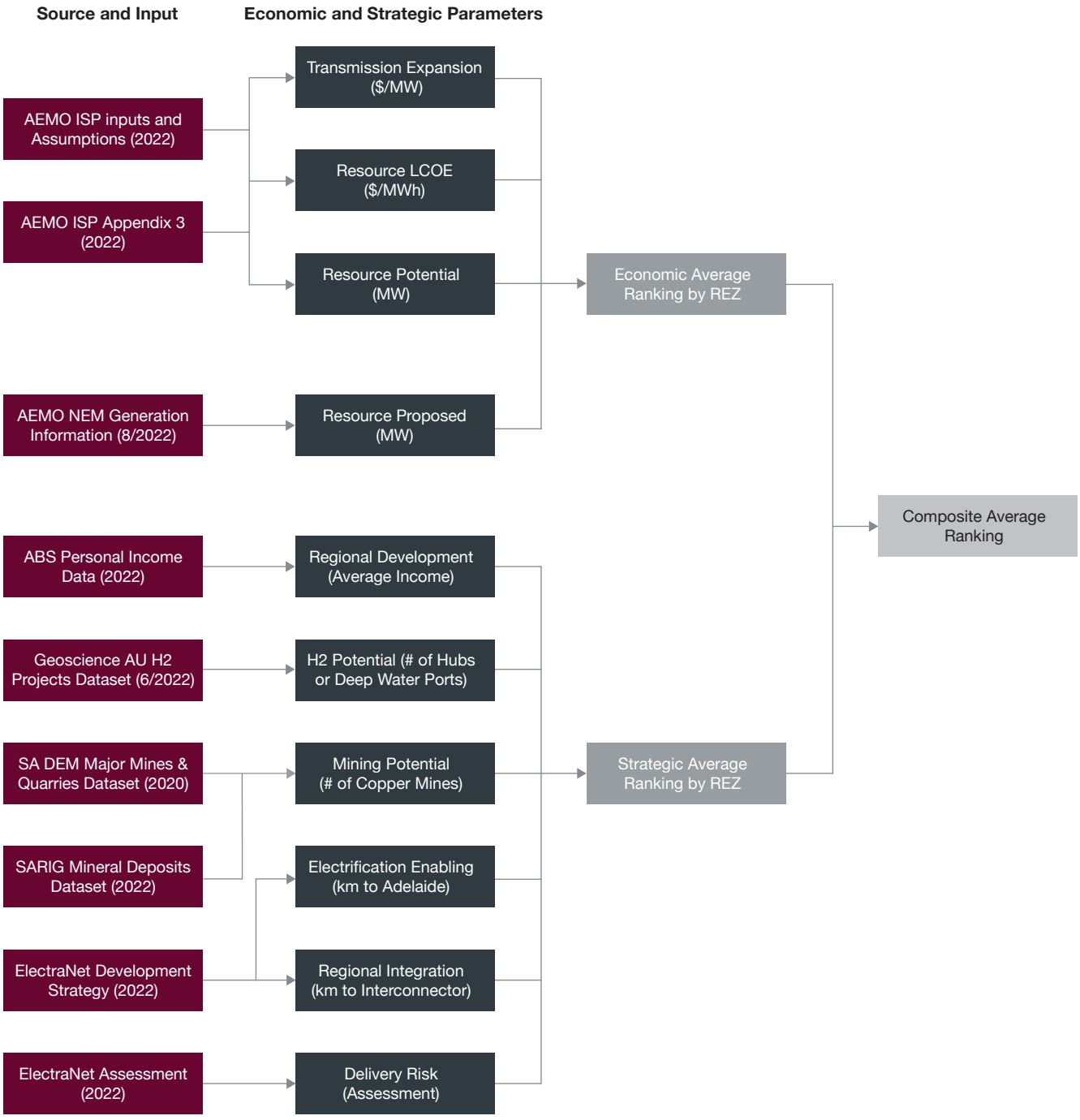
Based on these findings, the creation of new interconnectors is likely to be the only feasible way to further expand interconnector capability between South Australia and the rest of the NEM.

South Australian Renewable Energy Zone Development

ElectraNet engaged consultant Energeia to undertake a prioritisation of REZs that considers development cost, delivery risk, and strategic leverage for State policy objectives.

This prioritisation used key metrics and inputs to perform economic and strategic ranking assessments (Figure 6).

Figure 6 REZ prioritisation framework



Source: Energeia

These assessments were then combined into a composite ranking as discussed below.

Renewable Energy Zones

As an outcome of our REZ prioritisation work, we are considering prioritised options for development that would unlock capacity for new generation in Mid North SA, Riverland, Northern SA, Eastern Eyre Peninsula and South East SA REZs as shown in Table 3 and Figure 7.

We do not propose to further consider development of the Leigh Creek REZ, as it is unlikely to be possible to effectively address anticipated significant environmental and cultural concerns around options for its development.

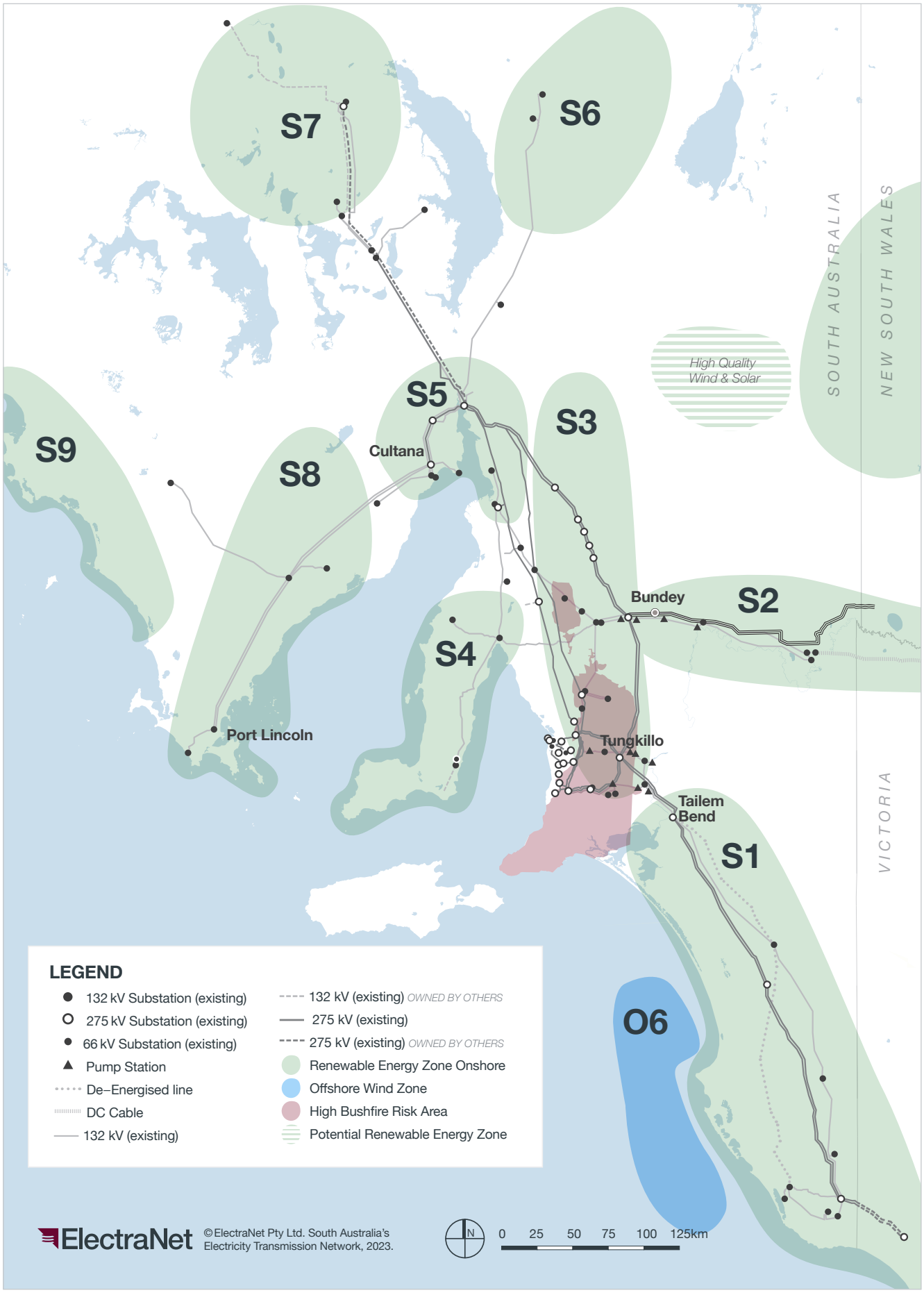
Table 3 REZ rankings

REZ	Economic rank	Strategic rank	Composite rank
S3 Mid North SA	1	3	1
S2 Riverland	6	1	2
S5 Northern SA	8	1	3
S8 Eastern Eyre Peninsula	4	5	4
S1 South East SA	2	8	5
S6 Leigh Creek	4	6	5
O6 South East SA Coast	3	9	7
S4 Yorke Peninsula	6	7	8
S7 Roxby Downs	10	4	9
S9 Western Eyre Peninsula	9	10	10

2

Are there other options for increased supply from renewable generation sources, including REZ options, that we should be considering as part of our planning?

Figure 7 South Australia Renewable Energy Zones



Source: AEMO

4

Transmission development options

The following transmission development options are being considered

These potential developments could enable large-scale growth of new electricity demand and growth in renewable energy and hydrogen production in South Australia, while delivering the energy transition at lowest cost to customers.

The 2022 TAPR identified these potential transmission developments that may be needed to address future emerging intra-regional and inter-regional constraints.

These options have been further developed, based on the potentially higher demand forecasts and customer interest described in this report, with more details provided in Tables 4 and 5 below.

We are engaging with AEMO to have these options considered in development of AEMO's 2024 ISP.

This TAPR Update is focused on the large-scale transmission developments that may be needed to support the connection of potential large new loads and generators in South Australia. We are also working with SA Power Networks to assess the impact of recent load forecasts on the capability of connection points to the distribution network. We plan to provide an update about any connection point impacts in our October TAPR.

Near-term priorities

The following project options could deliver benefits if development occurs within approximately 5 years. The details of these options, benefits for customers and next steps proposed are set out below (Table 4).

We are mindful of the upward pressures on transmission project costs in the current environment, and continue to review these cost assumptions in our analysis. We are also conscious of the growing challenges for our supply chains and we are factoring this into the potential timing of project options.

Table 4 Near-term priorities and proposed next steps

Project options[6]	Technical options	Customer benefits	Proposed next steps
Mid North Expansion (Southern) *Indicative cost: $300–700 million (depending on option)* *Timing: Mid to late 2020s* Construct new high capacity double-circuit twin conductor lines from Bundey to Para or to a new site between Parafield Gardens West and Torrens Island	• New lines to be 275 kV (rating at least 1100 MVA per circuit) or • New lines to be 330 kV (rating at least 1300 MVA per circuit) or • New lines to be 330 kV but operated initially at 275 kV Consider immediate incremental benefits of installing a second 275/132 kV transformer at Templers West and reconfiguring the Mid North 132 kV system to alleviate constraints caused by parallel operation of the Mid North 275 kV and 132 kV systems	Enable higher transfers of low-cost renewable energy from the Mid North to the Adelaide Metropolitan load centre, unlocking potential for increased connection of renewables in the Mid North SA, Riverland and Northern SA REZs Improve geographical diversification of transmission corridors to improve security of supply to customers in Adelaide, which will become increasingly important as Adelaide's dispatchable gas generation retires and as climate change increases bushfire risks to the transmission corridors in the Eastern Hills	We are currently undertaking Preparatory Activities to support AEMO's consideration of this project in the 2024 ISP AEMO's 2022 ISP identified that this project would be needed by the late 2020s in the *Hydrogen Superpower* scenario and by the early 2030s in the *Step Change* scenario Given the updated demand outlook it is likely that the need for this project will be brought forward, and we believe it should be considered for actionable status in the 2024 ISP If identified as an actionable project in the 2024 ISP, we will undertake the applicable RIT-T and contingent project processes

[6] Indicative cost ranges only, currently under review

Table 4 Near-term priorities and proposed next steps (cont.)

Project options[6]	Technical options	Customer benefits	Proposed next steps
South East Expansion (Stage 1) *Indicative cost: $30–60 million* *Timing: Mid to late 2020s* String the vacant 275 kV circuit between Tailem Bend and Tungkillo	String the existing vacant circuit that exists on one of the Tailem Bend to Tungkillo 275 kV lines – there are no other comparable options	Increase transfer capacity between the South East region and the rest of South Australia, unlocking potential for increased connection of low-cost renewables near Tailem Bend Improve firmness of Heywood interconnector limit at 750 MW	We are currently undertaking Preparatory Activities to support AEMO's consideration of this project in the 2024 ISP AEMO's 2022 ISP identified that this project would be needed by the mid-2020s in the Hydrogen Superpower scenario and by 2029 in the Step Change scenario Given the updated demand outlook it is likely that the need for this project will be aligned with the earlier timing, and we believe it should be declared as an actionable project in AEMO's 2024 ISP If identified as an actionable project in AEMO's 2024 ISP, we will undertake the applicable RIT-T and contingent project processes
Eyre Peninsula upgrade *Indicative cost: $60–90 million* *Timing: Mid to late 2020s* Upgrade the operating voltage of the new Cultana to Yadnarie transmission lines from 132 kV to 275 kV	Upgrade the Cultana – Yadnarie lines from 132 kV to operate at 275 kV and establish a new 275/132 kV substation adjacent to Yadnarie There are no other comparable options	Increase the capacity to supply large new loads on the Eyre Peninsula, unlocking potential for increased connection of low-cost renewables in the Eastern Eyre Peninsula REZ Increase the ability for renewable generation on the Eyre Peninsula to supply proposed Hydrogen facilities near Whyalla	Earlier this year we completed Eyre Peninsula Link, which delivered a new double-circuit 132 kV transmission line between Cultana and Port Lincoln. The Cultana to Yadnarie section was built 275 kV capable to enable it to be cost effectively upgrade to 275 kV operation when needed in the future Based on current customer interest on the Eyre Peninsula, we will commence a RIT-T to investigate increasing the capacity of the Cultana to Yadnarie section of Eyre Peninsula Link If found to deliver net market benefits, and with the commitment of sufficient additional load on Eyre Peninsula, we will seek approval of the Eyre Peninsula Upgrade contingent project that is included in our 2023-24 to 2027-28 revenue determination[7]
Mid North Expansion (Northern) *Indicative cost: $300–1500 million (depending on option)* *Timing: Mid 2020s to early 2030s* Construct new high capacity double-circuit twin conductor lines between Bundey and Cultana	New lines to be 275 kV (rating at least 1100 MVA per circuit) New lines to be 330 kV (rating at least 1300 MVA per circuit) New lines to be 500 kV (rating at least 2000 MVA per circuit) New lines to be 330 kV but operated initially at 275 kV New lines to be 500 kV but operated initially at 275 kV Consider further staging with an initial build from Bundey to Yunta, and a subsequent build from Yunta to Cultana Consider option of connecting the new lines at Wilmington or Davenport East in the Mid North or potential duplication of Cultana to Davenport	Unlock potential for development of a good quality wind and solar zone near Yunta that has not yet been identified as a REZ due to its distance from the existing grid Unlock potential for increased connection of low-cost renewables in the Mid North SA, Northern SA, and Eastern Eyre Peninsula REZs Provide capacity to supply developing iron ore deposits in the Braemar region (near Yunta) Provide a new high-capacity transmission path connecting the Adelaide load centre and emerging hydrogen hub major load centres on Eyre Peninsula (e.g. at Port Bonython or Cape Hardy) with sources of renewable energy generation	We see this project as a priority option for further investigation given the extent of the higher potential electricity demand discussed in this TAPR Update We are currently progressing these investigations to support AEMO's consideration of this project in its 2024 ISP

[7] Australian Energy Regulator, ElectraNet 2023-28 Determination, 2023

Future potential network development options

We are also considering a range of potential options for future development of the South Australian electricity transmission system to meet supply requirements over the medium term (Table 5). These options represent strategic expansions that would build on the immediate priorities by providing increased capacity for future large load and generation connections as they occur.

Table 5 Future potential needs

Project option	Description	Customer benefits
South East Expansion (Stage 2)	Construct new high capacity double-circuit twin conductor lines from the South East SA and South East SA Offshore REZs to Bundey, via a location near Kincraig	Provide strong connection for new low-cost renewable generation developments in the South East SA REZ and Offshore REZ to the South Australian transmission backbone
Eyre Peninsula Grid	Develop an HVDC link from Cultana to a new 500 kV HVAC system on the Eyre Peninsula that is AC islanded from the rest of the NEM, with double circuit 500 kV lines to connect new REZs and large loads	Develop REZs on the Eyre Peninsula to support large Hydrogen projects near Whyalla, Port Bonython, and Cape Hardy, unlocking potential for increased connection of low-cost renewables in the Eastern Eyre Peninsula and Western Eyre Peninsula REZs
South East Interconnection	Develop a new HVAC interconnector between the South East of South Australia and Heywood in Victoria	Increase transfer capability between South Australia and Victoria to unlock cheaper energy sources Enable access for South East SA wind to Victoria and the rest of the NEM
Mid North Reinforcement	Establish new substations at Cultana, Wilmington (if required), Bundey and between Parafield Gardens West and Torrens Island if needed to enable operation of the Cultana to Adelaide transmission path at a higher-voltage operation, and/or replace existing lower capacity lines	Enable increased access for new low-cost renewable generation in the Mid North SA, North SA, and Eyre Peninsula REZs to Adelaide and the proposed Eyre Peninsula hydrogen hub major load centres
Metropolitan Reinforcement	Establish a second 275 kV underground cable to provide a second transmission supply to City West, and establish a new 275 kV underground cable from City West to the Southern Suburbs	Improve geographical diversification of transmission supply to the Southern Suburbs of Adelaide to increase supply security, which will become increasingly important as climate change increases bushfire risks to the transmission corridors in the Eastern Hills Increase supply capability to Western Suburbs, Eastern Suburbs and Southern Suburbs to cater for potential increased electrification
Mid North Interconnection	Develop a new 500 kV HVAC interconnector between the Mid north of South Australia and New South Wales	Increase transfer capability between South Australia and New South Wales to unlock cheaper energy sources

3 What are your views on the near-term priorities and next steps proposed to address emerging constraints and unlock benefits for customers?

4 Do you have any views on the future potential options for network development? Are there other options we should consider for future network development?

Appendices

Appendix A Project alignment with recent network plans

Project options discussed in this report correspond to options presented in the 2022 TAPR and 2022 ISP as follows. Projects in Table 6 are presented in the same order as in section 4.

Table 6 Corresponding projects in our 2022 TAPR and AEMO's 2022 ISP

Project title in this report	Project references in our 2022 TAPR	Project reference in AEMO's 2022 ISP
Mid North Expansion (Southern)	Table 8, Mid North SA REZ Southern Expansion Table 19, EC.15205 Increase Transfer Capacity Between Robertstown, Davenport and Adelaide – second dot point option	Mid North SA REZ Expansion We are currently undertaking Preparatory Activities for this project
South East Expansion (Stage 1)	Table 8, Mid North SA REZ Northern Expansion Table 19, EC.11011 Upper South East network augmentation	South East SA REZ Expansion (Stage 1) We are currently undertaking Preparatory Activities for this project
Eyre Peninsula Upgrade	Table 8, Eastern Eyre REZ Table 19, EC.15104 Eyre Peninsula upgrade	Not featured
Mid North Expansion (Northern)	Table 8, Mid North SA REZ Northern Expansion Table 19, EC.15205 Increase Transfer Capacity Between Robertstown, Davenport and Adelaide – third dot point option	Future ISP Project FY2042 *Step Change* scenario FY2029 *Hydrogen superpower* scenario with additional 20,500 MW REZ capacity by FY2050
South East Expansion (Stage 2)	Table 8, South East SA REZ	Future ISP Project FY2049 *Step Change* scenario FY2034 *Hydrogen superpower* scenario with additional 900 MW REZ capacity by FY2050
Eyre Peninsula Grid	Table 8, Western Eyre REZ and Eastern Eyre REZ	Not featured directly We propose for this project to replace the Leigh Creek REZ development forecast to be needed in FY2042 in AEMO's *Step Change* scenario
South East Interconnection	Table 8, South East SA REZ	Not featured
Mid North Reinforcement	Table 8, Mid North SA REZ Northern Expansion and Mid North SA Southern Expansion Table 19, EC.15205 Increase Transfer Capacity Between Robertstown, Davenport and Adelaide – third dot point option	Future ISP Project FY2042 *Step Change* scenario FY2029 *Hydrogen superpower* scenario with additional 20,500 MW REZ capacity by FY2050
Metropolitan Reinforcement	Table 8, Mid North SA Southern Expansion	Not featured
Mid North Interconnection	Table 8, Mid North SA REZ Northern Expansion	Not featured

Appendix B Glossary

Abbreviation	Definition
ABS	Australian Bureau of Statistics
AC	Alternating Current
AEMO	The Australian Energy Market Operator
BESS	Battery Energy Storage System
ESG	Environment, Social and Governance
ESOO	AEMO's Electricity Statement of Opportunities
EV	Electric vehicle
GW	Gigawatt
H2	Hydrogen
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IASR	AEMO's Inputs, Assumptions and Scenarios Report
ISP	AEMO's Integrated System Plan
kV	Kilo-Volt
LCOE	Long-run cost of energy
MW	Mega-Watt
NEM	National Electricity Market
PV	Photovoltaic
REZ	Renewable Energy Zone
SA DEM	South Australian Department of Energy and Mining
SARIG	South Australian Resources Information Gateway
SPS	Special Protection Scheme
TAPR	Transmission Annual Planning Report
TWh	Tera-Watt-hour

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