# EYRE PENINSULA ELECTRICITY GRID UPGRADE SOLUTION

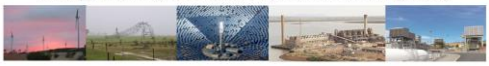
## Energy Security Future


### Abstract

ElectraNet are currently finalising a Regulatory Investment Test for Transmission for a proposed upgrade of regional grid infrastructure on the Eyre Peninsula of South Australia. The Eyre Peninsula Region of South Australia has significant opportunity to become the major Renewable Energy Zone for Australia. The Energy Security for South Australia Working Party are proposing an alternative long-term infrastructure solution that meets current and future requirements.



Energy Security for South Australia Working Party (ESSAWP).



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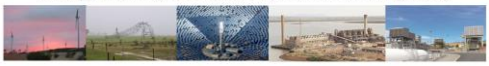


## Who are the Energy Security for SA Working Party?

The Energy Security for SA Working Party (ESSAWP) are an independent group of people based on Eyre Peninsula, with no vested interests, who are working together to progress an energy future and energy security solution for Eyre Peninsula and South Australia. ESSAWP have been working with stakeholders across government, industry and the region, on a plan and solution for energy security in SA for over 18 months. The group brings together a wide range of backgrounds with specific skill sets needed to develop solutions in the best interest of South Australia.

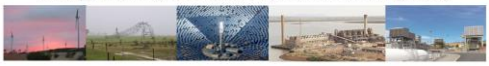
The ESSAWP team have good support from regional bodies, local government and RDA Whyalla and Eyre Peninsula and have established connections with Electranet, ESCOSA, SA Power Networks, the Minerals, Resources Infrastructure and Investment Taskforce, generators, funders, investors and major commercial users including fishing, manufacturing and mining industry stakeholders. ESSAWP are working with all stakeholders, to secure a collaborative, informed and pro-active approach to energy security and capacity for South Australia.

The overall objective of ESSAWP is to achieve sustainable, reliable, affordable, energy security for South Australia. The Energy Security for South Australia Working party's only purpose is to work with government, energy sector companies and agencies, industry and community to get a solution in place for energy security that maximises the generation capacity of the available renewable resources and to stabilise the grid on Eyre Peninsula, across South Australia, and Australia. ESSAWP have no political allegiances and have no financial interests. We are interested in outcomes and have no specific technology solution preferences.

ESSAWP are committed to working for a collaborative energy security solution. The ESSAWP has been advocating for immediate energy security improvements and for accessing the abundance of renewable energy capacity, with Eyre Peninsula demonstrating some of the highest reserves of untapped wind and solar and emerging pumped hydro capacity and hydrogen in Australia which when harnessed can contribute to secure, affordable and low emission energy generation.

## Our goals are:

- Affordable energy
- Reliable supply
- Sustainable systems
- Zero emissions from energy
- Eyre Peninsula as a major exporter of zero emission energy
- Efficient use of energy



## Introduction

The Australian Electricity System and the National Electricity Market System is now in the beginning of a new revolution which will see substantial changes on the focus and way the system is structured and operates.

The current National Electricity Market and rules are no longer appropriate and are an impediment to the transition to new renewable energy based generation and interactive grid systems.

Under the Improve System Planning Considerations, recommendations include the development of an integrated grid plan to facilitate the efficient development and connections of renewable energy zones across the National Electricity Market (Recommendation 5.1).

Recommendation 5.5 also recommends a review of the Regulatory Investment Test for Transmission, which relates to the preceding recommendations. This change in focus needs to be considered in this current RIT-T (Regulatory Investment Test for Transmission) as failure now to allow for future developments could make the proposed outcomes of this RIT-T obsolete and in conflict with this recommendation.

Community needs and expectations, should also be identified, considered and evaluated.

Where these components conflict with the current RIT-T requirements, this again needs to be identified and separate costings for compliant and non-compliant components, elements that would require external funding.

Energy security is an economic imperative for South Australia and the nation. The Eyre Peninsula region of South Australia is a strategic priority. Eyre Peninsula is located at the end of the national grid and has experienced consistent issues regarding reliability, stability of supply and grid capacity.

Following the dramatic blackouts of 2016 and the economic impost of rising electricity prices in South Australia, it is evident that immediate effective action is required to establish energy security on the Eyre Peninsula alongside the positive work occurring through the South Australian Government's State Energy Plan.

Eyre Peninsula has a population of 58,000+ people and produces $4.2 billion of regional product and exports a similar value of $4.1 billion. Eyre Region includes the major centres of Whyalla, Port Lincoln and Ceduna.

Eyre Peninsula is a region of innovation with a diversified economy including agriculture, aquaculture and seafood, tourism, manufacturing, mining and minerals processing and the renewables sector. Economic development is currently constrained due to energy security, affordability and reliability issues. The region's current energy requirements are up to 30 MW for the Southern Eyre Peninsula inclusive of Port Lincoln and around 50 MW for the balance of Eyre Peninsula.

The Eyre Peninsula region is a major economic contributor to the state's economy. Current electricity infrastructure is not fit for purpose and this includes the power line from Whyalla to Port Lincoln and the significantly under sized power line to Streaky Bay to Ceduna. The Port Lincoln back-up generator, which is currently identified as the backup power supply in case of blackout, has not successfully operated for some time and costs $9 million annually. The generator's ten-year contract for that back-up supply concludes at the end of 2018.

The region has significant electricity generation capacity. The 2010 Select Committee on Wind Turbines Report undertaken by Worley Parsons and Macquarie Capital identified over 4000 MW of approved, easily harvested wind generation. A further capacity of over 4000 MW on Eyre Peninsula has been identified.

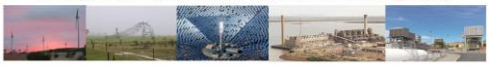
## Response to the Project Assessment Draft Report (PADR)

ESSAWP recognise the proactive work undertaken by Electranet and their consultants, Houston and Kemp, in assessing the best grid upgrade options for the Eyre Peninsula and also recognise the current policy and regulatory restrictions they work within.

ESSAWP recognise that the outlined, preferred option, 4B, that would run along the current east coast of the Eyre Peninsula, does represent an increase in capacity over the existing line and an increase in energy security for the region. What we are concerned about is that in terms of the resource potential, that option is rated at about 12.5% of the capacity needed. It allows for the connection of up to 500 MW of generation capacity around Port Lincoln and up to about 1000 MW of solar/wind around the Cleve district, with a restriction that the total connected generation on the line is less than 1000 MW. It will lead to only a small gain in the reduction of wholesale energy costs and will not meet the capacity and infrastructure requirements needed to advance the region as a major renewable energy zone for the state and nation.

ESSAWP believes that a full exploration of what the cost benefits to the region, the state (all customers) and the nation, would enable an assessment of the upgrade level required to enable the region to grow as the most significant renewable energy zone in Australia.

When in the future, Eyre Peninsula does progress to becoming a Renewable Energy Zone, it would appear short sighted and potentially wasteful to have invested $300M into infrastructure that won't meet the need. While the immediate cost to customers would be less, the overall cost to customers



would be much less over the longer term as more affordable and reliable energy is made available by through the Eyre Peninsula Renewable Energy Zone.

## Comments and outcomes from the Pt Lincoln Forum

At the Forum held in Pt Lincoln on Monday 20 November, which was attended by about 40 people, there were several outcomes that were agreed to by ElectraNet that were proposed by ESSAWP and supported by most of the forum attendees.
These were:

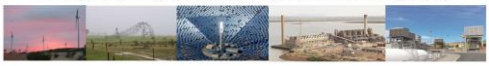
1. Look at the costings and evaluation of providing a much larger capacity transmission (as proposed by ESSWAP) and allow for the full utilisation of the Eyre Peninsula wind and solar potential
2. The transmission system would be rated at 500 kV (not 275 kV or 132 kV) to provide the additional capacity
3. The evaluation would not just be from ElectraNet's investment perspective and financial rules as set by the NEM, but it also quantifies the benefits of this proposal to Eyre Peninsula and customers

## Comments and outcomes from the Adelaide Forum

ElectraNet also held the same forum in Adelaide on the following Monday and was attended by about 32 people.

There appeared to be only three take home points from this forum

1. The assumptions utilised by Houston Kemp in their analysis were severely questioned by one attendee who appeared to be in support of Option 1
2. A summary of the outcomes from the Port Lincoln Forum had to be prompted and a very brief statement of the request for capacity increase and assessment of both the community benefits as well as those for ElectraNet as being of high importance to Eyre Peninsula.
3. Based on the $3.00 per customer increase in the transmission charges for the preferred option 4B, it was suggested that if they undertook the ESSAWP plan, it would increase this annual cost to $12 per year for all South Australian customers, but it would also decrease the wholesale price of electricity dramatically, as much as 50%, even an extremely conservative 10 - 20% reduction would see a saving of several hundreds of dollars on average for all South Australian residential bills. Much higher savings are expected for commerce and industry. This would be of significant benefit all customers



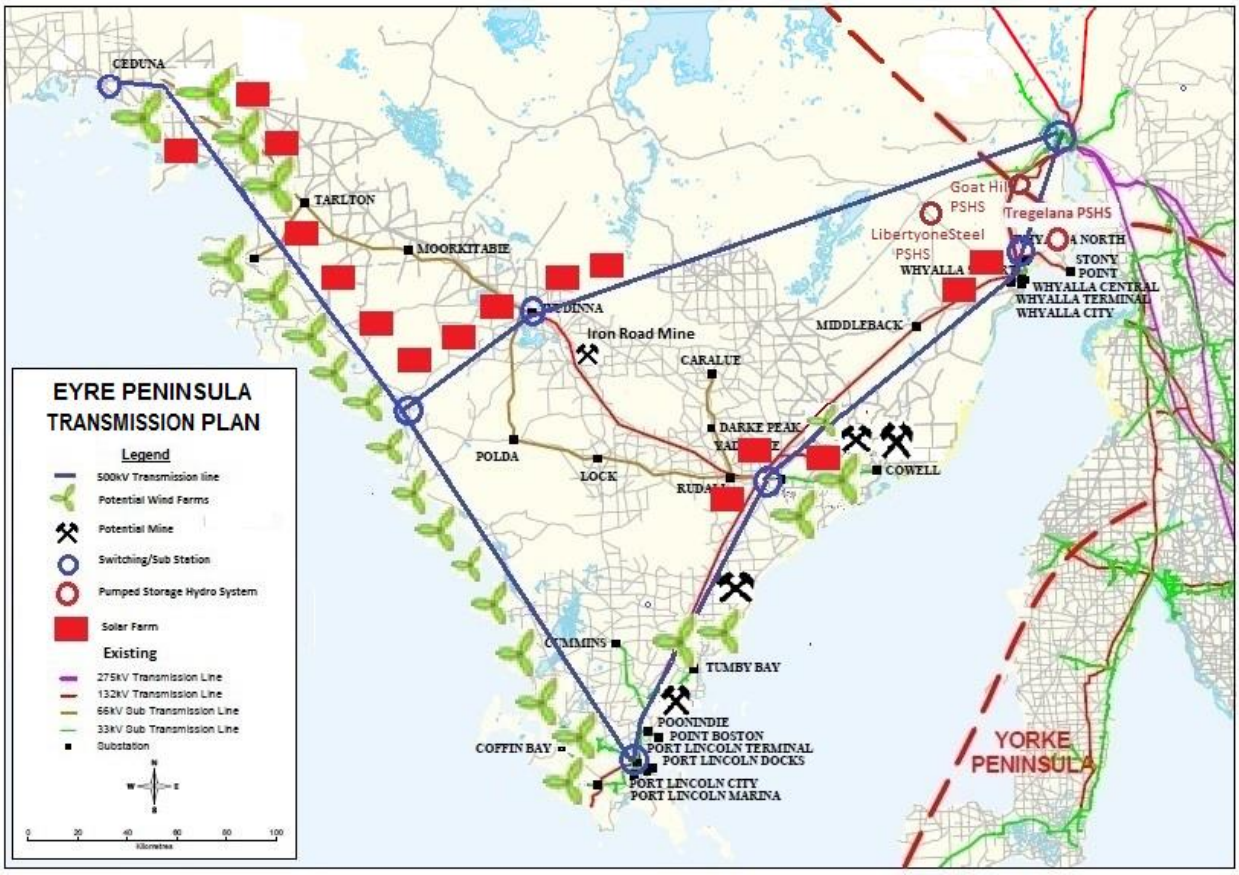
## The 500 kV ESSAWP Transmission System Plan

While this proposal may not be justifiable in terms of the incremental market benefits it may return to ElectraNet under the existing NEM requirements, it's returns and benefits to South Australia are enormous.

However, if the new recommendation in the Finkel Report as approved at the recent COAG Energy Ministers Meeting is adopted, the region may be given priority as one of the acknowledged renewable energy zones.

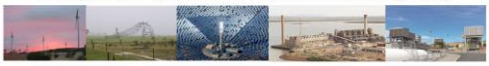
The installation of a large 500kV network across Eyre Peninsula (coupled to new interconnectors) is essential to enable the connections of vast quantities of renewable generation and large scale storage options which is vital for the future of South Australia. It also enables other emerging technologies to piggy back on this resource such as hydrogen production (which fits into the State's Energy Plan) and fertiliser production as well as decreasing manufacturing and industry overheads and supporting local business and industry.

ESSAWP has recently updated its plans taking into account the rapidly changing energy scene to develop a short-term plan to improve the reliability on Eyre Peninsula, and a longer-term plan to integrate the proposed generation, loads such as the Iron Road Development, large scale pumped Hydro storage scheme near Whyalla and the establishment of a hydrogen generation Industry system near Whyalla.




This concept plan takes into account:

- Network reliability by providing two geographically separate single circuit lines which provides a ring for Port Lincoln to meet the ETC reliability standards (as well as improving this in other parts of the peninsula)
- Allows for large load customers such as the Iron Road Mine Development
- Allows for the connection and utilisation of the large amount of wind resources identified on Eyre Peninsula and enables getting to market.
- Allows for the connection and utilisation of the large amount of solar resources identified on Eyre Peninsula and enables getting to market.
- Allows for the connection and integration of large scale pumped hydro storage schemes such as the Goat Hill and Tregalana Pumped Hydro Systems.
- Allows capacity for the transport of the energy from across the Peninsula to location such as Whyalla to feed the former Arrium plant and a proposed hydrogen manufacturing facility
- The proposed establishment of a Hydrogen industry on Eyre Peninsula which fits into the State Government Hydrogen plan.



## Energy Transformation Regulatory Investment Test for Transmission (RIT-T)

The future of Eyre Peninsula and South Australia's vision to be a major generator of renewable energy is impacted by all the proposed changes and any upgrades to the transmission system.

This includes the "Energy Transformation" RIT-T. While not part of this RIT-T, it is important to recognise the interdependencies of one project on another and the effects for the short and long-term energy security prospects of Eyre Peninsula and South Australia.

The capacity of interstate connectors will be a critical factor in the ability of South Australia to export energy the eastern states. The existing Heywood interconnector is inadequate and the ratings of the proposed interconnectors in the current Energy Transformation RIT-T are critical to the expansion of SA's energy resources.

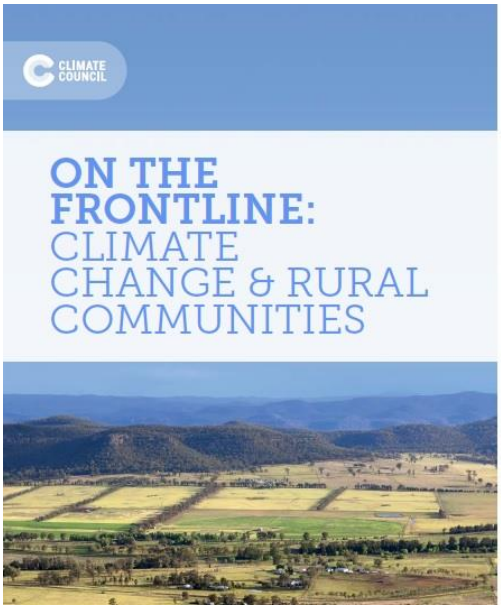
The 2016 ESSAWP plan for achieving this involves two components:

1. Installation of a new interconnector to NSW, rated transfer capacity would be a minimum of 2000 MVA to the Wagga Wagga vicinity. This would allow access to the NSW 500 kV network and to the NSW load. This connection point is critical in providing a connection into the Snowy Hydro Scheme. The existing 1500 MW pumped hydro scheme, predominantly utilised to meet the Sydney peak demand can then also be utilised to store excess energy exported from SA that cannot be immediately utilised on the NEM market.

2. An upgrade to the Heywood interconnector will also provide more market capacity into Victoria and encourage the expansion of the Tasmanian renewable resource and promote the proposed upgrade of Baslink cable capacity. This will also allow changes to the existing hydro schemes to better utilise the hydro storage capacity by retaining hydro capacity until it can be better utilised such as during low wind times coincident with peak system load instead of its current general operating regime as a prime energy source.


## On the Frontline: Climate Change & Rural Communities

This report (released in 2016) highlights the high levels of benefits for rural communities and these were utilised in the preparation of some of the 2016 estimates and reinforces the value to Eyre Peninsula becoming a Renewable Energy Zone. This also provides some suggestion of criteria which might be utilised in evaluating benefit to the consumers and the evaluating the

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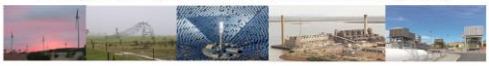
While rural and regional communities are on the frontline of climate change impacts, tackling climate change also provides these communities with many opportunities.

- In Australia, rural areas receive around 30 - 40% of the total investment in renewables, valued at $1-2 billion per year.
- Renewable energy projects bring jobs and investment into rural and regional communities. Delivering half of our electricity from renewable sources by 2050 would create more than 28,000 jobs.
- The transition to clean energy will also reduce the health burden of burning coal, which is almost entirely borne by rural and regional areas, eg the Hunter and Latrobe valleys.
- Farmers can build the climate-resilience of their farms by adding additional revenue streams, such as by hosting wind turbines and other renewable energy projects. Across Australia, approximately $20.6 million is paid annually in lease payments to farmers and landholders hosting wind turbines.
- Community funds and additional rate revenue for rural and regional areas from renewable energy can be used to improve public services such as schools and local infrastructure.
- Renewable energy can reduce electricity costs for rural and remote communities, who traditionally pay much higher prices than their urban counterparts. It also offers independence from the grid with several towns now racing to be the first to operate on 100% renewable energy.



## Benefits to Eyre Peninsula Communities and South Australia

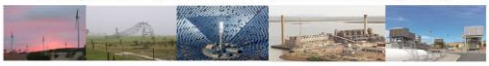
The benefits to Eyre Peninsula and South Australia are numerous but previous estimates focused on the following:

1. Reduction in the wholesale price of electricity in SA due to the increased generation and competition
2. Increased electricity sales within SA and to interstate by SA based generators
3. Local benefits to rural communities from transmission system construction on EP
4. Benefits to SA from transmission interconnectors' construction
5. Local benefits to rural communities from the construction of wind farms on EP
6. Local benefits to rural communities from construction of solar farms on EP
7. Ongoing employment benefits from wind and solar farms
8. Lease payments to landowners hosting generation facilities

The 2016 estimates for these benefits are summarised in the table below:

| **Benefits to Eyre Peninsula Communities and South Australia** | |
|---|---|
| **Description** | **Benefits** |
| Reduction in the wholesale price of electricity in SA due to the increased generation and competition | $2,000M pa |
| Increased electricity sales within SA and to interstate by SA based generators | $1,000M pa |
| Local benefits to rural communities from Transmission system during construction on EP | $300M |
| Benefits to SA from Transmission interconnectors' during construction | $1,000M |
| Local benefits to rural communities from the construction of wind farms on EP | $1,200M |
| Local benefits to rural communities from construction of solar farms on EP | $1,200M |
| Ongoing employment benefits from wind and solar farms | $60M pa |
| Lease payments to landowners hosting generation facilities | $16M pa |

In terms of the direct benefits to Eyre Peninsula, the estimated benefits during the construction of the new transmission system, wind and solar farms would be of the order $2.7Billion, and the ongoing annual returns from employment and leases for hosting farms is a $76Million.



This is in addition to several billion dollars per annum in benefits to the broader state which include Eyre Peninsula.

The following evaluation for the 2016 documents indicate that the original upgrade on Eyre Peninsula (2016 estimate of $700M – now updated to $1200M) and Interstate Interconnectors returned a net gain of $34B over 10 years

# Energy Security for SA Proposal

| Estimated Financial Costs for 10 years | | | |
|---|---|---|---|
| Components | Do Nothing | Current single 275 Interconnector only (assuming 3 yr construction) | This Proposal (assuming 5 yr construction) |
| Predicted increase/reduction in Electricity Cost to South Australians | -$2B pa = -$20B | 1st 3 years -$6B<br>Next 7 yrs +$14B | 1st 5 years -$10B<br>2nd 5 years +$20B |
| Interconnector/Transmission Construction Costs | 0 | <- $1B | -$4B |
| Connection Charges recovered by new generators and industry | 0 | 0 | $3B |
| Electricity Sales to Interstate | 0 | 0 | $1B |
| RET Penalty (Aust) | -$2B | -$2B | 0 |
| Local Benefits to SA from Wind/Solar Farms | 0 | 0 | $3B |
| Local Benefits to SA from Interconnector Construction | 0 | Small | $1B |
| Total | -$22B | $5B | +$14B |

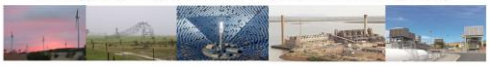
**Do Nothing will cost $22B over 10 years**
**This proposal has a positive return of +$14B over 10 years (+$36B compared to do nothing)**

The increased cost of the Eyre Peninsula System would only have minor influence on these figures.

## Environmental Considerations

Developing a comprehensive high capacity grid upgrade solution for the Eyre Peninsula has considerable environmental benefit. The opportunity to connect multiple zero emission, renewable energy generators will assist the state and the nation move more rapidly to meeting our emissions reduction and international obligations.

ElectraNet's overarching Environmental Policy as published on the web states "facilitating uptake of new and emerging renewable energy sources". While the PADR Report considers some transmission lines with geographical separation, their rating still allows for only a small percentage of the capacity needed to service the west coast.



The PADR does not consider any options in relating to providing capacity for connection of these systems (therefore you cannot facilitate connection if you do not have the system capacity available).

Hence the 5 credible options (and sub options) considered may not strictly comply with this policy statement as the preferred option 4B only provides capacity for 12.5% of the resource available.

## Funding mechanisms/ Co-funding options and Private Transmission lines

There are significant opportunities to look at co-funding options that support a longer-term solution for energy security, generation, reliability and affordability

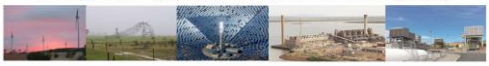
Sources identified include;

- SA Government's State Energy Plan and the Federal Government, ARENA and the CEFC
- Contributions from grid users including major regional projects such as The Iron Road Project and potentially a consortium of generators.
- Private Investment, one company has already suggested funding the SA to NSW inter connecter and another the west coast section of the 500 KV line from Wudinna to Port Lincoln (assumes separately funded transmission line from Davenport or Cultana to Wudinna)

Changes to the RIT-T rules from the COAG Energy Council Review of the Regulatory Investment Test for Transmission Review recommends to "*better reflect the net system benefits of options, including those relating to system security and renewable energy and climate goals."*

## Recommendation and Conclusion

The Eyre Peninsula will become a major Renewable Energy Zone and a major exporter of renewable energy throughout South Australia and Australia, creating major economic benefit to the region. To realise this potential the region will require a 500kV grid to provide the required capacity. Any upgrade of the existing transmission needs to take this into account.



The South Australia Government Energy Plan outlines policy support behind increasing generation and grid capacity upgrades to enable increased renewable generation across the state.

The recently adopted Finkel review has also recommended policy changes that support the transition to the new renewable energy based generation systems.

ESSAWP strongly recommends that the grid infrastructure developed for the region matches existing and longer-term energy capacity and potential. ESSAWP recommends that Eyre Peninsula region, through the support of Councils and key regional bodies, work with State and Federal Government, their respective funding solutions and Electranet, to secure the resources needed to establish a 500kV network as the preferred option for the Eyre Peninsula.

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