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Eyre Peninsula Supply Options

Overview of the RIT-T economic assessment

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Port Lincoln
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Key points to be discussed today

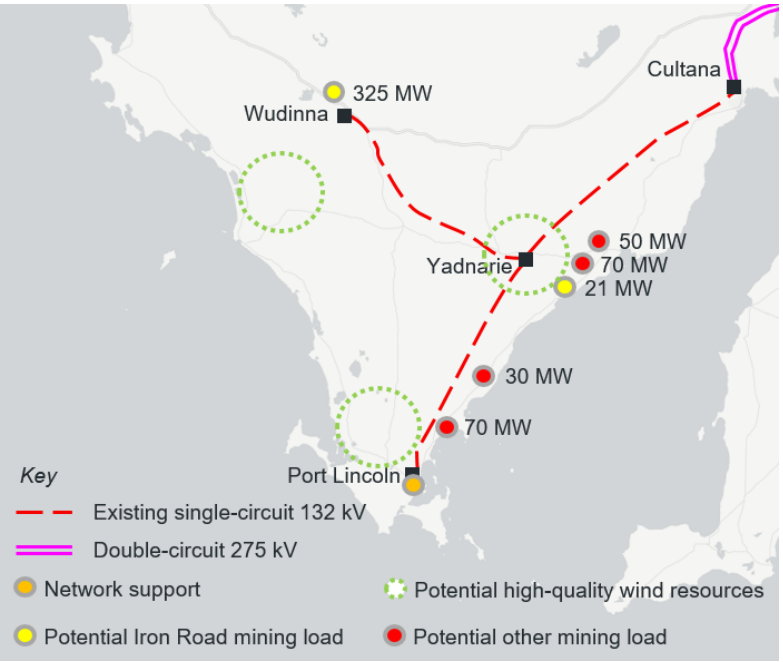
- How this RIT-T considers the most economic long-term solution for the Eyre Peninsula
- Key categories of costs and benefits assessed
- The two modelling approaches applied
- An overview of the key assumptions feeding into the analysis (and where they come from)
- The draft finding that Option '4B' is preferred
- Robustness of the draft finding

The RIT-T is designed to identify the efficient investment option in light of uncertainty about the future

- The RIT-T is designed to identify the option that maximises the expected net benefits in the NEM
  - It ranks options compared to each other
- It does so by considering costs and benefits across a range of future states of the world ('scenarios')
  - Costs and benefits are weighted across scenarios to derive an expected net benefit
- Costs and benefit categories are prescribed in the National Electricity Rules
  - Focus is on costs and benefits to parties in the electricity market
  - The RIT-T excludes wider economic impacts
  - Considers benefits across the whole National Electricity Market (NEM) not just South Australia

The future is uncertain… driven by factors inside and outside of the Eyre Peninsula

- The challenge of this RIT-T is to identify the most economic long-term solution in light of uncertainties, eg:
  - Future demand (including mining load)
  - Future emissions & system security policy
  - Future gas prices
- Five options have been assessed, including options that include flexibility to expand later, in the light of future information ('option value')

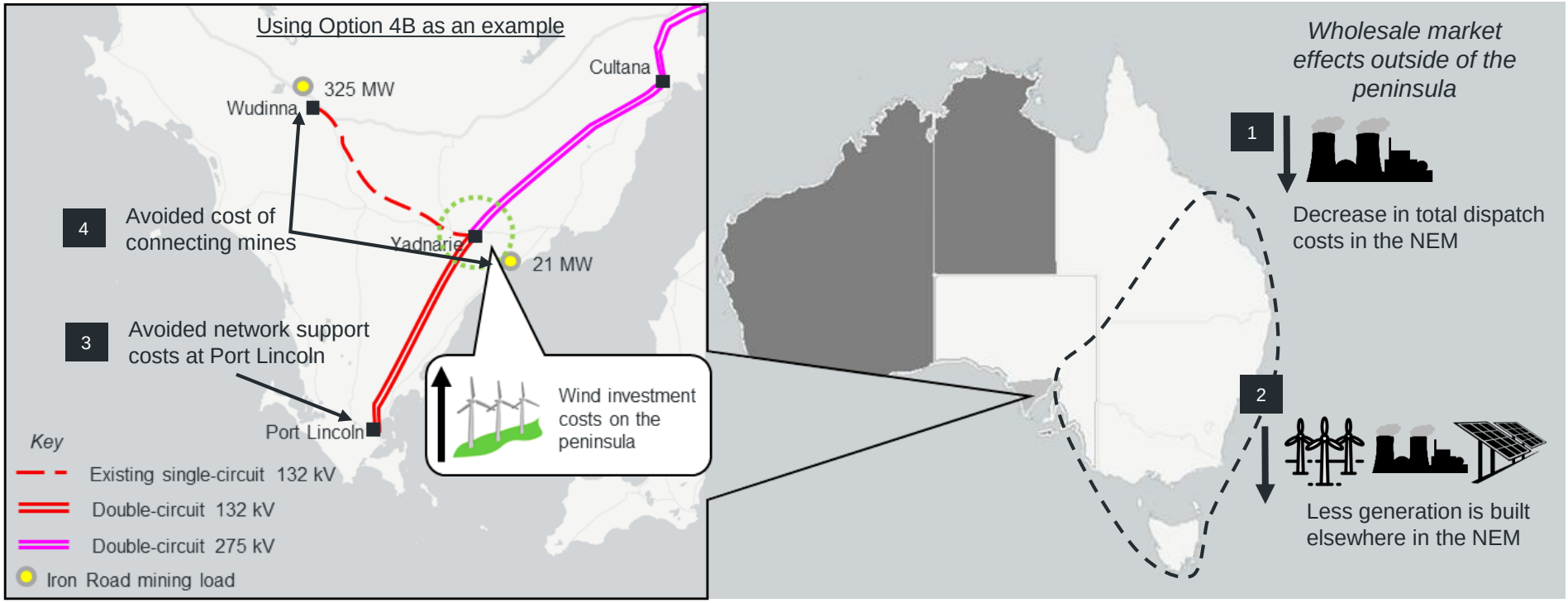


All options maintain a reliable supply to Port Lincoln

In addition, to differing extents, the options considered:

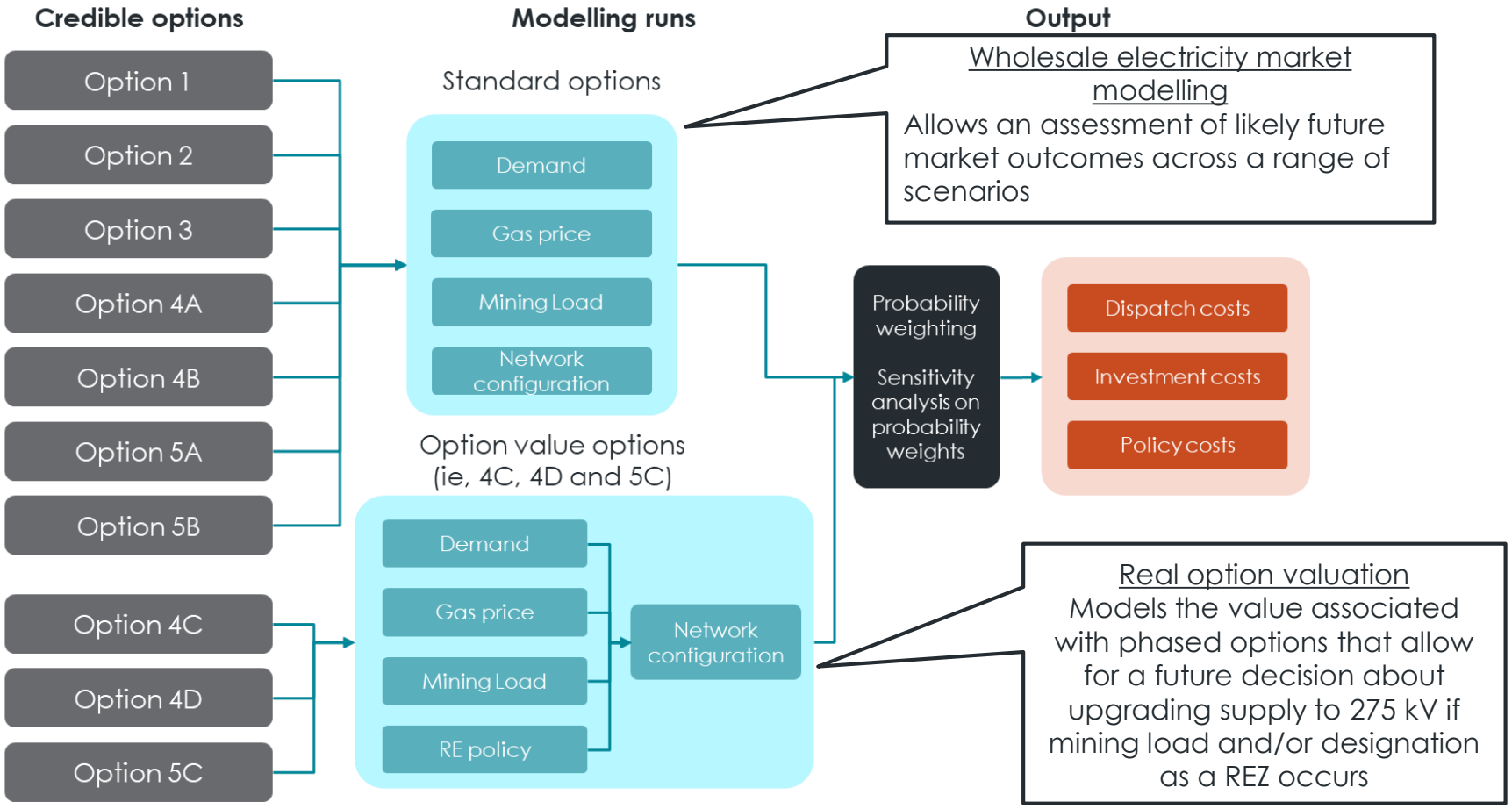
- Facilitate the connection of additional wind generation
- Enable the avoidance of network support costs at Port Lincoln
- Facilitate the connection of future mining spot load at a lower cost

Market benefits are driven by the ability of options to facilitate wind generation on the Eyre Peninsula



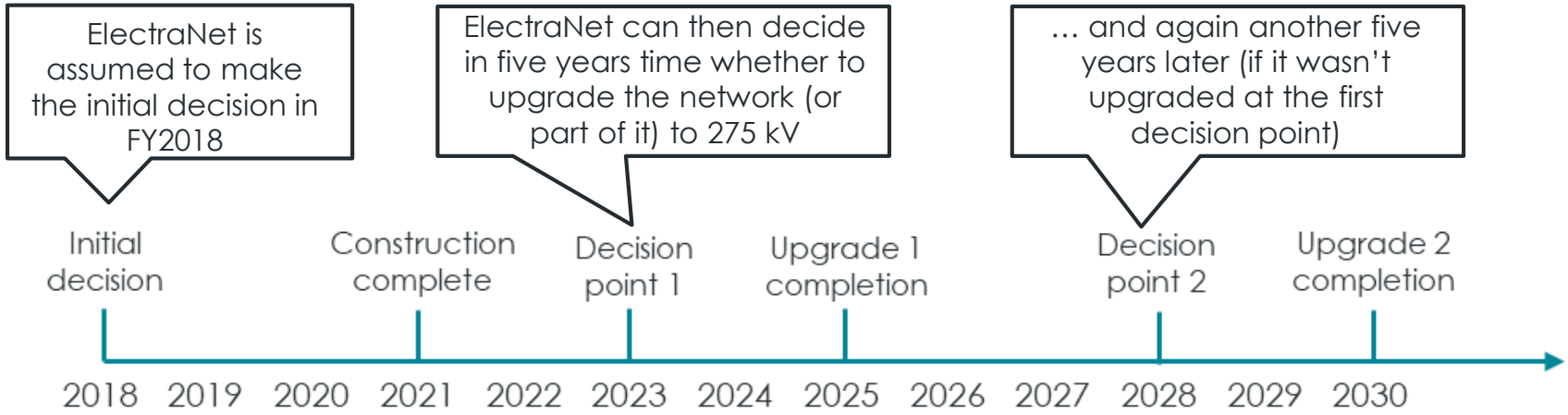
System security requirements have been taken into account in considering additional wind generation

Two modelling approaches have evaluated the expected net benefits and captured uncertainty



What modelling 'option value' means in practice

- For staged options, captures the benefits of optimising the Eyre Peninsula network going forward as new information becomes available (eg, new mines or designation of the Eyre Peninsula as a Renewable Energy Zone)



- This is the first RIT-T to model 'option value' and it allows for a more comprehensive consideration of uncertainty and the benefits of staged options

Key underlying assumptions and forecasts are consistent with public sources

- Market modelling assumptions are primarily based on public sources, in particular AEMO's National Transmission Network Development Plan and the Electricity Statement of Opportunities
- Assumptions align with those used in the coincident South Australian Energy Transformation RIT-T & reflect stakeholder feedback in that process
  - A wider range of gas prices has been adopted than in NTNDP
  - Assumes SA Energy Security Target from 2020 and a non-synchronous generation cap and synchronous generation floor in place until 2022
  - Includes additional wind generation in Victoria from first tranche of VREAS
- Outcomes of the market modelling are calibrated with AEMO market modelling and cross-checked with ElectraNet's internal modelling

How key assumptions are employed to develop four sets of results

Key market modelling assumptions

Latent assumptions

1. New entrant generation capex
2. Generator retirements
3. Committed new generation/storage
4. SA Energy Security Target in-place
5. VRET in-place

'State of the world' assumptions

1. Demand – weak, neutral or strong
2. Gas prices – low, neutral or high
3. Mining load – no mining, Iron Road or Iron Road AND other mining loads
4. Wind on the peninsula identified as a priority zone

All market modelling runs draw on the same 'latent assumptions' and the same 'state of the world' assumptions (via the option value modelling)

'Triggers' for upgrading to 275 kV under options 4C, 4D and 5C

Discretionary parameters

1. Presence of a new SA interconnector
2. Stringency of national emissions policy 3. How mines source their energy when there is not sufficient 275 kV capacity

The 'discretionary parameter' assumptions have been individually selected to investigate the effect of changing certain key assumptions

Sets of market modelling outputs/sensitivities

'Core' results

1. No new SA interconnector
2. 28% emissions reduction by 2030
3. Mines source energy from the grid

Sensitivity #1 – SA interconnection

1. A new SA-NSW interconnector
2. 28% emissions reduction by 2030
3. Mines source energy from the grid

Sensitivity #2 – Higher emissions policy

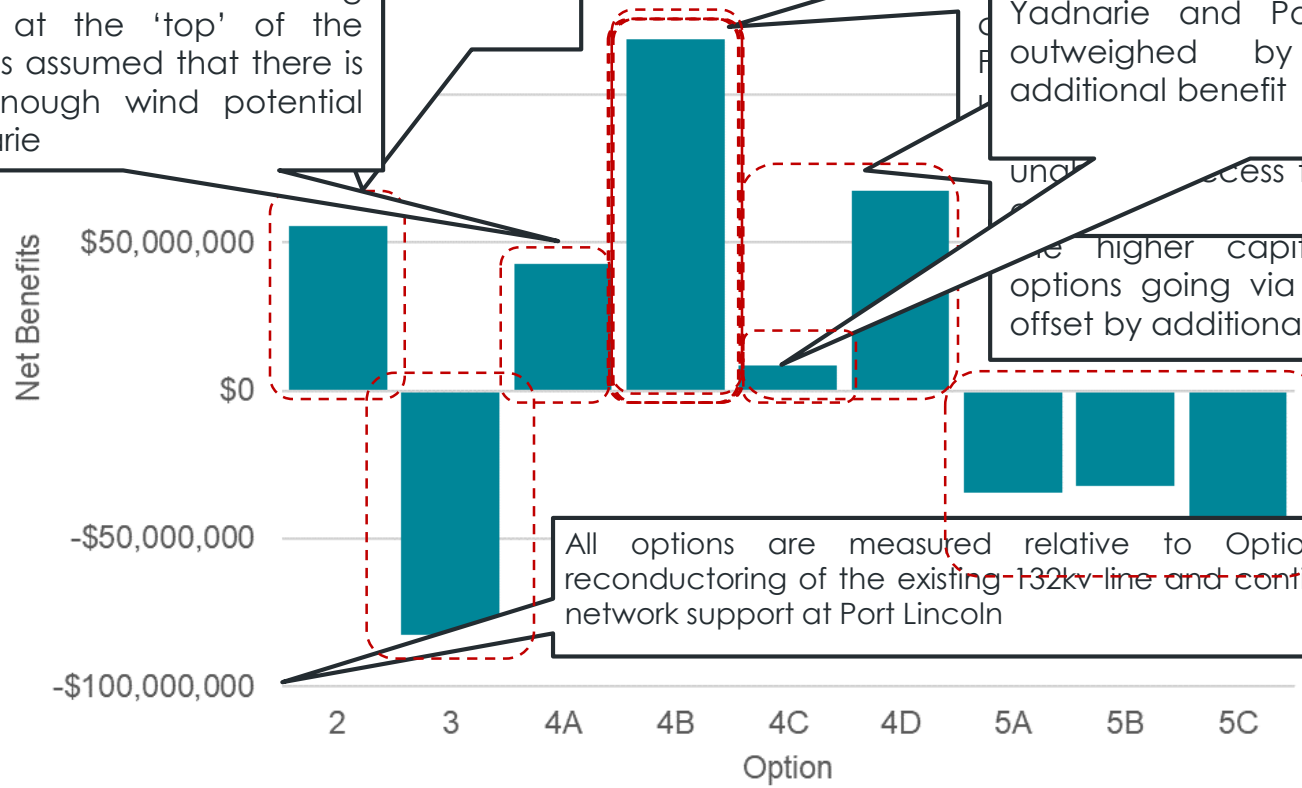
1. No new SA interconnector
2. 45% emissions reduction by 2030
3. Mines source energy from the grid

Sensitivity #3 – Onsite mining generation

1. No new SA interconnector
2. 28% emissions reduction by 2030
3. Mines source energy using onsite generation

Option '4B' is identified as the preferred option

Estimated net market benefits – 'Core'



Building a larger capacity option upfront has less benefit than building 275 kV only at the 'top' of the peninsula – it is assumed that there is more than enough wind potential around Yadnarie

rk precludes expanding

Incurring the costs now to allow a later upgrade to 275kV between Yadnarie and Port Lincoln is not outweighed by the potential additional benefit

ccess the wind resources

higher capital costs of the options going via Wudinna are not offset by additional market benefits

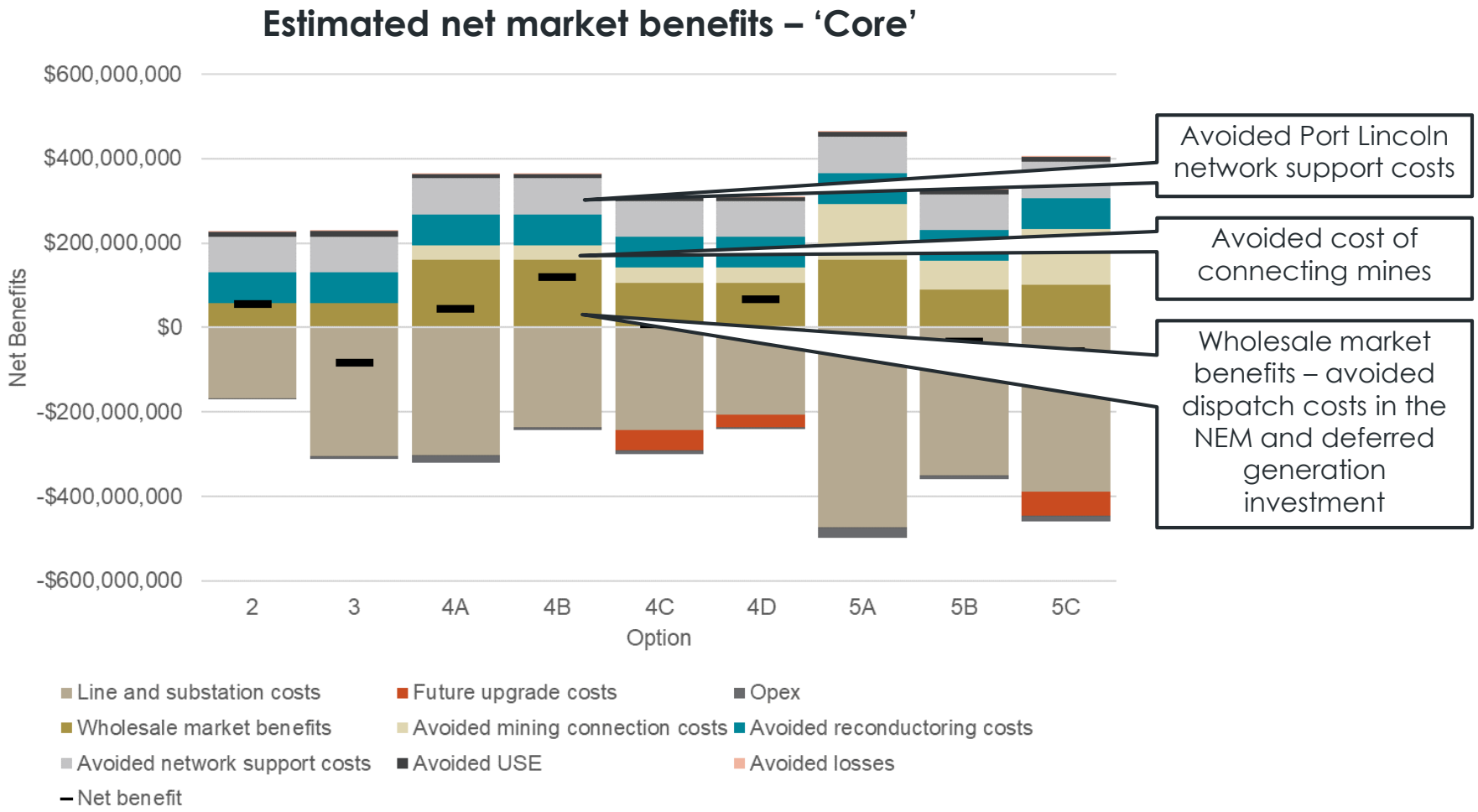
All options are measured relative to Option 1, reconductoring of the existing 132kv line and continued network support at Port Lincoln

So… in summary, the key takeaways from the 'core' set of results are

- Expanding the network to double circuit 275kV between Cultana and Yadnarie is justified – maintaining a 132 kV network limits wholesale market benefits
- However the benefits of building a double circuit 275kV line all the way to Port Lincoln are not expected to outweigh the costs.
- The higher capital costs of options going via Wudinna are not offset by additional market benefits
- The staged 'option value' options are not preferable:
  - Building a smaller capacity option between Cultana and Yadnarie upfront with the flexibility to upgrade later has less net benefit than building 275 kV upfront
  - However, incurring the costs now to allow a later upgrade to 275kV between Yadnarie and Port Lincoln is not outweighed by the potential additional benefit

Option 4B is the preferred option overall

Wholesale market benefits are the largest source of benefit, followed by avoided Port Lincoln network support



We investigated three additional combinations of key assumptions in addition to the 'core' ones

- The finding that Option 4B is the preferred option was tested against a range of alternate assumptions
  - assuming additional interconnection is commissioned between South Australia and the rest of the NEM
  - assuming that there is a national renewables policy requiring 45 per cent renewables by 2030
  - assuming that any mining on the Eyre Peninsula elects to source their energy requirements from onsite generation

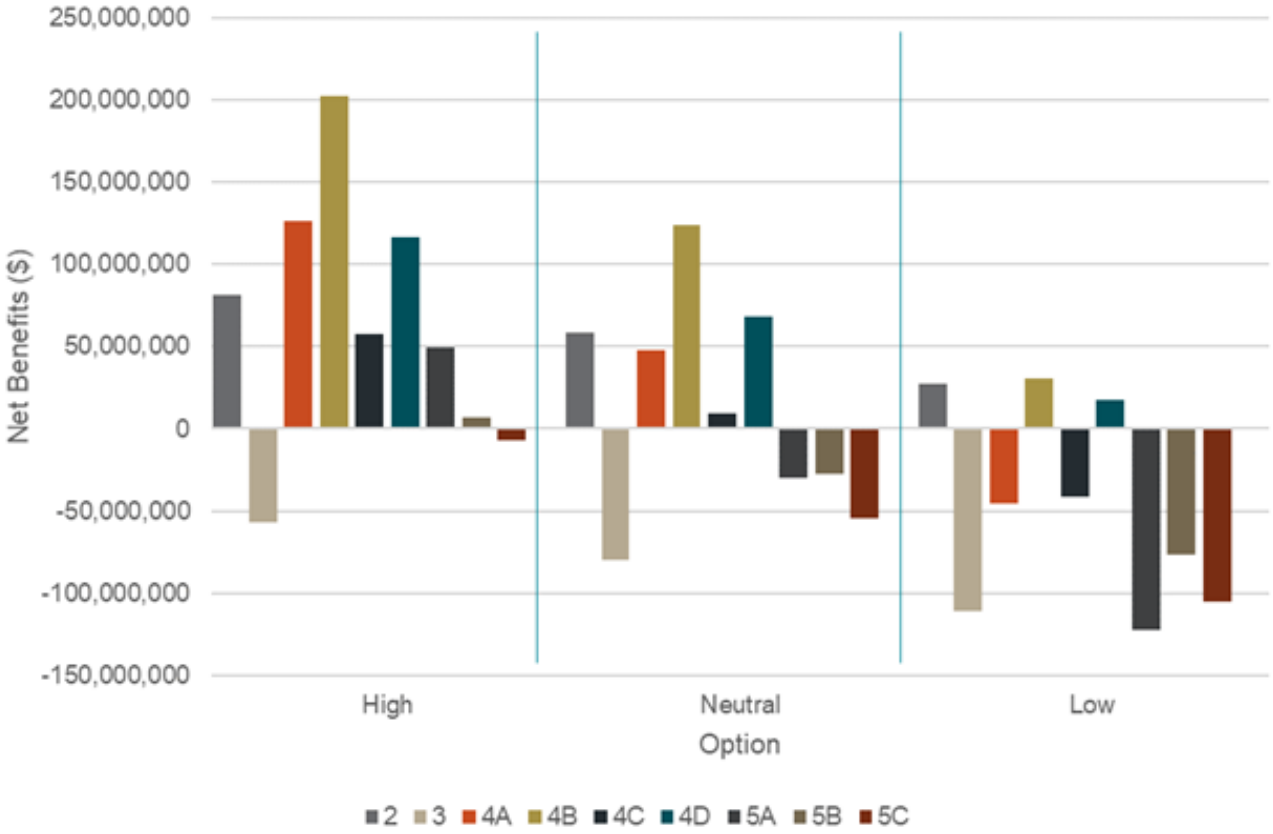
Option 4B remains the preferred option in all cases

All three sets of alternate assumptions increase the expected net market benefits for Option 4B

We also undertook a range of 'sensitivity tests' on key assumptions

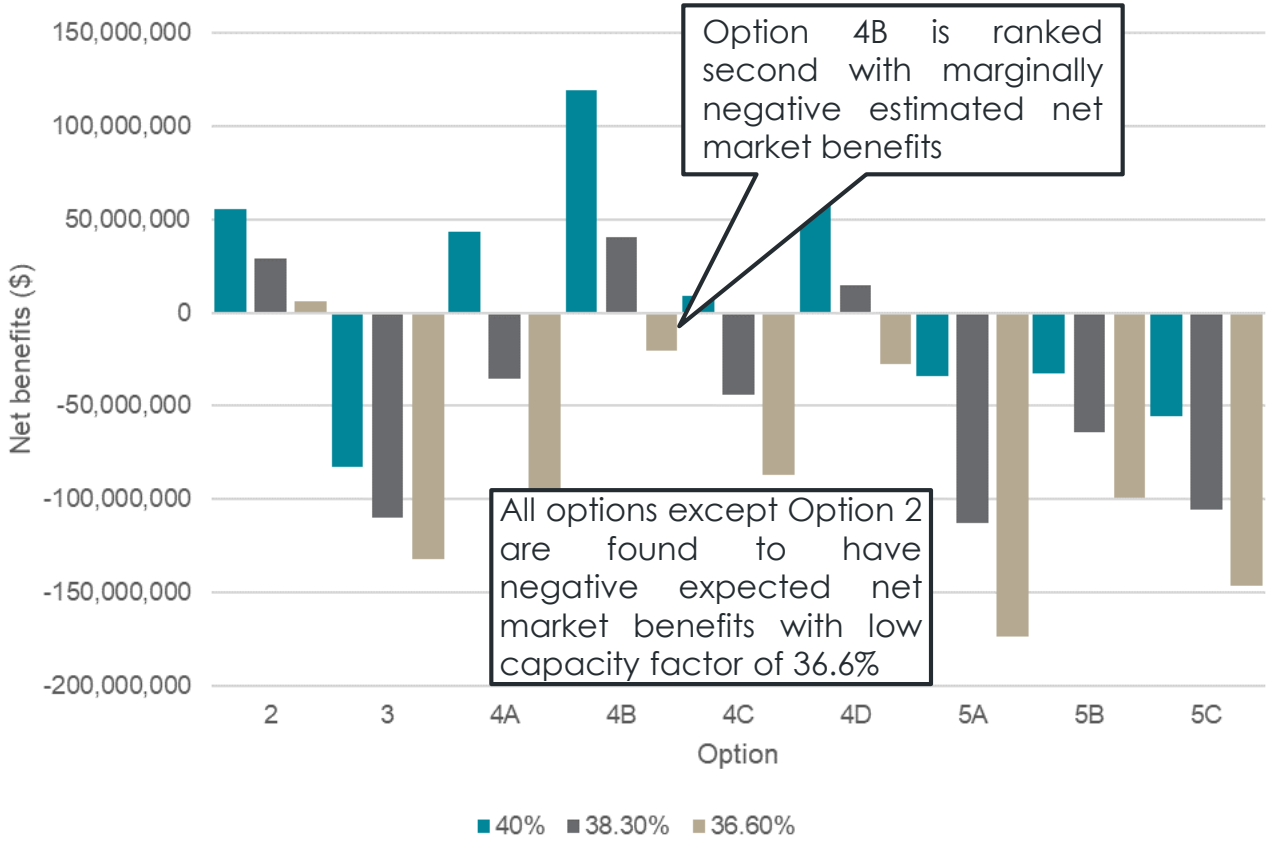
- Option 4B is consistently found to be the preferred option…
  - Whether or not mining load locates on the Eyre Peninsula
  - Whether or not there is a policy designating the Eyre Peninsula as a renewable energy zone
  - Under both AEMO's low and high electricity demand forecasts
  - Assuming lower/higher discount rates and capital costs
- Assumed future system security requirements are found to affect the level of net market benefits
  - Option 2 is the top ranked option where the cap on non-synchronous generation and floor on synchronous generation continues into the future
  - Option 4B still has positive market benefits and is ranked 2nd
  - This scenario is considered unrealistic and represents an upper bound on system security restrictions on additional wind generation in SA

The results are sensitive to assumed gas prices



- However, Option 4B remains the preferred option and has positive net market benefits, even under low assumed gas prices

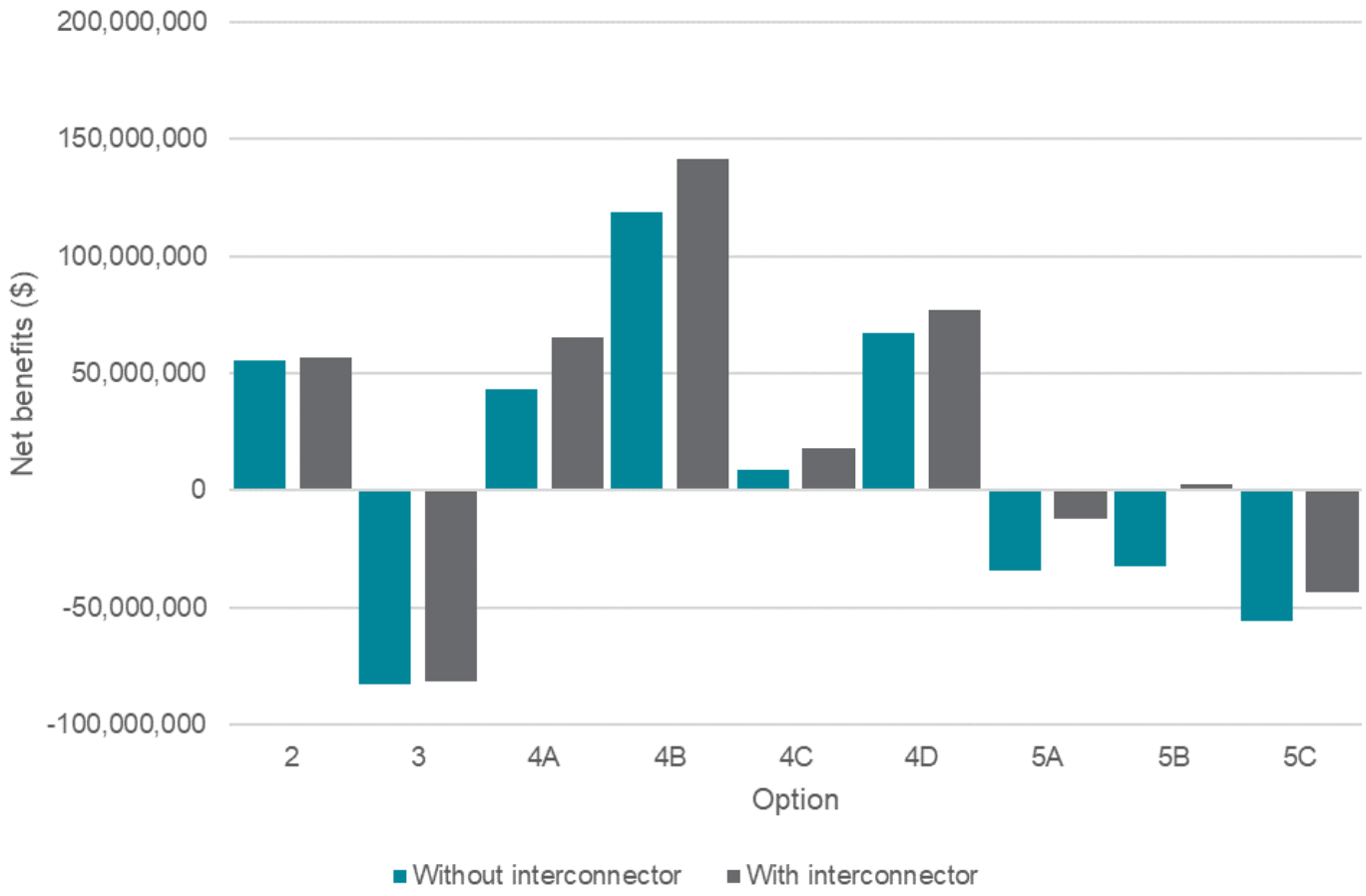
The assumed quality of the Eyre Peninsula wind resource is also a key driver of benefits



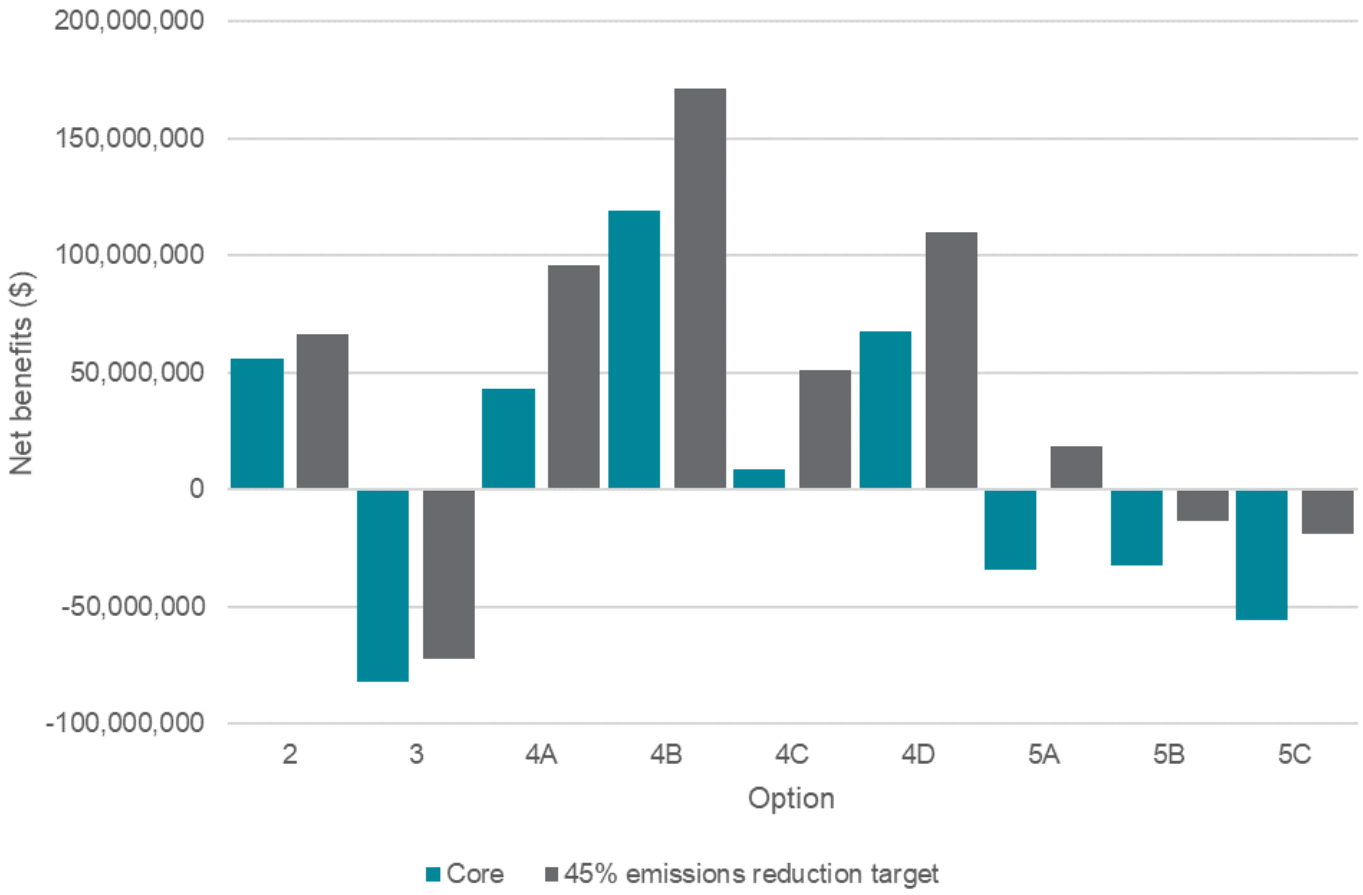
- However, there are good reasons why any new wind farms locating on the Eyre Peninsula are expected to have higher capacity factors

Additional slides – sensitivity analysis on key 'discretionary parameters'

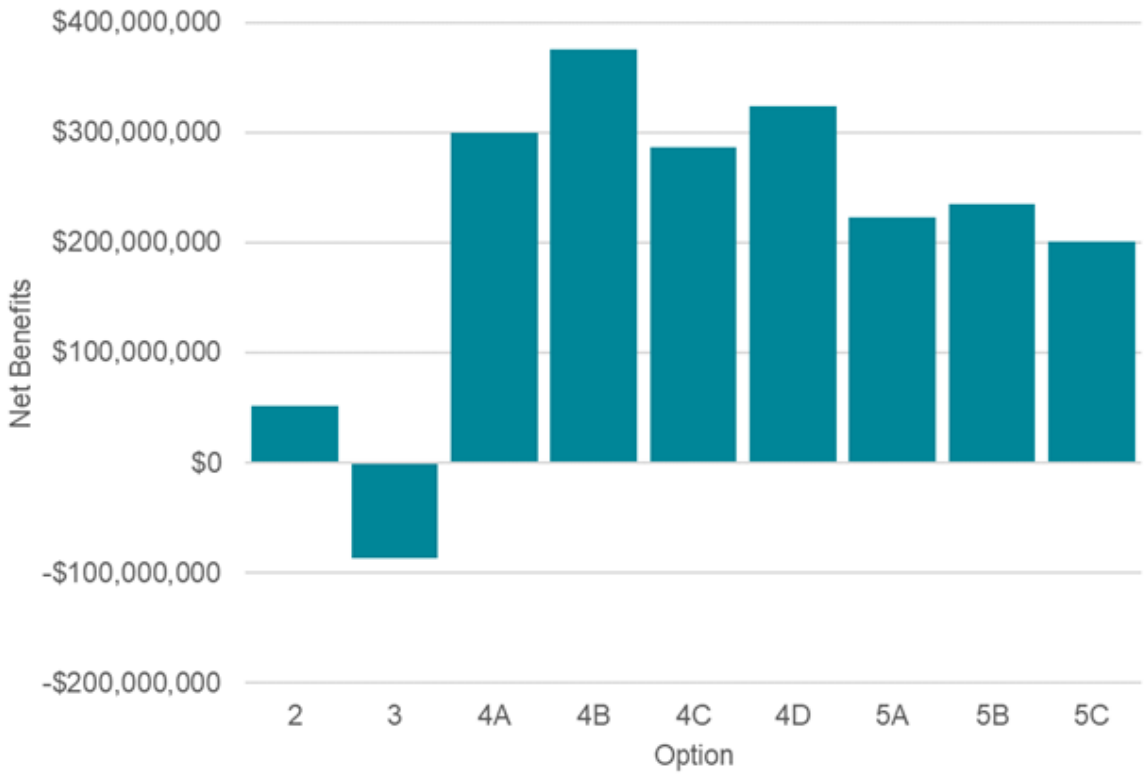
Additional interconnection commissioned between SA and the rest of the NEM



National renewables policy requiring 45 per cent renewables by 2030



Mines elect to source their energy from onsite generation



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