

How Hydro Tasmania can become a 'Battery for the Nation' in Australia

Alex Beckitt – February, 2019

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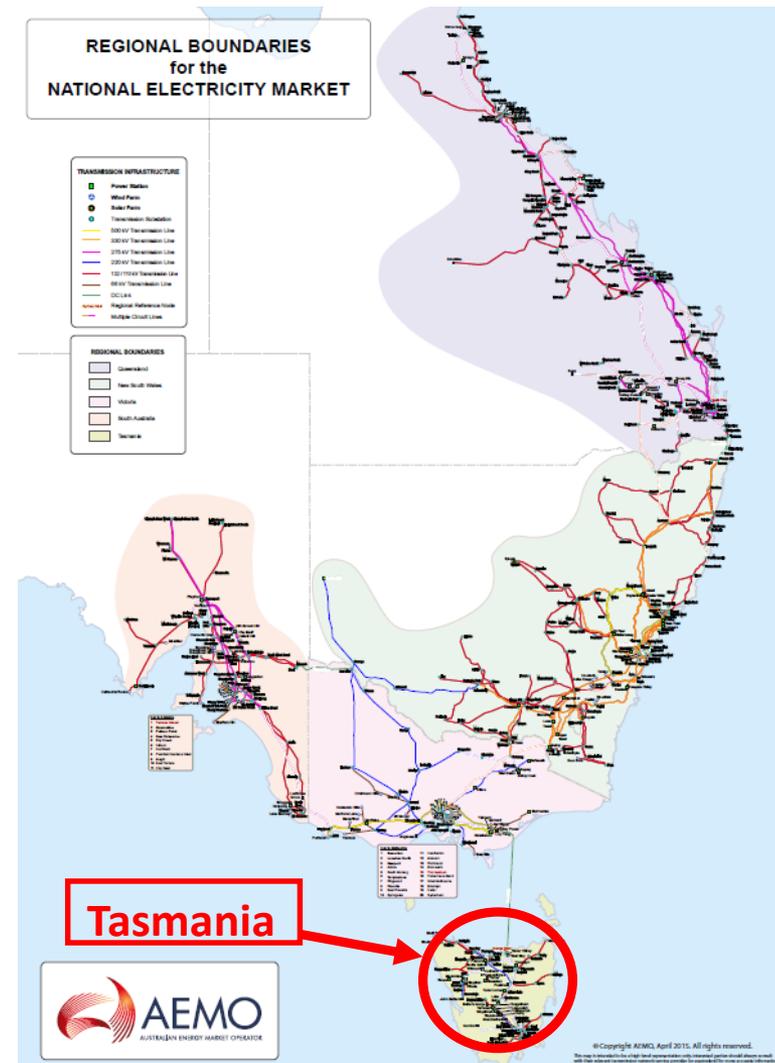
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1. Australia's National Energy Market (NEM)

The Australian NEM:

- Energy only market (and FCAS)
- Spans 6 states and territories;
- Operational since 1998;
- Has approximately **40,000km** of transmission infrastructure;
- Supplies **~10,000,000** customers;
- **Generating capacity of ~54,241 MW** (as at December 2017);
- Annual demand of **~180,000 GWh**

• **長いグリッドと少ない消費**



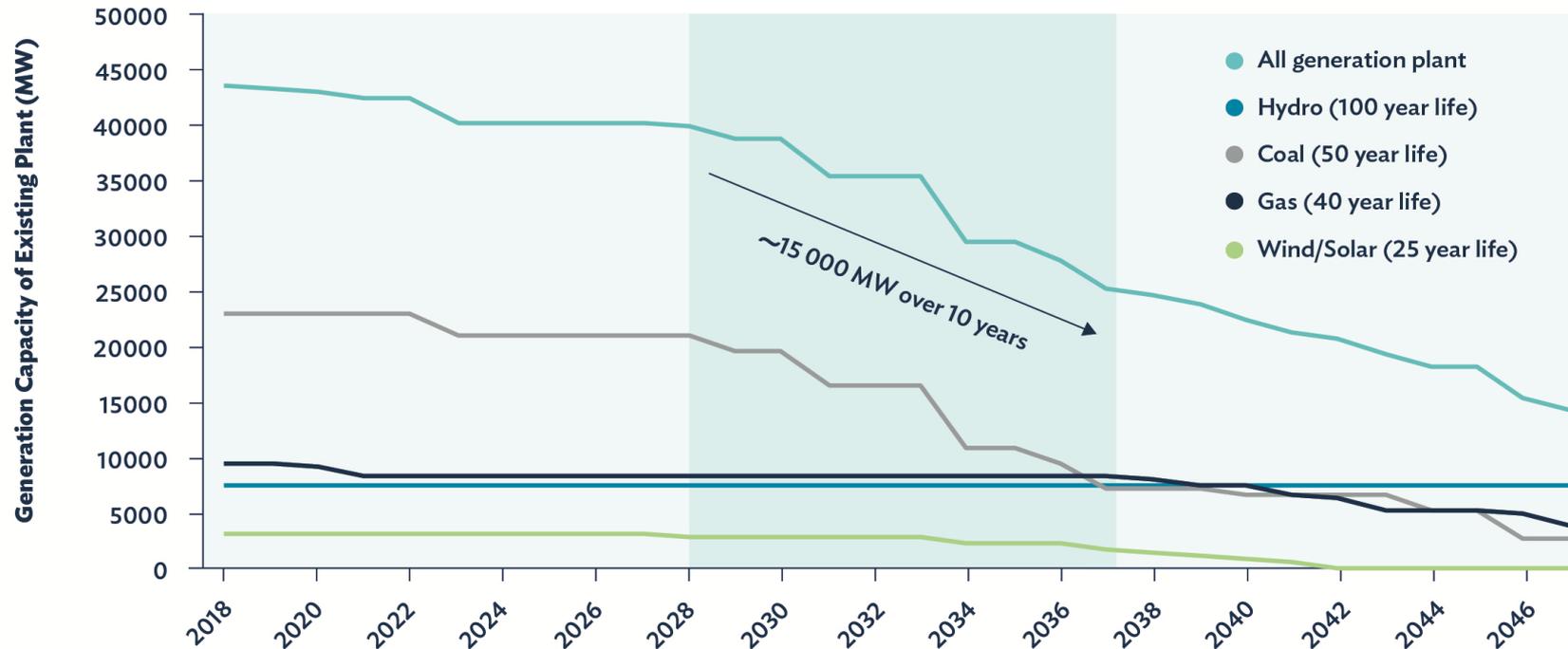
2. Drivers of change in the NEM

- **Ageing fleet, coal plant retirements**
 - Tighter supply/demand causing market volatility
- **Falling costs of renewable energy**
 - Significant uptake of wind and solar driven primarily by the federal level
- **Consumer reactions to increasing prices**
- **Renewable Energy Target**
 - Increased and extended in 2009
 - Amended downwards in 2015
 - Phasing out 2020-2030
- **States bringing in different schemes**
- **急速に変化する世代構成**



3. Quantifying the challenge

- ~30% of the NEM's thermal fleet is forecast to retire 2028-2037.
- This capacity is likely to be replaced primarily by VRE.
- A key challenge will be 'dispatchability/firming/balancing'.



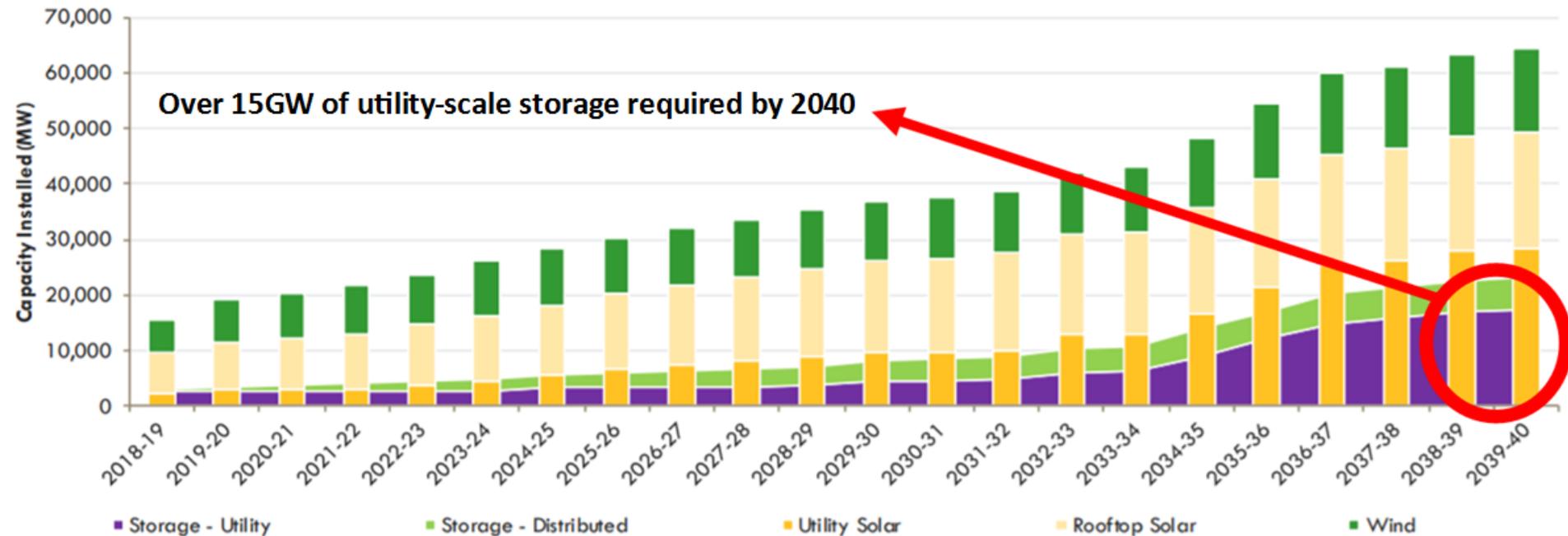
石炭時代の終わりとグリッドに接続する新しい再生可能エネルギー

4. Australia needs large-scale storage



The Australian Energy Market Operator (AEMO) has identified that the NEM requires 15,000 MW of large-scale storage by 2040

オーストラリアは貯蔵が必要



5. Energy storage solutions

- オーストラリアは多くの貯蔵オプションを検討しています
- Tesla delivered a **100MW/129MWh Tesla battery** alongside Hornsdale wind farm.
 - Main value in delivering grid services - Frequency etc.
- **Snowy Hydro board has endorsed final plan to expand scheme by ~2,000MW** – awaiting shareholder approval
- **Where does Battery of the Nation fit?**



Source: www.neoen.com/en/



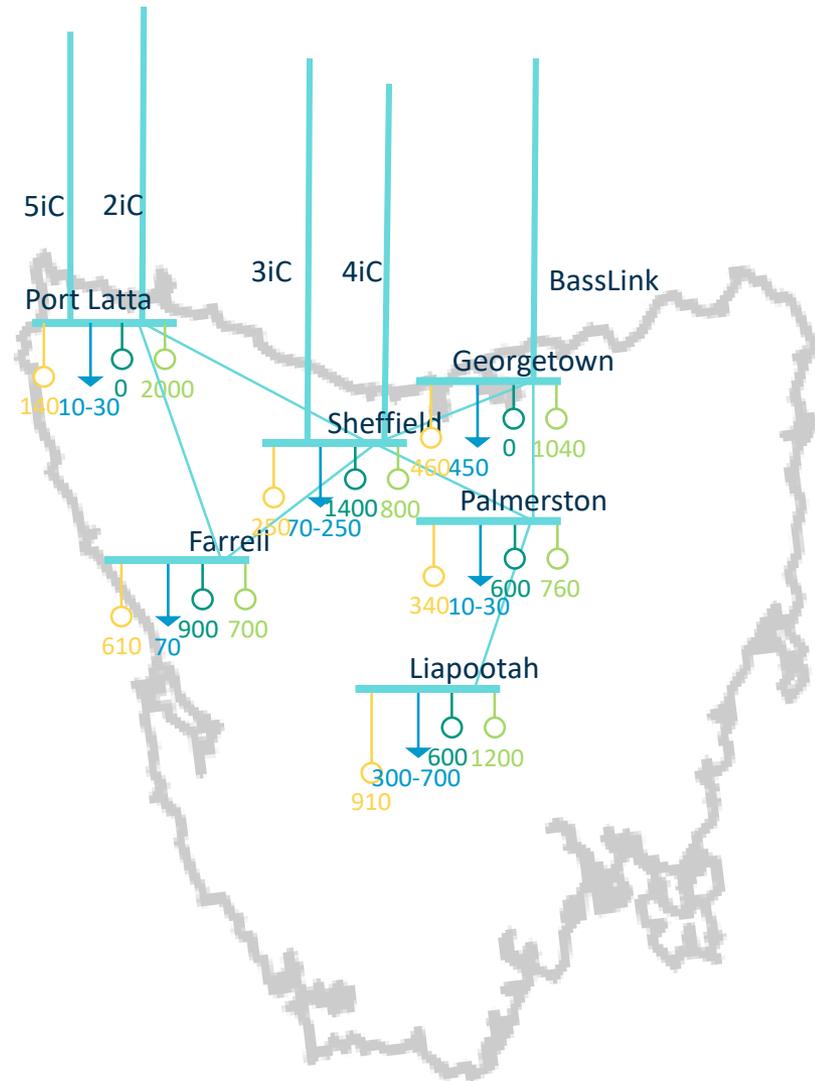
Source: www.snowyhydro.com.au

6. Battery of the Nation

“Battery of the Nation” には多くの利点があります

We envisage Battery of the Nation could include up to 5 interconnectors, 2,500 MW of pumped storage hydro, and significant wind generation.

- **Cost competitive** energy storage.
- **Significant wind resources.**
- **Facilitates uptake of VRE** in the National Energy Market.
- **Downward pressure on prices.**

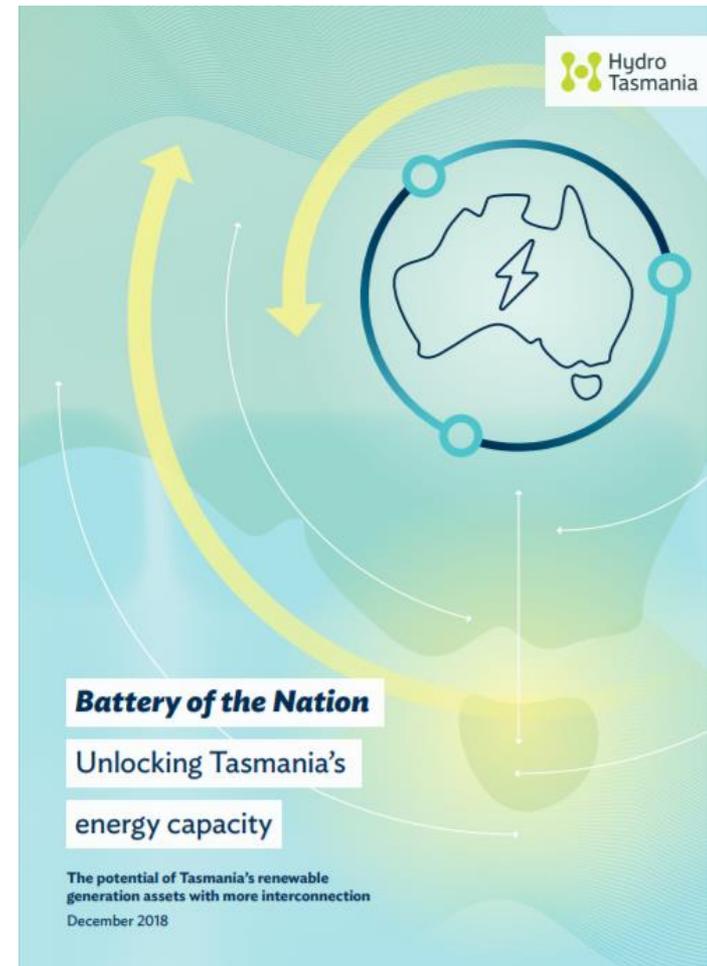


6. Battery of the Nation

プロジェクトを支援するための豊富な研究

Hydro Tasmania is developing a series of white papers addressing issues felt by hydro operators around the world.

- The first released December 2018
- Topics include:
 - How will Tasmanian assets respond to more interconnection?
 - Modelling the value of Tasmanian pumped hydro
 - Benefits for neighbouring regions
 - Revenue and finance models



7. Key messages

全国的な価格競争と少ない排出物

1. Tasmania has significant natural resources to help it become a *Battery for the Nation* in Australia.
2. It is integral that the value of PHES and strategic interconnection is properly recognised in market/policy frameworks
3. The Australian government is keen to continue exploring opportunities for pumped hydro in Tasmania



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Thank you
有難うございました。

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