Beyond net zero together: The potential for Tasmania and Japan to collaborate on decarbonisation

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Hydrogen at the Tokyo Olympics

Australia can become a renewable energy superpower

THE CONVERSATION

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To really address climate change, Australia could make 27 times as much electricity and make it renewable

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Australia's electricity system is on the road to becoming 100% renewable as coal-fired power stations close and wind and solar takes their place.

But as a proportion of electricity consumed domestically, it's on the road to more than 100% renewable. That's because renewable power set to be produced in Australia's north could be exported in ways such as via subsea cables.

And if we get really serious about bringing down global emissions we will be doing much, much more.

In a newly-published study carried out as part of a multi-disciplinary team under

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Disclosure statement

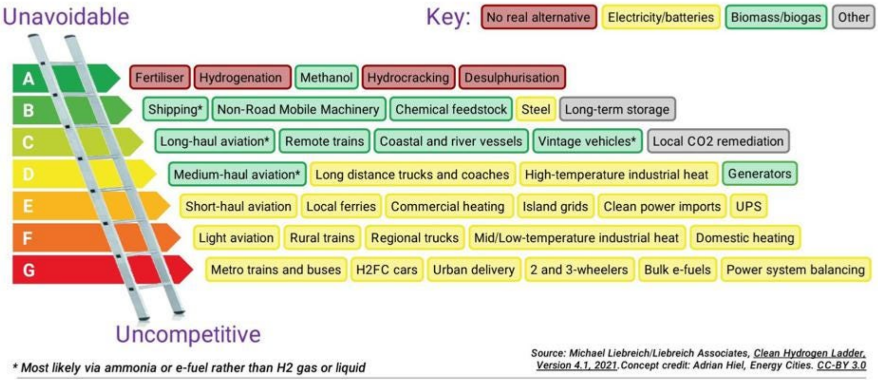
Three ways of exporting renewable energy

1. Direct transmission

2. Green steel and aluminium

3. Green hydrogen and ammonia

Applications of hydrogen and the "hydrogen ladder"



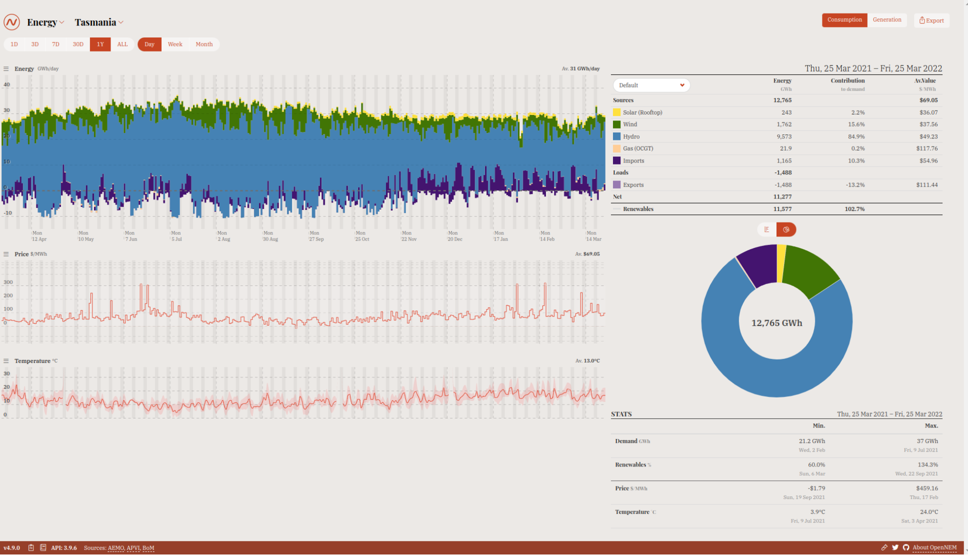
The many different "colours" of hydrogen

	Terminology	Technology	Feedstock/ Electricity source	GHG footprint*
PRODUCTION VIA ELECTRICITY	Green Hydrogen	Electrolysis	Wind | Solar | Hydro Geothermal | Tidal	Minimal
	Purple/Pink Hydrogen		Nuclear	
	Yellow Hydrogen		Mixed-origin grid energy	Medium
PRODUCTION VIA FOSSIL FUELS	Blue Hydrogen	Natural gas reforming + CCUS Gasification + CCUS	Natural gas | coal	Low
	Turquoise Hydrogen	Pyrolysis	Natural gas	Solid carbon (by-product)
	Grey Hydrogen	Natural gas reforming		Medium
	Brown Hydrogen	Gasification	Brown coal (lignite)	High
	Black Hydrogen		Black coal	

*GHG footprint given as a general guide but it is accepted that each category can be higher in some cases.

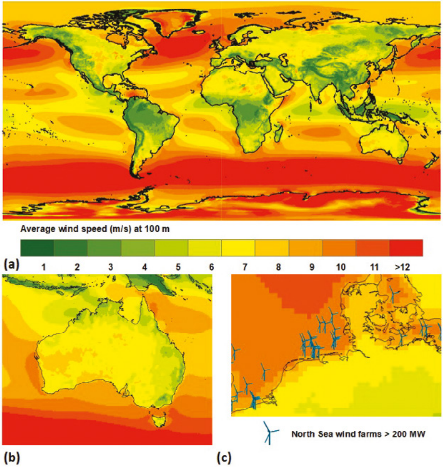
Cheng and Lee (2022), doi:10.3390/su14031930

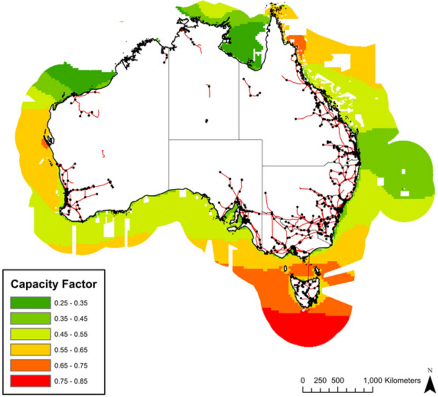
Why Tasmania? Already more than 100% renewable



https://opennem.org.au/energy/tas1/

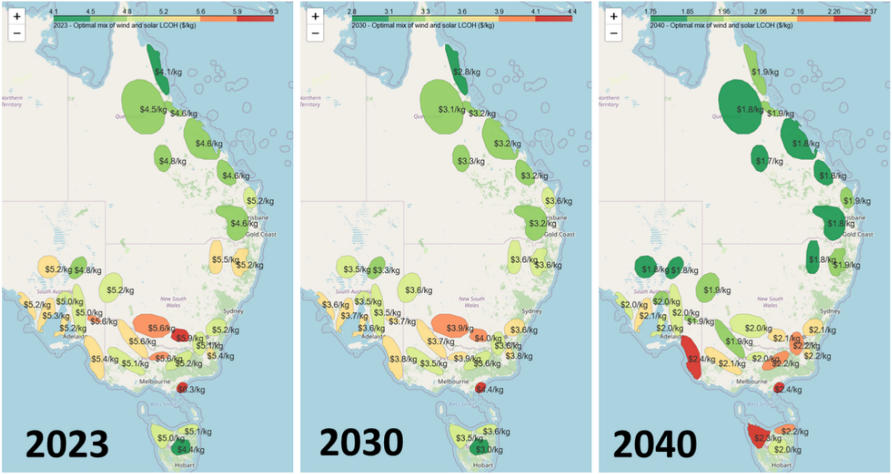
Why Tasmania? Enormous potential for offshore wind





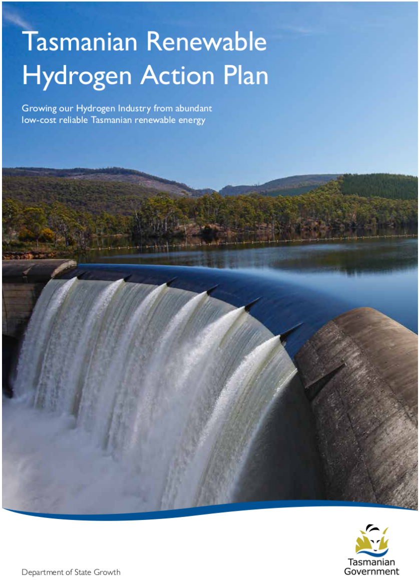
Briggs et al. (2021), Offshore Wind Energy in Australia: Blue Economy CRC

Why Tasmania? Green hydrogen is cheap



Steven Percy, Victorian Hydrogen Hub

Tasmanian Renewable Hydrogen Action Plan (2020)



Goals

By 2022 to 2024

- Tasmania has commenced production of renewable hydrogen.
- Locally produced renewable hydrogen is being used in Tasmania.
- Export based renewable hydrogen production projects are well advanced.

By 2025 to 2027

- Tasmania has commenced export of renewable hydrogen.

From 2030

- Tasmania is a significant global producer and exporter of renewable hydrogen.
- Locally produced renewable hydrogen is a significant form of energy used in Tasmania.

Japan: 6th Strategic Energy Plan (2021)

Points of policy responses towards 2030 [Hydrogen/Ammonia]

- Looking ahead to the carbon neutral, **hydrogen will be positioned as a new resource and its societal implementation will be accelerated.**

- In order to supply cost-effective hydrogen/fuel ammonia, **steadily and by large amount in the long term, inexpensive hydrogen from overseas will be utilized** and **hydrogen production base will be established by utilizing domestic resources.**

  - **Commercialization of hydrogen production utilizing international hydrogen supply chain and water electrolysis equipment using excess renewable energy, etc.; and development of innovative hydrogen production technology** utilizing high temperature heat sources **such as photocatalyst/high-temperature gas-cooled reactor** will be addressed.

  - **Supply amount of hydrogen will be increased** by **reducing its supply cost to the similar level to those of fossil fuels.**

    Cost: reduction from current 100 yen/Nm^3 to 30 yen/Nm^3 in 2030, and not more than 20 yen/Nm^3 in 2050.

    Supply amount: increase from current approx. 2 million tons/year to max. 3 million tons/year in 2030, and 20 million tons/year in 2050.

- Use of hydrogen on demand side (power, transport, industry and consumer sectors) will be expanded.

  - **In power generation sector** expected to large amount of hydrogen demand, aiming at **introduction/expansion of 30%-hydrogen co-firing in gas-fired power generation or hydrogen-fired power generation** and **20%-ammonia co-firing in coal-fired power generation, demonstration of co-firing/single fuel firing will be promoted** and the environment for appropriate assessment of non-fossil value will be prepared. In addition, **1% hydrogen/ammonia will be positioned in power generation mix in FY2030.**

  - **In transport sector, hydrogen station will be strategically streamlined for further expansion of FCVs and future FC trucks.**

  - **In industry sector, large scale diversion of manufacturing process such as** hydrogen-reduced iron making and **technology development of burners and large and highly functional hydrogen-fired boilers** based on its combustion characteristics will be addressed.

  - **In buildings sector, technology development towards cost reduction** will be addressed **for further introduction and expansion of stationary fuel cells** including pure hydrogen fuel cell.

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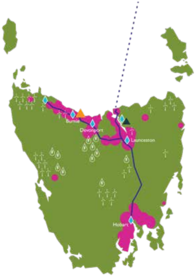
Bell Bay Advanced Manufacturing Zone



Proposed hydrogen projects

1. Woodside (H2TAS)
   - 1.7 GW
   - Hydrogen/ammonia
2. Origin Energy
   - 500 MW
   - Hydrogen/ammonia
3. Fortescue Future Industries
   - 250 MW
   - Hydrogen/ammonia
4. Abel Energy
   - 100 MW
   - Hydrogen/methanol

H2TAS Consortium

H2TAS: Phase 1 (Conceptual image only)

H2TAS: Full Capacity (Conceptual image only)

Consortium members and partners

- Woodside
- Countrywide Renewable Energy
- Tasmanian Government
- Tas Gas
- Marubeni Corporation
- IHI Corporation

Phase One

- Capacity of up to 300 MW
- Up to 200,000 tonnes of ammonia per year for export
- Small amounts of hydrogen and ammonia for domestic market

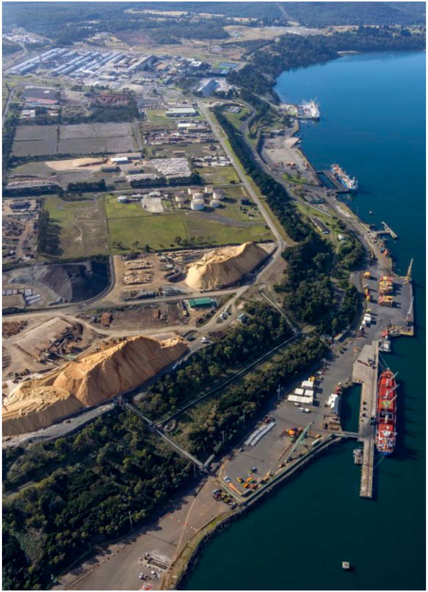
Full potential

- Capacity of up to 1.7 GW
- Subject to customer demand and utility availability

100% renewable.

Land secured. Final decision in 2023.

Fortescue Future Industries



Partners

- Fortescue Future Industries
- IHI Corporation
- IHI Engineering Australia

Planned operations

- Capacity of up to 250 MW
- Up to 250,000 tonnes of ammonia per year for export

Economic potential

- Estimated 500 new full-time jobs
- Net $2 billion increase to gross state product over project lifetime

100% renewable.

Option Agreement signed with TasPorts.

Final decision expected imminently.

Conclusions

Tasmania has significant early-mover advantages:

- Already more than 100% renewable.
- Enormous potential to expand energy supply through onshore/offshore wind.
- Green hydrogen and ammonia can be produced cheaply.

Benefits for Japan:

- Tasmania has the potential to supply $>$1 million tons of green ammonia per year.
- Sufficient to meet $>$8% of 2030 hydrogen target.

Benefits for Tasmania:

- Potential to generate $>$1,000 new full-time jobs.
- Billions of dollars per year added to the Tasmanian economy.

Challenges and opportunities:

- Requires three-fold increase in Tasmania's energy supply to reach full potential.
- Green ammonia supply chains do not yet exist.
- Strong potential for collaboration on green manufacturing in Tasmania.