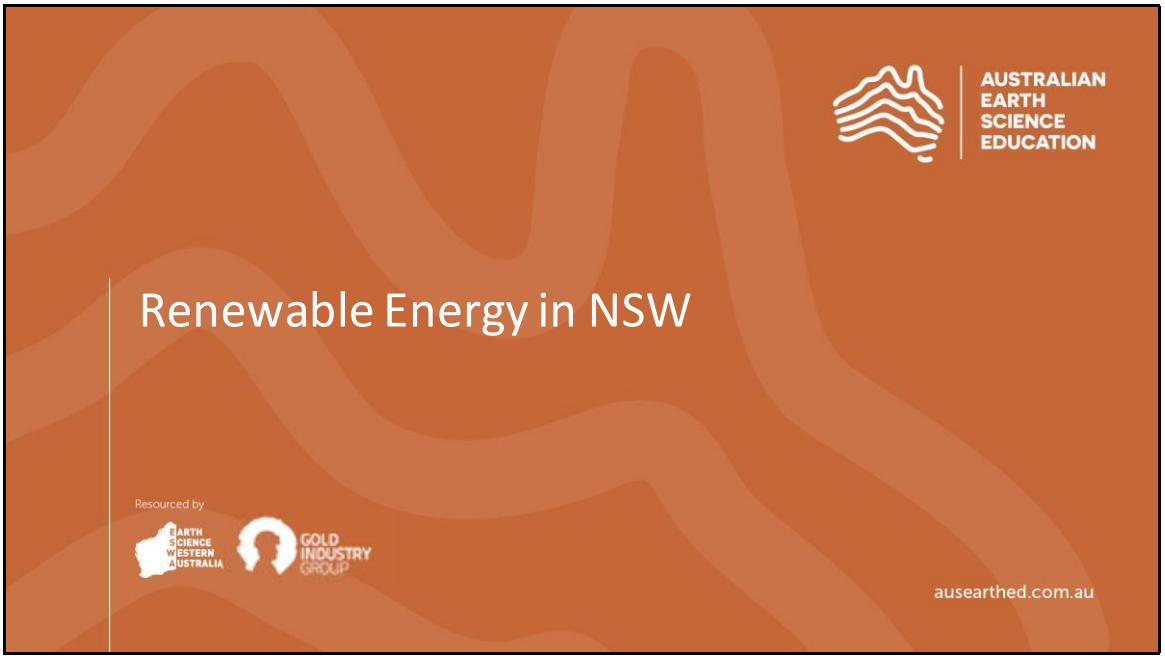
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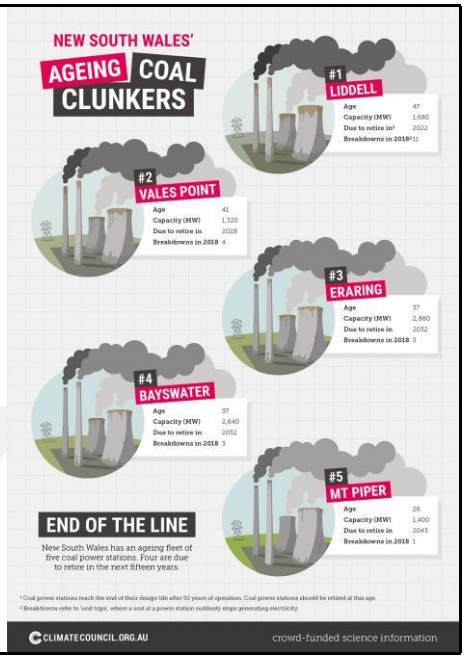
Cover Slide

Coal-fired power in NSW

- The majority of electricity generation in Australia is from fossil fuels, primarily coal
- Five coal-fired power plants produced 80.8% of NSW electricity in 2018-19
- The Liddell Power Station is due to close in 2023 and the others will follow by the end of 2043

NSW Electricity Strategy 2019 https://energy.nsw.gov.au/media/1921/download#

Infographic used with permission of the Climate Council
https://www.climatecouncil.org.au/resources/new-south-wales-ageing-coal-clunkers/



NSW is by far the greatest user of coal for power due to the high population of the state and its abundant coal reserves.

Coal-fired power stations release sulfur and nitrogen oxides, as well as carbon dioxide. These compounds form acid rain. NOx compounds are greenhouse gases, as is the carbon dioxide produced by combustion.

The coal-fired power stations are nearing the end of their lifetimes and we need to develop new electricity sources. There is an opportunity to change the electricity mix in NSW and move to renewable energy sources.

Building renewable energy capacity can replace the current electricity supply

- Renewables plus storage are cheaper than new coal and nuclear power plants
- Renewables provided 24% of Australia's electricity in 2019

De Atholia, Flannigan & Lai 2020 Renewable Energy Investment in Australia https://www.rba.gov.au/publications/bulletin/2020/mar/renewable-energy-investment-in-australia.html
RMIT ABC Fact Check 2019 https://www.abc.net.au/news/2019-09-12/is-renewable-power-cheaper-than-coal-nuclear-malcolm-turnbull/11495558
The Guardian 2020 https://www.theguardian.com/environment/2020/mar/12/wind-and-solar-plants-will-soon-be-cheaper-than-coal-in-all-big-markets-around-world-analysis-finds

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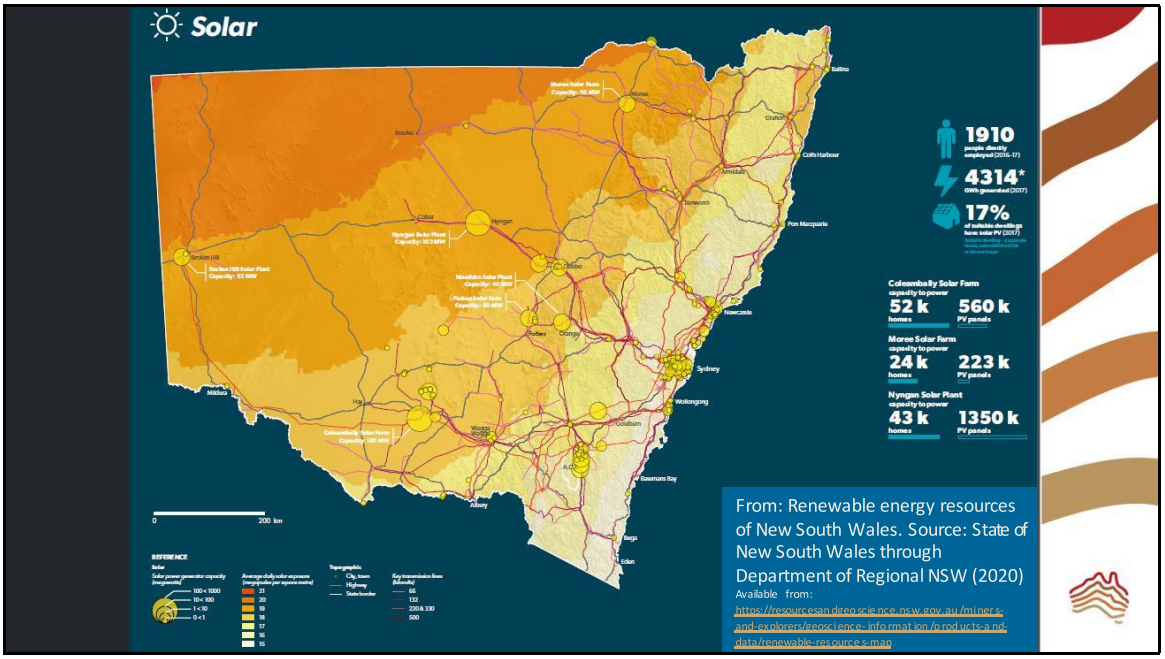
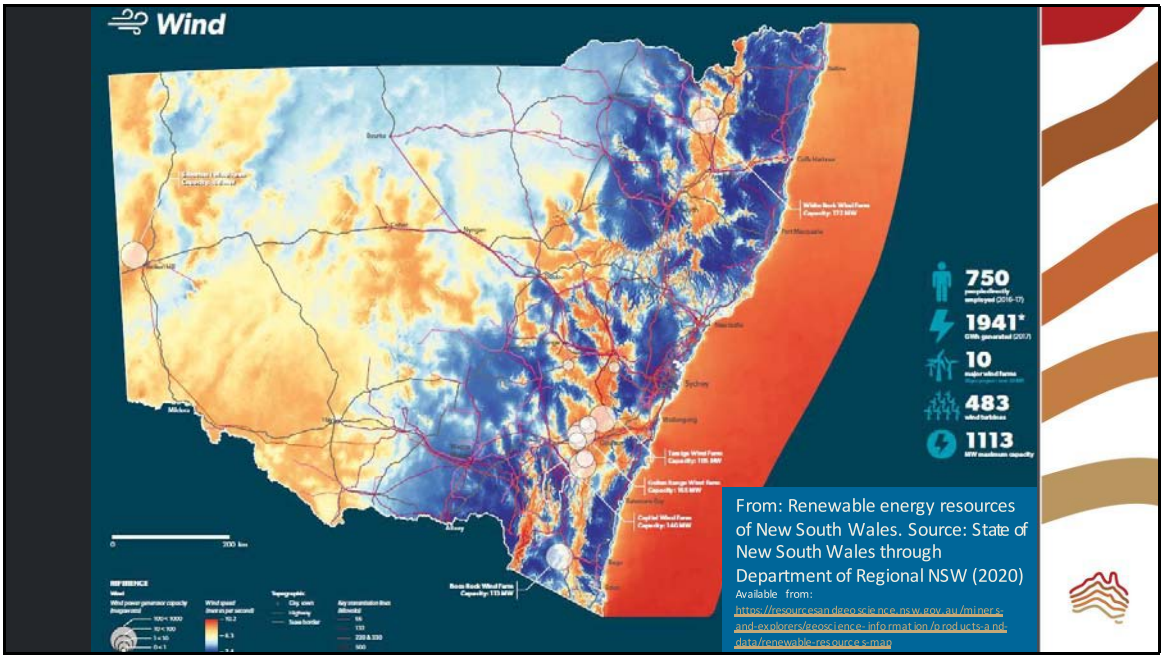
The rapid decrease in price of solar and wind generation, as well as battery storage, make these the cheapest options for replacing the ageing coal-fired power plants.

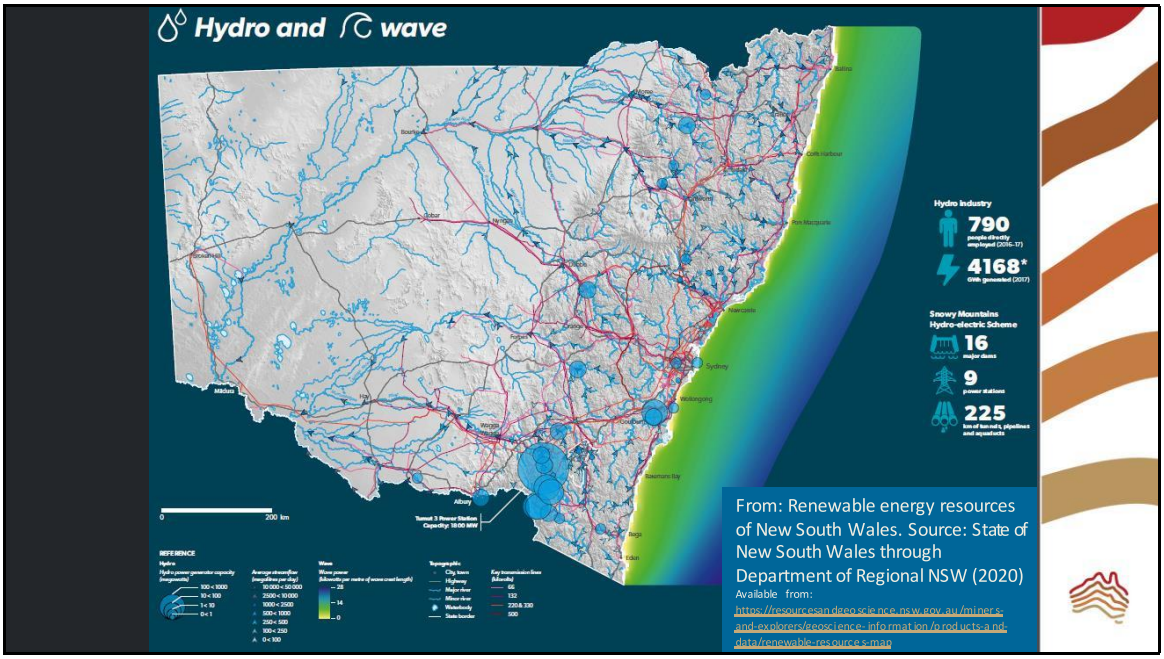
The Reserve Bank of Australia has noted the decrease in cost and increase in capacity of renewable energy. They predict that the coal-fired power plants will be replaced with distributed networks of renewables (rooftop and small systems), as well as larger power plants (solar farm) coupled with storage.



The most sunlight exposure is in the parts of the state with the least people. Thus, the distribution of solar power plants is greater near population centres, despite the lower efficacy in these areas. The reason for this is the high cost and inefficiency of electrical power lines.

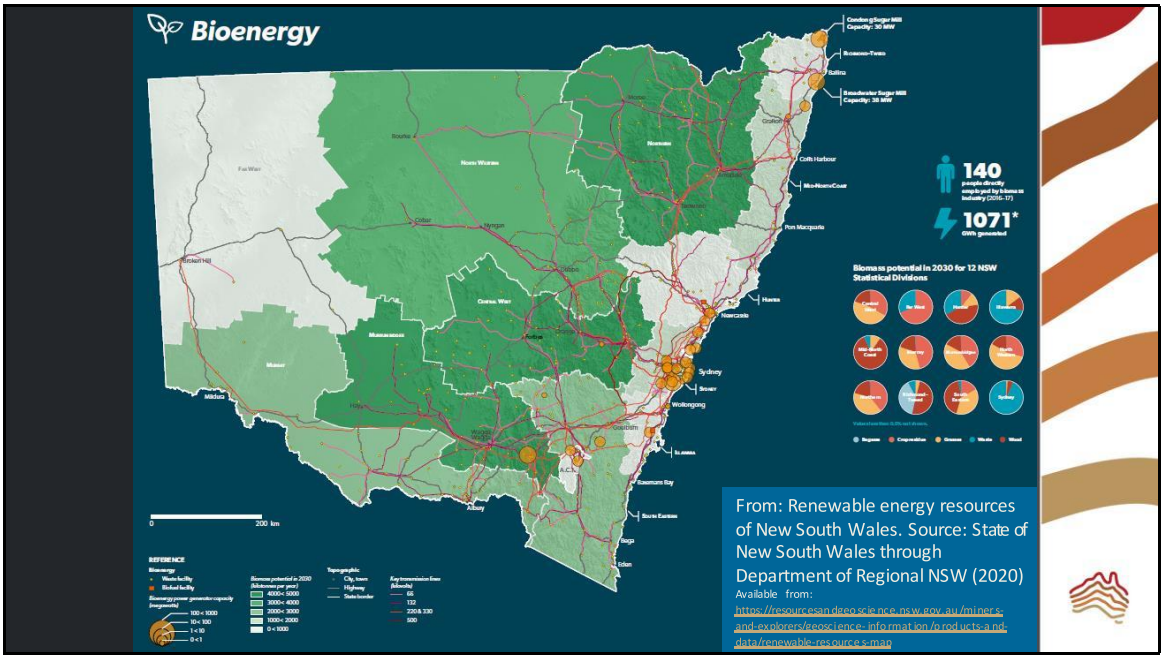


The distribution of wind power stations is more closely matched to population and areas with strong grid connections. With very low wind speeds in the biggest population centre (Sydney), wind farms are mainly along the east coast in area with strong grid connections. This offers another income stream for farmers – one which is not vulnerable to erratic weather. This has been an important factor in wind farm construction globally.



From: Renewable energy resources of New South Wales. Source: State of New South Wales through Department of Regional NSW (2020)
Available from: https://resourcesandgeoscience.nsw.gov.au/miners-and-explorers/geoscience-information/products-and-data/renewable-resources-map

By far the greatest contribution to hydro power is the Snowy Mountains Hydro-electric Scheme. A great advantage of hydro is the ability to provide power in response to demand. This is the primary function of the Snowy Scheme, which provides peak time power to the east coast grid. Hydro made its smallest contribution to power generation in 2019 due to drought. Despite the potential for wave energy, this is not yet commercially viable.



Bioenergy is renewable, but definitely the smaller contributor to the NSW and Australian energy mix,providing 6% of renewable generation and 1.4% of total electricity generation in 2019. Estimates for potential on the map are based on stubble (pulp from logs, harvest residue), grasses, wood, sugar cane residue and waste. Sewage and landfill gases offer the greatest potential for electricity generation with the benefit of converting methane into carbon dioxide and thus reducing the warming effect per atom of carbon.

Problem 1:

Renewable power is not always located where people live

- Electricity transmission lines are costly and vulnerable to storms
- Hydrogen is a promising solution with the potential for a $26 billion export industry by 2050*

Hydrogen fueling pump in Las Vegas. (US Dept of Energy, public domain)

*Clean Energy Council (2020). Clean Energy Australia Report 2020. from https://assets.cleanenergycouncil.org.au/documents/resources/reports/clean-energy-australia/clean-energy-australia-report-2020.pdf

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How could we harness the Sun's power and take it to where it is needed most? Hydrogen may offer the answer. Although still under development, solar to hydrogen cells are becoming increasingly efficient. A new technology developed at ANU showed impressive results in 2020.*

The COAG Energy Council launched a National Hydrogen Strategy in November 2019, aiming for Australia to be an industry leader by 2030 in hydrogen for both domestic and export use.

*https://reneweconomy.com.au/australian-researchers-claim-new-record-for-direct-solar-to-hydrogen-solar-cells-63927/

Problem 2:

Renewable power is not always available when it is needed

- Australian households installed 22,661 batteries in 2019 – a household storage capacity of more than 1 GWh*
- The Hornsdale Power Reserve in SA is the world's largest battery, helping to stabilise the power supply grid
- Snowy 2.0 and Tasmania's Battery of the Nation will store power with pumped hydro

*Clean Energy Council (2020). Clean Energy Australia Report 2020. from https://assets.cleanenergycouncil.org.au/documents/resources/reports/clean-energy-australia/clean-energy-australia-report-2020.pdf

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Solar and wind are not always generating power, so storage is needed. Snowy 2.0 will be a 2000 MW pumped hydro battery. Tasmania's Battery of the Nation project will store 2500 MW and export excess to Victoria via the Marinus Link.

Although there is a long payoff time, many Australian households are installing battery systems in order to maximise the benefits of rooftop solar and protect against power outages. The Hornsdale Power Reserve in SA (built with the assistance of Tesla) stabilises the power grid and has helped SA move to 50% renewable energy in 2019. With expansion of the battery, the state aims for 100% renewable energy by 2030.

Reference:

Clean Energy Council (2020). Clean Energy Australia Report 2020. from: https://assets.cleanenergycouncil.org.au/documents/resources/reports/clean-energy-australia/clean-energy-australia-report-2020.pdf


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