

## THERMAL COAL IN TERMINAL DECLINE - Vs 1 - Oct 2019

**Climate change is real.** Even the International Energy Agency (IEA) says so. The IEA is dominated by the world's largest oil companies and can hardly be called 'Greenies'. In 2018 it estimated that under current policies, the world will be 6°C warmer than at present. When it included planned new policies, it will be 4°C higher, but this will still make the world largely unliveable for the human species. Under its Sustainable Development Scenario, the increase may be limited to under 2°C. Energy sources are amongst the main causes of this increase, especially thermal coal<sup>1</sup> and gas, which are used for electricity and heating.

**The choice is ours.** Science and technology have developed many ways to generate electricity that do not cause warming of the atmosphere. Solar panels and wind generators are two. These are now cheaper to use than coal while their costs keep coming down. In 2017 the lowest cost was \$0.03 kWh<sup>2</sup>. In July 2019, a contract to supply 211 MW<sup>2</sup> of solar was for a new low of \$0.0175 kWh, a 42% drop (IEEFA.org). Wind generators are following a similar path. Coal is around \$0.035 kWh, now twice solar.

Solar and wind need to be backed up for "when the sun does not shine or the wind does not blow". There are many ways to store electricity. Batteries and Pumped-Hydro are being used, Green Hydrogen is coming.

**Batteries.** There are now batteries for many different purposes. They keep improving and coming down in price. Huge battery banks capable of storing up to 4 hours supply have been proven effective. They are now an integral part of new large solar and wind projects and are used to stabilise the grid. The most recent cost of solar or wind plus that of the batteries is below that of newly built coal stations.

Solar with batteries is used at small scale e.g. individual properties going off-grid. At medium scale it is used for stand-alone small grids such as in mines, shopping centres, industrial complexes etc. These are now commercial investments: they save more than they cost. Stand-alone grids promise power-independence for regional Australia<sup>3</sup>: lower cost, more reliable supply and no more poles and wire lost to fire or floods.

Roof-top solar is the second largest renewable energy supplier in Australia, after wind. Batteries for homes are increasing in capacity and becoming cheaper. This, together with improved software, is increasing the already substantial role of rooftop solar as supplier to grids. Batteries for electric vehicles can now be charged from solar panels during the day and used as back-up at home at night.

**Pumped-hydro.** This method uses two water storages (dams), one at a high level and one at a lower level. During day time (for solar panels) or windy periods (for wind generators) when power supply is high, water is pumped from the low dam up to the high dam. When the power supply is low - at night or when there is not much wind - the water flow is reversed and the pump becomes a generator of electricity. This method has been successfully used at the Wivenhoe dam near Brisbane since it opened in 1984.

At these low costs of electricity, pumped-hydro has become more economical. In North Queensland two old gold mines near Kidston will be used for pumped-hydro for a very large solar farm some distance away. The Queensland Government is putting \$132 million towards a high voltage connection for this and similar projects. There are 1,000s of locations suitable for pumped-hydro in Eastern Australia.

**Green Hydrogen.** 'Green Hydrogen' refers to hydrogen made from water by electrolysis using electricity from renewable sources. Using Hydrogen Fuel Cells<sup>4</sup>, hydrogen can be used as a clean source of energy for electric engines in cars, heavy transport, rail and shipping. This is still in its early development but has great potential for competitive, sustainable and permanent export of clean energy from Australia<sup>4</sup>.

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<sup>1</sup> Thermal coal is used for heating to make electricity, metallurgic coal is used to make steel. This is about thermal coal.

<sup>2</sup> The basic unit to measure electricity is a Watt.

*We buy electricity in kWh. kW means 1,000 Watt. kWh is 1000 Watt of electricity delivered in one hour.*

*Our electricity supplier buys electricity from the generators in MW (Mega Watt), which is 1,000 kWh.*

*Big Generators measure their ability to produce electricity in GW (Giga watt) which is 1,000 MW.*

*Large networks measure their ability to handle huge flows of electricity in TW (Terra watt) which is 1,000GW.*

*So: 1 TW = 1,000 GW = 1,000,000 MW = 1,000,000,000 kWh. It is a lot of electricity.*

<sup>3</sup> See <https://onestepoffthegrid.com.au/yackandandah-takes-one-step-closer-to-100-renewable-energy/>

<sup>4</sup> For details see factsheet 'GLADSTONE: A HYDROGEN – AMMONIA CENTRE - 'A SUSTAINABLE, CLEAN, PROSPEROUS FUTURE FOR GLADSTONE' on <http://gladstoneconservationcouncil.com.au/web/factsheets/>

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**Finance.** Since 2015 many big banks and investment companies have stopped funding thermal coal. The risk of backing a loser and being left with 'stranded assets', leading to huge losses, became too great. In 2015, funding of coal-fired power stations was for 80 GW. In 2018, it had shrunk to 21 GW. Many large Insurance companies no longer insure new coal-fired power stations. Large mining companies have been getting out of thermal coal. In 2018, BHP, Rio and Peabody sold seven Australian coal mines, one for \$1. In contrast, investments in solar projects in 2015 was for 58 GW. For 2019 it is estimated to be for 129 GW. In 2018 the capacity of newly installed wind projects was 63 GW. (The Global Wind Energy Council). World-wide, an increasing number of huge solar and wind projects with batteries are being approved for finance<sup>5</sup>. They can be built in stages and in a short time as they use mass-produced components, need little site preparation and no buildings. Coal can take 5 years to build.

The CEO of the largest energy supplier in the USA, NextEra (about as big as Australia's total network) says renewables and batteries beat coal, gas and nuclear. Renewables without subsidies will likely replace coal generation in the US within a decade. Other USA energy firms are also fast-tracking their closure of coal<sup>6</sup>.

In Australia, NSW has a short list for 3 GW of renewable projects to replace the Liddell coal powered station. The NT has a vision of a "19 GW renewable energy industry" by 2030, creating 8,000 jobs. Another proposed huge NT project is for a \$25 billion, 10 GW project with 20-30 GW battery storage to be connected to Singapore by a 3,000km cable. It is gaining financial backing from large investors<sup>7</sup>.

**Obstacles to growth.** The current power distribution systems are based on large central generators with steady, controllable output and distributed through poles and wires to a wide region. In the new system, power is still distributed widely but is now also generated at many places with varying output. This creates technical challenges. These are being solved by engineers, technicians and software writers.

Regulations have been written for one system: coal and gas fired power who have similar characteristics and requirements. These need to be re-written to include alternative sources which have different ones.

Government policy is needed to create a legal frame work and approve or fund some infrastructure such as major high-voltage connecting links. Existing stakeholders try to protect their interests by influencing new policy. One is the Mining Council of Australia (MCA). It is listed amongst the world's top 10 climate policy opponents and has very close connections to the Federal Government<sup>8</sup>.

No power policy has been developed in Australia for ten years notwithstanding many urgent requests by the power industry, the wider business sector, consumer groups, environmental groups and young people.

**Jobs in Thermal Coal.** The Australian Bureau of Statistics, using its 'Labour Account' method, gives an estimate of about 38,000 employees for the whole black-coal industry. As about 58% of these work in thermal coal, the estimate for thermal coal is about 22,000<sup>9</sup>. Once remote-controlled electric trucks<sup>10</sup> for hauling and robots for underground work are introduced, this figure is likely to be reduced. Displaced workers will find plenty of job opportunities in renewable energy, and in cleaner work-environments.

**Jobs in Renewable Energy.** The International Renewable Energy Agency (IRENA) estimated that in Australia in 2017 large scale solar directly employed about 4,400 people, rooftop solar systems about 5,500 and wind power about 11,200 for a total of about 21,000<sup>11</sup>. These figures are likely to increase rapidly as costs keep coming down, factories to produce panels and batteries are being built (one big one is proposed for Townsville<sup>12</sup>), the very large projects come on line and research keeps developing additional technologies<sup>5</sup>.

Regardless of endangering the future of our children and grand-children, the Government's failing to plan for these major developments is bad economic management. After all, failing to plan is planning to fail.

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<sup>5</sup> Source: <https://reneweconomy.com.au/category/storage/battery> various articles.

<sup>6</sup> <https://reneweconomy.com.au/us-energy-giant-says-renewables-and-batteries-beat-coal-gas-and-nukes-78962/>

<sup>7</sup> Source: <https://reneweconomy.com.au/cannon-brookes-confirms-investment-in-worlds-biggest-solar-project-34651/>

<sup>8</sup> Source: <https://reneweconomy.com.au/minerals-council-of-australia-makes-global-top-10-climate-policy-opponents-57698/>

<sup>9</sup> Source: <https://www.abc.net.au/news/2019-07-11/fact-check-are-there-54000-jobs-in-thermal-coal-mining/11198150>.

<sup>10</sup> Rio no longer employs drivers at its iron ore mines in WA and far fewer mechanics. Driverless trucks and trains, automated robots in underground mines etc. are hot topics at mining conferences. When attracting capital, companies e.g. Whitehaven in NSW, highlight it extensively in their prospectuses, but they hide it when promoting "Jobs, Jobs, Jobs" to gain local support.

<sup>11</sup> Source: <http://ecdonline.com.au/content/efficiency-renewables/news/renewable-energy-how-many-jobs-are-there-in-aus--358735355#ixzz61BDtVwEN>

<sup>12</sup> Source: <https://reneweconomy.com.au/magnis-puts-cost-of-townsville-battery-gigafactory-at-3-billion-85691/>