



Why Renewables are the Solution for Australia

The Low-Cost Source of New Electricity Generation

Renewables are the lowest cost, sustainable solution for Australia's energy policy crisis and potentially one of Australia's largest export industries of the future.

Renewable energy is created through electricity generation using renewable sources such as wind, solar, hydro, landfill gas, biomass and geothermal.

The integration of renewable electricity generation is already been achieved at a world leading scale in the Australian Capital Territory, Tasmania and South Australia, with Victoria and Queensland recently lifting ambitions for 50% renewables by 2030 and unlocking large scale regional investment and employment opportunities as a result.

The expanding ability to integrate domestic renewables adds resilience to Australia's electricity grid while providing sustainable national energy-security benefits. It also delivers on our international obligations of the Paris Agreement.

In comparison, fossil fuels – thermal coal, natural gas, petroleum, petrol, oil and shale - are a finite source of dirty, heavily subsidised energy with additional 'externalities' that are extreme and almost entirely uncoded.

Externalities include air pollution, particulate pollution, extensive water use, waste water disposal problems, fly ash waste disposal issues, and carbon emissions. Further, mercury, lead, sulphur and nitrous oxide contaminants are released in fossil fuel extraction and use, plus there is the acid leaching of coal mine overburden waste and the associated toxic "lakes" left with the massive final voids.

Externalities - both seen and unseen - pose a serious and growing threat to the health of people and the environment.

In 2017, Insurance Australia Group Limited (IAG) reported that the total economic cost of natural disasters in Australia over the 10 years to 2016 averaged \$18bn per year, equivalent to 1.2% of GDP. This was expected to double by 2050, in large part driven by higher frequency and more extreme weather events.

Externalities also include hidden costs which build up at every point in the fossil fuel supply chain, creating health and pollution costs to the community.

Despite those hidden costs, fossil fuel extraction in Australia still benefits from massive taxpayer subsidies.

These include diesel fuel rebates (~\$2bn annual subsidy which largely goes to the thermal coal industry), free water, free carbon emissions, and massive often multi-decade royalty holidays (particularly for gas, and in the latest example, the seven-year royalty holiday offered by the Queensland government to Adani for its proposed thermal coal mine in Queensland).

The majority of fossil fuel projects in Australia are owned by foreign multinationals who use tax-haven based offshore marketing hubs and who also have a history of paying next to no corporate tax in Australia - ever.

Examples include Jemena, whose parent company is jointly owned by State Grid Corporation of China and Singapore Power. Also, the well-publicised tax havens and/or inflated financial leverage at non-commercial rates of interest providing an unending stream of corporate tax deductions enjoyed by Chevron, Peabody and Glencore, with little or no corporate tax paid in Australia.

There is no other private industry in Australia so dependent on using public, finite assets for private, foreign, largely tax-free gain at such a cost to the community.

In contrast to the fossil fuel industry, the renewable energy industry does not require major subsidies going forward, beyond policy clarity.

The Renewable Energy Target (RET), an Australian Government scheme designed to reduce emissions in the electricity sector while encouraging alternative generation of electricity, has been key to getting the renewable industry established with critical mass, as has the Clean Energy Finance Corporation (CEFC) and the Australian Renewable Energy Agency (ARENA).

With the RET now effectively achieved, and no policy to extend this excellent catalyst for a sustained and low-cost decarbonisation of Australia's electricity system, new utility scale renewable projects do not receive any material subsidy.

Rather, the single biggest reason renewables are the clear choice for Australia is they are now the low-cost source of new electricity generation.

Solar and wind projects are being built across Australia at just A\$40-50/megawatt hour (MWh), down some 70% in just the last three years. This is a similar rate of decline as has been evident in other leading renewable energy countries, from India to America.

Further, renewables are deflationary. Once built there is no fuel cost, with proponents primarily wearing only the interest cost on their debt capital.

And like storage costs, renewable energy costs are expected to fall some 10% annually over the coming decade due to economies of scale and massive ongoing technology gains - for example, double-sided panels.

There are other significant reasons for renewables being the obvious choice going forward.

Renewables are clean, sustainable and deflationary.

Renewables use almost no water (a little is used to wash solar panels).

Once built, renewables create no air or particulate pollution, nor do they emit carbon emissions.

It takes energy to move energy from one place to another, from the source to the customer. The lifecycle analysis shows that for renewables, the 'energy in to energy out' is 20-30 to 1, which is many multiples of most fossil fuel sources.

In October 2018, Snowy Hydro CEO Paul Broad testified in an Australian Senate Estimates Committee that Snowy tendered for 888 megawatts (MW) of renewable energy and received 20 times this (i.e. 17 gigawatts of proposals). Broad attested that even adding in the cost of firming, the variable renewable energy would see a total cost of below A\$70/MWh.

In contrast, a new coal-fired power plant would cost well over A\$100/MWh (and upwards of A\$150/MWh including a carbon cost and the higher cost of capital requirements).

That is presuming a new thermal coal-fired power plant could get debt or equity financing. Major global lenders are rapidly exiting thermal coal-fired power, while Australia's three largest electricity generators, Energy Australia, Origin Energy and AGL, have all ruled out any involvement in new coal-fired plants.

So, what's the thing about baseload?

'Baseload' refers to the benchmark of a minimum level of demand across a 24-hour day required to underwrite coal-fired power plants so they do not have to be switched off.

Baseload power harks back to the way electricity markets used to work when totally reliant on coal-fired power stations.

The idea of baseload electricity is last century's solution to today's problem.

While solar hot water is a lower cost source of water heating and Australia led the world in commercialising this technology two decades ago, the Australia government has ensured most water heaters use thermal power which are set to run in the middle of the night - to 'create' demand when there is little alternative use of coal-fired power.

Similarly, while solar and wind energy generation is variable depending on whether the sun is shining or the wind is blowing, there are now technological advances in firming our electricity supply to balance out when low cost renewables are not available.

For instance, South Australia built the world's largest battery in just 100 days during 2017, Neoen/Tesla's Hornsdale Power Reserve 100MW/129MWh battery. The

Australian Energy Market Operator evaluated it in 2018, concluding it was a brilliant success.

Subsequent multiple proposals and investments under construction in utility scale batteries underway across Australia provides a further clear endorsement of the bankability and viability of this technology solution.

Australia is a world leader in adopting new battery technology.

Australia has commissioned a number of similar utility-scale lithium-ion battery projects across the country, including West Australia (the 35MW/11.4MWh Newman battery in the Pilbara), the Northern Territory (a 5MW/2.5MWh system in Alice Springs) and Victoria (the 25MW/50MWh Gannawarra and the 30MW/30MWh Ballarat battery facilities), while South Australia is testing a second battery project (30MW/8MWh Dalrymple North).

New battery investments are being proposed on an increasingly regular basis, including a 215MW battery proposal for RES Australia's yet-to-be-built 180MW Twin Creek Wind Farm north of Adelaide in South Australia.

And highlighting the magnitude of renewable technology disruption hitting the energy market globally, California's Pacific Gas and Electric Company (PG&E) recently awarded two similar battery projects, but 5-7 times the size of the Hornsdale Power Reserve in South Australia.

With peak demand growth and underlying consumption declining in Australia, there is still a requirement for 'peaking' capacity.

In Australia, firming and peaking power will come from batteries (both utility scale and distributed), electric vehicles, pumped hydro storage, wind-solar-battery hybrid infrastructure, and greater interstate grid connectivity. It will also come through technology innovations leveraging iPhone apps, smart meters and demand response management, and potentially gas peakers (such as AGL Energy's 215MW fast-start gas generators under construction at Barkers Inlet near Adelaide, South Australia).

In February 2019, Hydrostor Australia proposed Australia's first energy storage project using compressed air, aiming to construct a \$30m commercial demonstration project of a 5MW/10MWh fuel-free Advanced Compressed Air Energy Storage (A-CAES) facility at the re-purposed, end-of-life Angas Zinc Mine in Strathalbyn near Adelaide, critically enabled by funding support from ARENA.

And New South Wales (NSW) recently launched an excellent program to pay 40,000 households A\$1,000 over three years for use of their home battery system, a virtual 200MW power plant delivering ultra-peak power supply.

South Australia and Victoria have similarly ambitious residential solar and battery storage programs.

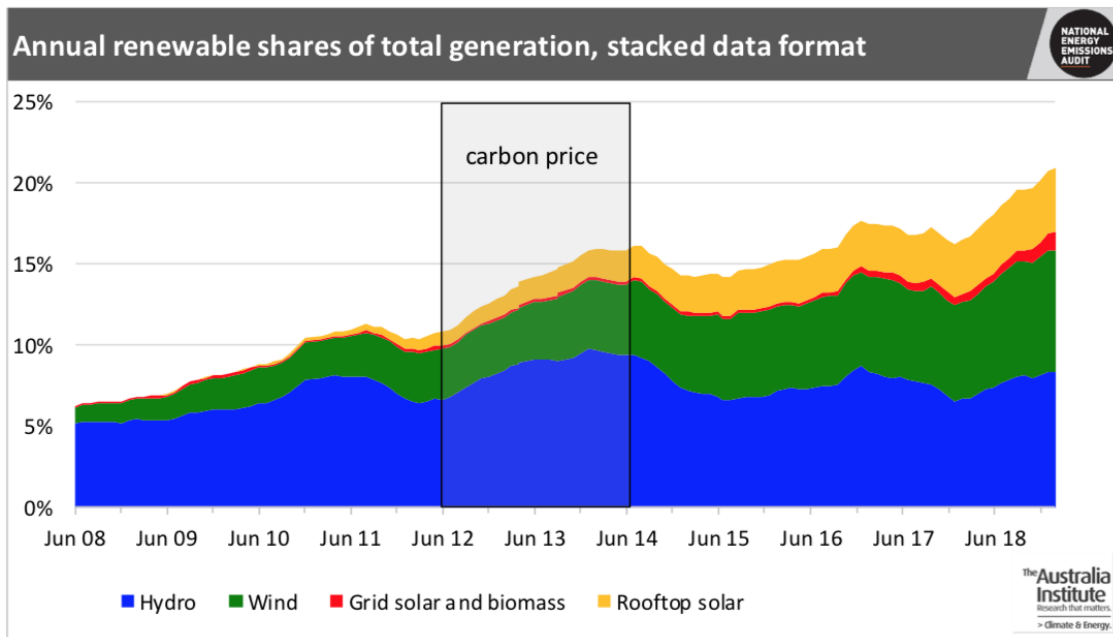
Investing in renewable energy infrastructure is creating massive investment and jobs for regional Australia.

NSW’s previous Energy Minister Don Harwin announced in November 2018 that its government department, NSW Planning had a record \$28bn of low carbon infrastructure project proposals under evaluation, ranging from pumped hydro storage to wind and solar infrastructure.

Only this week AGL Energy announced a 250MW/2000MWh pumped hydro energy storage project in an old copper mine south-east of Adelaide, leveraging an unrehabilitated mine site’s final void.

This is a similar concept to the well advanced plans of Genex Power to build its proposed 250MW/2,000MWh Kidston Pumped Storage Hydro Project, with an associated 250MW solar project in far north Queensland.

Australia is now consistently sourcing over 20% of all electricity from renewable energy, and grid reliability is increasing as variable renewable energy penetration continues to increase, the technology innovations and capacity to deliver this have system wide advantages.



Source: The Australia Institute, “National Energy Emissions Audit”, February 2019, Hugh Saddler.

Investing in industries of the future builds our engineering and scientific capacity, leverages our financial capacity (i.e. our \$2.7 trillion superannuation pool of assets), and builds export industries of the future.

For the last two decades, Australia’s multiple award winning Dr Martin Green AM and Dr Stuart Wenham from the University of NSW have been be at the forefront of developing the best solar technologies in the world.

And Australian entrepreneur Mike Cannon Brooks, who ‘brokered’ the building of the Tesla battery in South Australia, recently launched “Fair Dinkum Power” calling for Australia to target 200% renewable energy.

This is a clear vision worth discussing.

After iron ore, Australia’s top exports are all fossil fuel commodities (LNG for electricity, coking coal for steel, thermal coal for electricity).

If the world is to address the critical issue of climate change, we need to transform our economy and our export profile. To do this, we need to build industries of the future.

What better than to build a renewable energy hub in Australia to underwrite downstream minerals processing investment within Australia, while at the same time facilitating the development of clean and 100% sustainable renewable energy exports, either in the form of hydrogen, ammonia or in the long term, green electricity via a subsea cable connecting to Indonesia.

Several of the largest energy investors and corporates in the world are exploring this concept in Australia’s Pilbara – the \$20bn 9GW Asian Renewable Energy Hub, founded by CWP Renewables and backed by Macquarie Group.

Ideally, in addition to investment in renewables, Australia also needs to reintroduce a whole-of-economy price on carbon emissions.

A carbon price is the low-cost solution to achieving the deep decarbonisation of our entire economy.

Further, Australia must belatedly consider an outright ban on any new thermal coal mine development, entirely consistent with our Paris Climate commitments, and particularly given Australia is a top three exported emissions nation globally. The scientists of the UN IPCC report of October 2018 also made this entirely clear.

Renewable energy is rapidly becoming the low cost source of new generation globally, confirmed in the International Energy Agency’s World Energy Outlook 2018 report. Under the Agency’s Sustainable Development Scenario (SDS) only 5% of global electricity generation is based on thermal coal by 2040.

However, the technology- and finance-driven inevitability of renewables is not happening fast enough in Australia to deliver on the Paris commitments, and without a national energy policy, this leaves Australia with a growing stranded asset risk, as recently highlighted by both the Reserve Bank of Australia and the Australian Prudential Regulatory Authority.

Australia must step up and take advantage of this low cost, sustainable solution for Australia’s energy future – today.

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The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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Tim Buckley, IEEFA's director of energy finance studies, South Asia/Australia, has 30 years of financial market experience covering the Australian, Asian and global equity markets from both the buy and sell side. Tim was a top-rated Equity Research Analyst and has covered most sectors of the Australian economy. Tim was a Managing Director, Head of Equity Research at Citigroup for many years, as well as co-Managing Director of Arkx Investment Management P/L, a global listed clean energy investment firm that was jointly owned by management and Westpac Banking Group.

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