

Australia's Initiatives towards Clean Energy and Net-Zero Emissions

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The latest Intergovernmental Panel on Climate Change (IPCC) Report, released on 9 August 2021 has brought climate change into the spotlight and raised enough distress and [anger among the young people](#), more because of the inefficient handling of the crisis by governments. The present situation demands nations to urgently intensify efforts, make crucial policy decisions and reversal of many climate change policies currently in practice.

One of the critical actions requires an immediate and sustained decline in carbon dioxide (CO₂) and other greenhouse gas (GHG) emissions. The World's three leading emitters, the USA, European Union and China are aiming to achieve net-zero emissions by 2050 (2060 for China). However, Australia is proving to be a laggard due to its inaction and poor policies. A recent UN report has ranked [Australia at last position](#) among 193 UN member countries based on its progress in sustainable development goal 13 – climate action. Australia was listed as having 'major challenges' for clean energy but recorded a moderate improvement over the past year. To significantly reduce emissions before 2050, it is imperative to make bold decisions and massive investments to accelerate clean energy transitions in Australia.

Australia is the [highest exporter](#) of coal and accounted for 39.5% of global coal exports in 2020. However, coal is by far the single largest source of global energy-related carbon emissions. Its electricity sector itself depends on coal. The burning of fossil fuels for electricity production and industrial production of materials such as cement are the major contributors to CO₂ emissions in Australia. Around one-third of its GHG emissions come from the power sector. With the focus of many countries shifting to net-zero emissions and cleaner energy, the fossil fuel industries in Australia are sensing a feeling of impending doom. At the same time, the Australian government is also facing the challenges of climate change. The IPCC report mentions that Australia's [fire season has lengthened](#) since 1950. Thus, addressing such issues requires concerted efforts and immediate implementation of supportive policies to become carbon neutral by 2050.

Australia is still far from able to harness its potential in the renewable energy (RE) sector. It depends

largely (~75%) on non-renewable energy sources for generating electricity. However, its policy advocates decreasing dependency on fossil fuels and producing maximum electricity from renewables. Wind and solar power are the two sectors where Australia can take a lead in a coordinated and integrated manner. It demands favourable energy policy developments at the sub-national level and technological progress for these two RE sources. Thus, Australia must scale up investments in modern energy systems to swiftly transition to a net-zero future.

Intriguingly, it is the state/territory governments who have made considerable efforts and introduced various ambitious policies to achieve their sustainability objectives. Australia's RE capacity has increased multifold over the past decade (Figure 1). The year 2020 saw a substantial jump of 3.7% in its total electricity generation from renewables (27.7% of the total electricity production). In 2020, Australian Energy Regulator (AER) approved a major electricity sector transformation project. The new grid interconnector between South Australia & New South Wales (NSW) is predicted to reduce power bills for consumers, alleviate wholesale electricity costs and consequently reinforce Australia's energy transformation towards a low carbon emissions future.

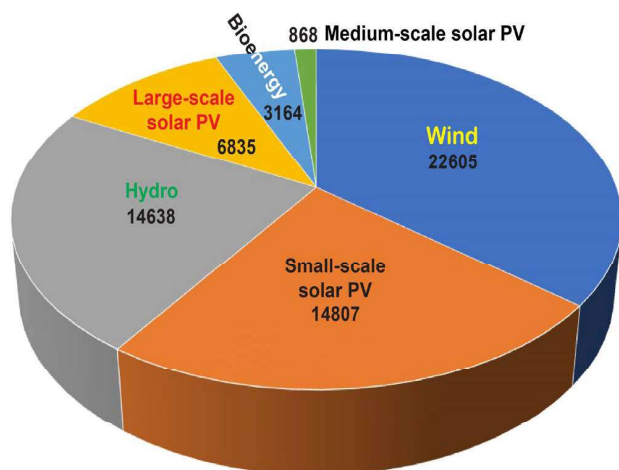


Figure 1. Australia's renewable energy generation capacity (in GWh) from six different technologies (Source: Clean Energy Australia Report, 2021)

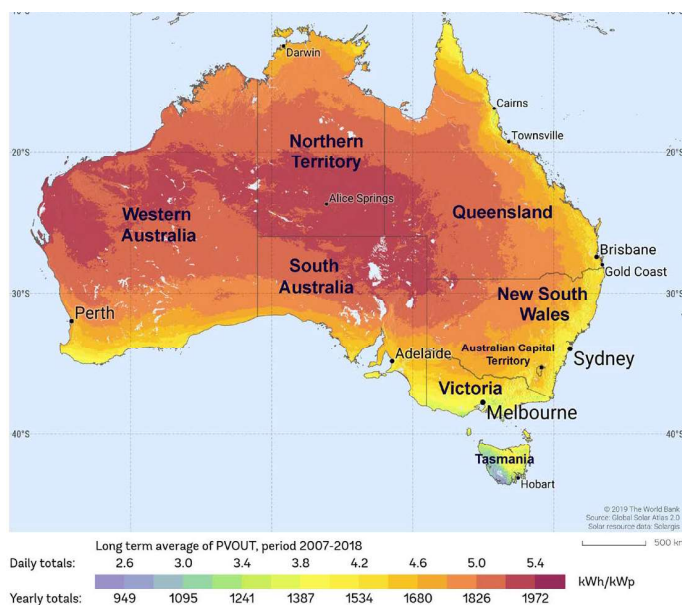


Figure 2. Solar photovoltaic power potential of Australia (Source: Global Solar Atlas 2.0)

Australia possesses one of the highest rates of rooftop solar installations in the world. It is estimated that in eastern and southeastern Australia only, solar photovoltaics (PV) has the potential to generate almost 72,000 terawatt-hours (TWh) per year (Figure 2). This is around **270 times** Australia's total annual electricity generation (265 TWh in 2019) and 2.7 times the world's total annual electricity generation (just over 27,000 TWh in 2019). In 2020, 3 gigawatts (GW) of new solar capacity was added to Australian rooftops shattering the previous record of 2.2 GW in 2019. As on 30 June 2021, Australia's cumulative installed rooftop solar capacity stood at 14.9 GW as it has installed 2.88 million rooftop solar systems. The **success** of distributed solar PV in Australia may be credited to numerous factors among which socket parity, simple administrative procedures for installation, several support schemes (e.g. States' feed-in-tariffs, rebates and interest-free loans) and a high proportion of single-family homes. The rooftop solar PV costs just a quarter to half of the retail electricity prices. This cost advantage indicates that RE is set to proliferate in Australia. It has led to various smart initiatives in other parts of the country as well.

Wind energy accounts for over 35% of all RE generation and 8% of all electricity generated in the country. In the wind sector, Australia has added 1 GW of new capacity in 2020 and commissioned 10 new wind farms. In the last decade (2010–2020), the annual wind capacity has increased from 159 megawatts (MW) to 1097 MW while the cumulative installed capacity has made a remarkable leap from 1840 MW to 7376 MW. According to the Australian Energy Market Operator (AEMO), close to 95% of the electricity of Australia's main wholesale electricity market in the eastern and southeastern regions could come from RE in 2040. Recently, Tasmania became the first Australian state to generate 100% of its electricity from renewables.

The AEMO has identified 35 possible REZ candidates in eastern and southeastern Australia. The NSW Government's Electricity Infrastructure [Roadmap](#) set out a plan to deliver the state's first 5 Renewable Energy Zones (REZs). These will play an essential role in producing 12 GW of new transmission capacity and would aid in phasing out the State's existing power stations that depend on non-renewable sources. The construction of the first REZ is set to begin in 2022. The Port Augusta Renewable Energy Park (PAREP) is a unique hybrid renewable energy development combining wind and solar PV technology. It is one of the new breeds of renewable projects and when completed will be one of the southern hemisphere's largest hybrid renewable power stations.

The battery storage sector in Australia is gaining momentum. In 2020, the sector grew from 100 MW/129 MWh to 150 MW/194 MWh. It plans to add 595 MW of new capacity through its 16 utility-scale batteries which are under construction. The Hornsdale Power Reserve in South Australia is home to the world's largest lithium-ion battery. In early 2021, a plan to install a 1.2 GW battery in NSW has been announced by RE developer CEP. Furthermore, Empowering Homes Battery Loan programme launched in 2020 which provides interest-free loans of up to \$14000 to install a solar PV and battery system or \$8000 to retrofit a battery to an existing solar PV system has proven to be a game-changer.

With a keen focus on export opportunities to various neighbouring countries, Australia is boosting its "Hydrogen Action Plan". In particular, South Australia is following the plans of converting excess RE electricity into stored hydrogen. The State of Queensland has set up the \$11 million Queensland Hydrogen Industry Development Fund for green hydrogen. Similarly, a \$7 million Renewable Hydrogen Fund has been created by the State of Western Australia.

The Federal government has also initiated many schemes. While the [Emissions Reduction Fund](#) incentivises Australian companies to minimise the amount of GHGs they produce, the [Renewable Energy Target scheme](#) emboldens the additional generation of electricity from renewables. The [Safeguard Mechanism](#) requires Australia's largest GHG emitters to keep their net emissions within a permissible limit. The government is also drafting a regulatory framework for [offshore renewable energy projects](#), including offshore wind. The federal government is also collaborating with other countries to deploy clean energy technologies. In 2020, Australia signed an [MoU](#) with Singapore to work on low emissions fuels and technologies, including clean hydrogen and ammonia. The government is also funding a joint project of Glencore and China Huaneng Group to cooperate on the carbon capture utilization and storage (CCUS) project in Queensland, Australia.

Additionally, several energy providers in Australia have launched their virtual power plants, procuring excess electricity generated from bundles of rooftop solar assets and then on-selling to consumers and businesses. However, the most rapid gains are being made in renewable energy storage. The path to 2050 is a long one and Australia must continue to devise suitable strategies to decarbonize and achieve global net-zero emissions by 2050.