

AUSTRALIA'S RENEWABLE ENERGY PROMOTION POLICY

— AIMING TO BECOME A HYDROGEN SUPPLIER THROUGH STABLE SUPPLY OF ELECTRICITY —

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SUMMARY

- Australia has set an ambitious target of achieving an 82% renewable energy share by 2030. One of the reasons behind the policy for the rapid spread of renewable energy is that Australia aims to become a green hydrogen production center by a stable and inexpensive supply of renewable energy.
- Reduction of energy storage costs from technological innovation is expected to advance the introduction of renewable energy. However, the major energy generation in Australia is currently coal-fired, and transitioning to renewable energy presents technical challenges, such as adjusting transmission volumes and securing engineers, as well as issues surrounding policy implementation, such as delays in the development of renewable energy grids.
- To address these issues, plans are underway to set up Renewable Energy Zone (REZ) that produce renewable energy in areas adjacent to hydrogen demand zones and supply it over efficient grids, thereby connecting renewable energy power with hydrogen production.

1. AUSTRALIA'S ENERGY SITUATION

Australia aims to become a global hydrogen supply hub and is promoting renewable energy policies with the objective of establishing a stable power supply from renewable energy sources for the production and supply of green hydrogen. Currently, the primary cost for producing green hydrogen is the electricity generated from renewable energy, making the availability and efficiency of affordable and stable electricity indispensable. In order to understand the current situation of renewable energy power that supports Australia's hydrogen strategy, this report will review the current situation and outlook of the power supply mix and the power business structure resulting from the electricity market liberalization since the late 1990s.

1-1. Current situation and outlook of the electricity mix

Australia is one of the world's leading producers of coal and gas, with the current domestic electricity supply mix consisting of 60% coal-fired thermal generation, just under 10% natural gas, 10% hydroelectric power, and 20% solar and wind power (Figure 1). However, as shown in Figure 2, the Australian government forecasts a shift in coal- and brown coal (lignite)-fired power generation to wind and solar power.

When the Labor Party came to power in 2022, it set a target to raise the renewable energy share to 82% by 2030 and to achieve carbon neutrality by 2050. Prior to the Labor Party government, the Renewable Energy Target (RET) set the target of producing 33 TWh of renewable energy by 2020, but this was not achieved because the distribution of electricity produced from renewable energy and the development of the grid could not keep pace.

Figure 1: Energy supply mix by source in 2021/2022 (July 2021–June 2022)

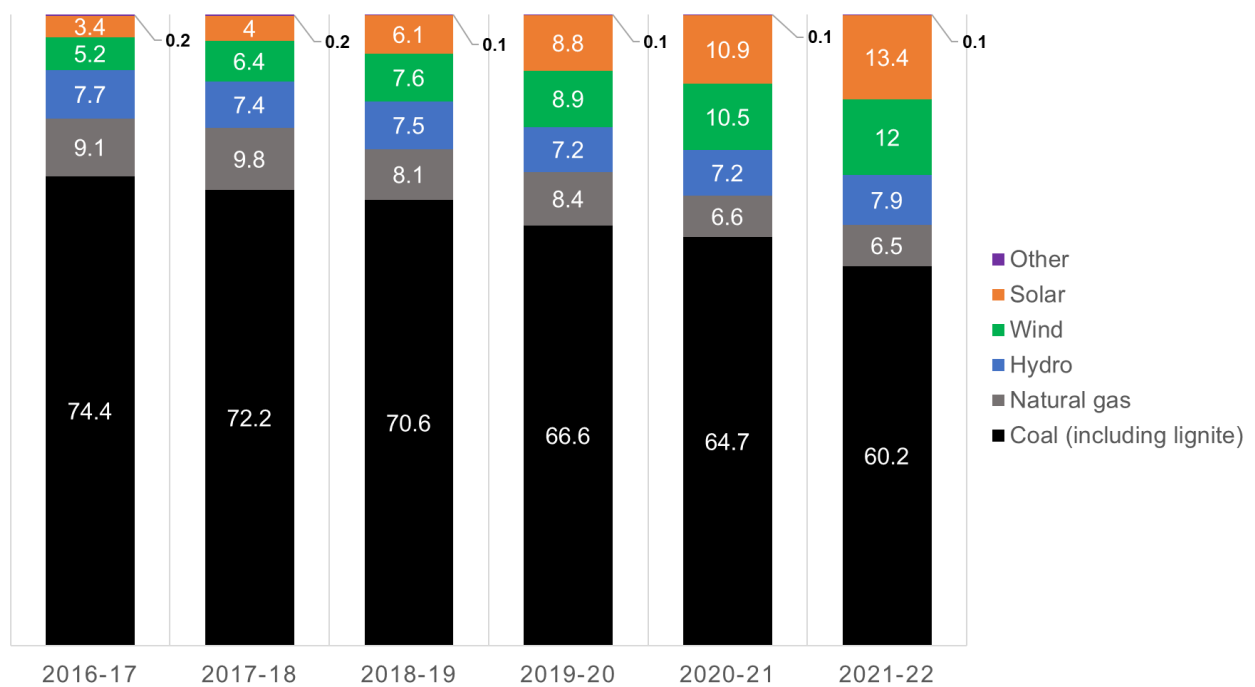
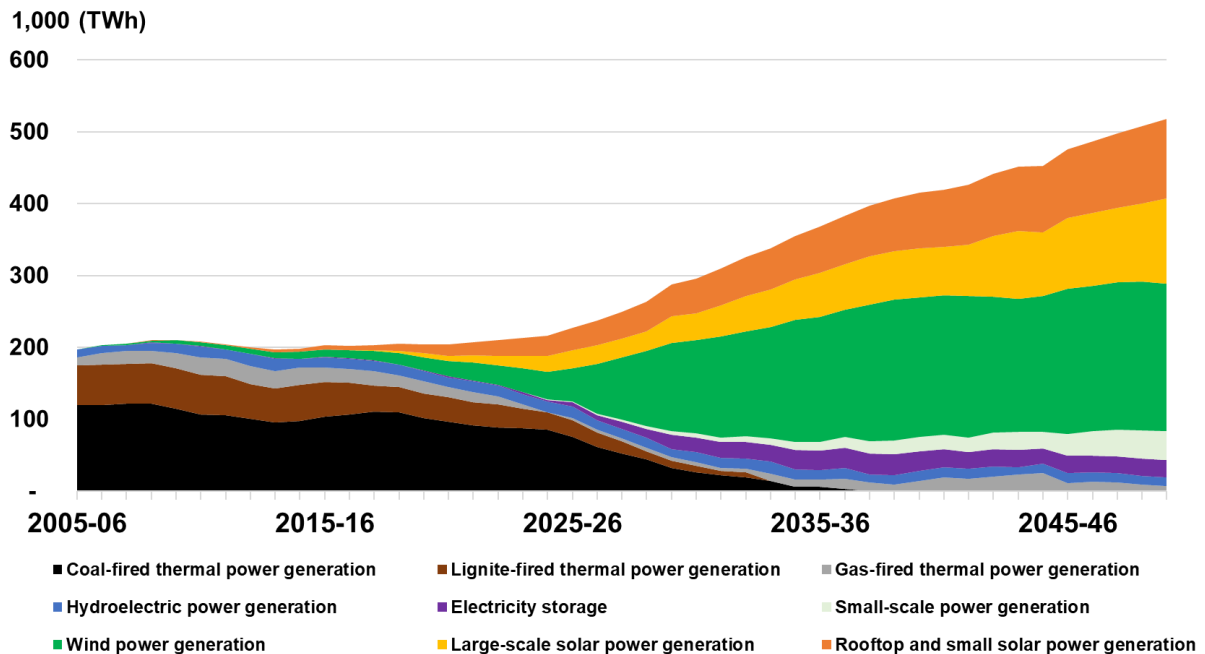


Figure 2: Transition in energy supply mix by fuel source from 2009 to 2050



Source: Compiled by MGSSI based on AEMO and Australia's government websites

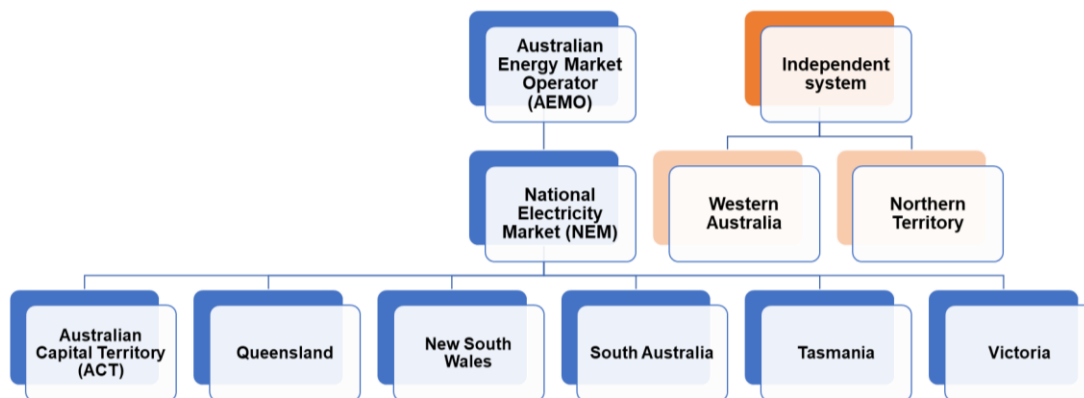
1-2. Wholesale electricity business

Since the late 1990s, Australia's electricity market has undergone reform from a centralized management system under state electricity authorities to a liberalized market. These systemic reforms have allowed various companies to enter the market, excluding the electricity generation and distribution business.¹

¹ Coal-fired thermal and gas power generation are handled by national enterprises, and the construction of transmission lines has not kept pace in the power distribution business, making it difficult for new businesses to enter the market.

The national wholesale electricity market is divided into the National Electricity Market (NEM), Western Australia, and the Northern Territory (Figure 3). Of these, the NEM accounts for about 90% of the national electricity market on a generation capacity basis. The NEM is under the jurisdiction of the Australian Energy Market Operator (AEMO), and statistics related to the Australian government's decarbonization policy are derived from the NEM. Policies are formulated in collaboration with state governments and transmission system operators.

Figure 3: Wholesale Electricity Business



Source: Compiled by MGSSI based on AEMO and Australia's government websites

2. BACKGROUND OF THE POLICY SHIFT TO RENEWABLE ENERGY

Coal and natural gas are major export commodities for Australia, with 91% of coal and 76% of natural gas domestically produced being exported during the 2021-2022 financial year. This section explores the reasons behind the shift towards promoting renewable energy by examining the challenges associated with existing energy resources.

2-1. Aging and closure of coal-fired power plants

In its 2018 Integrated System Plan, AEMO set a target to close all domestic coal-fired power plants by 2040. The 2024 draft of the Integrated System Plan proposed moving up this target to shut down all coal-fired power plants across the country between the 2037-2038 financial year. However, due to issues of power shortages, it is difficult to shut down coal-fired power plants immediately. Therefore, the current outlook is that some coal-fired power plants may remain in operation beyond 2040 (Figure 4).

2-2. Current situation of LNG and gas

From 2019 to 2022, Australia was a leading LNG exporter, competing closely with Qatar. However, in 2023, it was overtaken by the US. Factors such as labor shortages increased plant construction costs, existing gas fields became depleted, and environmental regulations were strengthened, resulting in an increase in the cost of producing LNG for export, and leading Australia to source LNG from overseas, including the US.² Additionally, the State of Victoria banned the supply of gas to new homes from January 2024, which is expected to reduce domestic gas demand.

² The Australian oil and natural gas giant Woodside Energy Group is expected to increase its LNG procurement from North America by five times by around 2029.

Figure 4: Coal-fired plants scheduled for closure

Coal-fired power plant	State	Expected year of closure
Eraring	New South Wales	2025
Callide B	Queensland	2028
Yallourn W	Victoria	2028
Vales Point B	New South Wales	2033
Bayswater	New South Wales	2033
Gladstone	Queensland	2035
Loy Yang A Power Station	Victoria	2035
Tarong	Queensland	2036
Tarong North	Queensland	2037
Mt Piper	New South Wales	2040
Kogan Creek	Queensland	2042
Stanwell	Queensland	2043
Loy Yang B	Victoria	2047
Callide C	Queensland	2051
Millmerran	Queensland	2051

Source: Compiled by MGSSI based on AEMO and Australia's government websites

In May 2024, the Australian government released the Future Gas Strategy, stating that demand for LNG and gas would remain flat until 2025 and would be an important transition energy source until it can be replaced by hydrogen and biofuels. The International Energy Agency (IEA) has presented three scenarios for gas and LNG consumption and demand, from which AEMO has developed three scenarios (Figure 5). Similar to the IEA's projections, which foresee a peak in natural gas and other fossil fuel demand around 2030, AEMO's scenarios predict that domestic gas demand in Australia will decrease until 2042 (Figure 6).

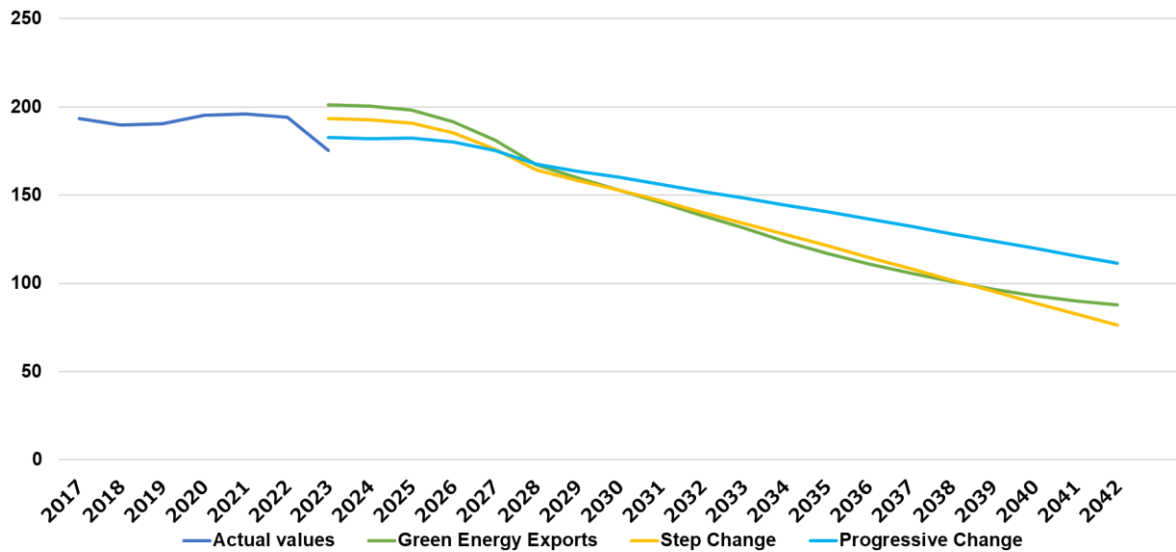
Figure 5: Overview of the three scenarios envisioned by AEMO

	Step Change	Green Energy Exports	Progressive Change
Overview	Assumes that the NEM electricity sector will focus on decarbonization, leveraging a wide range of economic activities for this purpose. As a result, other economic sectors decarbonize faster than the Paris Agreement's 2°C mitigation target. In addition, energy consumers make rapid and significant ongoing investments in well-planned energy consumption, including electrification of the transportation sector.	Reflects very strong decarbonization activities both domestically and abroad, with the aim of limiting the temperature rise to 1.5°C. A rapid transformation of the Australian energy sector takes place, including electrification, green hydrogen, and the aggressive use of biomethane. The NEM electricity sector is envisioned to play a pivotal role in decarbonization. Australia is expected to play an active role as a "hydrogen superpower."	Assumes meeting the commitment to the Paris Agreement to achieve 43% emissions reductions by 2030 and net zero emissions by 2050. This scenario involves more challenging economic conditions, relatively higher technological costs, and more supply chain challenges compared to other scenarios.
Position in the IEA World Energy Outlook 2023 scenario analysis	Announced Pledge Scenario (APS): Targets set by each country are met. Demand for natural gas is reduced by 7% between 2022 and 2030. Global temperature rise by 2100 is limited to below 2°C above pre-industrial levels.	Net Zero Emissions (NZE): Assumes achievement of net zero emissions by 2050. Global demand for natural gas decreases starting in 2025, and gas demand decreases by 20% by 2030. Global temperature rise by 2100 is limited to 1.5°C.	Stated Policies Scenario (STEPS): Total global consumption of fossil fuels peaks in the 2030s, demand for natural gas declines in developed countries starting in the mid-2020s, however, demand for gas grows in developing countries. Global temperature rise by 2100 is limited to 2.6°C.

Source: Compiled by MGSSI based on AEMO and IEA websites

Figure 6: Annual residential and commercial gas consumption in Australia (by scenario)

Unit: PJ



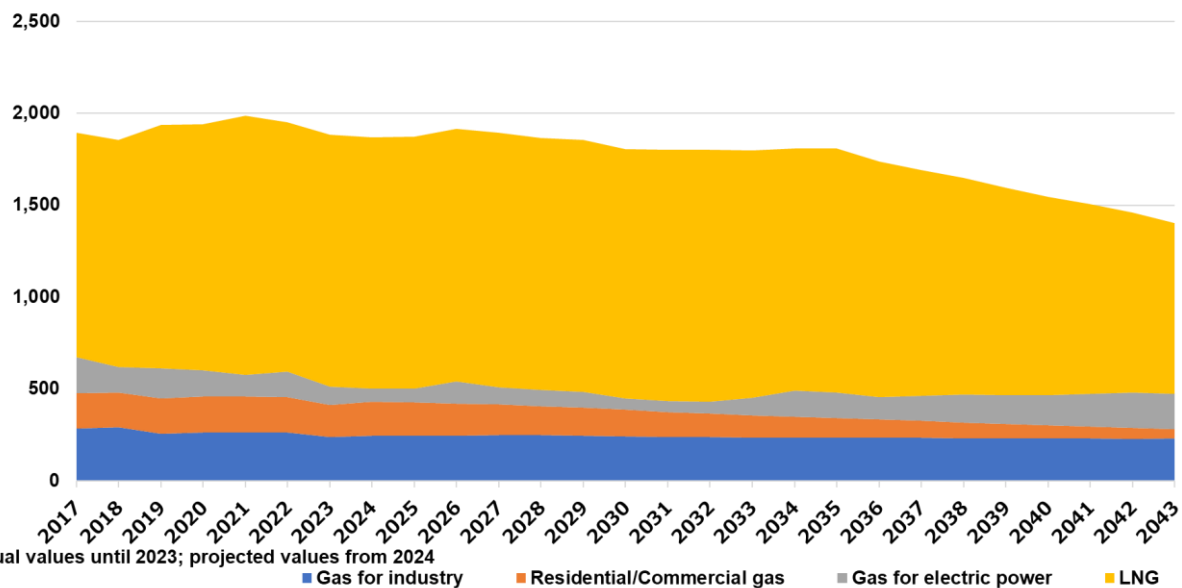
Source: Compiled by MGSSI based on AEMO "2024 Gas Statement of Opportunities-report figures and data," Figure 15- Actual and forecast residential and commercial annual consumption, all scenarios and compared to 2023 GSOO, 2017-43(PJ)

URL: [AEMO | Gas Statement of Opportunities](#)

The Australian government expects that the introduction of renewable energy will lead to a decrease in domestic gas demand from 2028, and a sharper decline in LNG exports from 2035 (Figure 7). AEMO forecasts that global demand for LNG, particularly in Asia, will continue to increase until the 2030s. Although global demand is expected to gradually decrease after 2035, LNG is still anticipated to account for the majority of gas consumption.

Figure 7: Actual and projected total annual gas and LNG consumption across all sectors

Unit: PJ



*Actual values until 2023; projected values from 2024

Source: Compiled by MGSSI based on AEMO "2024 Gas Statement of Opportunities-report figures and data," Figure 9- Actual and forecast total annual gas consumption, all sectors, Step Change scenario, 2017-43[PJ]

URL: [AEMO | Gas Statement of Opportunities](#)

2-3. National Hydrogen Strategy

Announced in November 2019, Australia's National Hydrogen Strategy aims to make the country a green hydrogen production hub by 2030, assuming hydrogen demand from Japan, South Korea, and China.³ Renewable energy constitutes the most significant cost in hydrogen production; therefore, a consistent and cost-effective supply of such is essential to achieve affordable and stable hydrogen production. At present, electricity accounts for 70% of the cost of hydrogen production, placing the focus on the reduction of electricity costs from renewable energy generation.⁴

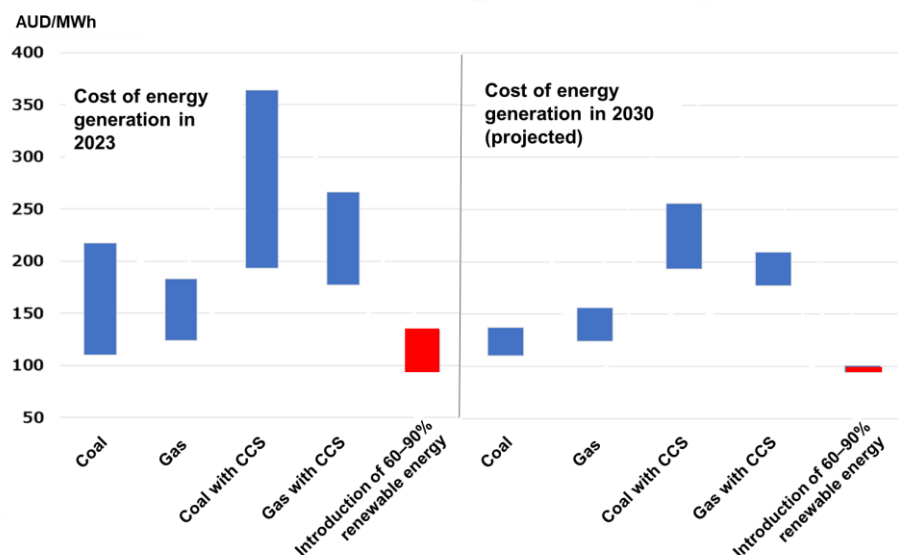
3. RENEWABLE ENERGY PROMOTION PLAN

The Australian government's active promotion of renewable energy adoption is driven by the low cost of introducing it. While state governments are also active in the introduction of renewable energy, there are various issues to be addressed. The resolution of these will influence the promotion of renewable energy adoption and the direction of the National Hydrogen Strategy.

3-1. Cost of renewable energy

According to the Australian government's estimates as of 2023, in comparison of power generation costs by source, the scenario in which wind and solar power make up 60–90% of total electricity generation is the most cost-effective (Figure 8). By 2030, technological innovations related to renewable energy storage are expected to further reduce costs if renewable energy accounts for 60–90% of total electricity generation. However, renewable energy, which is influenced by natural conditions, requires supplementary energy sources for times of shortage. In addition to storage, it is difficult to ensure a stable power supply without utilizing existing coal-fired or gas-fired thermal power generation. For this reason, achieving a 100% renewable energy power supply is considered unrealistic.

Figure 8: Cost comparison between renewable energy and other forms of generation



Source: Compiled by MGSSI based on CSIRO "GenCost 2023-24: Final Report"

URL: [GenCost2023-24Final_20240522.pdf](#)

³ Some view the export of hydrogen to Japan as economically inefficient because it necessitates the chemical conversion of hydrogen into substances like ammonia. In response, Australia envisions that Japanese steel and other industries will leverage Australia's renewable energy and hydrogen to produce products such as green steel in Australia and then import them back to Japan. However, this method raises concerns about the hollowing out of Japanese industries. Australia's hydrogen exports will necessitate coordination between Japan and Australia regarding transportation methods and hydrogen-related businesses.

⁴ This report does not go into the details of hydrogen production costs, but apart from the cost of renewable electricity, long-distance transportation of hydrogen and the process of converting it into ammonia also present significant cost challenges.

3-2. Renewable energy policies by federal and state government

The Australian government formulates the overall national policy related to the electricity sector, but federal, state and territory governments also develop their own individual policies. The implementation of national policies is left to the discretion of each state and territory government, resulting in varying renewable energy targets across states and territories (Figure 9). Queensland, which has a high dependency on coal-fired power (80%), has established a fund of AUD 1.5 billion (approximately JPY 154 billion)⁵ to create 100,000 jobs in the renewable energy sector and electricity distribution industry. It has also enacted legislation to achieve a power supply mix of 50% renewable energy by 2030, 70% by 2032, and 80% by 2035. However, most of the coal-fired power plants in operation in Queensland are scheduled to close after 2040, indicating a gap between policy and actual progress in promoting renewable energy. It will be necessary to closely monitor the state's renewable energy policies and the actual trends in its electricity plans.

Figure 9: Renewable energy promotion policies and energy storage targets by the federal, state and territory governments

Area	Renewable energy promotion measures	Energy storage target
Federal government	Announced Powering Australia Plan with the aim of increasing the percentage of electricity generated from renewable sources to 82% by 2030. Emissions to be reduced by 43% by 2030	—
Australian Capital Territory	Ensured 100% of electricity supply by renewable energy in January 2020 (first outside the EU). Aims to reduce emissions by 50–60% by 2025, 65–75% by 2030, 90–95% by 2040, and achieve net-zero emissions by 2045.	Construction of the Big Canberra Battery, a 250-MW energy storage project, to begin in late 2024 and be completed in 2025
New South Wales	Targets the production of 8 GW of new renewable generation capacity in the New England REZ, 3 GW in the Central-West Orana REZ, and 1 GW elsewhere by the end of 2029.	Targets 2 GW storage capacity by 2030
Queensland	The Clean Economy Jobs Act 2024 and the Energy (Renewable Transformation and Jobs) Act 2024 provide for plans to increase Queensland's Renewable Energy Target (QRET) to 50% by 2030, 70% by 2032, and 80% by 2035.	Execution of the development plan for the Borumba Pumped Hydro Project
Tasmania	Set a target to achieve 150% of consumption (based on 2020 levels) by 2030 and 200% by 2040 based on the Energy Co-ordination and Planning Amendment Act 2020.	Battery of the Nation under consideration as a power generation development option
Victoria	Set renewable energy targets of 40% by 2025 and 50% by 2030, with the goal of increasing the state's renewable energy generation from 65% by 2030 to 95% by 2035.	Set storage targets of 2.6 GW by 2030 and 6.3 GW by 2035, but legislation is pending

Source: Compiled by MGSSI based on data from the Australian national government and state government websites

3-3. Challenges in achieving the target

Building a stable renewable energy power system involves addressing several challenges.

First, there are technical challenges such as supply and demand balance in transmission volumes and a shortage of skilled engineers.⁶ Many solar power operators are small-scale businesses, and their transmission volumes can fluctuate due to environmental conditions. It is pointed out that this variability makes it difficult for distribution operators to maintain a stable power supply while balancing supply and demand and controlling output.⁷ In terms of engineers, foreign workers' labor costs are significantly lower than those of Australian nationals,⁸ leading to a shortage of essential personnel for renewable energy projects, such as

⁵ Calculated at an exchange rate of JPY 102 per AUD (rate as of May 10, 2024).

⁶ See Tomoko Matsumoto, 2020, "Research Report: Australia's Efforts To Become a Major Hydrogen Exporter" [in Japanese] pp. 1–31, pp. 25–28.

⁷ Matsumoto 2020 op. cit. pp. 27–28.

⁸ The wages of foreign workers are 25% lower than those of Australian nationals, and they are subject to fewer regulations regarding vacation entitlement and other working conditions. When hiring Australian nationals locally, the strong bargaining power of domestic labor unions, shorter working hours, and higher labor costs create barriers to employment. Additionally, there is a shortage of personnel involved in renewable energy projects in Australia, leading to a reliance on foreign workers. This dependency on foreign labor is recognized as an energy security issue, as it makes a critical industry dependent on non-domestic entities. Most of the specialized engineering personnel required for offshore wind power projects are based in Europe, and Australia continues to rely on European talent and companies for these needs.

offshore wind power engineers, within Australia.

Next, after producing renewable energy power, a grid is needed to transmit the generated electricity. However, the development of the grid for renewables within Australia has not yet progressed sufficiently. This has been identified as an issue of policy implementation.⁹

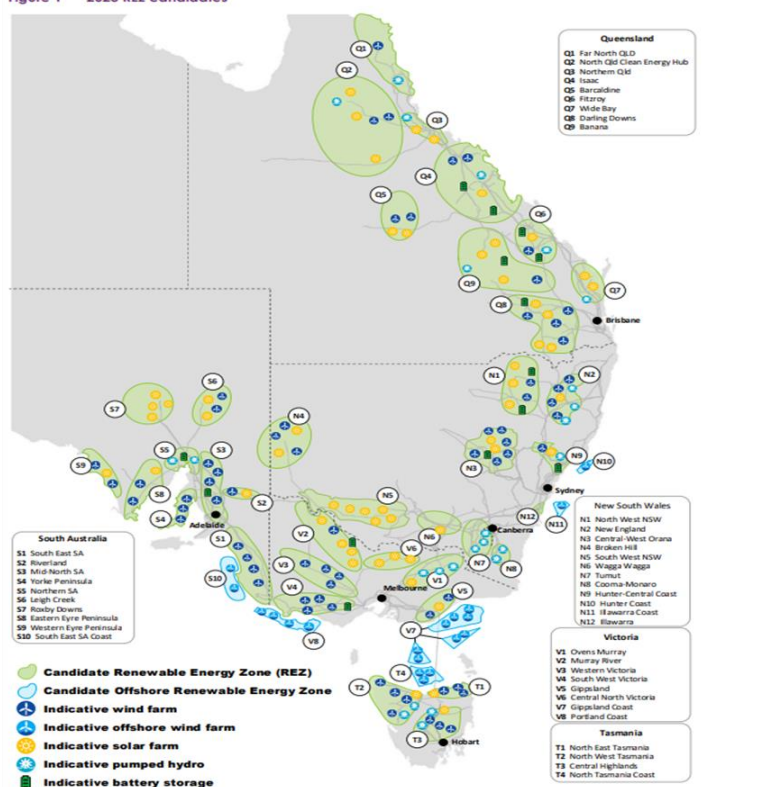
Lastly, from a political perspective, if the Liberal or National opposition parties win the general election in 2025, they may promote nuclear power, which could stall renewable energy policies.¹⁰ From an economic security standpoint, over 90% of solar panels are produced in China, making the sector highly dependent on China. At present, only 1% of solar panels are produced in Australia.

3-4. Solutions

To ensure a stable supply of renewable energy, the Australian government aims to establish Renewable Energy Zone (REZ) that co-locate hydrogen demand areas with renewable energy production sites within the country, thereby forming hydrogen supply hubs. The 2024 Integrated System Plan identifies 43 sites for the construction of REZs (Figure 10).

Figure 10: Proposed renewable energy zone construction sites and hydrogen supply sites

Figure 1 2023 REZ candidates



Source: AEMO 2023 "Appendix 3. Renewable Energy Zones
December 2023: Appendix to the Draft 2024 Integrated System Plan for
the National Electricity Market" p.8

Reference: [a3-renewable-energy-zones.pdf \(aemo.com.au\)](https://aemo.com.au/a3-renewable-energy-zones.pdf)

⁹ The renewable energy grid was initially scheduled for completion by 2020, but it was delayed due to factors such as the COVID-19 pandemic and, consequently, was not completed on time.

¹⁰ It will be difficult for such situation to occur unless the Labor Party loses the 2025 general election. Even if a change of government were to take place, the introduction of nuclear power would involve long-term challenges such as constitutional amendments, technology transfer, and the training of engineers, making its implementation unlikely before 2040.

In response to solar energy-related challenges, the Australian government announced the Solar Sunshot Program in March 2024, with a budget of AUD 1 billion.¹¹ The program aims to make Australia a manufacturing and supply chain hub for solar power-related products. The program outlines a policy of reducing energy security risks by domestic production of the solar power industry. And this includes reallocating workers from the coal and gas sectors to the solar power sector with the aim of avoiding disruptions from phasing out existing fossil fuel businesses.¹² Initially companies like Tindo, which currently manufactures solar panels in Australia, will import parts and assemble them domestically. The ultimate goal is to produce polysilicon-based solar panels in Australia.¹³ The first step is to increase the market share of domestically produced solar panels, which currently stands at 1%.

4. SUMMARY

The Australian government is actively promoting renewable energy policies, emphasizing the cost advantage of renewable energy over fossil fuels, in order to achieve its National Hydrogen Strategy. However, the introduction of renewable energy faces technical challenges, potential policy shifts due to changes in government, and economic security risks associated with dependence on China for solar power manufacturing. To address these issues, the Australian government has proposed the establishment of REZs and the Solar Sunshot program. The direction of policies by both the Australian federal, state and territory governments, as well as the implementation of these policies, will determine Australia's future as a major hydrogen exporter, and it is worth keeping an eye on these trends.

¹¹ Prime Minister of Australia 2024 “Solar Sunshot for Our Regions”(28 March 2024)< [Solar Sunshot for our regions | Prime Minister of Australia \(pm.gov.au\)](https://www.pm.gov.au/news/speeches/2024/03/28/solar-sunshot-for-our-regions)>

¹² With an eye on the 2025 election, one of the approaches that the Labor government is taking to workers in the coal and gas industries is to promote domestic employment in the renewable energy sector. However, many are skeptical about the government's policy to reallocate workers from the coal and gas sectors to renewable energy projects. Due to technical differences, it is expected that non-Australian personnel will be utilized more than domestic workers, such as those from Europe for wind power projects.

¹³ Hallam, Brett and Fiacre Rougieux 2024“Could Spending a Billion Dollars Actually Bring Solar Production Back to Australia? It is Worth a Shot” UNSW Sydney Newsroom <[Could spending a billion dollars actually bring solar production back to Australia? It is worth a shot \(unsw.edu.au\)](https://www.unsw.edu.au/news/stories/2024/03/28/could-spending-a-billion-dollars-actually-bring-solar-production-back-to-australia-it-is-worth-a-shot)>