

ETA Special Report

Japan's Net-Zero Journey – a Story of Distraction and Unrealised Potential



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In April 2022, the IPCC ¹ published probably the starkest warning about the need for rapid and deep carbon dioxide (CO₂) emission reduction. In a special report, the working groups stated that avoiding the worst impacts of climate change is possible only if global greenhouse gas (GHG) emissions peak by 2025 and decrease rapidly afterwards.

These warnings should be ringing an alarm in Japan, the fifth-largest GHG emitter globally ². Pursuing decarbonisation will not only be for the common good but will also help the country solve many of its energy system's inherent problems, including heavy import orientation, low energy self-sufficiency and high fossil fuel exposure. However, the latest signs coming from the Japanese government's policies and energy plans make the country's net-zero goal look more and more distant. The country's actions on the local and global energy stage are also concerning. They signal that the country may not be honest about its decarbonisation plans.

Should Japan reconsider its priorities and cut out distractions, like hydrogen and coal and ammonia co-firing plants, the opportunities for a swift transition to a more resilient, sustainable and self-sufficient energy system is there.

1. Climate Change 2022, Mitigation of Climate Change: Summary for Policy Makers, IPCC

2. Cheng Cheng, Andrew Blakers, Matthew Stocks, Bin Lu, 100% renewable energy in Japan, Energy Conversion and Management, Volume 255, 2022, 115299, ISSN 0196-8904, https://doi.org/10.1016/j.enconman.2022.115299.



Japan's Net-Zero Commitments

In October 2020, Japan committed to becoming net-zero by 2050 ³. In April 2021, the country followed up this pledge with a 46% emission reduction target by 2030 ⁴. By that time, non-fossil-fuel power supply sources are intended to comprise close to 60% of the country's energy mix ⁵. According to the country's plans, renewable energy capacity will account for 36% to 38% of the country's energy mix.

The price of electricity from new power plants

Electricity prices are expressed in 'levelized costs of energy' (LCOE). LCOE captures the cost of building the power plant itself as well as the ongoing costs for fuel and operating the power plant over its lifetime.





3. Japan aims for zero emissions, carbon neutral society by 2050 - PM, Reuters

- 4. Japan Aims to Reduce Greenhouse Gas Emissions by 46% Over 2013 Levels by 2030, Climate Scorecard
- 5. Japan set for 60% non-fossil fuel power supply in 2030 in GHG slash drive, SP Global

6. Japan's Proposed Renewable Energy Mix, <u>SP Global</u>



The government also promised to fundamentally revise its coal-fired power plant policy and promote carbon recycling technologies as well as second-generation solar photovoltaic (PV) research and development ⁷.

As of 2020, renewable energy sources are responsible for 20.8% ⁸ of all generated electricity in Japan. However, the share of wind power in the total power generation mix sits at just 0.86%, with 8.5% for solar PV. In a bid to improve on that front, the country is launching the Green Growth Strategy ⁹ policy framework under which Japan will aim for a 50% to 60% share of renewables in its total electricity production by 2050, mainly from offshore wind. The rest will come from nuclear power and fossil fuel plants that have carbon capture and storage (CCS) technology (30% to 40%) and hydrogen (10%).

7. Japan's net-zero by 2050 announcement a step forward, but 2030 target revision now crucial, Climate Action Tracker

8. Share of Electricity Generated from Renewable Energy in 2020 (Preliminary Report), ISEP

9. Overview of Japan's Green Growth Strategy Through Achieving Carbon Neutrality in 2050, March 2021, Ministry of Economy, Trade and Industry (METI)



The Dark Side of Japan's Net-Zero Strategy

The EU and the UK prove that developed regions and highly industrialised nations can commit to sufficient net-zero targets without sacrificing competitiveness and economic prosperity. On the other hand, Vietnam showed that actions speak louder than words when in December 2020, it added 6 gigawatts of solar PV ¹⁰ alone, becoming a top 10 solar power ¹¹ market globally and Asia's next clean energy powerhouse. However, in comparison, Japan does not come close in terms of its commitments or results when it comes to transitioning. Even its most ambitious targets and policy measures fall in the "insufficient" category of Climate Action Tracker's evaluation ¹².



Figure 2¹²

10. Vietnam Smashes 2020 Solar Capacity Records, <u>The Asean Post</u>

11. Renewable Energy Investments in Vietnam – Asia's Next Clean Energy Powerhouse, Energy Tracker Asia

12. Japan - Country Summary, <u>Climate Action Tracker</u>



According to the IPCC ¹³, Japan's case illustrates that even if all the global carbon reduction policies are put in place by the end of 2020 were fully implemented, the world would still warm by 3.2°C this century. According to Wood Mackenzie, without any further policy support from the government, not only will Japan's emissions fail to decrease, but they are likely to increase even further due to the addition of a potential 9-gigawatt coal fleet ¹⁴.

The Hydrogen-Ammonia Plans and the Greenwashing Concerns

In January 2022, Japan's Energy for New Era (JERA) announced plans to invest close to USD 600 million ¹⁵ in ammonia technology, mainly in the co-firing capacity of hydrogen-derived ammonia and coal. Almost 70% of the project's funds ¹⁶ will come from the Japanese government's green innovation fund. JERA's plants will use blue ammonia ¹⁷, which is incompatible with a green pathway. The move risks trapping Japan in import dependency since the ammonia will be shipped from abroad ¹⁸.



JERA Zero CO₂ Emissions 2050 Roadmap for its Business in Japan

This roadmap will be gradually developed in greater detail based on relevant conditions such as government policies. JERA will revise the roadmap when relevant conditions change significantly. *The use of CO 2-free LNG is also being considered.

Figure 3¹⁹

13. Climate change: IPCC scientists say it's 'now or never' to limit warming, BBC

- 14. Japan unlikely to meet 46% emissions reduction by 2030, Wood Mackenzie
- 15. Japan's JERA to develop ammonia-related tech with green fund backing, Yahoo
- 16. JERA to develop ammonia-related tech with green fund backing, <u>Hydro Carbon Processing</u>
- 17. Japan's new net-zero project will use more energy than it produces, QZ
- 18. 'Crazy, wasteful greenwash': Japan to spend \$242m on mixing hydrogen-derived ammonia with coal at power plants, Recharge News
- 19. Figure 3: JERA Zero CO2 Emissions 2050 Roadmap for its Business in Japan, JERA



Conceptual Flow Diagram of "Blue Ammonia" Supply Chain Demonstration (Duration : August 2020 - October 2020)



Figure 4²⁰



Figure 5²¹

20. Figure 4: Conceptual Flow Diagram of "Blue Ammonia" Supply Chain Demonstration, <u>Aramco</u> 21. Figure 5: Japan's Road Map for Fuel Ammonia, <u>Ammonia Energy Association citing METI</u>



The move signals that Japan is extending a lifeline to coal-fired power plants instead of supporting a future without fossil fuels. It will trap the country in a future of highly inefficient electricity-producing plants and add a significant cost burden that will not be overcome in the years up to 2030 ²². Experts estimate that the project will make the country pay up to five times the cost per joule ²³ of the energy other countries use. Bloomberg NEF estimates that co-firing coal with 20% ammonia in Japan would add "86% to the LCOEs of coal-fired power today, and 59% by 2040" ²⁴. At the same time, it would lower emissions by only 20%. This will only add to the already high energy bills Japan citizens are paying.





Although the Ministry of Economy, Trade and Industry (METI) and the Clean Fuel Ammonia Association have announced the establishment of a task force to coordinate global ammonia standards ²⁶, the hydrogenammonia plans are proof that the country is looking everywhere for alternatives, bar renewables. A move like this puts a giant question mark over the country's focus on real decarbonisation.



^{22.} The Role of Low-Carbon Fuels in the Clean Energy Transitions of the Power Sector, IEA

^{23.} What Is Behind the Japan Ammonia Greenwash Accusations, Energy Tracker Asia

^{24.} Bloomberg LP (2021), Ammonia in Japan, Bloomberg Terminal

^{25.} Figure 6: Japan Energy Bills to Hit Highest in at Least 5 Years, NHK Says, Bloomberg

^{26.} Hydrogen update and outlook in Japan 2022, Nishimura

The Basic Hydrogen Strategy

In 2017, the Japanese government issued its Basic Hydrogen Strategy ²⁷, becoming the first country with a national hydrogen framework. Under it, the country aims to expand its hydrogen economy and hydrogen production by three million tonnes by 2030 and 20 million tonnes by 2050 ²⁸. Furthermore, the country plans to make hydrogen the backbone of its energy transition ²⁹.

The problem with such a move stems from the fact that green hydrogen, for now, remains expensive ³⁰. Due to this, the country is increasingly focused on using blue hydrogen in the short term ³¹. In addition, Japan is yet to adopt a national certification standard for the carbon footprint, or "colour", of hydrogen, aside from single instances like the Aichi Prefecture, where green hydrogen use is stimulated through certificates and other incentive schemes ²⁶. In this aspect, Japan lags behind other regions like the EU and Australia.

However, leaping from being the fifth-largest carbon emitter to net-zero in less than 30 years requires immediate action. A detour to hydrogen distracts the country from investing in proven and cheaper clean energy solutions. Furthermore, it makes Japan's road towards net-zero longer, costlier and more challenging.

Meanwhile, domestic hydrogen production will not be sufficient, and imports will meet up to 80% of total demand in Japan by 2050 ¹⁴.

Transition Bonds as a Transition Washing Tool

JERA, a joint-venture between Japan's first and third largest energy companies, announced plans for issuing transition bonds ³².

Companies rely on transition bonds to attract capital to fund their decarbonisation efforts so they can transition to greener operations. However, JERA plans to use the funds to replace existing liquefied natural gas (LNG) capacity with ammonia-hydrogen co-firing infrastructure ³³. Tokyo Gas will use the capital raised to back three separate projects ³⁴, two of which are heavily related to fossil fuels.

Whether intentional or exploitative, Japan has created an environment where transition bonds can be used to support fossil fuels. This risks putting a stain on the idea of transition bonds, a core pillar of green finance. The country's actions provide a blueprint for how they can be exploited for "transition-washing" practices to maintain the status quo.

^{27.} Basic Hydrogen Strategy, Ministry of Economy, Trade and Industry (METI)

^{28.} Japan's Hydrogen Industrial Strategy, Center for Strategic & International Studies

^{29.} Japan's Hydrogen Strategy – A Detour to Carbon Neutrality, Energy Tracker Asia

^{30.} Cheap Green Hydrogen and its Impacts on Asia's Oil and Gas Industry, Energy Tracker Asia

^{31.} Japan's Hydrogen Society Ambition, IFRI

^{32.} Japan's largest CO2 emission company "JERA" to issue transition bonds as a "model project" of the Ministry of Economy,

Trade and Industry, **<u>RIEF</u>**

^{33.} JERA Transition Bond Framework, JERA

^{34.} Tokyo Gas issues a transition bond for the first time as a city gas supplier, <u>Tokyo Gas</u>

Increased Fossil Fuel Project Funding Overseas

During the 2021 G7 Summit in the UK, Japan pledged to commit USD 60 billion per year between 2021 and 2025 to tackle the climate emergency ³⁵. At COP26, it actively advocated funding the decarbonisation efforts of developing Asian nations. The country pledged USD 10 billion in additional overseas climate financing over the next five years ³⁶.

Japan also vowed to end international coal financing by the end of 2021 ³⁷. However, the country has not lived up to its promise. Global Energy Monitor reveals that Japan's government institutions provide ongoing financial support to coal projects in Indonesia and Bangladesh ³⁸.

The Matarbari power plant project in Bangladesh, for example, is an illustrious example of how committed the Japan International Cooperation Agency (JICA) is to supporting coal financing abroad ³⁹. Even after the massive withdrawal of contractors and trading houses, along with the doubts expressed by Bangladesh's government ⁴⁰, JICA remains the sole supporter of the project. The more concerning fact is that Japan is directly financing an unnecessarily polluting technology ⁴¹ that is otherwise banned from being used across Japanese power plants.

The duality of Japan's strategy is eroding its credibility in the eyes of the public. On the one hand, the country pledges to provide financial assistance to developing nations' decarbonisation efforts. On the other hand, however, it finances coal projects abroad.

The Japanese link to coal support is also evident on the corporate level. The Global Coal Exit List (GCEL) reveals that Japanese banks hold the top 3 positions in the biggest coal industry lenders ⁴² list. Collectively, they have provided over USD 77 billion. Japan's Government Pension Investment Fund is the fifth-biggest institutional investor in coal, with around USD 28 billion.

- 36. Japan pledge brings \$100 bln climate funding target closer, U.S. envoy says, <u>Reuters</u>
- 37. South Korea and Japan Will End Overseas Coal Financing. Will China Catch Up?, World Resource Institute
- 38. Coal Financing Map, Global Energy Monitor
- 39. The Risks From JICA's Involvement in the Matarbari Power Plant Project of Bangladesh, Energy Tracker Asia
- 40. Matarbari plant: Japanese firm Sumitomo won't bid for phase-2, The Daily Star
- 41. Ten Reasons Why Sumitomo's Matarbari Coal Plant is a Terrible Idea, Mighty Earth
- 42. Who Is Still Financing the Global Coal Industry?, Coal Exit



^{35.} Japan commits US\$60.0 billion to tackle climate emergency from 2021-2025 during G7 Summit, Donor Tracker





43. Figure 7: Emission Limits for Air Pollutants and Dust for Japanese Coal Power Plants Compared to Japanese-Financed Coal Power Plants in Other Countries, <u>Greenpeace</u>



Japan Can Accelerate Its Energy Transition and It Should

Japan has all the means to do better in its energy transition. The country has vast potential for clean energy sources. The International Renewable Energy Agency (IRENA) finds that it has the third-highest potential for geothermal energy globally ⁴⁴. Its geography also provides the perfect conditions for large-scale offshore wind expansion ⁴⁵. Studies identify potential for over 4,000 gigawatts of solar PV and 2,000 gigawatts of offshore wind². Combined, both represent an annual generation of more than 13,000 TWh or 14 times the current amount.

For now, however, Japan is not tapping into its clean energy potential. In 2019, fossil fuels accounted for 88% of its total primary energy supply ⁴⁶, the sixth-largest share among IEA countries. Furthermore, the country relies on imports to meet 96% of its energy needs ⁴⁷. Today, the national primary energy output and consumption ratio is just 11.2% ⁴⁸, compared to 60.7% for the EU ⁴⁹.

Renewable energy sources like solar PV and offshore wind can provide a way out of this dependency. Fortunately, there are signs that the country is starting to realise that. The Energy Supply and Demand Report published in November 2021 reveals that the supply of fossil fuels has been decreasing for seven consecutive years while renewable energy has continued to increase for the eighth year in a row ⁴⁷. Between 2012 and 2019, Japan's renewable electricity generation grew by 70% ⁴⁶. Solar power accounted for almost 90% of the growth, mainly due to feed-in tariff (FIT) systems. Wood Mackenzie expects Japan to satisfy 30% of its power demands ¹⁴ with renewable energy sources by 2030, surpassing its current target of 22 – 24%.

While the Japanese power sector is responsible for 36% of the total emissions ⁵⁰, the energy-related CO₂ emissions have been continuously decreasing and are now 21.7% down compared to 2013 ⁴⁸. The country has marked the most significant reduction among G7 nations since the 2013 fiscal year ⁵¹, lagging only behind the UK and Germany.

Today, the Japanese government is among the few that are focused on supporting the companies signing up to Science-Based Targets, RE100 and other major business initiatives that aim for decarbonisation⁷.

According to McKinsey, achieving net-zero in Japan is not out of reach ⁵⁰. For it to happen, however, the country would need to take drastic measures, including a threefold increase in solar and wind capacity to 275 gigawatts by 2050, shutting down unabated coal-fired power plants by 2030 and major transformations in the industrial, transportation and construction sectors.

- 44. Unlocking Geothermal Potential in Japan Through Small-scale Generation, <u>IRENA</u> 45. Wind Map, <u>Global Wind Atlas</u>
- 45. WING Map, <u>Global V</u> 46. Janan 2021. IEA
- 46. Japan 2021, <u>IEA</u>

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- 49. Japan's 2050 goal: A carbon-neutral Society, <u>European Parliament</u>
- 50. How Japan could reach carbon neutrality by 2050, McKinsey & Company

^{47.} Danmei Zhu, Seyed Mostafa Mortazavi, Akbar Maleki, Alireza Aslani, Hossein Yousefi, Analysis of the robustness of energy supply in Japan: Role of renewable energy, Energy Reports,

^{48.} FY2020 Energy Supply and Demand Report (Preliminary Report), Ministry of Economy, Trade and Industry (METI)

^{51.} Japan's Roadmap to "Beyond-Zero" Carbon, Ministry of Economy, Trade and Industry

Getting to net-zero will require dramatic steps in each sector.

Sectoral highlights



Figure 8 50



Japan Holds the Keys to its Future

The only obstacle standing between Japan and its green future is Japan itself. According to the Renewable Energy Institute's observations ⁵², Japan's ministries and agencies continue to work to extend the life of fossil fuels, including coal-fired power, through various methods, including the use of CCS technology, mixed ammonia combustion, and other methods. Furthermore, the Ministry of Economy, Trade and Industry (METI) considers the pursuit of a 100% renewable electricity scenario unrealistic ⁹, with technical issues and costs cited among the reasons.

However, TransitionZero estimates the levelised cost of electricity (LCOE) for solar PV to be two times lower than the average LCOE, which is USD 200 per MWh when it comes to advanced coal technologies and green ammonia co-firing ⁵³. Studies find that, in the case of a solar-dominated system, the LCOE can get even as low as USD 86 per MWh². This is substantially cheaper than the 2020 average system prices on the Japanese spot market of USD 102 per MWh. The Renewable Energy Institute argues that 100% electricity generation from renewable sources is technically feasible and can be integrated into the power grid while maintaining supply stability.

In 2023, Japan will host the G7 Summit. The country has to arrive at the table knowing it can hold its head high. Industry analysts find the ambitious target to cut emissions by 46% by 2030 unrealistic ¹⁴. The only way for Japan to prove them wrong is through actions, not pledges and promises.

Pursuing a renewable energy pathway will bring positives on all fronts, paving the way for a more economically-viable, competitive, greener and self-sufficient energy system. One that suits Japan's image as a global leader.

52. 2022, A Year to Further Accelerate Renewables and Moving Toward the Decarbonization of the Industry Sector, <u>Renewable Energy Institute</u> 53. Coal-de-sac: Advanced Coal in Japan, <u>TransitionZero</u>





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