Global Asset Management

Japan's green journey

The RBC Asian Equity team

Japan's competitive edge in renewables technologies can help it overcome the unique challenges it faces in its transition to a net-zero carbon economy.

In 2020 Japan announced its plan to achieve carbon neutrality by 2050. As the world's fifth-biggest greenhouse gas emitter, the government set a goal to reduce emissions by 46% from 2013 levels by 2030.[1] The Green Growth Strategy launched in June aims to create a positive cycle of economic growth and environmental protection. It sets goals in 14 fields with high growth potential (Exhibit 1), identifies current challenges and outlines action plans to solve them, including budgets, taxes and regulatory reforms. We expect increased investment by government, businesses and households to change Japan's energy mix in the coming years. (Exhibit 2). The government estimates total investment at about 290 trillion yen (USD2.5 trillion), providing employment opportunities for about 18 million people (14% of the population).[2]

"We expect increased investment by government, businesses and households to change Japan's energy mix in the coming years."

Exhibit 1: 14 growth sectors specified by Japan's Green Growth Strategy

Energy-related Industries	Transportation/Manufacturing-related Industries		Home/Office-related Industries
Offshore Wind/Solar/ Geothermal Power	Automobile/ Battery	Semiconductor/ Information and Communication	Housing and Building Next-generation Power Management
Hydrogen/ Fuel Ammonia	Shipping	Logistics, People Flow, and Civil Engineering Infrastructure	Resource Circulation-related
Next-generation Heat Energy	Food, Agriculture, Forestry and Fisheries	Aircraft	Lifestyle-related
Nuclear	Carbon Recycling/ Material		

Source: Bloomberg, Walk the Talk to Green: Finance, Innovation, and Sustainability from Japan. Data as at 2021.

Exhibit 2: Investment in Japan's Green Strategy

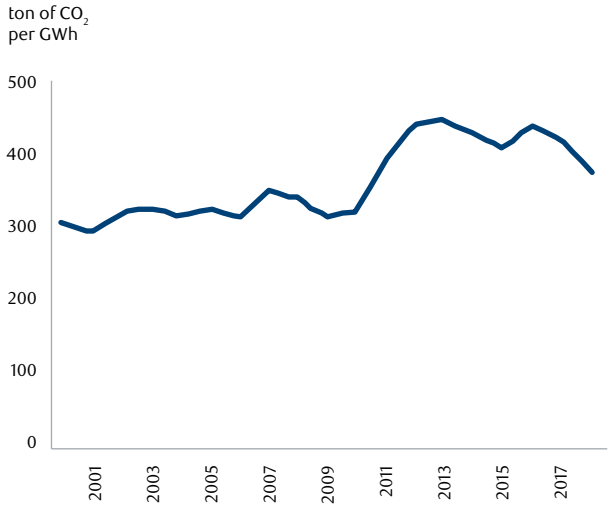
Capital investment (J.P. Morgan estimate, trillion JPY)

Private sector	2021-2023	2021-2030
Chemical	7.0	14.6
Oil and coal products	2.2	31.6
Primary metals	0.1	2.1
Machinery	10.9	36.2
Electronic components	1.6	6.6
Electric machinary	7.6	25.4
Autos & auto parts	10.3	48.2
Other products	2.7	4.4
Utility	8.5	29.2
Wholesale and retail	0.3	1.0
Transportation	1.6	5.8
Real estate	0.5	3.7
Total amount of private Capex	**53.2**	**208.8**
Housing investment	1.3	7.3
Total	**54.5**	**216.0**

Source: METI, MoE, MLIT, Cabinet Office, J.P Morgan estimate. Data as at 2021.

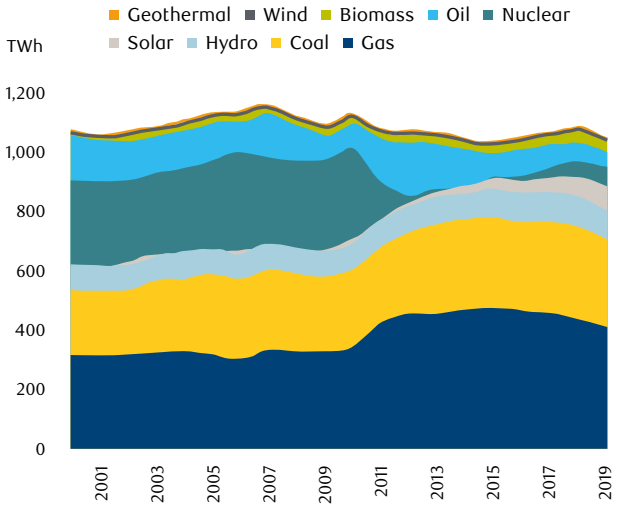
[1] https://thediplomat.com/2021/11/japan-pledges-support-for-asia-wide-decarbonization/
[2] https://sponsored.bloomberg.com/article/jco/charting-the-path-to-net-zero-with-japanese-innovations

Exhibit 3: Historical $C0_2$ emissions intensity for power



Source: Japan Ministry of Economy, Trade and Industry. Data as at 2020.

Exhibit 4: Historical annual power generation in Japan



Source: Japan Ministry of Economy, Trade and Industry. Data as at 2019.

Japan's emission profile

The power sector is Japan's biggest source of emissions, accounting for 37% of carbon emissions in 2018 (Exhibit 3). Japan's dependence on fossil-fueled power generation increased after the Fukushima nuclear power plant accident in 2011. Since then, nuclear power's contribution to Japan's annual electricity supply has decreased from 30% to less than 7%. Coal power now accounts for 30% of the energy mix, a 5% increase from 2010 (Exhibit 4).[3]

The country's power sector is more dependent on fossil fuels than other developed economies, due to Japan's lower

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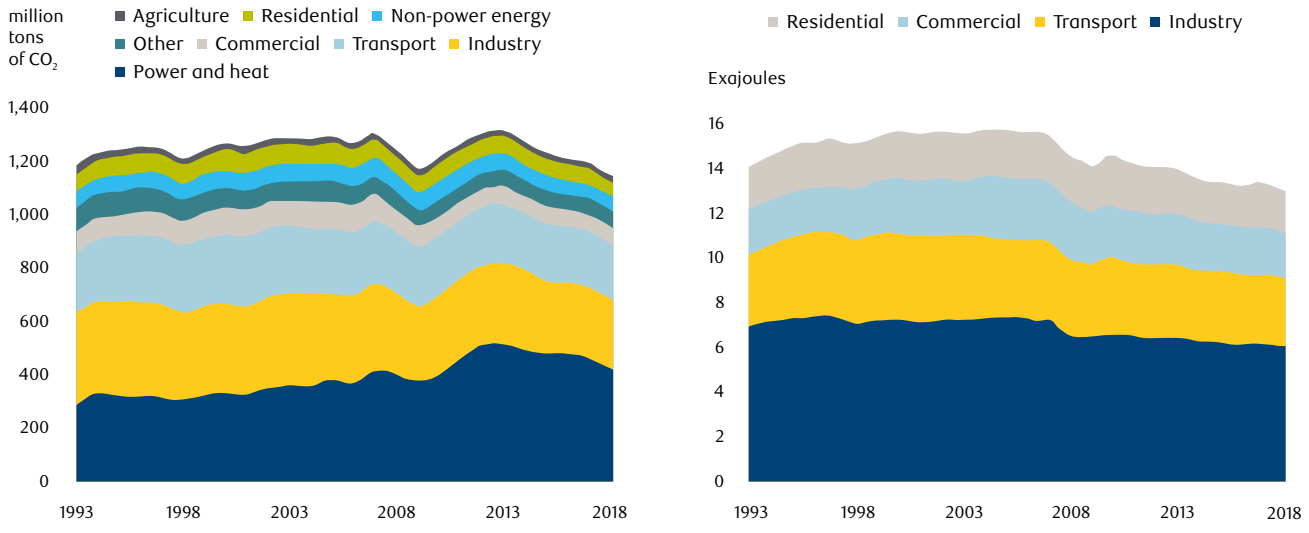
renewables potential. For instance, its deep coastal waters make it difficult to install offshore wind turbines, and its mountainous terrain limits open space for onshore wind and solar farms. As a result, offshore wind is seen as key to reducing dependence on fossil fuels, along with hydrogen, ammonia and carbon capture and storage (CCS). Exhibit 5.

Exhibit 5: Japan's $C0_2$ emissions & final energy consumption by sector

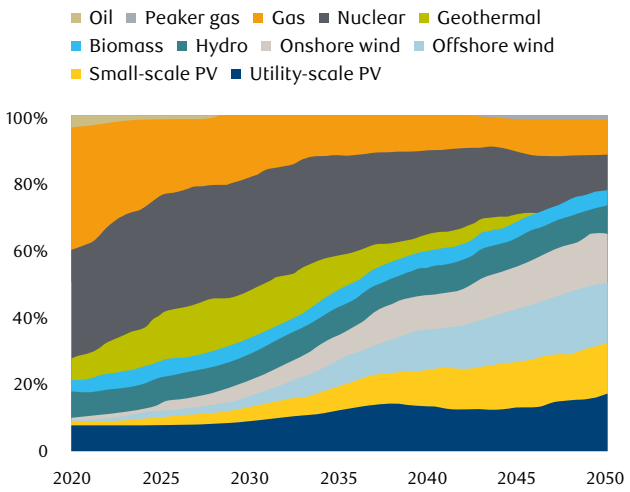


Source: Emissions data from Japan National Institute of Environmental Studies; final energy consumptions data form Japan Ministry of Economy Trade and Industry. Data as at 2019.

[3] https://www.meti.go.jp/english/policy/energy_environment/global_warming/ggs2050/index.html

Exhibit 6: BNEF's Japan electricity outlook

Annual electricity generation mix



Source: BloombergNEF New Energy Outlook 2019, Japan Ministry of the Environment. Note: the BNEF 2050 outlook values refer to the capacity values under the economic transition scenario. Data as at 2019. .

Exhibit 7: Energy forecast

Energy	FY2030 (revised)	FY2030 (previous)	FY2019
Renewables	36%-38%	22%-24%	18%
LNG	20%	27%	37%
Coal	19%	26%	32%
Oil	2%	3%	7%
Nuclear	20%-22%	20%-22%	6%
Hydrogen/ Ammonia	1%	0%	0%

Source: BloombergNEF. Japan Seeks to Aggressively Cut Fossil Fuel, Lift Renewables. Data as at July 22, 2021.

According to the government's energy plan, renewable energy should make up more than a third of the nation's power generation by 2030.[4] Nuclear power will more than double, while liquefied natural gas is slated to fall roughly 50% by the end of the decade. The use of coal should also fall by about 40% (Exhibits 6 and 7).

Industry accounts for 23% of Japan's total emissions, the second-highest source. The iron and steel sector is the largest emitter, accounting for over half of industrial emissions (Exhibit 8). Steel production emissions have declined by 8% since peaking in 2013, thanks to improved energy efficiency and the use of electric arc furnaces (Exhibit 9). Companies are now seeking to commercialize technologies such as CCS and hydrogen to further reduce emissions.[5]

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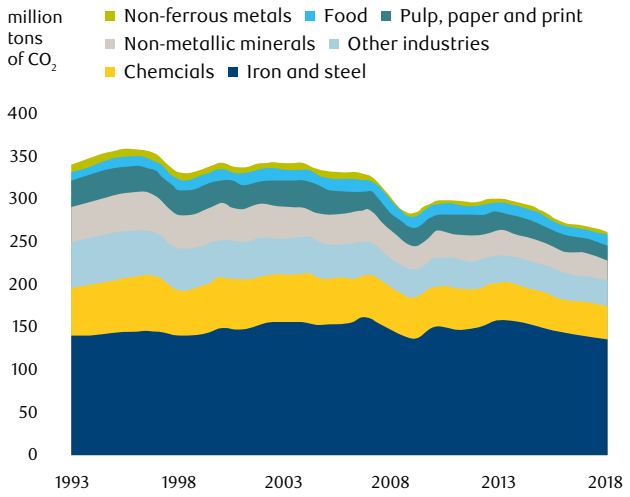
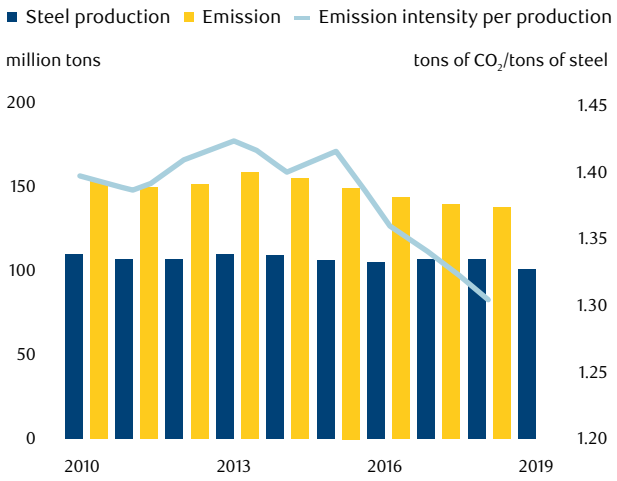
Exhibit 8: Japan industry sector emissions



Source: Japan National Institute of Environment Studies. Data as at 2018.

Exhibit 9: Emissions intensity of steel production in Japan



Source: Japan National Institute of Environmental Studies, Japan Iron and Steel Federation Note: Emissions data is available to 2018.

[4] https://www.bnef.com/insights/24563/view

[5] https://www.bloomberg.com/news/articles/2020-12-15/japan-to-lift-offshore-wind-capacity-fourfold-in-decade-to-2040?sref=WvIXLrwO

Transport accounts for 18% of Japan's carbon emissions, with cars making up 49% of that total (Exhibit 10). To decarbonise the sector, the Green Growth Strategy called for all new passenger vehicle sales by 2035 to be electric (including hybrids) or fuel-cell vehicles.[6]

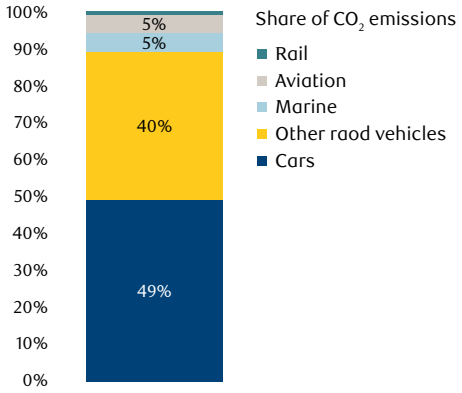
The aggressive target would provide a great economic opportunity for Japanese automakers, who are faced with declining domestic demand due to a shrinking population. Honda announced this year it will increase zero-emission vehicle sales to 40% in developed markets including Japan by 2030, while by 2040 it will phase out petrol and diesel vehicle sales everywhere.[7] Toyota will launch 15 battery electric models by 2025. The company also set a goal of achieving carbon neutrality for its factories by 2035.

Private sector commitment

Japan's businesses are increasingly committed to more sustainable practices. More than 50 private Japanese companies have signed the RE100, a global pledge to use 100 percent renewable electricity (target dates vary by company). After the US, Japan has had the highest number of companies sign the pledge.

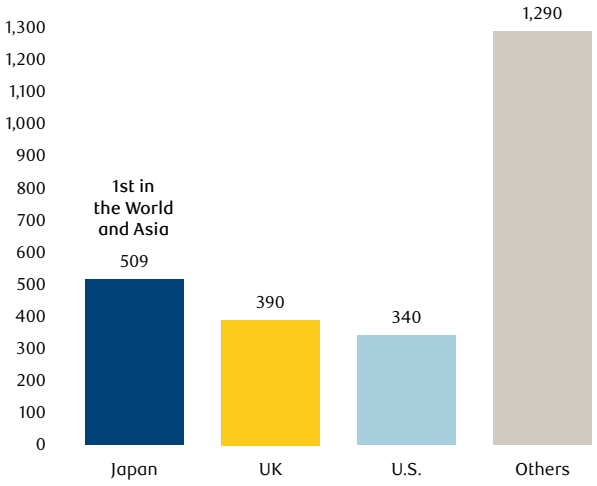
Japanese companies are also leading the world in supporting the Task Force on Climate-related Financial Disclosures (TCFD), an international framework created by the Financial Stability Board (Exhibit 11). The TCFD recommends how companies and institutions should disclose their climate-related financial information, including risks and opportunities. Over 2,500 companies from around the world have embraced the framework, more than 500 of them Japanese. From April 2022, listed companies on the Prime Market of JPX will be required to disclose information based on the TCFD recommendations or an equivalent framework.

Exhibit 10: Japan's transport CO_2 emissions in 2018

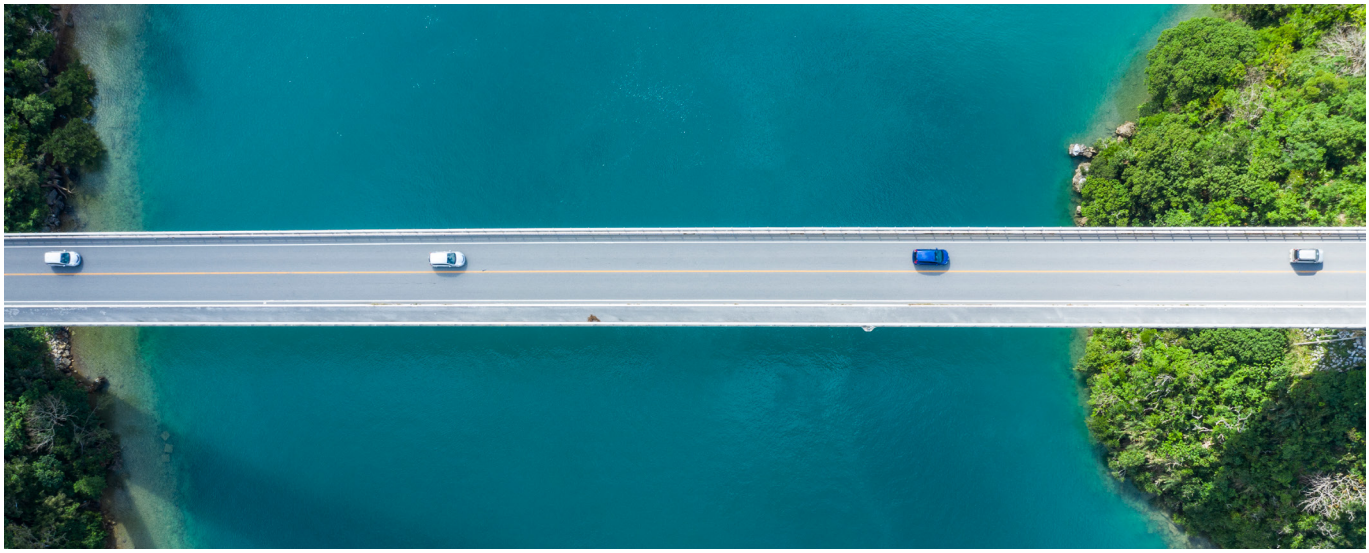


Source: Japan National Institute of Environmental Studies. Data as at 2018.

Exhibit 11: Number of companies supporting then TCFD



Source: TCFD. Data as at 30 September, 2021.



[6] https://www.bnef.com/news/942681
[7] https://sponsored.bloomberg.com/article/jco/5-ways-japan-is-accelerating-global-decarbonization-efforts?sref=WvIXLrwO

Japan leads on renewable tech

Innovative technologies are vital to achieve the universal goal of net-zero carbon emissions. Japan is leading the field: it has the most renewable energy international patent applications under the Patent Cooperation Treaty (PCT) in the world. Between 2010 and 2019, Japan filed 9,394 patent applications relating to solar, fuel cell, wind and geothermal technologies (Exhibit 12). It also leads patent filings for battery technologies, accounting for roughly one-third of the global total in 2018.[8]

Japan has also been a leader in the race toward a hydrogen economy (Exhibit 13). It has 137 hydrogen refueling stations – the world's largest network – and has been developing hydrogen mobility for a decade. Japan aims to increase the number of fuel cell vehicles on the road from 3,800 currently to 800,000 by 2030.[9]

Risks and challenges

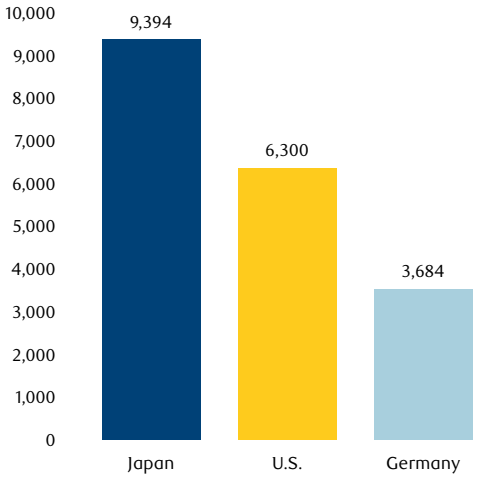
Given limited solar and wind capacities in Japan, renewables can ultimately comprise only 60 percent of its power mix. That means it needs to rely on more expensive technologies, such as low-carbon hydrogen and CCUS, to decarbonise its power sector. Moreover, its lack of abundant zero-carbon electricity for domestic hydrogen production means higher hydrogen costs. Raising the share of renewable energy in the energy mix will also require a substantial expansion of the power grid and storage capacity, pushing costs higher. In addition, the country's stance on restarting and expanding nuclear power facilities is still uncertain. Lastly, reducing greenhouse gases in all sectors of the economy will require an increase in energy efficiency through innovation or changes in the industrial structure, which require extensive investments.

Investment implications

Japan's decarbonisation target provides an opportunity for Japanese companies to get ahead of global competition and develop technologies and business models that can succeed in a decarbonised world. Several businesses have already launched strategies to commercialize new technologies such as hydrogen and CCS. They include Tokyo Gas, the country's largest city gas company; Eneos, the largest integrated oil company; and Nippon Steel, the largest steel producer. Japan's auto and tech industry, including companies such as Toyota and Toshiba, will benefit through accelerated demand for products such as battery electric vehicles and electrolyzers.

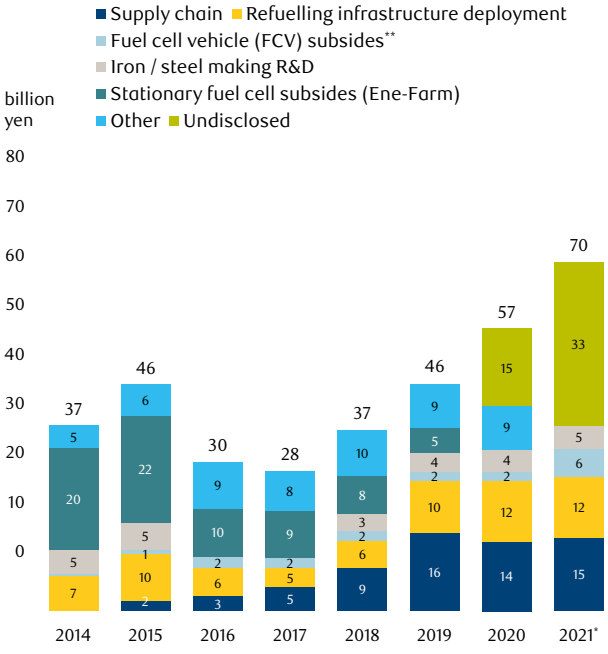
For more information on how the team's unique investment approach aims to build on their findings in this report, visit the RCB Asian Equity team page.

Exhibit 12: Total renewable energy patents filings (2010-2019)



Source: Under the patent cooperation treaty. WIPO Economic Statistics Department. Data as at 2019.

Exhibit 13: Japanese government funding exclusively for hydrogen and fuel cells



Source: BloombergNEF based on annual METI budget allocation. Note value include budget exclusively allocated to hydrogen and fuel cells. Years are fiscal years from April to March. *2021 numbers are draft and may change. **FCV subsidies are based on multiplication of FCV sales by subsidy allocation per vehicle; 2020-21 values are based on our FCV sales forecast. Data as at 2021.

[8] https://www.bnef.com/insights/26773/view
[9] https://www.bnef.com/insights/24555/view

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