

The European connection to Japan's Green Transformation

Following the European Union's ambitious commitment, announced on December 11, 2019, to become carbon neutral by 2050, Japan followed suit just a few months later. On October 26, 2020, Japan pledged to reduce greenhouse gas (GHG) emissions by 26% from 2013 levels by 2030, a target that was later increased to 46% in April 2021, and to achieve carbon neutrality by 2050. Understanding the scale of this challenge requires examining the significant hurdles Japan must overcome, set against a backdrop of its historical energy landscape.

Japan, a country with scarce natural resources, is heavily reliant on fossil fuels—one of the largest sources of GHG emissions. Its primary energy needs are predominantly met through imports of crude oil, coal, and liquefied natural gas (LNG). LNG plays a particularly crucial role in electricity production, accounting for nearly 40% of the electricity supply—a figure significantly higher than its share in the overall primary energy mix. This reliance on LNG surged after the 2011 Fukushima disaster, which led to a sudden reduction in nuclear power usage, previously contributing 30% to the energy mix. Japan's vulnerability to energy market fluctuations is further exacerbated by its limited LNG inventory, capable of sustaining only 2-3 weeks of consumption, coupled with the absence of underground storage facilities and interconnected neighbors for energy support. The ongoing war in Ukraine has placed additional strain on Japan's energy security, driving LNG prices to unprecedented levels and causing a sharp rise in household energy bills. Moreover, Japan's investments in Russian LNG projects, such as Sakhalin 1 and 2, have introduced further uncertainty due to geopolitical tensions, casting doubt on the future security of these energy supplies.

In light of these challenges, it became evident that Japan needed a bold and innovative strategy to reduce its dependence on fossil fuels while fostering long-term economic growth, job creation, and international competitiveness. This strategy materialized as the Green Growth Strategy, adopted in December 2020, two months after Prime Minister Suga announced Japan's commitment to achieving net-zero GHG emissions by 2050. The strategy identifies 14 key growth sectors across the energy, transport, manufacturing, and home/office related industries, each tasked with decarbonization through the adoption of renewable energy and innovative green technologies. In October 2021, Japan adopted its 6th Basic Energy Plan, which calls for doubling the share of renewable in the energy mix (from 18% to 36-38%), more than tripling contribution of nuclear energy (from 6% to 20-22%) and introducing new fuels like hydrogen and ammonia to account for 1% of the energy mix by 2030. These measures aim to reduce fossil fuel use from 76% to 46%, compared to 2019 levels.

Most recently, the Cabinet approved the "Basic Policy for the Realization of GX" (Green Transformation) in February 2023, setting out policy and regulatory roadmaps for 22 target areas, including major GHG-emitting sectors like steel, chemicals, automotive, as well as clean technologies such as next-generation power grids, zero-emission ships, bioplastics, carbon capture and storage, hydrogen and ammonia, or battery technologies, to name a few. To support this transformation, the government plans to invest 20 trillion JPY over the next decade through the issuance of "GX Economy Transition Bonds" to finance R&D, capital investment, and

demand creation, with an additional 150 billion JPY investments expected from the private sector.

With both Japan and the EU committed to green transitions and climate neutrality as key strategies for economic prosperity, streamlining their efforts through the EU-Japan Green Alliance, adopted in May 2021, was a natural and logical step. The alliance focuses on four priority areas for technological collaboration: renewable energy, renewable hydrogen, energy storage, and carbon capture, utilization, and storage. The agreement also emphasizes promoting sustainable and circular practices in production and consumption, alongside regulatory cooperation, business exchanges, and R&D in low-carbon technologies and environmental solutions, all aimed at accelerating an economy-wide decarbonization.

In tandem with the political commitment between Japan and the EU, Japanese corporate investors, trading houses, and venture capital firms are increasingly recognizing investment and open-innovation opportunities with European companies in the clean-tech, climate-tech, sustainability, and smart city domains. Europe, recognized as a global leader in clean and environmental technologies, has become a key focus for Japanese companies with strong innovation presence on the continent. Over the past five years, there has been a notable increase in Japanese corporate investments in European companies, including startups, that are working on renewable energy, hydrogen, and energy storage technologies.

Among these investments, two major deals, both involving Hitachi Energy, stand out. The first is Hitachi's acquisition of the Swedish-Swiss ABB Power Grids, and the second is its strategic partnership with Sweden's H2 Green Steel, alongside investments from Nippon Steel and Kobelco. Other significant Japanese investments in European startups include Marubeni's stake in the UK's Carbon Clean Solutions, which specializes in CO2 separation technology; Mitsui's investment in Germany's The Mobility House, focused on developing vehicle batteries for the grid; Itochu's investment in Norwegian battery manufacturer Freyr; Yaskawa's stake in the Finnish utility-scale energy storage company Teraloop; Omron Ventures' investment in Spanish carbon offsetting firm ClimateTrade; and Mitsubishi Electric's acquisition of Swedish high-voltage circuit breaker developer Scibreak, to name a few.

Hydrogen technology, in particular, has garnered increasing interest among Japanese investors from various industry backgrounds. While the H2 Green Steel project also involves plans for a large-scale electrolysis plant for hydrogen generation, other notable investments include Mitsui's stake in French green hydrogen developer Lhyfe and Toyota's investment in Norwegian Corvus Energy, which produces large-scale maritime certified hydrogen fuel cells. But the most strategic Japanese investors in the European hydrogen sector include Mitsubishi Corporation and Sumitomo Corporation. These two trading houses, breaking with a traditional gentlemen's agreement among Japanese trading houses not to pursue each other's investments, have both become limited partners in AP Ventures, a London-based investment fund dedicated to hydrogen technologies. AP Ventures portfolio include, among others, Norway's Hystar, which is developing a proprietary cell architecture for proton exchange membrane (PEM) electrolysis; ZEG Power, developing a blue hydrogen production plant with integrated carbon

capture; and Hydrogen Mem-Tech, which specializes in membrane separator technology for hydrogen production. In addition to several Norwegian companies, the portfolio also includes several French companies like Ergosup, which develops an electrolysis technology integrating the phases of green hydrogen production, and Hydrogen-Refueling-Solutions, developing turnkey hydrogen refueling stations.

In addition to corporate investors, Japanese venture capital (VC) firms are also active in the European clean-tech and sustainability space. Nordic Ninja VC, the largest Japanese deep-tech fund established in Europe, is based in Finland and has invested in companies like Sweden's ClimateView, which develops digital tools for cities to simulate their climate actions, the Swedish autonomous transportation company Einride (using electric trucks), and the Estonian startup Arbonics, which specializes in measuring nature-based carbon capture. Softbank, Japan's largest VC firm, also maintains a strong presence in the European clean-tech space, with investments in companies such as Switzerland's Energy Vault, developing a utility-scale gravity-based energy storage system, and Sweden's Exeger, known for its indoor solar products.

Additionally, there is a growing trend to attract European clean technology startups to Japan through open calls to participate in Japanese smart city initiatives, both public and private. One such initiative is Smart CityX, a private program launched by the Silicon Valley-based Japanese venture capital firm Scrum Ventures. This platform primarily attracts startups from Japan, the U.S., and Europe, offering support with market entry and facilitating connections with Japanese corporate partners, municipalities, and investors. Public smart city initiatives that have succeeded attracting European startups include, for instance, Fukuoka City's 'Open Network Lab Fukuoka'.

As both Japan and Europe strive to meet their ambitious 2030 and 2050 climate commitments, Japanese companies are expected to intensify their presence and scouting activities in Europe, recognizing it as a key region for sourcing cutting-edge technologies in sustainability and clean energy. To achieve these goals, enhanced cooperation in investment, R&D collaboration, and the demonstration and deployment of green technologies will be crucial between the two regions. This deepened partnership will not only accelerate their respective transitions to a low-carbon future but also drive global advancements in clean technology innovation.

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Author:

Peter N. Popovics

Assistant Professor of Japanese Business, Department of International Economics, Government and Business, Copenhagen Business School

Affiliated Researcher, European Institute of Japanese Studies, Stockholm School of Economics

Email: pp.egb@cbs.dk

Stockholm School of Economics | Box 6501 | SE-113 83 Stockholm | Phone: +46 8 736 90 00

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