

Future Directions for Japan's Energy Policy – a Realistic Take on Climate Change Policy

By Sumiko Takeuchi



Author Sumiko Takeuchi

The Takeaway from COP26

Views are mixed on the outcome of the 2021 United Nations Climate Change Conference (COP26) held in Glasgow, in the United Kingdom. Let's briefly run through the current state and future of this most important of global issues – climate change.

This session demonstrated conclusively that COP has become a process that is increasingly at odds with the real world and that the speed with which the gap is widening is only rising. A major issue at COP26 was the upgrading of national emissions reduction targets, with British Prime Minister Boris Johnson leaning heavily on the participating countries to improve their targets. However, although global CO₂ emissions had declined temporarily due to the negative impact of the coronavirus crisis on the economy, they are quickly on the rise again as nations adopt policies aimed at economic recovery, with one published study estimating that global CO₂ emissions would rebound to pre-Covid levels by early November 2021. For example, Japan has set a target of reducing CO₂ emissions by 46% by 2030 from the 2013 level, but it will not be easy to achieve such a dramatic reduction in less than a decade. It's possible to produce an ambitious target; the question is how to achieve it.

Moreover, an energy crisis is here now, with soaring fuel prices and concerns over supply. There are various explanations for this, but they all point to the same cause: the drop-off in recent years in hydrocarbon resources development. The global economic slowdown caused by the coronavirus and calls for strengthening climate change countermeasures have come on the heels of the 2015 fall in fossil fuel prices to diminish enthusiasm for developing hydrocarbon resources. There is a growing tendency to see the development and use of fossil fuels as something evil. Achieving carbon neutrality as soon as possible after 2050 means that we will not be able to use oil, natural gas, and coal in a matter of decades because they generate CO₂ emissions. It's obvious that no financing will be forthcoming if there is a risk that development costs may not be recovered. If investment in hydrocarbon resources becomes even more of a bet, pushing capital costs higher, energy costs will rise, creating the risk of inflation.

It is necessary to limit costs and secure stable supplies during the transition to a carbon-neutral society. Energy is a necessity, not a luxury, for everyday life as well as for business activities. It is the weak who are the hardest hit by rising energy costs and supply disruptions. The "Yellow Vests" protests in France began as a

response to the prospect of rising gasoline prices as the consequence of a tax hike to address climate change. In Katowice, Poland, when I was attending COP24, I watched news reports from France in which a demonstrator said: "Rich people from around the world are gathered in Poland to tax carbon dioxide to protect our planet 20 years from now, but we're worried about paying next week's gasoline bill." It was a reminder of the fact that policies to promote energy conversion will not be sustainable unless we face up to the realities of the world around us. This new year began with news from Kazakhstan, where a sharp increase in fuel prices touched off massive protests that led to the intervention of Russian military forces. For the time being, many other countries will struggle to cope with the challenge of containing energy costs.

The negotiations over upgrading emission targets took up much of the time at COP26. But shouldn't more have been spent on ways to fill the growing gap between aspirations and reality? Did the focus on setting our sights higher turn our eyes away from reality? As climate change becomes a matter of national concern in many countries, the conference appears to have become a stage for political performance. But any attempts to pull developing countries into the act are doomed to fail, as these nations intend to employ energy to eliminate poverty. The comment from the Bolivian delegation that "developed countries are trying to recolonize developing countries through decarbonization" highlights this point.

Questions about the Fossil of the Day Awards

Fossil of the Day Awards are given out by environmental NGOs that attend COP. Overseas media do not give much coverage to the award, but the Japanese pay great attention. So it made headlines in Japan when Prime Minister Fumio Kishida received an award for indicating in his plenary statement that Japan would follow a policy of developing and utilizing "zero-emission thermal power".

But what, exactly, is the Fossil of the Day Award? It is an award given out by young members of environmental NGOs to three recipients on each of the 10 weekdays that sessions are held during the two-week meeting, which means that a total of 30 countries will receive the reward. It is usually developed countries that are targeted for criticism since they basically see climate change as an issue where developed countries are perpetrators and developing countries are victims. Japan, the United States, and Australia usually take turns as recipients, since environmental NGOs are often organized by

Europeans. Indeed, Australia led at COP26 with five awards, followed by host UK, the US, and Brazil with two each. Meanwhile, China did not receive any. With this background, let's examine Kishida's statement to see if it was truly that regressive.

The first pillar of the prime minister's statement addressed financing. Japan would provide up to an additional US\$10 billion over the following five years. Verification is required so that the funds are used appropriately and effectively to reduce greenhouse gas emissions, particularly in light of the difficulties that the Japanese economy faces from the coronavirus crisis. But the financial support certainly received a warm welcome, beginning with repeated expressions of gratitude from the UK's Johnson.

The second pillar was technology development. Kishida stated that Japan would develop technologies such as hydrogen mixed combustion for thermal power plants to be used for dispatchable power generation, since renewable energy sources alone are not enough to achieve decarbonization for the time being. He also promised to cooperate with countries in Asia and elsewhere for whom these technologies are essential, for they cannot achieve decarbonization by renewables alone due to geographical and meteorological conditions. This was criticized by the sponsors of the award as "deluded dreams of using ammonia and hydrogen as 'zero-emission thermal power'." But these days, Europe is also actively undertaking the development and utilization of "green" hydrogen produced by decarbonized power. Indeed, operating dispatchable thermal power plants to counterbalance power output fluctuations in renewable power generation could be part of the solution for an efficient decarbonized energy system. The criticism does not appear

to be warranted.

There is no disputing the need for Japan to further accelerate its efforts to combat climate change. All the more is the need for criticism and debate to be constructive.

Formula for Decarbonization

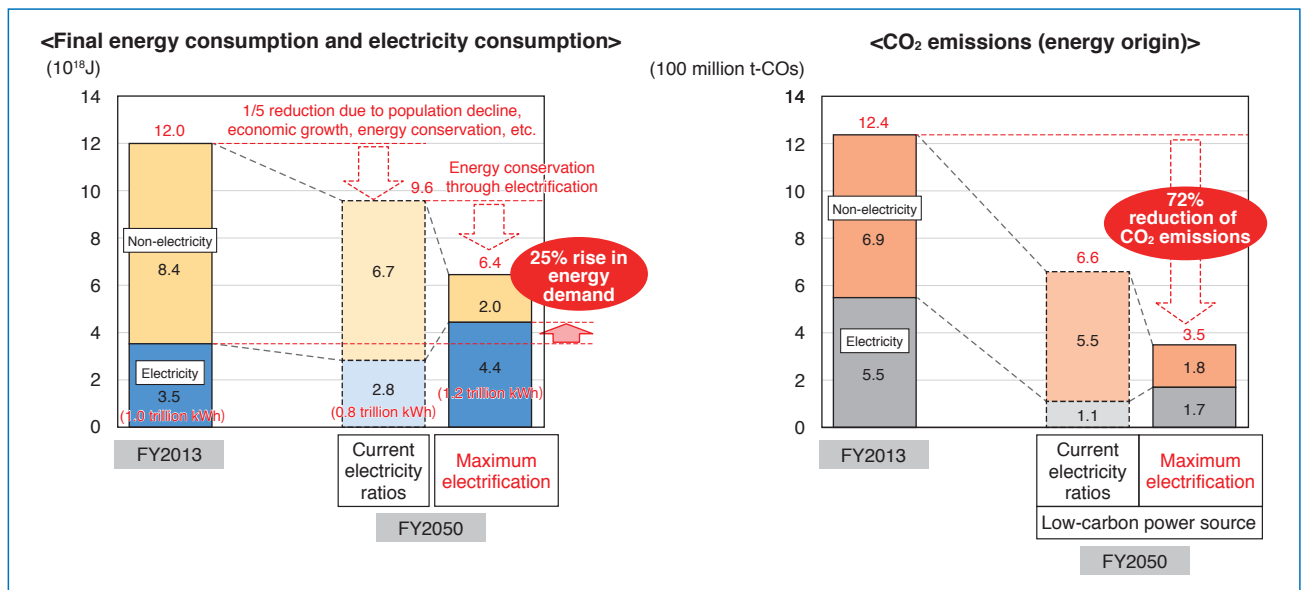
Achieving a decarbonized society is not at all an achievable goal on the current trajectory of our efforts. Technologies that are not yet in place must be developed and deployed. And complicating the development of alternative technologies is the fact that in addition to energy requirements, steelmaking, petrochemicals, cement, and other industries generate CO₂ in chemical reactions essential to the manufacturing process. It is necessary to achieve a virtuous circle between the environment and growth through discontinuous innovation. Japan is undertaking a wide range of initiatives aimed at generating innovation including the establishment in 2020 of a 2 trillion-yen Green Innovation Fund, which supports technology development in specific sectors. But innovation also comes in the form of the accumulation of improvements that reduce costs and enhance convenience in existing technologies, and many things can be achieved with technology that is already available.

The basic formula for the massive reduction of CO₂ emissions is "electrifying demand × decarbonizing power generation". In *Utility 3.0 in 2050: The Game Changer for the Energy Industry* (2017), I showed that CO₂ emissions could be reduced up to 70% using existing technologies by thoroughly using this formula (Chart 1).

So far, discussions in the Japanese government on energy

CHART 1

Potential of 'electrifying demand × decarbonizing power generation' for decarbonization



Note: Estimate by TEPCO Research Institute
 Source: Sumiko Takeuchi, others (2017)

decarbonization have had an excessive focus on decarbonizing power generation. But the proportion of electricity in final energy consumption – the electrification rate – is only 30%. This is not particularly low compared to other countries, but 70% of final energy consumption takes place at the place of final demand as fossil fuels are burned, so there is a limit to what can be achieved if we decarbonize power sources without taking care of the rest of final consumption. Changing the goal to carbon neutrality achieves no fundamental changes. Indeed, much can be achieved by electrifying final demand as much as possible and utilizing hydrogen produced with electricity generated without fossil fuels for final demand that is difficult to satisfy through electrification. Here, hydrogen is broadly defined to include hydrogen carriers such as ammonia. This hydrogen may begin with “blue” hydrogen, which is generated from fossil fuels and paired with CO₂ capture, utilization and storage (CCUS), but “green” hydrogen generated using renewables and nuclear power should eventually cover most of the supply.

The Challenges Ahead in Japan for the Adoption of the Formula

“Electrifying demand × decarbonizing power generation” is a globally shared formula. *The Green Growth Strategy Through Achieving Carbon Neutrality in 2050*, drafted by the Japanese government in June 2021, explicitly calls for the promotion of electrification. However, there are challenges that must be overcome in order to thoroughly implement this formula. Let’s explore two key issues.

The first is “securing cheap, abundant, and CO₂-free electricity”. Costs for photovoltaics, wind power, and other natural, variable electric power sources have been declining rapidly worldwide. However, renewables remain expensive in Japan; the construction costs for a giant solar farm are double the global average. There are several reasons for the high costs, but one of them is the failure to develop a competitive industry as the consequence of the abundant subsidies it received. There is an urgent need to develop a healthy industry around renewables.

However, there are immutable geographical constraints. According to data published by the International Energy Agency (IEA), Japan ranks sixth in the total amount of power generation capacity for renewables, and third in photovoltaic capacity. In fact, it leads the rest of the world in terms of photovoltaics capacity relative to land mass. However, it takes a back seat to other countries in terms of the proportion of renewables in total electricity

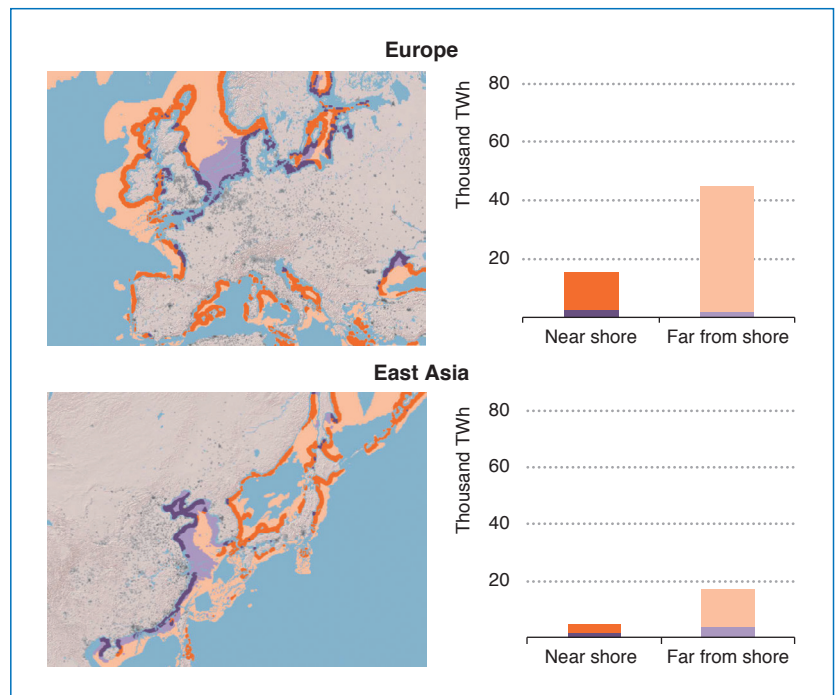
supply, given its high energy demand density. To overcome this geographical handicap, it is beginning to work on offshore wind power generation, as the UK and others in Europe and elsewhere are doing, but the wind conditions and the geography of the surrounding seas are inferior to those of Europe. Shallow waters are scarce, as *Chart 2* shows, and air flow declines significantly in summer.

There is no realistic way to meet the demand for CO₂-free electricity unless nuclear power is used. The construction of nuclear power plants continues worldwide even after 2011, in China and Russia in particular. In the West, the US, the UK, France, and others are working to develop small modular reactors (SMRs) with enhanced safety and constructing new nuclear power plants. In November 2021, President Emmanuel Macron announced that France would resume construction on nuclear power plants, the first since 2002, when two new plants were commissioned, stating: “They are necessary to achieve effective zero greenhouse gas emissions by 2050.” And the European Union already determined at the beginning of 2021 that nuclear power would be included in green investment under the EU Taxonomy.

In Japan, we have stopped thinking about nuclear power generation since the accident in 2011 at the Fukushima Daiichi Nuclear Power Plant. A policy was adopted to only allow a nuclear power plant to resume operations if it satisfies new regulatory requirements that were issued after a comprehensive overhaul of the entire regulatory system. As the result, very few nuclear power

CHART 2

Technological potential for offshore wind power generation by region



Source: *Offshore Wind Outlook 2019, International Energy Agency*

plants have been operating in the 10 years since the accident. In addition, the complete liberalization of the Japanese electricity market that reduced certainty regarding recovery of investment costs and the mass introduction of renewables through abundant subsidies have made nuclear power generation unviable as a private sector operation. Politicians should realize that decarbonization and denuclearization are incompatible goals.

Second is the allocation of the costs of promoting electrification. Take the soaring crude oil prices we are currently experiencing as an example. The government appears to be considering subsidies for oil refinery-distributors. However, it was supposed to have been exploring ways to put the use of fossil fuels at an economic disadvantage through a carbon tax or other means. Soaring fossil fuel prices are “desirable” from a climate change perspective. But unless the price of the electricity that replaces fossil fuels is reduced and electric vehicles become less expensive than internal combustion engine vehicles, the general public will bear the brunt of the high energy costs. A sustainable structural transformation requires the burden to be reasonable. A long-term strategy is required.

Initiatives Aimed at Boosting National Electrification Rates

In order to raise the electrification rate, some countries have announced that they will ban the manufacture/sale of gasoline and diesel cars by 2030 or thereafter. Japan also is targeting 2035 as the year in which all new cars sold will be electric vehicles. The idea behind this is that the goal of carbon neutrality by 2050 cannot be met otherwise, given the longevity of cars.

Urgent action is required on housing, which lasts longer than cars. Multiple local governments in California have enacted laws banning the installment of gas pipelines in new housing construction. There is a movement in the UK as well to regulate gas pipeline connections in newly built housing in 2025 and beyond. Our response to climate change requires phasing out gas, gasoline, and other fossil fuels and intensifying electrification, but a disaster-prone country like Japan may have its resilience enhanced by having multiple sources of energy. It is necessary to work towards carbon neutrality through a wide variety of paths, but there is a strong tendency to accelerate measures to tackle climate change by giving them priority in the economic recovery from the coronavirus crisis.

The climate change law passed by the French parliament in July 2021 also deserves attention. It sets forth ambitious policies in a wide range of areas including the elimination of airline flights for short-distance routes that are connected by 2.5 hours or less by rail, reduction of the CO₂ emissions of a car to 95g/km – a level that a highly efficient car can barely meet now – by 2030, and provision of vegetarian meals in school lunches (given the high CO₂ emissions from the dairy sector).

Executing this aggressive social transformation through the coercive power of the law requires significant political will. It is

necessary to address the Japanese public forthrightly and candidly that the target of achieving net-zero GHG emissions by 2050 comes with risks as well as the chance that it provides.

The Tasks Ahead

We must not let the momentum created by COP26 go to waste. Instead, we must accelerate our efforts geared to the transition to a sustainable society. But we are beset at the moment by all sorts of emerging energy crises. In Europe, electricity and gas prices are soaring due to insufficient natural gas supplies, drought in Northern Europe, and widespread decline of wind-power output. China has been unable to keep pace with the rapid rise of electricity demand since the onset of the coronavirus crisis, leading to rolling blackouts and a nationwide order from Beijing to increase domestic coal production by 220 million tons. The impact can be gauged by comparing this with Japan’s annual coal consumption of 170-180 million tons. China did bring three new nuclear power plants into operation in 2021 and has worked forcefully to introduce renewables through subsidies, but it is surely inevitable as a matter of the nation’s energy policy to use coal if it cannot otherwise satisfy electricity demand.

These energy crises are not merely fire on the other side of the sea. Already, electricity fees are also rising in Japan to absorb the cost of natural gas, which is linked to the international market. Supply is tight nationwide this winter, barely able to clear the 3% capacity reserve margin threshold considered the minimum necessary to insure against emergencies. But the threat of an energy crunch for the second consecutive winter is a natural consequence of the introduction of massive amounts of renewables while deregulating electricity and the long-term suspension of nuclear power plant operations.

Japan is no exception in the need to explore a realistic compromise between the transformation of the energy that underpins human society and climate change countermeasures. Subsidies have resulted in the introduction of large amounts of renewables online, but renewables have yet to come of age as an industry. The 10-years-and-counting blank in nuclear power is making it difficult to maintain the necessary technology and human resources. And the economy is too battered to adopt a forceful policy for electrification. It looks like a deadlock, but the way ahead is clear. The key, then, is the determination of the politicians... and the will of the people who elect them.

JS

Sumiko Takeuchi is a director and senior fellow of the International Environment and Economy Institute (IEEI), joint founder and representative director of U3 Innovations LLC, and specially appointed professor at Tohoku University.