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POLICY Q&A

AN INTERVIEW WITH YU NAGATOMI

Japan's Low-Carbon Transition

By SARA ITAGAKI

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Since long before the Kyoto Protocol, Japan has been a strong champion of addressing climate change and mitigating carbon dioxide emissions. Yet after making drastic cuts to nuclear power following the 2011 Fukushima Daiichi accident, Japan has been forced to re-evaluate its strategies to promote energy and environmental security. As the country continues its transition toward a low-carbon economy, NBR spoke with Yu Nagatomi, Senior Researcher of the Electric Power Group at the Institute of Energy Economics, Japan, to understand the changes currently happening in Japan.

What priorities and targets has the Japanese government set for strengthening the country's energy outlook?

The core priorities of Japanese energy policy have traditionally been encapsulated in the abbreviation "3E," which stands for energy security, economic efficiency, and environment. After the Great East Japan Earthquake, "safety" was added to this mix. The government of Japan characterized the basic viewpoint of its energy policy as "3E + S" in the new strategic energy plan and described it as follows: "The point of the energy policy is to first and foremost ensure stable supply ('energy security'), and realize low cost energy supply by enhancing its efficiency ('economic Efficiency') on the premise of 'safety.' It is also important to make maximum efforts to pursue environment suitability ('environment')." After the Fukushima Daiichi accident in 2011, safety has become one of the most important elements of Japanese energy policy. Unless the Japanese government can assure the public of the safety of nuclear energy, it cannot play a major role in the national energy mix.

Yet this has posed a dilemma for Japan's policymakers. In the previous strategic energy plan announced in June 2010, the share of zero-emission power sources such as nuclear and renewables was expected to reach 70% in 2030. To achieve this target, the 2010 energy plan aimed to construct at least fourteen more new nuclear power plants. Yet in the aftermath of the Fukushima Daiichi accident, no one in Japan still believes that this many new nuclear power plants will come online in the near future. The plans for the majority of these projects have been suspended, and even current projects near completion will likely not go online soon since priority is given to verifying the safety of existing plants. Thus, for the Japanese government the most urgent priority is to restore the public's trust in nuclear power and pursue the safest standard for nuclear power plants in the world. Otherwise, renewables, instead of nuclear, would be obliged to account for the overwhelming share of the generation mix to reach Japan's greenhouse gas (GHG) targets.

YU NAGATOMI is a Senior Researcher of the Electric Power Group at the Institute of Energy Economics, Japan.

How does the government's approach fit together with the goals of the 21st Conference of the Parties (COP21)?

The transition pathways laid out in Japan's intended nationally determined contribution (INDC) for COP21, such as almost doubling the share of renewables in the power-generation mix to 22%–24% by 2030, must be understood in the context of 3E + S, which stresses a balanced energy mix. Based on this principle, the government views that a biased portfolio of energy sources is vulnerable to impacts from energy-supply disruption. Just after the Great East Japan Earthquake, the energy source that supported Japan's daily livelihood and national economy was not nuclear nor renewables but fossil fuels. The disaster reminded us of the importance of fossil fuels in situations of emergency. For these reasons, it is not an easy decision for Japan to get away from fossil fuels in a single step. However, the new energy plan and the 2010 energy plan clearly share the vision of transitioning to a low-carbon society. Looking even further, the government has additionally announced an ambitious goal to reduce GHG emissions by 80% by 2050. It is clear from these targets that Japan recognizes that it must embark on a path to a low-carbon society.

In this context, the challenges ahead for Japan are related to how fast and how broadly the expansion of zero-emission energy will take place. The target for renewables to reach 24% of the power mix in 2030 does not seem to be high enough when compared with the targets of other developed countries. Yet this target clearly indicates Japan's commitment to laying the foundations of a low-carbon energy mix for the future, such as through the introduction of feed-in-tariffs (FIT) for renewable energy options in 2012. At the same time, these efforts must take into consideration constraints and challenges such as cost, security, Japan's geography, and the limitation in its transmission network.

At the same time, the government of Japan is planning to improve energy efficiency even beyond the current level, which is already one of the highest in the world. This is happening at a breakneck speed faster than efforts in the post–oil shock era in the 1970s, driven by the impetus to achieve the GHG target with some amount of coal, natural gas, and crude oil. In my view, Japan's energy-efficiency target is one of the most ambitious goals in the new energy outlook. Thus, if we look closer at the details of the new energy plan and the new energy outlook, it is clear that achieving the target of reducing GHG emissions to 26% below 2013 by 2030 will be a great challenge for Japan.

As you noted in 2012, Japan enacted feed-in-tariffs guaranteeing profit margins for five renewable options—wind, solar, small- and medium-scale hydropower, geothermal, and biomass.[1] How has this policy evolved in the past four years? Has it been effective in promoting the expansion of renewable energy?

Each year since the enactment of FIT, the government has revised the tariffs to suppress the surcharge in tandem with the decreasing cost of renewables. Despite this practice, the profit margins under FIT have still been extremely attractive to renewable generators. The program has strongly helped the increase of their generation capacity of renewables. As of June 2016 the total amount of approved capacity is more than 87 gigawatts, which is almost half of peak demand in Japan. This quick expansion has revealed some of the issues facing the expansion of renewables. For example, the approved capacity of photovoltaics in the Kyushu area is more than the physically acceptable amount in light of the network capacity of the Kyushu Electric Company. Therefore, the company had to announce a limit to the acceptable amount of each renewable in 2014. Some electric companies have followed Kyushu Electric's practices due to high penetrations of intermittent renewables.

The experience of many European countries clearly showed that FIT is one of the strongest policy measures. In the case of Japan, however, because higher tariffs caused an excess of investment, FIT may not be an effective way to promote the expansion of renewables. The immediate rise of intermittent renewable power driven by FIT policies revealed that one of the limits to expanding renewables is the national power grid. In light of this realization, the Japanese government has finally decided to amend the FIT act to exclude dishonest business players and to better match the current transmission network in Japan. The amended act, set to come into effect in April

[1] Risaburo Nezu, "Japan's Energy Supply Mix and the Economic Impact," Interview with Dai Nagata and Toshie Ando, January 7, 2013, http://www.nbr.org/research/activity.aspx?id=299.

2017, will also introduce auction mechanisms for some renewables to suppress surcharges on FIT. Overall, FIT encouraged business players to invest in renewables. Yet going forward, Japan must consider how best to realize the expectations for renewables in deregulated electricity markets to get to the next stage of FIT.

In tandem with the above efforts, Japan has moved to deregulate electricity markets in the hope of introducing competitive pressures to lower power-generation costs and improve emissions efficiency.[2] How might this initiative affect national targets for carbon mitigation?

Deregulated electricity markets are predicated on the competition between different providers. Power generators are expected to switch to cheaper sources under competitive pressures. One of the immediate responses to this intensified competition is the increase of new coal-power projects by both smaller entrants to the power market and existing large, regional electricity producers given the cheap abundance of coal. This new trend has raised deep concerns by the Ministry of Environment. The "dash for coal" has occurred because while nuclear remains an important cheap power source, it is difficult for new entrants to have their own nuclear power plants for technical reasons.

On the other hand, natural gas is expected to play a prominent role as a bridge fuel between deregulated energy markets and GHG targets. New entrants such as gas companies and some oil companies are able to deliver natural gas using their own facilities. In addition, the efficiency of natural gas power plants is higher than coal power plants. The key challenge remains for natural gas on how energy companies will be able to reduce the cost of importing LNG.

On top of these challenges, even the big electric utilities that already have nuclear power plants are struggling with nuclear reactor restarts. Beyond the strong opposition from the public, the utilities face tough, arduous meetings with the new Nuclear Regulatory Authority. This is chiefly because the prolonged licensing procedure lacks clear criteria for evaluating applications. Thus, nuclear is not an attractive option for new market entrants. When they look beyond nuclear there are only three competitive choices for power generators: coal, natural gas, and renewables supported by FIT. Yet having such limited option is not good for the country, because Japan needs to have "all of the above" energy sources to achieve 3E + S.

Amid these emerging trends, there needs to be strong support for renewables to play a key role as low-carbon energy sources, particularly because they contribute to both energy security and GHG mitigation. The question ahead for renewables is how the Japanese government identifies the positive effects mentioned above from market deregulation while also addressing market externalities and consumer preference for renewables in the liberalized market. Almost all stakeholders that produce renewable energy are supported by FIT, which means that currently it is not markets that are driving the expansion of renewables but policy. As I mentioned earlier, the current FIT policy is not a sustainable way to expand the market for renewables. The government expects that deregulation would encourage power retailers to provide more varied services to customers, including rebates for power from renewables.

What role might consumer choice play in the expansion of renewables in power generation?

As consumers are now able to choose their electricity sources, the government hoped that consumers would choose renewables from among the available options. But some opinion surveys found that many chose their power retailer based on cost without much concern for whether their electric power is green or not. Thus the number of consumers who will choose low-carbon power depends on how well power suppliers and consumers could engage in a dialogue with each other through markets. If consumers express their strong opinions about renewables or retailers provide attractive green-power options, markets are expected to respond. However, the current costs of renewables are still higher than for other power sources. Thus, Japan should implement policy measures that will capitalize on the positive effects unleashed by both deregulation and the FIT program, while addressing externalities in power markets. If left alone, deregulated markets will not realize the expected

[2] Koichiro Ito, "Reforming Japan's Electricity Sector: Abe's Push for Deregulation," Interview with Jennifer Steffensen, October 23, 2013, http://www.nbr.org/research/activity.aspx?id=368.

role of renewables in the energy mix or achieve a desirable emissions target.

In the long term, we need to consider the impact of technological development. The cost of renewable energy is decreasing year by year. Sooner or later, the cost of renewable energy will be lower than the retail price as a result of grid parity. Renewables could be expected to become an economic choice for customers in the near future. At the same time, we must also pay attention to the increasing hidden costs of intermittent renewables in tandem with the growing of share of those renewables (for example, the backup cost of intermittent energy, investment on the transmission line, and so on).

To what extent might the ongoing reintroduction of nuclear power affect views on the particular tactics, strategies, and priorities for Japan's overall energy mix? What impact might this have on efforts to accelerate the expansion of renewables?

For the electric utilities and government of Japan, to restore the public's trust in nuclear power and the restart of the nuclear power plants is their first-order priority. On the other hand, the utilities swiftly decided to shut down old and small nuclear power plants based on their profitability. Thus, at this moment it is extremely difficult to assess the impact of debates happening at various levels about the reintroduction and replacement of nuclear power plants on the future energy mix because there still remains a long list of issues to be resolved. Some of the most important outstanding issues are the licensing procedure for the restart, regular inspections, and special inspections for lifetime extensions. Criteria for how detailed safety assessments should be have not yet been discussed nor shared with the stakeholders. This is why the Nuclear Regulatory Authority has been taking a longer time than the utilities had expected to establish safety criteria. The utilities will not make any further investment decisions until definite criteria for the assessment are determined.

Another hurdle to restarting nuclear power plants is the local courts. Although the Nuclear Regulatory Authority approved the safety of plants, local courts have imposed provisional disposition orders to stop restarts. These rulings have been directed at the agency's handling of safety issues, including safety standards. Court decisions have mainly focused not on the safety standards themselves but on the administrative procedures of nuclear policy in other countries. These decisions in Japan are exceptional cases in the global context of lawsuits over nuclear safety. Thus, the electric utilities face not only uncertainty about safety standards but also unexpected challenges from judicial decisions.

If the government of Japan and utility companies are unable to achieve the necessary share of nuclear in the power generation mix, renewables must make up for the lack of low-carbon energy. The current target share of renewables is estimated based on the maximum amount of renewables that could come online in the current national power grid. Thus, if the Japanese government sticks to the GHG target without nuclear, natural gas might have a more prominent role in the future energy mix. In the long term, renewables must increase regardless of whether or not nuclear makes up a certain share to achieve GHG targets beyond 2030. The government and utility companies will be required to make continuous efforts to incorporate more renewables in Japan's energy mix. In addition to what I mentioned above, there are still many items on the agenda to be addressed, including strengthening the power network, increasing energy storage, and developing hydrogen power.

What do you see as the greatest hurdle ahead for Japan to achieve its emissions and energy targets?

The greatest hurdle ahead for Japan is in articulating a clear vision for the future of nuclear energy. While a majority of the public has been opposed to the restart of nuclear power plants since the Fukushima Daiichi accident, there is still uncertainly over how many plants will be restarted, replaced, or have their lifetime extended. As I mentioned, the first-order priority of the government's energy policy is to restore the public's trust in nuclear power. To implement the new energy plan, the government must address many issues, such as the safety standards, judicial issues, fuel-cycle issues, and profitability in a deregulated market, and public opinion. Particularly, profitability in the new deregulated market is a common issue for conventional and nuclear power plants. A regulated market will ensure that power plants have a stable cash flow and guarantee profit margins.

Yet some EU nations and states in the United States have faced declining incomes from conventional power generators once switching to deregulated markets due to lower energy prices and higher penetration of renewables. In this context, the United Kingdom and the state of New York have announced new policies such as the FIT contract for difference and zero-emissions credits to support nuclear power as a key-player in efforts to mitigate GHG emissions and enhance energy security. If Japan loses nuclear as a viable energy option, either economically or politically, it cannot achieve any of the targets in the new energy plan. As the country continues its energy transition, politicians will require immense political resources to recover the public's confidence and draw a detailed roadmap for nuclear energy beyond just setting a numerical target in the new energy outlook. ◈

This interview was conducted for NBR's Pacific Energy Summit initiative. By bridging the commercial, public, and nonprofit sectors, the Summit informs policy and inspires collaboration to help support sustainable economic development. Learn more at pacificenergysummit.org.

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NBR is pleased to invite you to a high-level discussion on factors shaping Asia's energy future. This on-the-record event will examine how a range of factors—including lower oil prices, efforts to accelerate lower carbon transitions, regional geopolitics, and Paris Climate Accord commitments—will shape energy security outlooks in the Asia-Pacific. The event will also feature a discussion of the implications of the United States' leadership transition for U.S.-Asia energy ties.

Following the discussion, please join the panelists at a cocktail reception.

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Additional Senior Policy Representatives (invited)

The event will mark the launch of NBR's twelfth annual Energy Security Report, "Asia's Energy Security amid Global Market Change," as well as recap findings from the seventh annual Pacific Energy Summit, held in Singapore earlier this year.

To RSVP, register here or contact Ashley Johnson at eta@nbr.org.

Kindly note that space is limited, and on a first-come, first-served basis.