



The future of Japan's energy and environmental policies

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This is the fifth and final article in a series of reports about Japan's energy policy.

In the first four parts of this series, I mainly outlined the current state and challenges facing the supply side of energy. But reflecting the growing popularity of the sharing economy and progress in digitization, we are going to see a sea change in how we use energy. In the last entry in this series, I'd like to think about both the supply and demand sides of Japan's energy, which is at a major turning point.

The catalyst for drastic change in Japan's energy and environmental policies is the Fukushima No. 1 nuclear power plant disaster that started in 2011. Until then, the government had focused on raising the ratio of nuclear power generation to tackle the burgeoning crisis of global warming, but the disaster brought an abrupt about-face, with Tokyo now seeking to reduce reliance on nuclear power as much as possible. In addition, the government has deregulated the postwar power industry structure under which regional power monopolies had dominated the supply chain from generation to retail. The deregulation still requires more revisions, but it is hoped that the paradigm shift under which the adjustments of supply and demand are now entrusted to the market economy rather than the monopolies-led supply chain will be an important starting point for future reform. And in a new environment with a completely liberalized market, Japan has to work through the following four changes.

The first is depopulation. Japan is facing a population decrease, the scale of which the world has never experienced, and half of the nation's cities, towns and villages could cease to exist by 2040. Rapidly depopulating regions are already facing difficulties in maintaining all kinds of social network infrastructure, such as energy and water supplies, and transportation. Several municipalities have suffered from a loss of gasoline stations, and in the near future, maintaining the nationwide power

transmission network will also run into problems.

The second is decarbonization. Japan has envisioned a society where carbon dioxide emissions would be cut by 80 percent by 2050. The drastic reduction in carbon dioxide would require a shift to electrification of energy demand and low carbonization of power sources. The electrification of demand means a shift to electrification of equipment that previously used fossil fuels as energy to move, as exemplified by a shift to electric vehicles from gasoline-powered cars. The electrification of demand is combined with generating CO₂-free electricity via renewables or nuclear power. Electricity and hydrogen can be made without emitting carbon dioxide, depending on methods of production, and we need to make the best use of them as much as possible. If low carbonization of power is pursued to the best extent possible under this theory, a trial calculation of supply and demand shows that Japan's power demand could grow about 25 percent from 2013 levels by 2050. Unless we curb the ratio of thermal power generation to about 35 percent of the power mix, we would be way off the target of an 80 percent CO₂ reduction by 2050. Even if we used the government's most ambitious renewable energy introduction outlook, renewables would only cover about 55 percent of projected power demand in 2050. If we put priority on achieving the 80 percent greenhouse gas emissions reduction target for 2050, the remaining 10 percent of demand would need to come from nuclear power.

The third is decentralization. Previously, it was the era of mass production where power generated at large-scale power plants is transmitted over long distances to consumption areas, but what's on the rise now is distributed power generation technology that generates electricity closer to where it will be used, such as solar and wind power. The factors that hindered their growth was mainly the high cost and the fluctuating power output depending on the weather. But in terms of cost, the price has declined exponentially in recent years. To control an unstable output would require such things as expanding power transmission networks or storing electricity in power storage batteries, but the price of storage batteries is expected to decline further, which could make them come into popular use. Storage batteries have traditionally been supported by demand for a backup power source in case of disasters, but the decline in cost could pave the way for making the most out of zero-marginal-cost renewable energy.

The last is digitization. Most of the global population now uses the internet and stays connected. In addition, the dramatic decline in sensor prices has made it possible to quantitatively grasp ideas for products and services that consumers desire. Reflecting

changes in the preferences of consumers fed up with a deluge of goods in their lives, all businesses that have previously supplied goods as tools are now shifting their focus to offering a strong customer experience. Tire manufacturers, for example, are making a transition to offering sensor-embedded tires to customers to provide optimal maintenance services at optimal timing. Energy is just a means of moving equipment that makes people's lives more convenient. We may see the advent of service providers that do not offer such equipment as cars, air conditioners and refrigerators but instead offer such value as mobility, a comfortable indoor environment and proper management of necessary food. There is great potential in the world of energy, too, for digitization to create new businesses and change the industrial structure.

These trends prompting a revolution in Japan's energy industry are inescapable and some of them have already made substantial headway. It's important to picture the future of Japan's energy industry that is led by these big trends as well as to see how to connect the dots toward such a future. A few decades may not be enough time to change the social infrastructure of energy, but the transition is definitely underway. It can be said that Japan now stands at the crossroads of a good future and a bad one.