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Sumiko Takeuchi

Five Issues Confronting Energy in Japan

(Summary of speech)

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Dr. Sumiko Takeuchi, Senior Fellow and Board of Directors Member, International Environment and Economy Institute: The Government of Japan is raising renewable energy as the main source of power for its vision of the future of Japan's energy. Because it will be the main power source, it will be a problem if it is not cheap. The cost of the world's renewable energy has become lower to a certain extent. Setting aside assessments of competitive power, it has become substantially lower compared to five or 10 years ago. It goes without saying that Japan should be in line with the rest of the world, and must at least decrease costs of its coal-fired power plants and its natural gas power plants and gain competitive power.

Japan has introduced the feed-in-tariff (FIT) system, but it is very doubtful that the system's cost decreases have been progressing as much as expected.

Furthermore, when we speak of the term "renewable energy," we take up the naturally varying power supplies of sunlight and wind power, which will mainly greatly spread going forward. A further problem of the proliferation of those main energy sources is how to manage the fluctuating technology.

In 2050 or 2100, renewable energy will probably be cheap and storage technology will probably develop. There are two points that should be considered to tide over until then. The first is the need for investment in power lines, also known as the grid. It is necessary to strengthen the power lines to deliver renewable energy to distant consumption areas so everyone can use it. However, what we must consider at the same time is Japan's rapidly decreasing population and accelerating depopulation, which is progressing like nowhere else in the world. Looking at the progress of storage battery technology, it is necessary to think consistently so there is no futile social investment.

Another point that should be considered is maintaining thermal power generation, which is a regulated power source. Power from renewable energy fluctuates. Because of this, renewable energy needs thermal power for a regulatory role. Nevertheless, ESG investment has increased recently, and we are in a situation in which it is difficult to invest in thermal power. In order to spread more renewable energy, although it is necessary to maintain thermal power to a certain level and have high optimization and de-carbonization for this, it seems that current discussion of ESG investment neglects this point.

Furthermore, nuclear power is a very major technology in terms of de-carbonization. However, it is certain that deregulation is incompatible with it because enormous investment has been collected for a very long period of time. It is necessary for Japan to incorporate viewpoints on how to handle nuclear power in its policies.

The changes attacking Japan's energy can be organized into five "D's." The first is the decreasing population and depopulation. This is progressing at a speed unlike any other in the world. Maintenance of power grids is the most affected by this phenomenon in the energy field. Japan has been transmitting stable energy to each and every remote village that is at the same price as in the cities. However, with the progression of the decreasing population and depopulation, it will become necessary to think about the maintenance costs for power lines amidst mountains where barely anyone lives. It will be thinking about whether to stop the support from the people of Japan. One method would be having a portion of areas go off-grid at some point and having them receive power via renewable energy and storage batteries.

Another "D" is de-carbonization through warming. Japan has included an 80% decrease in greenhouse gas emissions by 2050 within its global warming countermeasures plan. Japan's CO₂ emissions in 2013 were 1.41 billion tons. An 80% decrease of this would be just under 300 million tons. At the time in 2013, this number was roughly equal to the combined value of CO₂ emissions by Japan's steel industry and its chemicals industry. There were not that many technological options to realize such large-scale de-carbonization. Utilization of secondary energy is effective for this. If we look at the overall energy currently used by Japan, only 30% is electricity. 70% is non-electrified. Examples include the gasoline in gasoline-powered vehicles and the heavy oil that powers factory boilers. Burning fossil fuels as they are and using that energy constitutes 70% of use. If we want to drastically reduce CO₂ emissions, naturally we must aim at this 70%. However, there are only two methods for decreasing CO₂ emitted by this non-electrified power. The first is high optimization. It is improving fuel consumption of vehicles. However, this technology is suitably maturing. The remaining method is usage control. However, usage control of energy places a major burden on citizens, and is a step that absolutely must not be taken. Secondary energy use is a method for decreasing CO₂ emissions without controlling energy usage. Electricity and hydrogen are forms of energy that can be procured without emitting CO₂ according to the way of producing them. Energy can be obtained without emitting CO₂ by linking renewable energy, nuclear energy, and CCS technology. There is still no infrastructure to distribute hydrogen, so electrification will probably take priority amidst secondary energy. It is

necessary to thoroughly advance the combination of “de-carbonization of electricity sources” and “electrification on demand.”

The progress in introduction of decentralized power is also boosting demand for de-carbonization. This is the 3rd “D.” Decentralized power is a form of renewable energy for solar and wind power. However, decentralized energy cannot cover everything. Maintaining the regulatory role of thermal power is necessary for good handling of renewable energy with natural variability, and is the reason that the 4th “D” is needed.

The 4th “D” is correcting deregulation. Deregulating power generation business and expanding renewable energy by protecting it through policy results in thermal power plants only serving in a regulatory role. In a situation with a market that has no choice but to pay the equivalent value for kWh, there will be a disappearance of power plants that provide the necessary kW and changing kW values that are necessary to maintain the stability of the power network. The problem is how to maintain thermal power in such a situation.

The 5th “D” is digitalization. It is necessary to utilize various digital technologies, but for this there needs to be reform of regulations and the tax system. For example, there is a need for measurement of electricity usage through a meter possible in the consumer’s presence through regulation via the Measurement Act. In order for someone to think about selling the solar energy he or she creates to the neighborhood, a portion of the Measurement Act must be amended. With just the technology of digitalization, there would be a need to change the system in a futile way at the same time.

Toward making renewable energy the main source of energy, it is necessary to have careful discussion for lowering costs and energy-neutral carbon pricing for de-carbonization. The current FITs are carrying energy costs as an additional form of electricity prices. Electricity charges rise as renewable energy increases. This impedes electrification, the de-carbonization theory, and is not adjusted through policy. This discrepancy should be eliminated.

Furthermore, it is necessary to have appropriate relaxation or reconstruction of regulations toward utilization of distributed energy technology. The spread of electricity storage technology is necessary, but placing storage batteries in each household would be exceedingly useless. For example, by using a portion of electric vehicle batteries as a

form of stable electricity supply, the energy and automobile industries would in that sense unite. This method would entail a cross-sector change by utilizing a portion of electric vehicle batteries as a form of stable electricity supply.

Without such methods, renewable energy as a main source of power cannot be established. Discussion is ongoing in Japan on using policy to support the smooth accomplishment of a switch to using renewable energy as the main source of power.