

Does Japan Have the Future with Nuclear Power?

Science, Technology and Sustainable Development

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Term Paper

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The series of Fukushima nuclear accidents in March 2011 caused by the earthquake and tsunami on March 11<sup>th</sup> involved meltdowns of three nuclear reactors and subsequent hydrogen explosions that spewed vast radioactive plumes into air flow and displaced more than 150,000 local residents. Nowadays, nuclear development in both developed and uprising countries has become the main subject of sustainable development as a powerful tool which affects politics and economics among both allied and confronted states in the international order. Especially, not only governments but also its citizens have become sensitive about this topic since Chernobyl in 1986 and Fukushima in 2011. Some developed countries such as Germany have manifested decommissioning nuclear reactors in the country, and then have shifted its energy policy to focus on renewable energy resources. In response to this change, Japan should follow the international criteria as a developed country. Tom Corben pointed out that nuclear power is gaining significance not only as a strategic asset but also as a strategic vulnerability in the international community (2017). However, it is the fact that related information is strictly controlled by its authorities as the state secret. There is little amount of information the people can reach even it has been 7 years since Fukushima, and there are tons of things that have never been uncovered such as the aftermath of the accidents and atmospheric radioactivity in the surrounding area. This paper will examine the context of nuclear plants development in Japan and some accompanied tasks such as problems over its security and management.

Before examining the main point, it is necessary to know the degree of information control by the Japanese government. This is because each state tends to control any information about states secret; for example, the case of Fukushima not only for Japan, but also for the country holding the nuclear power plants. In Japan, nuclear energy has come under public discussion, and public dissatisfaction towards the government's way of dealing with national nuclear development has increased dramatically after 2011. At the same time, public attention pivoted to media blackout by the government such as television and newspapers. There were many medias reported the situation every day all day, but all channels represented exactly the same contents and statistics provided by the officials (Funabashi and Kitazawa, 2012). Residents in the surrounding area of the nuclear power plants seriously requested briefing sessions and evacuation instructions because they kept feeling uncertainty for relevant information disclosed by the government and Tokyo Electric Power Company (TEPCO). Reporters Without Borders reported that Japan is ranked 67<sup>th</sup> in 180 countries in the degree of freedom of the press of the country (RWB, 2018). It shows that nationalists tend to oppress journalists who are critical of the authorities or cover antipatriotic subjects such as the Fukushima crisis. Under the circumstances, it is difficult to assess nuclear

development in Japan; however, the crisis in Fukushima, like the accidents at Three Miles Island and Chernobyl, has been prompting countries around the world to reassess the safety of their plants and their nuclear possessions.

It is important to understand the reason why Japan has relied on nuclear power for electricity. Japan before March 11<sup>th</sup>, 2011 relied on 54 active nuclear reactors for almost 30 percent of all electric generation, which still ranks the third state of possessing nuclear power plants after France and the United States. Based on an energy policy called 3Es, focuses on energy security, economic efficiency and environmental protection, the government had set its own 'safety net' for nuclear power plants. In other words, it was believed that nuclear power generation fulfilled all these criteria. As of June 2018, there are 60 nuclear reactors including decommissioned furnaces. And among them, there are 9 nuclear reactors in operation, including under inspection (Agency for Natural Resources and Energy, 2018). Since the accident, Japan has been reviewing its own dependency of electricity generation by nuclear power plants. According to the same report, the percentage of nuclear power generation declined to 2.8 percent followed by increasing consumption of other natural resources (2017). Approximately 80 percent of electric power generation in the country relied on thermal power plants (Liquefied Natural Gas: 38.7; Coal: 30.4; Oil: 4.1; Other: 8.5) and renewable energy occupied only 15.6 percent (Institute for Sustainable Energy Policies, 2018). Although the percentage of electric generation with renewable energy resources is increasing year by year, it is obvious that it is still a small proportion compared to other developed countries. Japan has been behind other developed countries in terms of efficiency of energy usages because of lacking the land and domestic natural resources reserves. Japan struggles with not only lacking enough space for constructing facilities for wind power generation and hydroelectric power generation, but also heavily relying on the massive amount of import of many natural resources for thermal power generation; therefore, nuclear power generation is the key to supply sufficient electricity to the total population stably (Feldhoff, 2014). According to the report from the Ministry of Economics, Trade and Industry (METI), the increased use of thermal power plants resulted in increasing the fossil fuels import, and dependency on these imported fuels increased to 89 percent in 2016 (2017). As a result, No. 4 reactor in Kyushu area resumed operation after inspection under new safety standards (Yamashita, 2018). All these changes showed that Japan has now struggled with its energy strategy. In other words, Japan without nuclear power is anything but a sure bet (Takubo, 2011).

Japan's energy policy is confronted with increasing cost of energy resources as well as addressing nuclear safety and the adverse effects of its energy and power demand trajectory both on the economy and environment (Vivoda and Graetz, 2014). As mentioned before, the

government had justified its nuclear power generation by saying it fulfills the energy policy, 3Es. Theoretically, developing nuclear power plants meets following three conditions which attain the policy: First, a sufficient amount of electric power can be stably supplied both to industry and household since a large amount of energy can be taken out with a small amount of resources. Setting nuclear power as a major pillar in the longer-term energy policy was to reduce dependence on imported oil and coal (Pickett, 2002). Second, the nuclear power generation has a highly efficiency of electric power; therefore, it contributes to high self-sufficiency rate of electric generation. Third, the nuclear power generation does not emit greenhouse gases which cause global warming during the process. The amount of greenhouse gas emissions by thermal power electric generation in Japan accounted for one-third of total amount of greenhouse gas emissions (Agency for Natural Resources and Energy, 2017). For these reasons, nuclear power generation in Japan has been justified. However, this policy has been no longer effective after the crisis as safety and security issues have emerged. Reviewing the energy policy, the government newly added 'security' to the existing policy, 3Es+S, and established the Nuclear Regulation Authority (NRA) in 2012. Believing security is the most important indicator of energy policy, the new safety standards focus on not only more efficient management of nuclear power plants, but also potentially associated accidents such as evacuation instruction. It also emphasizes that electric utilities that operate nuclear power plants should achieve utmost sincerity to safety concerns among local governments and communities, especially towns within 30-kilometer emergency planning zones (Nikkei, 2012). Japan since the crisis has faced energy security challenges by questioning the accountability of nuclear power generation in terms of safety management. Alternatively, renewable energy resources have been emphasized as materials which attain the 3E+S policy. However, as mentioned, Japan stays behind due to geographical reasons.

In order to think about the future energy policy in Japan, it is necessary to examine some disadvantages of nuclear power generation. First of all, there is a possibility of accident. The government implements various kinds of multilayered safety measures for nuclear power plants, but it is impossible to assert there is no risk. The case of Fukushima uncovered the lack of preparation to deal with chain-reaction accidents due to a public myth of "absolute safety" (Funabashi and Kitazawa, 2012). As long as Japan is a country struggling with a potential of natural disasters such as earthquakes, like the March 11, it is inevitable that unforeseen accidents occur not only by natural disasters, but also by human disasters. Secondly, there is a problem of radioactive waste disposal. Technically, geological disposal is internationally valid to solve the problem, but it gives another problem that there is no enough space to dispose it in Japan as a small island state. These two points have been discussing

carefully and were emphasized when modifying the new safety regulatory standards which will be discussed later. In addition to these two main issues, it is possible to point out the potential of diverting to nuclear weapons and being abused by terrorists. In order to prevent this, there is an international framework such as "Treaty on the Non-Proliferation of Nuclear Weapons (NPT)" and "Convention on the Physical Protection of Nuclear material", and Japan implements "Regulation of Nuclear Source Material" to manage nuclear power plants. It is impossible to remove all these risks as long as Japan continues using nuclear development. Therefore, it is necessary for the society to share safety goals how to accept these potential risks of nuclear power plants based on a new energy policy. In other words, it is necessary to provide sufficient information about social safety to the public in an easy-to-understand way. Even if Japan continues to use nuclear power in the future, such a nuclear disaster should never happen again. The civil society opposes to building anything new related to nuclear power without clear explanation and regulation about a policy change (Iida, 2012). Safety agreements between nuclear plant operators and local governments generally require utilities to secure the advance consent of the local governments when new reactors are built, or important changes are made to existing facilities. People at the center of management such as the government and TEPCO are required to stably and safely operate nuclear reactors more than before. After the accident, the regulatory structure has been fundamentally reviewed by the NRA, and it is said that newly developed safety standards are the strictest standards in the world. But it is not enough to only achieve the regulatory standards. This is because TEPCO has not confirmed that there were regulatory criteria violations in Fukushima, but as considering that they could not prevent the accidents, the new regulation should be recognized as the minimum requirement, not as the goal of achieving safety (Funabashi and Kitazawa, 2012). The main focuses in the review of Japan's nuclear reactors after Fukushima were Japanese government's and TEPCO's poor risk management practices and lack of communication. Funabashi and Kitazawa pointed out that TEPCO's lack of adequate preparation with incompetent handling of the aftermath of the disaster came from its management structure as well as limited provisions for an extended loss of power in government's accident-management policy (2012). This issue has raised even after the earthquake in Niigata on July 16<sup>th</sup>, 2007 questioning transparency and safety of nuclear power plants management (Pinto, 2007). However, this case did not cause serious aftermath such as explosion and massive radioactive emission, so no one took it seriously at all and the public awareness was quite low. In response to the Fukushima, TEPCO and other operators, who are responsible for managing nuclear power plants, should make constant efforts to improve and maintain its safety, and the government must be well-prepared to support them.

Even though the civil society discusses disadvantages of using nuclear power, it is hard to say Japan can be independent from it. This is because Japan is a poor country in terms of natural resources reserves and spaces for alternative energy development as discussed. There is no way to access transnational electricity transmission systems with neighboring countries, thus Japan needs to seek electric self-sufficiency to all domestic economic activities. Moreover, it has been largely supportive of an expansive nuclear policy (Takubo, 2011). For one thing, there is a network between the government and private-sector actors called the “nuclear village” to acknowledge prioritizing the development of nuclear power to maintain national energy security. This acknowledgement no longer plays effectively, but it had encouraged the public to overcome anti-nuclear sentiments connected to the atomic history of Hiroshima and Nagasaki (Funabashi and Kitazawa, 2012). It is the fact that some influential business communities such as Nippon Keidanren (the Federation of Economic Organizations in Japan) have expressed strong opposition to a permanent nuclear shutdown because the Japanese economy would not recover without the resumption of nuclear plants avoiding an increase in electricity prices (Vivoda and Graetz, 2014). Consequently, the nuclear shutdown has precipitated a sharp rise in fossil fuel consumption in the power generation sector, which means increasing natural gas and oil import influenced Japan’s GDP (Hosoe, 2012). Many Japanese companies have been concerned if they maintained their productivity with electric supply without nuclear power plants. There have also been notable outcomes for Japan’s environmental policy following the decrease in nuclear electricity generation. Since 2011, the amount of greenhouse gas emissions in Japan has increased as high as 1990s when the records began; therefore, it is obvious that this increase makes it impossible for Japan to achieve the Kyoto Protocol 2020 target of reducing emissions (World Nuclear Association, 2018). It influenced Japanese economy to take both energy policy and environmental issues seriously. The accident and accompanied issues has reshaped and would reshape nuclear agenda and politics in countries around the world. It makes it clear that the magnitude of a nuclear accident can quickly become so large that no private company can bear the liability. Energy alternatives like renewables become increasingly more attractive and offer more power in small increments at stable or declining prices, providing to be better-suited for a slow-growth economy. However, it is doubtful that Japan has the capacity to shift to these new energy resources.

Japan should not rely on nuclear power generation in the future even though it is difficult to increase the amount of electric generation by renewable energy resources. At the same time, it is essential that acceleration of the reconstruction and steady progress of decommissioning all reactors in Fukushima as well as reassessment of human resources and

technological management to maintain the safety. It is true that renewable energy is gathering attention as an effective tool for solving many environmental problems, but until finding the technological advancements, such as improving power generation efficiency and stabilizing supply rate by renewable energy generation, it is necessary to rely on alternative ways, nuclear power or thermal power in this case (Feldhoff, 2014). A fundamental shift from nuclear power to renewable energy production requires the focus on lower energy consumption through efficiency and conservation. Also, as mentioned earlier, while considering environmental problems such as global warming and depletion of natural resources especially oil, it will not be possible to continue to rely on only thermal power generation which accounts for a large proportion of electricity generation around the world, but it is also difficult to manage nuclear power plants as a whole. As development of electronic equipment, it is important for the society how much demand will increase and how much renewable energy can increase in order to supply sufficient amount of electricity. In addition, it is difficult to eliminate existing nuclear plants at once and the process to decommission nuclear plants takes cost and time; thus, the current society should take an initiative to achieve the energy strategy without putting a burden on the next generation as much as possible. In order to maintain it, we must strictly ask the question who will take a responsibility. The series of accidents in Fukushima revealed that the discrepancy among the government, TEPCO and other related organizations to share information and to deal with the emerged situation made many human errors. Only TEPCO taking all safety measures would lead the same consequences repeatedly, so the government should work on the society to assess the future energy strategy. However, Feldhoff claimed that Japan's new strategic energy plan approved does not show clear indications as an "important base-load power source" (2014). Increasing public awareness of potential energy shortages, which has become a permanent feature of energy policy in Japan, plays a positive role for the society to be interested in nuclear development in Japan and associated problems such as the management of local community security. At the same time, the civil society should be taken into a consideration in the official decision-making process (Dusinberre, 2011; Ogawa, 2014).

The implication of Fukushima is that nuclear power generation is the most fascinating way for Japan, which the country struggles with lacking natural resources on the ground, but it takes high risks in terms of pursuing sustainable development as a developed country. It has been showed by the case of Fukushima involved radioactive effects on the human body after chain-reaction accidents such as hydrogen explosion, and environmental pollution with radioactive waste disposing process. Both are expected as long-term damage in the society. It is said that it would take 50 years to complete all treatments of the aftermath of

the Fukushima crisis. Japan may move away from nuclear power if the state were to be affected by another nuclear disaster again. In the current society where science and technology are increasingly developed, it is necessary to pursue the effective energy policy, which is essential to support industrial economy, in order for Japan to survive as a developed country. It is difficult to remove all nuclear power plants completely until obtaining sufficient amount of energy by renewable recourses. However, in order not to repeat the accident in Fukushima and prevent the country from collapsing due to more serious crisis like Chernobyl, the government should cooperate with all businesses involved in electric power generation such as TEPCO to further advance research and development towards achieving the goals of the new energy policy. The question whether there is the bright future for nuclear power development in Japan is also a question asking for the preparedness of the Japanese society.

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