

# The Nuclear Power Industry in Public or Private Sector:

A comparison of Russian and Japanese Experiences

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*Abstract*— In this paper, the author try to discuss how we should improve the management of the nuclear industries in order to decrease the probability of severe accidents and to lessen the damage caused by them, from the view point of business administration, comparing the experiences in the Soviet Union, Russia and Japan.

The Fukushima Nuclear Accident which occurred during the Great East Japan Earthquake is still badly shaking Japanese society. Back to 1986, Chernobyl Nuclear Power Plant Accident triggered the collapse of the Soviet Union.

The author is not a specialist of the nuclear industry, but she believes that we should start for the denuclearization, because nuclear power generation is not a way of power generation to be controlled safely by humans, at least up to now. But even if we actually launch the denuclearization, it should take long years until we finish decommissioning of all the nuclear reactors, and it is unlikely that the nuclear industry totally will cease to exist. Therefore one of the most important issues confronted by scholars of business management is how we should improve the management of the nuclear industries, especially nuclear power plants in order to decrease the probability of severe accidents and to lessen the damage caused by them .

In the Soviet Union after the Chernobyl accident, the management system of nuclear industries was transformed to be more sensitive to safety based on the assumption that a nuclear power plant is originally dangerous. Such a perspective has been basically maintained through the transition process to a market economy from a socialist one.

In Japan the management system of nuclear industries is in the process of transformation after Fukushima accident. However, the “privately run national program” system of Japanese nuclear power industry, which is considered to be one of the main causes of Fukushima accident, has been untouched.

*Keywords-* nuclear power industry, Russia, Japan, management

## I. Introduction

This paper seeks to discuss how we should manage and operate the nuclear power industry, so that we can reduce the probability of occurrence of severe accidents and minimize the damage they cause, especially from the viewpoint of management, and based on the comparison of the experiences of the former Soviet Union, Russia and Japan.

The accident at Fukushima Nuclear Power Plant No. 1, a result of the Great East Japan Earthquake in March 2011, continues to reverberate throughout Japanese society. The Chernobyl accident, which occurred in the former Soviet Union in 1986, was a tragedy which was a cause of its eventual collapse.

A majority of respondents to polls conducted in Japan after the Fukushima accident have supported denuclearization of Japan’s power generation. In a survey conducted by the cabinet office in July and August 2012 was asked the question, “What percentage of power derived from nuclear power in Japan in 2030 would you support: 0%, 15% or 20-25%?” Based on the tabulated results of the responses, there was more support for 0% nuclear power for each of the three times ((1) questionnaire by phone, (2) questionnaire before respondents’ debate on the issue, (3) questionnaire after the debate) the survey was conducted, with 32.6% in the 1st survey of the respondents choosing 0%, which rose to 46.7% after the debate was over. In addition, of the 89,000 public comments on nuclear power sent to the cabinet office over the same time, around 81% wanted the “complete abandonment” of nuclear power and around 9% wanted a “gradual elimination” (*Asahi Shimbun*, August 23, 2012). In a poll conducted by NHK (Japan Broadcasting Corporation) in August 2012 that asked the question “How many nuclear plants should there be in the future?”, 33.1% stated “None” while 43.4% responded “The number should be reduced” (<http://www.nhk.or.jp/bunken/summary/yoron/social/pdf/110827.pdf>).

When compared with results from polls taken before the accident, it is clear that the accident had a major impact on

Japanese society. With respect to progress in nuclear energy, a survey conducted by the cabinet office in 2009 showed that 59.6% stated “Nuclear power energy should be further developed” (including 49.8% who stated “It should be developed cautiously”), 20.2% stated “Nuclear energy should be kept at current levels” while 17.0% stated “Nuclear energy should be abolished”. (<http://www8.cao.go.jp/survey/tokubetu/h21/h21-genshi.pdf>).

I am a researcher on business management specialized in the former Soviet Union and Russia and Eastern Europe, and had no prior interest or knowledge of the nuclear power industry before the accident at Fukushima. However, I was much affected by the accident as well as many Japanese people, and began to study on the nuclear power industry, although not sufficiently. Based on my study I have got to believe it necessary to immediately abandon nuclear power generation, because we cannot yet safely control nuclear power generation. However, even if we are going to denuclearization, it may be difficult to attain the national consensus to stop all the NPPs just immediately, and even if we successfully do it, we should manage NPPs (nuclear power plants) for long years until complete decommissioning of reactors. Furthermore, radioactive waste must still be managed after the shutdown of the reactors. Therefore, one of the most important issues confronted by scholars of business management is how we can improve the management of the nuclear industries, especially nuclear power plants in order to decrease the probability of severe accidents and to lessen the damage caused by them.

The nuclear power industry is not represented solely by nuclear power generation. There are other peaceful uses including medical applications and military uses of nuclear power. The industry consists of the nuclear fuel cycle from when uranium is mined until it heads off for nuclear waste disposal. These production processes are all closely tied technologically (Yoshioka [2012]). Nonetheless, there are no military uses of nuclear power in Japan, and its uses for peaceful purposes are overwhelmingly power generation related, and also the nuclear accident that occurred in Fukushima was at a power plant.

Therefore, in this paper we will focus on the nuclear power industry, and discuss about what is better management system of the industry while referring the Soviet or Russian systems.

## II. Reorganization of Soviet-Russian Management System of NPPs after the Chernobyl Accident

The Russians currently have ten nuclear power plants (32 generators) covering 16.7% of their total power production.

These are managed by OAO Kontsern Rosenergoatom (including affiliates directly involved in NPP operations), a wholly-owned subsidiary of OAO Atomenergoprom (a stockholding company overseeing the civilian nuclear industry), itself wholly owned by GK Rosatom (a state company overseeing the civilian nuclear industry partly related to military nuclear industry). Briefly speaking, the nuclear power industry in Russia is, in effect, fully under the state control. In the state administration, the promotion of nuclear industry is under the responsibility of the President and Prime Minister, and actually GK Rosatom appears to be actively involved in formulating such a policy (Table and Figure 1). Safety regulations to the nuclear industry are handled by the Federal Service for Ecological, Technological and Nuclear Supervision (Rostekhnadzor) (Table and Figure 2).

In this way, the management system of Russia’s nuclear power plants differed to that in Japan until recently by being (1) fully state controlled, (2) separate from the non-nuclear power industry and placed in the civil nuclear industry as a whole and (3) the agency regulating nuclear power industry is independent of the nuclear promotion agencies.

Let’s examine how these characteristics were formed (Kato [2012]) in Soviet Union and Russia.

(1) Under the Soviet socialist system, all the industrial enterprises were state-owned, so it was quite natural that all the NPPs were state-owned in the Soviet era. After the collapse of the Soviet Union, most enterprises were privatized. However, Russia excluded the same fate for many of the enterprises in the nuclear power sector “considering the necessity of centralized state control and securing safety,” and those companies were placed under the state-run company, GK Kontsern Rosenergoatom, while Ministry of Atomic Energy (Minatom) was involved in its management owning 100% shares of the company. Minatom was dissolved resulting from the reform of government structure in 2004, and Rosatom (State Nuclear Energy Agency) was established under the control of the Russian Ministry of Industry and Energy. Rosatom became GK Rosatom in 2007, changing from a state organization to a corporation (actually a state-run corporation). While GK Rosatom became a holding company owning most of the stocks of major nuclear power sector companies, it is 100% state-owned, and is actually a quasi-government agency.

(2) Before the Chernobyl Accident in 1986, nuclear power plants were under the arm of VPO Soyuzatomenergo (Production Association of Nuclear Energy of USSR), which was under the control of Minenergo (Ministry of Energy). The design and construction of nuclear reactors, etc. were under the control of Minsrednemash (Ministry of Mid-scale Machine Manufacturing), which also controlled nuclear weapon production, and oversaw both the military and civil nuclear industry. In 1987 after the accident, Minatom (Ministerstvo atomnoi energetiki, Ministry of Atomic Energy) was formed, and the nuclear power generation was taken apart from non-nuclear power generation, and placed under the control of this ministry. After the breakup of the Soviet Union,

### iii. Features of Management System of NPPs in Japan & their Background

similar organization was formed in Russia; non-nuclear power plants were placed under the umbrella of a state stockholding company called RAO EES (Unified Energy System) which was gradually privatized, and ultimately dissolved in 2008, yet the nuclear power generation remained under state control as described earlier.

(3) The current structure of atomic energy safety & regulatory organization took shape in 2010 (Postanovlenie Pravitel'stva RF, 30 July 2004, no. 401). Various transformations had followed up until that time. During the Soviet era, Gosgortekhnadzor (The State Committee on Inspection of Safe Operation in Mining and Manufacturing Industries) originally regulated the industrial safety of all the industries including nuclear industry. Later in 1983 Gosatomenergoadzor (The State Committee on Inspection of Safe Operation in Atomic Energy Industries), which specialized in atomic energy, was established. Thereafter, it was reformed into Gospromatomnadzor (the State Committee on Inspection of Safe Operation in Manufacturing & Atomic Energy Industries) in 1990. In 1992 after the breakup of the Soviet Union, Russia established Gosatomnadzor (the State Committee on Inspection of Safe Operation in Atomic Industry), which was reformed into Rostekhnadzor (Federal Service for Ecological, Technological and Atomic Inspection) in 2004. In 2008 Rostekhnadzor was placed under the control of the Ministry of Natural Resources and the Environment, and in 2010 it became to report directly to the government. To sum up, while the Soviet and Russian atomic energy safety regulatory agencies has been repeatedly merged with and split off from manufacturing and mining industries safety regulatory agencies, they have more often reported directly to the government and have been independent from the atomic energy promotion agencies.

The transformations occurring in Soviet-Russian Management System of NPPs described above seems to suggest that Russians have put more attention to ensure safety recognizing inevitable NPPs' danger than Japanese have. We can assume Russian military use of nuclear power and the experience of the Chernobyl Accident as the background of such a Russian tradition.

In addition, when Minatom, the nuclear promotion ministry, was restructured into Rosatom in 2004, most of the nuclear weapon related organizations were transferred to the Ministry of Defense, and Rosatom itself became largely specialized in civil use of atomic energy. This was caused by the new nuclear policy of the Russian government, which aims to develop the stagnating nuclear power generation industry after the Chernobyl Accident.

There were 17 nuclear power facilities (54 reactors) operating in Japan in 2010 just before the Fukushima accident, covering 30.8% of Japan's total power generated. Japan was ranked 3rd globally after the United States and France in total facility capacity of NPPs. Japan's nuclear power generation has been mainly provided by private power generation corporations. There are 10 such corporations, and they almost monopolize power generation, transmission and retail sales in each region designated to them. Nine of the corporations are also involved in the nuclear power generation. One of these is TEPCO (Tokyo Electric Power Company) (See Table & Figure 3). Table and figure 4 shows the ten largest shareholders of TEPCO as of 2010. Besides, two power generating plants (three reactors) are operated by wholesale electricity providers specializing in nuclear power such as Japan Atomic Power Company, whose major investors are the nine power generation corporations mentioned above.

These private corporations have promoted nuclear power generation based on nuclear policies decided by the government, and have been under government safety regulations. More concretely speaking, the Atomic Energy Commission in the Cabinet Office used to establish general policies for the research, development and utilization of nuclear power in Japan, and the Nuclear Safety Commission used to determine fundamental guidelines on safety regulations for the use of nuclear power. Then according to these policies and guidelines, the Agency for Natural Resources and Energy in the Ministry of Economy, Trade and Industry (METI) established specific guidelines for research, development and utilization of nuclear energy and directed these providers, while the Nuclear & Industrial Safety Agency and the Ministry of Education, Culture, Sports, Science & Technology established specific policies for safety regulations and direct these providers (Table and Figure 5).

Japan differs from Russia in that: (1) nuclear power corporations have been privately owned, (2) nuclear power generation has been positioned in the general electrical power sector, and (3) the atomic energy promotion and safety regulation organizations have been standing shoulder-to-shoulder inside the Cabinet and METI respectively. The third point may also seem to represent an equal relationship between the promotion and safety regulation organizations. However, in actuality, both organizations in the Cabinet performed almost no real activities, and METI was basically standing on the side of promoting the industry and tended to treat the safety regulations as an ancillary. Thus the safety regulation organizations were actually subordinate to promotion organizations.

Let's examine how this type of management system of NPPs was developed.

(1) Japan's postwar atomic energy research, development and utilization started when a government budget for the development of nuclear industry was approved by the parliament in 1954. This was spearheaded by a politician who recognized the potential for introducing nuclear material and technology from overseas, especially the United States. In 1956 the Atomic Energy Commission decided to implement NPPs as early as possible by the initiative of private companies with importing foreign technologies. The nine power generation companies welcomed such a policy and actually in a short period successfully launched their NPPs. In those years most people in Japan, including scientists were positive to the civil use of nuclear power, and they had little concern over its risks. A famous comic, "Mighty Atom", which firstly appeared in a comic journal in 1952, and as an animated cartoon on TV in 1963, illustrates how positively nuclear power was accepted by Japanese people (Yoshimi [2012] pp. 195-264). The worries over using nuclear power were mostly connected with its military use, and a private initiative was more acceptable rather than a state initiative (Yoshioka [2012]).

(2) The Atomic Energy Basic Law (Genshiryoku Kihonho), enacted in 1955, states: "the promotion of the research, development and utilization of nuclear power shall help to get hold of energy resource, facilitate progress in science and industry, henceforth contribute to the welfare of human civilization and the bettering of living standards of the people of Japan" (Article 1). It suggested that nuclear power is, first and foremost, an energy resource in Japan, and therefore may or should be positioned in the general power sector. Special concern to nuclear energy, compared to non-nuclear energy, was that it should not be used for military purposes, because we experienced Hiroshima and Nagasaki. Article 2 states: "The research, development and utilization of nuclear power shall be conducted exclusively with peaceful purposes, ensuring safety, in a democratic way, and independently, and its outcomes shall be made publicly available, and shall contribute to the advancement of international cooperation" (Article 2). Although "ensuring safety" is mentioned, the focus seems to be on "peaceful purposes".

(3) Once NPPs actually were launched, some scientists began to point to the risks of nuclear power, and some people living in any proposed sites for NPP aggressively protested the plans. Many Japanese people became to feel uncertain of NPPs, each time nuclear accidents or incidents occurred in Japan and overseas. Responding to such a movement, the government reformed nuclear-related organizations: In 1976 in the Science and Technology Agency, which was in charge of supervising the nuclear industry at that time, the Nuclear Safety Department (later Nuclear and Industrial Safety Agency) was spun off from the Department of Nuclear Power, and in 1978 in the Prime Minister's Office, the Nuclear Safety Commission was separated from the Atomic Energy Commission. The cause for these measures was the radiation leaks from the Mutsu nuclear-powered vessel in 1974, which led to great public doubt regarding the security of nuclear power (Genshiryoku Inkaikai Geppo, No. 232, 1975.

<http://www.nsc.go.jp/info/081006.pdf>). The Science and Technology Agency was broken up in 2001, and its Nuclear Safety Department was reorganized into the Nuclear and Industrial Safety Agency in METI. This was in response to a sodium leak at the Monju fast-breeder reactor in 1995 and a criticality accident at the JCO (a nuclear fuel processing facility) in 1999 (Kokkaijikocho [2012] p. 554). In this way, safety regulation authorities got a formal autonomy from the promotion organizations as a result of several domestic accidents in nuclear industry. Yet, as described earlier, they could not have actual independence.

Why has nuclear safety been treated so lightly compared to its promotion? As described earlier, nuclear power research, development and utilization were guided by the national policies of Japan. Meanwhile, some people living in proposed NPP sites were totally against inviting NPP, and some nuclear scientists and some of general public developed anti-nuclear movements. Since Japanese people saw the destructive power of the atomic bombs dropped on Hiroshima and Nagasaki, most of them hoped for peaceful uses of nuclear power, while holding strong concerns about them. In such a situation, power generation companies, politicians, government agencies, scientists and local governments who committed to NPPs were closely united to be called as the "Nuclear Power Village" sharing benefits for nuclear power research, development and utilization, jointly creating, advertising and believing in the "myth of nuclear safety". The "myth of nuclear safety" is as following: "Japan's nuclear industry is basically safe. At least, a major accident will never occur." While such an assertion did not have any solid foundation, it has been considered to be indispensable to make a stand against the anti-nuclear movement (Kokkaijikocho [2012] p. 447). Most Japanese people had actually accepted the "myth of nuclear safety" jointly created by the "Nuclear Power Village" in that way.

This is partly because only relatively minor nuclear accidents had occurred in Japan before the Fukushima Accident, and Japan had not been directly affected by severe accidents that occurred overseas. The biggest nuclear accident and incident in Japan before the Fukushima Accident had been the JOC criticality accident in 1999. This was equivalent to an IAEA Level 4 accident, the lowest level of "accident" as defined as an "accident without local consequences." The Three-Mile Island (TMI) Nuclear Accident in the United States in 1979 was classified as Level 5, but the chairman of Japan's Nuclear Power Safety Commission asserted just two days after the accident: "Japan can never have a major accident like the one at Three-Mile Island". Meanwhile, the United States Nuclear Regulatory Commission (NRC) announced the need to retest the same pressurized water reactors, as used in TMI, and the Japan Nuclear Power Safety Commission also became forced to conduct a safety analysis of the pressurized water reactors in Japan (Yoshioka, 2011, p. 158-159). Nevertheless, it appears that TMI accident was accepted as "someone else's problem" in Japan.

Japan's anti-nuclear movement gained momentum due to the Chernobyl Accident in 1986. Radiation pollution of imported food products began to be reported in January 1987, and many Japanese people, especially housewives, activated

anti-nuclear movements, called as “No Nukes New Wave” phenomena. On the other hand, people in Japan’s atomic energy sector repeated the same argument as in the case of TMI accident: “An accident like at Chernobyl can never occur in Japan”. The following points were emphasized for that: (1) while the nuclear reactor at Chernobyl had design flaws, Japan’s reactors were technologically quite different from that one, 2) while the primary cause of the accident was violation of the NPP operation rules by the operators, who had not been familiar with nuclear safety culture, Japan’s operators had mastered a good safety culture (Yoshioka [2011] pp. 208-220). In addition, unlike European countries, Japan did not suffer significant radiation fallout due to its physical distance from the accident.

To sum up, Japan’s NPP management system had features to permit the neglecting of safety regulations. It was caused by the “myth of nuclear safety”, as well as some domestic and external factors.

#### IV. Lessons from the Fukushima Nuclear Accident

– Based on the Four Reports on the Accident -

The results of the meltdown at Fukushima Plant No. 1 in March 2011 were massive. Although acute radiation sickness was not seen, but tens of thousands of residents in Fukushima prefecture were forced to evacuate and lost their homeland, possessions and jobs. The cost of quieting, recovery and compensation related to the accident will probably run into the tens of trillions of yen (hundreds of billion dollars), and even the recovery within the limits of possibility is expected to take several decades (Yoshioka [2012] pp. 28-34).

There have been many attempts to verify why the accident happened and why the damage was so extensive, and in 2012 four major reports on the accident were released. These reports were created by the government, the Diet, TEPCO, and an influential private organization (RJIF). Let’s consider what lessons we can learn from the Fukushima Nuclear Accident based on these four reports.

The direct cause of the accident was seawater damage to many of the electrical panels in Fukushima Plant No. 1 as a result of the tsunami, causing a full loss of power, resulting in failure of the cooling of the nuclear reactors, which damaged the fuel rods, causing hydrogen explosions and the emission of radioactive material. But why did the tsunami cause such a major accident at the NPP which was believed to be secure?

TEPCO report states: (1) Although TEPCO was prepared for a tsunami, it could not have anticipated such a massive tsunami as occurred on March 11, 2011. (2) TEPCO has always been obedient to the instructions by safety regulatory authorities, so it is not guilty. (3) It was very difficult for TEPCO to communicate effectively with the government while handling the accident.

The other three reports state the following with regards to the above three assertions: (1) TEPCO had been aware of the possibility of such a massive tsunami as occurred in 2011, but focused more on the cost of countermeasures against tsunami than ensuring safety. (2) Safety regulatory authorities fell into a state of “regulatory capture” due to a lack of their

independence, transparency and expertise. More concretely speaking, although they were officially regulating power corporations, they were actually fulfilling their regulatory mandate just dependent on them, and always trying to meet with their expectation. What is worse, they were negligent in preparing for any severe accident. (3) The government was not prepared to respond to a severe accident as was the case in TEPCO.

The three reports all state that the direct cause of the accident was a lack of “preparation”, and that it would have been “possible” to prevent or lessen the scale of the accident if “preparations” had been made. We can notice three major issues raised by the reports: (1) A safety culture at power companies must be rebuilt. (2) Independence, transparency and expertise at safety regulatory authorities must be improved. (3) The government must be better prepared for a nuclear emergency.

If NPPs are to be operated at least for the time being, the NPP management system must be reorganized as soon as possible, so that these problems would be resolved.

#### V. Reorganization of the NPP Management System after the Fukushima Accident

The most comprehensive measure taken in terms of the reorganization of the NPP management system as of August 2012 was the adoption of the Law on the Establishment of Nuclear Regulatory Committee in June 2012. Its main purpose is to reorganize the safety regulatory agencies, recognizing that “we should always keep the possibility of an accident in our mind, and make the paramount and greatest efforts to prevent it” (Article 1). In short, the Nuclear Safety Commission, the Nuclear and Industrial Safety Agency, and several safety regulatory departments in the Ministry of Education, Culture, Sports, Science & Technology were all abolished, and reorganized into the Nuclear Regulatory Commission and its arms, the Nuclear Regulatory Agency (Table and Figure 6). The Nuclear Regulatory Commission is positioned as an external office of the Ministry of the Environment. Its four committee members should not be officers or employees of the nuclear power corporations within past three years, and be appointed with the agreement by the Diet. The “No Return Rule” is applied to employees of the Nuclear Regulatory Agency: If an employee moves to the agency from a nuclear power promotion agency, he should not be allowed to return to the agency he originated from. This seeks to integrate the nuclear regulatory authorities that were dispersed through multiple agencies and to make them independent from the promotion organizations and power corporations.

In addition, the Nuclear Disaster Prevention Council was newly formed to prepare for a nuclear accident (Article 12 of the Supplementary Provisions of the Law).

#### VI. How to Deal with “Privately Run National Program” System of Japanese Nuclear Industry

However, how to deal with nuclear power providers, especially TEPCO, which the three reports criticized seriously, is not clear yet.

The three reports other than the one from TEPCO equally indicate that “Privately Run National Program” System of Japanese Nuclear Industry was a major cause of lack of responsibility in NPP management. To put it simply, electricity providers seemed to think that they have right to earn secure profits from the nuclear energy generation, and in case of a severe accident at NPP, they should be protected by the state, because the promotion of nuclear industry was a national policy. Government agencies seemed to think that they should protect nuclear energy providers because of the national policy, but they could not control them very strictly because energy providers were private companies. This is what gave rise to a kind of “collusion” between the government and the nuclear energy providers.

One of the Fukushima Accident reports from a private organization (Minkanjikocho [2012]) mentions the management policy of Mr. Hiroshi Araki, a former executive at TEPCO (President 1993-1999, Chairman 1999-2002). Mr. Araki said “Let’s be a normal company”, “Let’s work for a better position on the Stock Exchange”, and then proposed streamlining policies, including cutting costs, for the purpose of the improvement of financial condition. Regarding the NPP department of TEPCO, he introduced a self-supporting accounting system at each NPP site, and promoted competition between the sites. According to their calculation, stopping 1 nuclear reactor a day would add around 100 million yen (million dollars) to the operating cost, so they tried to shorten the time period for regular inspections of NPP. In such a condition, a case of “nuclear incident cover-up” occurred at TEPCO in 2002. It was revealed that TEPCO routinely had concealed problems at NPP worrying that they would have to stop NPP operation if such problems might be reported. A former TEPCO employee indicated in an interview for the investigation of the Fukushima Accident: “We have never seriously discussed in the TEPCO concerning to what extent a public utility company providing a vital lifeline and assuming the risks of handling nuclear material, can be similar to any other ‘normal companies’.” (Minkanjikocho [2012] pp. 314-319).

The Diet report points out the fundamental problems with the risk management conducted at TEPCO. TEPCO’s executives listed a variety of problem events that could occur in the nuclear business, and assessed the possible risks caused by them. The problem events were listed as following; a fire in a nuclear facility, equipment troubles due to its aging, and destruction by terrorists, raised height of assumed tsunami, etc. Risk scenarios for these were listed as following; a long-term shutdown of the plant, a drop in public trust, a lack of power supply due to the plant shutdown, a negative effect to the lawsuits proposed by anti-nuclear activists, and the like. This list did not include a severe accident, a radioactive leak, the effect on the health of neighboring residents, and the effect on Japanese society as a whole. In short, TEPCO was only considering risks that would affect TEPCO itself and other electricity providers, and that would continue just for a few years, but was not considering risks for the neighboring people

or the long-term risks to Japanese society as a whole (Kokkaijikocho , pp. 526-533).

What does this mean? Much better morals should be required for organizations that handle enormous energy like nuclear, even if they were just private corporations. Is it possible? If it is difficult, it might be unreasonable that we allow private corporations to operate NPPs. Based on this concept, some academics and politicians are now arguing that we should split off the nuclear department from the power corporations and nationalize the department (Kikkawa [2011]). This seems to be an argument worthy of serious discussion when taking the Russian example into consideration.

In reality TEPCO has already been nationalized. It occurred in the following circumstances. Many people, starting with the neighboring residents, suffered extensive damage due to the Fukushima Accident. The Law on Compensation for Nuclear Damages states that nuclear power providers should be unlimitedly liable for damages caused by accidents at their nuclear power facilities, that providers must carry nuclear damage liability insurance preparing for accidents, and that the government should back compensation that exceeds the insured coverage. In the case of Fukushima accident, the damage was actually beyond the financial ability of TEPCO. Therefore, based on this law, the government invested 1 trillion yen (around 10 billion dollars) in TEPCO on July 31, 2012 and acquired 50% share of the voting stocks, thus effectively nationalizing it. When TEPCO repays all investments from the government in the future, it will become a private company again. In this way, the recent nationalization of TEPCO has occurred in a different context from the argument mentioned above.

We think that the nationalization of the nuclear industry is needed. However, this does not mean that nuclear safety might be assured when nuclear companies are nationalized. We should remember that the Chernobyl Nuclear Accident occurred at a state-run nuclear facility.

## VII. Conclusion

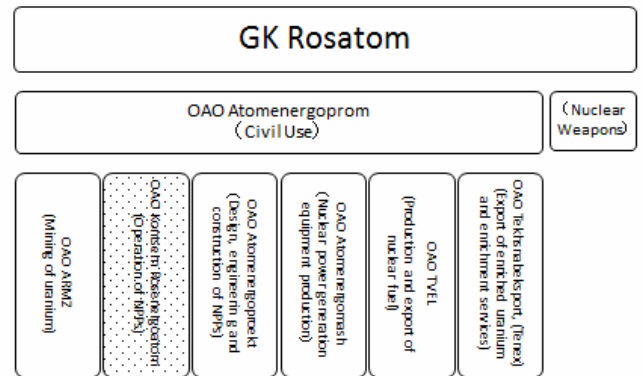
Reflecting on the changes in the NPP management system in Russia and Japan, we notice that the possibility for a serious accident was surprisingly neglected in Japan’s NPP management system. Although it was not mentioned in this paper, Japan’s NPP management system has significantly lagged behind those of the United States and France as well. This may be mainly because Japan does not use nuclear power for military purposes, and had not experienced a serious accident until Fukushima Accident, which may have enabled the creation of the “myth of nuclear safety”. With the reality of the severe accident at Fukushima Plant No. 1, a majority of the public is now calling for abolishing the nuclear industry immediately. However, since the nuclear industry and nuclear power industry should survive over comparatively long-term as aforementioned, there is an urgent need to establish the NPP management system, which should enable to control NPP more safely. One of the remaining critical issues is whether the nuclear industry in Japan should be placed in the public or the private sector.

In addition, we should remember that the problem of what to do about the nuclear management system is not one that Japan is confronting alone.

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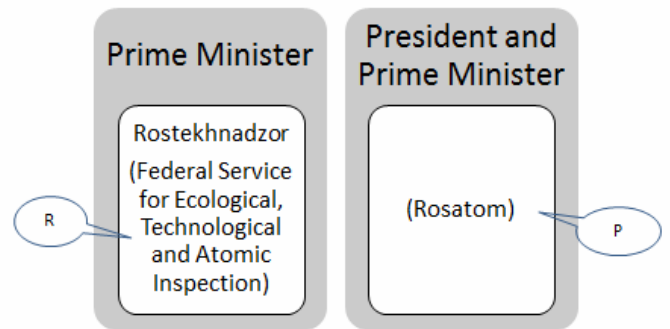
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Table & Figure 1  
 Russian Nuclear Industry



Source: Kato[2012].

Table & Figure 2  
 Russian Government Organizations controlling NPPs



Source: Kato[2012]

Table & Figure 3  
 Japanese Nuclear Power Providers

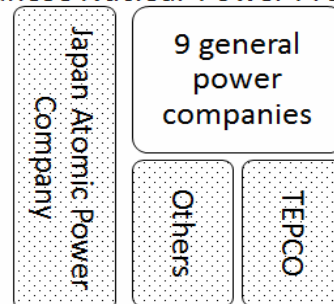


Table & Figure 4 Major shareholders of TEPCO (2010)

Name of shareholder	Number of shares (thousand)	Percent share held
Japan Trustee Services Bank, Ltd. (Trust Account)	60,489	4.47
Dai-ichi Life (Insurance)	55,001	4.07
Nippon Life (Insurance)	52,800	3.9
The Master Trust Bank of Japan, Ltd. (Trust Account)	51,557	3.81
Tokyo Metropolitan Government	42,676	3.15
Sumitomo Mitsui Banking Corporation	35,927	2.66
Mizuho Corporate Bank, Ltd.	23,791	1.76
TEPCO Employee Stock Ownership Plan	20,620	1.52
Japan Trustee Services Bank, Ltd. (Trust Account 4)	13,925	1.03
Bank of Tokyo-Mitsubishi UFJ, Ltd.	13,239	0.98
Total	370,029	27.35

Source: Report on Securities of TEPCO.

Table & Figure 5  
Russian Government Organizations  
controlling NPPs (Former)

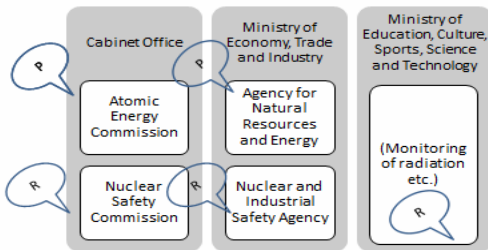


Table and Figure 6  
Russian Government Organizations controlling  
NPPs (2012- )

