

NUKE INFO TOKYO

July/Aug. 2014
No. 161



Citizens' Nuclear Information Center

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A business analysis of Japan's NPP export to Turkey

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the decommissioning process of nuclear power plants



Anti-nuclear movement in Turkey, Photo by AntiNükleer Sinop

Introduction

The Japan-Turkey Agreement for Cooperation in the Use of Nuclear Energy for Peaceful Purposes (hereafter "Nuclear Energy Agreement") was endorsed by the Japanese Diet on April 18, 2014 and came into effect on June 29, 2014. This agreement paves the way for and facilitates Japan's export of a nuclear power plant (NPP) to Turkey, along with the agreement on the outline of the NPP export project, the Host Government Agreement (HGA)¹ signed by the Turkish government and a Japanese-French consortium earlier, on October 29, 2013.

This project is part of Japan's public-private sector partnership scheme, jointly devised by the Japanese government, that intends to use infrastructure exports as a spark for expanding the

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Japanese economy and the nuclear power industry, which has been struggling to find a brighter outlook on the domestic market since the March 2011 nuclear accident in Fukushima. This project is currently being promoted by the government, together with the NPP export project to Vietnam.

Under the current circumstances, where the clean-up operations of the nuclear accident in Fukushima have yet to be completed, large numbers of citizens and intellectuals are expressing various criticisms of the NPP export projects, mainly from technical and ethical points of view. In this article, however, the writer will attempt to explore the problems of NPP exports from a business viewpoint.

Outline of the project

The outline and background to the project will be explained here briefly before getting into the main topic.

- **NPP operation body:** A joint venture financed by Mitsubishi Heavy Industries Ltd. (MHI), Itochu Corp., GDF Suez S.A., and EUAS (Turkish Electric Power Co.)
- **Planned construction site:** Sinop City on the Black Sea coast
- **Rated Output:** 1,100 MW × 4 units
- **Type of nuclear reactor:** ATMEA1 (advanced reactor jointly developed by the French Areva S.A. and MHI)
- **Schedule:** Commencement of construction in 2017; to begin operations in 2023
- **Project Cost:** US\$22 billion – 25 billion

The background to this project is described in **Table 1**. The Turkish Akkuyu NPP project was launched by a Russian enterprise in 2010, at Akkuyu on the Mediterranean Sea coast. The Sinop project largely follows the pattern of the Akkuyu project.

NPP export business based on official credit

The most important distinguishing feature of this Japanese project is that the NPP “operating business” will be exported. As in the contract with Russia’s state-owned company Rosatom, the contract for this project will be of the BOO, Build-Own-Operate, type. As **Figure 1** shows, the special purpose company (SPC) formed by the Japanese-French consortium and EUAS is the implementing body for this project, and will build, own, and operate the facilities.

This means that the project implementing body, consisting of Japanese businesses, financially supported by the Japanese government through the Japan Bank for International Cooperation (JBIC) and Nippon Export and Investment Insurance (NEXI), will take on all kinds of risks involved with the project, including commercial, country, operation, accident, environment, nuclear proliferation, and force majeure (Act of God) risks.

Previous NPP exports from Japan were confined to exports of individual equipment items, and for this reason there were limitations on the manufacturer’s liability. The exporters were therefore absolved from consequential responsibility, such as those for negative effects on the plant’s business operations and compensation for third parties. (In the case of the U.S. San Onofre NPP, MHI has been charged with equipment design flaws and is said to be partially responsible for the shutdown of the NPP. The Japanese firm is currently involved in a lawsuit for compensation liability, the amount of which is limited.)

Japanese plant makers, such as MHI, Toshiba Corp. and Hitachi Ltd. have never concluded even a “Lump Sum Turn Key (LSTK) Contract” for exporting facilities and equipment for a complete plant. In the case of the NPP export to Turkey, these companies will be forced to take on enormous and extensive business risks, incomparably greater than those in previous cases of NPP equipment exports.

1980’s	The Turkish government examined the feasibility of constructing NPP in the country.
May 2010	The Turkish government placed an order with a Russian company to build the Akkuyu NPP that would be equipped with four PWR units with a rated output of 1,200 MW each.
From 2010 through 2013	Negotiations on the Sinop NPP continued between the Turkish government and the governments and businesses of Japan, France, South Korea, China and Canada.
May 2013	Japanese Prime Minister Shinzo Abe visited Turkey and signed the Nuclear Energy Agreement with his Turkish counterpart. At the same time, the Japanese consortium won the preferential negotiating rights.
October 2013	The Turkish government and the Japanese-French consortium agreed on the construction of the NPP.
April 2014	The Japanese Diet ratified the Nuclear Energy Agreement.

Table 1. Background to the plan for the Sinop Nuclear Station in Turkey

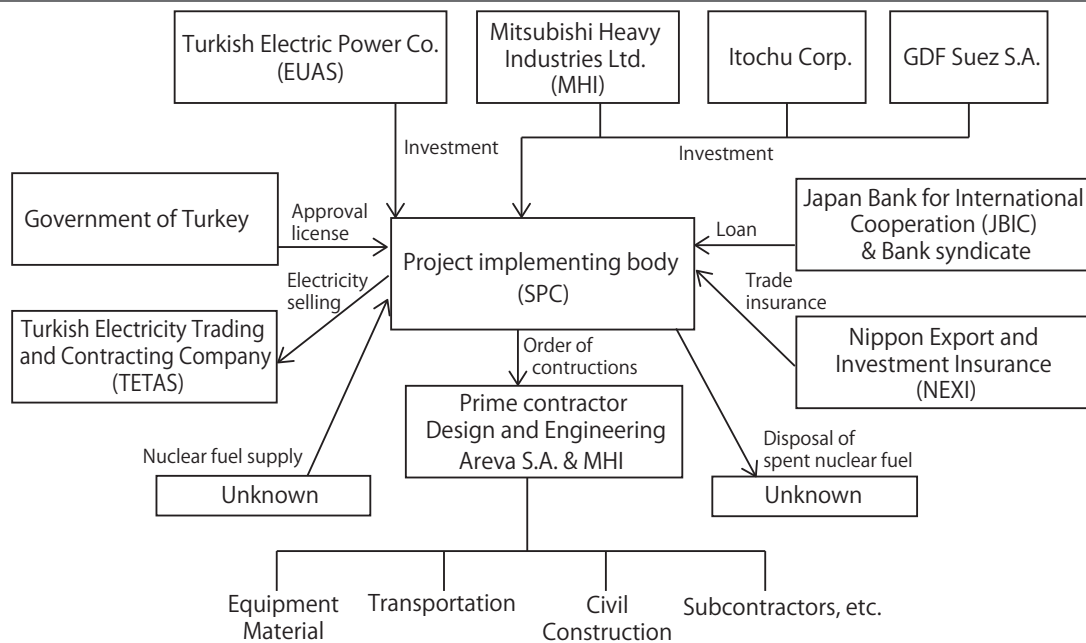


Figure 1. Provisional organizational chart for the export of a nuclear power station to Turkey

The biggest problem with the Turkish project is that no scheme has yet been formulated regarding who will pay how much compensation for damage if a severe accident similar to the one at Fukushima occurs. Plans for sharing the costs of accident clean-up operations have also yet to be worked out.

Although it is natural for the project implementing body to take primary responsibility, it would be impossible for the joint venture to pay the full amount of compensation and clean-up costs on its own, as can be seen from the case of Tokyo Electric Power Co. (TEPCO) in the Fukushima nuclear accident case. NEXI insurance covers merely the damage involving investment and loans, and it is not permitted to use the insurance money for damage compensation.

Should such an accident occur, will the Japanese government refuse to extend financial support to the Turkish government and force the Turkish counterpart to take full responsibility? Or will the Japanese government shoulder a “suitable portion” of the financial responsibility? In this case, the government will use Japanese taxpayers’ money, but how is it assessing such a risk? The public in the two countries has not been informed of these risks at all.

Even if a severe accident does not occur, there is still the danger of business failure by the NPP for other reasons. JBIC will be burdened with huge unrecoverable loans, or NEXI will have to pay out insurance money.

In either case, the Japanese government will use both tax payers’ money and national bonds to raise the funds, which means a massive

outflow of Japanese public assets. JBIC’s existing guidelines do not have provisions concerning the extension of loans for nuclear-related projects involving nuclear proliferation, nuclear accident response, or the disposal of nuclear waste. There is a chance, therefore, that the government will extend official loans to the Turkish NPP project without prudent study. On the other hand, the Organization for Economic Co-operation and Development (OECD) bans member countries from offering official development aid (ODA) for NPP projects due to the specificity of the NPP business. Likewise, the World Bank and the Asian Bank refrain from extending loans to the NPP business.

The German government also decided on June 12, 2014 to forbid official credit accommodation to exports of nuclear-related facilities, equipment, and so on. Given this situation, we wonder if JBIC has carried out a facile relaxation of the terms and conditions for extending credit to the Turkish NPP project by taking advantage of the partnership between the public and private sectors in the current environment, where Japan is being forced to compete with Russia, China and South Korea.

As a public financial institution, JBIC is required to take measures to increase transparency of its responsibilities in NPP projects; for example, by devising stricter guidelines on NPP exports, conducting a risk assessment for each project, and evaluating the projects’ anti-disaster measures, such as payment of damage compensation and evacuation of local residents. Other measures that should be taken by JBIC include an assessment of the environment around the plant, evaluation of the national consensus on the project within the importing country, and disclosure of these assessments.

International environment of the NPP business

Affected by the recent international economic environment and the nuclear accidents at the Chernobyl nuclear power station in Russia and the Fukushima nuclear power station in Japan, construction of NPPs is slowing in Japan, the U.S. and Europe, while the planning and construction of such plants are increasing in East Asia, South Asia, the Middle East, former Soviet Union, Eastern Europe and Africa. Russian, Chinese and South Korean plant manufacturers are actively engaged in exporting their plants to these countries and regions.

The U.S. nuclear power industry, in particular, is hard hit by the 'shale gas revolution' in the country, and is currently suffering from a shrinking domestic market and the subsequent sluggish business. In view of this situation, their major concern now seems not to be profits from their business, but containment of expanding NPP exports from China and Russia to third countries, and prevention of nuclear proliferation. For this reason, they are pinning their hopes on Japan's funding ability and the powerful alignment of Japanese, U.S., and European plant manufacturers (Toshiba-Westinghouse Electric Company, Hitachi-GE, and MHI-Areva) in winning orders in the international arena.

In other words, the U.S. manufacturers' intent to prevent nuclear arms proliferation (or a continuation of the monopoly over nuclear arms by nuclear powers) by using Japanese businesses, seems to have matched with the intent of the Japanese public and private sectors to use NPP exports as the main step to prolonging the life of the domestic nuclear power industry.

Significance of NPP business for the exporting companies

When the export of NPPs is looked at from a business viewpoint, exporting companies receive an order worth 1-2 trillion yen on average only once in several years. They are unable to gain the continuous and stable profits they receive from other infrastructure businesses (thermal power plants, water supply and traffic systems) or energy development projects (LNG facilities, etc.). According to Cabinet Office statistics for 2013, orders for infrastructure-related system projects received by Japanese exporting companies totaled roughly 9.3 trillion yen. Although the government's "Strategy for Infrastructure-related System Exports" says Japan aims to receive annual orders worth around 30 trillion yen in total in or before fiscal 2020, it is unlikely that unstable and unpredictable NPP exports will contribute to the

achievement of this target level. As things stand now, it is hard to believe that the NPP exporting business could become the driving force for Japan's economic growth. For plant exporters, the NPP business that forces them to maintain a large team of plant designers and construction engineers within their corporate organizations, is not a lucrative business.

Rather than for business reasons, there may be other reasons for the continuation of the NPP business. It may be that the companies are forced to continue by both the U.S. administration, striving to prevent nuclear proliferation, and Japan's so-called "nuclear village," comprising people in the government, academia and the power industry, who are eager to defend their vested interests.

Moreover, there is a limit to Japanese NPP exporters' efforts to enhance their competitive power. Although the public-private partnership project to export NPPs has been given special privileges, such as government subsidies for feasibility studies, low-interest loans from JBIC, and NEXI trade insurance, which may bolster their competitive power to some extent, their Chinese and Russian counterparts are far more competitive. These two countries are said sometimes to bundle NPP exports with weapons supplies. For Japanese exporters, the options available for increasing profits are limited. One would be longer-term and sustained value added to projects by supplying nuclear fuel, plant operation guidance, and offering maintenance services for facilities and equipment. Another possible option is to participate in the NPP supply business itself, which would expose companies to the risk of massive losses while providing opportunities to gain considerable profits.

Taking these factors into consideration, Japan chose the option of participating in the Turkish NPP operation business, rather than simply concluding a contract for delivery of plant facilities and equipment. However, each participating country has different reasons for joining the project. Turkey is banking on **1)** construction funds being provided by Japan and France, **2)** GDF Suez's experience in plant operation and maintenance, **3)** introduction of the state-of-the-art nuclear generation technology (ATMEA1), and **4)** the purchase of low-priced electric power (at almost the same price as that of the Akkuyu plant, 12.35 ¢/kWh.). The Japanese government aims to contribute to the U.S. strategy of controlling nuclear proliferation, to extend its record of NPP exports, and to strengthen diplomatic ties with Turkey. Japan's MHI is counting on profits from the construction of the NPP and from the plant operation, and the addition of the ATMEA1 construction to its company record.

However, this Turkish project, based on different intentions and purposes by the various participants, was launched in disregard of a large number of relevant risks and without forming a consensus within the Turkish and Japanese public spheres. It is, therefore, difficult to predict how long cooperation among the project participants, with their different purposes and intentions, will last.

Spent nuclear fuel and its reprocessing

There is another problem with the Turkish project. This involves the reprocessing and future of the spent nuclear fuel. The Nuclear Energy Agreement² stipulates in the third clause of Article 2 that the technology and facilities for uranium enrichment, reprocessing of spent nuclear fuel, and plutonium conversion can be transferred from Japan to Turkey only when the agreement is revised to enable such a transfer. In addition, Article 8 of the agreement states that uranium enrichment or reprocessing of spent nuclear fuel can be performed within the territory of Turkey only when the two governments sign a written agreement to that effect.

This means that the transfer of the technology and facilities for uranium enrichment and the reprocessing of spent nuclear fuel are not permitted under the existing agreement, but these might become possible in the future. Meanwhile, the Nuclear Energy Agreement³ with the United Arab Emirates (UAE), ratified by the Diet on the same day, clearly stipulates that the above-mentioned technology and facilities will never be transferred from Japan. This agreement does not include any clause similar to Article 8 of the Nuclear Energy Agreement with Turkey. Why is it that Japan provides the opportunity for the transfer of such technology and facilities only to Turkey? When we take into account Turkey's geopolitical position, we may become apprehensive over the country's future move toward domestic production of plutonium, and nuclear proliferation.

Furthermore, the nuclear energy agreement with Turkey has no clause on disposal or return of the spent nuclear fuel. The Japanese nuclear fuel cycle has collapsed and the plans for final disposal of nuclear waste have run into intractable problems. The consequence of this is that the amount of spent nuclear fuel stored in Japan has snowballed to an uncontrollable level. The Japanese government thus has the responsibility, as an implementing body of the Turkish project and provider of official loans and trade insurance, to explain clearly about spent

nuclear fuel disposal to the public in both Turkey and Japan. In any case, it is unthinkable for the participating countries to carry this project forward without resolving the problem of where the spent nuclear fuel will end up.

Concluding remarks

Indications are that the NPP export to Turkey will force the accident risks on the Turkish public and the greater part of the financial risk on the Japanese public. Moreover, the public-private sector partnership promoting the project will potentially contribute to further expansion of the bloated vested interests of the so-called "nuclear village," and strengthen the cozy relations between the two sectors on a global scale. This will hamper the healthy competition that exists among businesses under normal conditions, and erodes corporate governance. One of the major causes of the Fukushima nuclear accident and expansion of the disaster was the dysfunction of the TEPCO corporate organization. Taking this into consideration, it is hard to avoid the conclusion that NPP projects that can only proceed if they are based on public-private partnership, such as the proposed Sinop NPP export project, lack the basic qualifications for sound business. Our perception should be that the Fukushima nuclear accident has provided us with an opportunity to review Japan's nuclear power policy from various viewpoints, including that of business, and it is our international responsibility to inform the global community of this perception.

- 1). MHI press release October 30, 2013
<http://www.mhi.co.jp/news/story/1310305438.html>
- 2). Nuclear Energy Agreement with Turkey
<http://www.mofa.go.jp/mofaj/files/000018110.pdf>
- 3). Nuclear Energy Agreement with UAE
<http://www.mofa.go.jp/mofaj/files/000004075.pdf>

(Continued from page 7)

At the same time, subsidies may be sent to the location and various reasons for promotion of the site invented as soon as the document study begins. In such a case, the release of radioactive material from the buried wastes into the living environment might start to occur earlier than expected.

On the condition that no further radioactive wastes will be produced, all possible efforts should be made to minimize the influence of already existing wastes on future generations. For this reason, the author believes that discussion on this issue should be further prolonged.

(Hideyuki Ban, Co-director of CNIC)

Summary of Discussions in the Government Radioactive Wastes Working Group - Many unresolved problems remain

The Japanese government's Radioactive Wastes Subcommittee, reestablished in May 2013, comprised of different members from those in the subcommittee under the Electricity and Gas Industry Committee of the Advisory Committee for Natural Resources and Energy, Ministry of Economy, Trade and Industry. The subcommittee has been renamed the Radioactive Wastes Working Group ("Radioactive Wastes WG") from the time it met for the third time on July 5, 2013, and has been meeting regularly since then. On May 23, 2014, up to which time 13 meetings had been held, the WG publicized an interim report¹⁾ of its discussions.

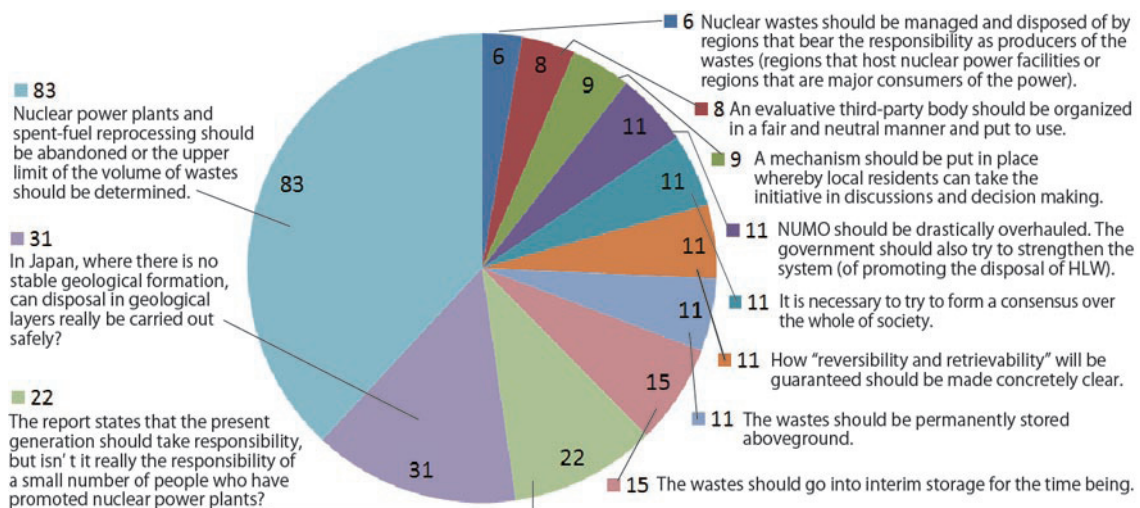
The Japanese government plans to bury high-level radioactive wastes deep underground, deeper than 300 meters from the surface, as the final disposal method. Since 2002, the Nuclear Waste Management Organization of Japan (NUMO), the main body supervising the project, has been openly soliciting applications for host locations for the disposal site from municipalities nationwide.

However, all the municipalities that expressed interest in applying were confronted with opposition from local residents and forced to desist from submitting the application. Thus, to date, no application has been delivered. As a result, the government has accelerated moves to enable the designation of candidate municipalities from the government side and to request them to accept onsite research for the determination of suitability as the disposal site. The Radioactive Wastes WG was established as part of this move.

Contents of the Interim Report

The Interim Report of the Radioactive Wastes WG consists of six chapters in 32 pages of text. In the "Introduction," the report states that in order to carry out the project the WG intends to review the conventional basic policy concerning high-level nuclear wastes and the final disposal project from the very basics. Chapter 2 discusses current conditions and problems; Chapter 3 describes efforts the present generation should make; Chapter 4 gives measures for improving these efforts; Chapter 5 discusses improvements in the disposal promotion organization. The following consists of summaries of the third and following chapters of the report.

The present generation is required to make substantial efforts to realize the final disposal of radioactive wastes. However, proceeding with the efforts as if the project was a "done deal" is not sufficiently supported by society (Section 3-1). To gain social support, it is essential to establish a system that, in consideration of technical uncertainty, will guarantee reversibility and retrievability, and will enable current and future generations to review earlier decisions concerning final disposal (3-2). As a final disposal method, geological disposal is the most promising, but alternative methods will also be studied (3-3). Social consensus should be developed through the evaluation of disposal technology improvement and alternative technologies (3-4). For consensus development, people from a wide range of social standings should have earnest in-depth discussions. Through the discussions, an awareness that the final disposal of radioactive wastes is an unavoidable issue should be developed, along with an understanding of ideas regarding the nature of nuclear power policies (3-5).



Summary of public opinion for the interim report of the Radioactive Wastes Working Group (see page 7)

1) http://www.meti.go.jp/committee/sougouenergy/denryoku_gas/genshiryoku/houshasei_haikibutsu_wg/report_001.pdf (in Japanese)

The government, for example, should indicate a location that is considered more scientifically suitable for final disposal than other locations, and explain the geological environmental characteristics of the location from a scientific point of view, thus gaining an understanding by local residents regarding the selection of the location as the final disposal site (4-1). A system for developing a consensus should be introduced into the location, and local residents of different social standings should participate in this (4-2). The government should plan measures that will support the location that has accepted the construction of the disposal site (4-3).

As measures to improve the conventional system for promoting the siting of the final disposal site, NUMO, which will implement the disposal project, should be fundamentally reformed (5-1), and third-party evaluation, essential to ensure the reliability of the disposal project (5-2), should be introduced.

The report, with reference to international agreements, clearly states that the disposal of radioactive wastes domestically is a fundamental policy, thus nullifying the possibility of the disposal of radioactive wastes overseas, where more geologically stable locations may be available.

Public opinions for this proposed Interim Report were solicited for one month, and many critical opinions were delivered. Of 121 opinions received, 83 indicated that before the disposal of radioactive wastes is discussed, nuclear power plants and spent-fuel reprocessing should be abandoned or the upper limit of the volume of wastes should be determined. Many doubted the safety of geological disposal (31 opinions). Other opinions included: "The small number of people who have promoted nuclear power plants should take primary responsibility for the wastes instead of the facile insistence on the responsibility of the entire generation" (22); "The wastes should go into interim storage for the time being" (15); and "The wastes should be permanently stored aboveground" (11).

Unresolved problems

The Interim Report includes many unresolved problems. This author had assumed that the Geological Disposal Technology Working Group ("Technology WG"), newly established in October last year, would discuss any locations that might be scientifically promising for hosting a radioactive wastes disposal site. However, the Technology WG ended up naming no prospective locations. At the meetings of the Technology WG, NUMO repeatedly asserted that it would evaluate prospective locations from all angles, in consideration of engineering measures, even if some conditions were unsatisfied in terms of geological environment, water-quality environment, or any other matters.

This indicates NUMO's policy in soliciting applications from municipalities for hosting a final disposal site; the policy is based on the organization's idea that if engineering measures are taken appropriately (if artificial barriers are provided), most locations within Japan are geologically suitable (wastes can be buried in 70% of the total area of Japan). However, if such is the case, no specific municipalities can be selected for the government to request acceptance of the construction of a disposal site. For the government to request municipalities to host the site, more detailed discussions on the selection of promising locations are indispensable.

Discussion on how to guarantee local resident participation in the selection process and ensure the revocability of earlier decisions has also been insufficient. In-depth discussion regarding by whom and through what process the acceptance of literature research will be determined has not been conducted, nor has the procedure for revoking decisions been discussed. These steps have not been specified such that they are organized into an established system.

To carry out the geological disposal project, it is critical to ensure that the activities of the government and NUMO are fair and that information released is objective. If the fairness of the activities and the objectivity of the information are verified by a third party, the project may be able to gain trust from society. People have been deceived by the government and businesses many times in the past, and a third-party panel would have a critical role to play.

Nuclear Waste WG meetings discussed the cases of France and Sweden, but the character and status of these are not precisely applicable to Japan. It is necessary to prepare a system with reference to the cases of countries other than these.

The Interim Report suggests that the Japan Atomic Energy Commission (JAEC) can play the role of the third-party panel. However, if the JAEC assumes this role, public criticism that interested parties are simply attempting to promote their own preferences will be unavoidable. A reliable organization should be established, and it should be administered fairly and transparently. In achieving this end, many issues, such as who should participate in the panel and who should share the costs, remain undiscussed. The discussions in the report mention only the necessity of solving these issues.

If the project is promoted while participation by local residents and the revocability of decisions remain unguaranteed, a scientifically unsuitable location may be selected in the political context and the placement of the site in the location eventually determined.

(Continued on page 5)

Current State of Post-Accident Operations at Fukushima Daiichi Nuclear Power Station

October 2013 to April 2014

State of the Plant

Many of the measuring instruments installed in the Fukushima Daiichi Nuclear Power Station (FDNPS) measuring system continue to malfunction as a result of the accident. Although there is no guarantee of the accuracy of values being measured, if these values are taken as the premise, from the temperature of the containment vessels and from the releases of Xenon-135, it can be estimated that the state of the reactors is stable. According to the assessment by Tokyo Electric Power Company (TEPCO), however, 10 million Bq/hr of radioactive substances continue to be released into the atmosphere (see **Figure 1**).

Current State of Post-Accident Operations

1. State of Operations concerning Molten Fuel

The current state is that for each of the reactors, surveys of the plant situation as preparation for decontamination of the buildings, surveys to reveal the locations of leaks in the containment vessels, as well as R&D work on various kinds of devices, are being implemented in parallel. Work to remove obstructing debris from the first floor of the Units 1 to 3 reactor buildings has now been completed.

2. State of Operations concerning Spent Fuel Pools

Removal of fuel assemblies from the Unit 4 spent fuel pool (SPF) began in November 2013. Of the 1,535 fuel assemblies present in the Unit 4 SPF at the time of the accident, 728 had been transferred to the common pool as of April 23, 2014. TEPCO has announced that the transfer to the common pool of the three damaged fuel assemblies found thus far (one has a deformed handle and a deformed and damaged channel box, while the other two show leakage of radioactive materials from the interior of the assemblies) is possible with the transfer vessel currently in use.

In February 2014, after the removal operations had begun, it was found that the air dose rate at the removal site had risen due to radioactive Cobalt-60 in the water of the SPF and the influence of radioactive materials in the surrounding area. By April, TEPCO had reduced the exposure rate of workers at the site after this was pointed out by the Nuclear Regulation Authority (NRA). However, it should have been possible to predict at the time when removal operations began that the dose rate in the working area would be high and to have considered methods for its reduction. This is one very clear example of how TEPCO prioritizes schedules and costs to the detriment of the safety of the workers at the site.

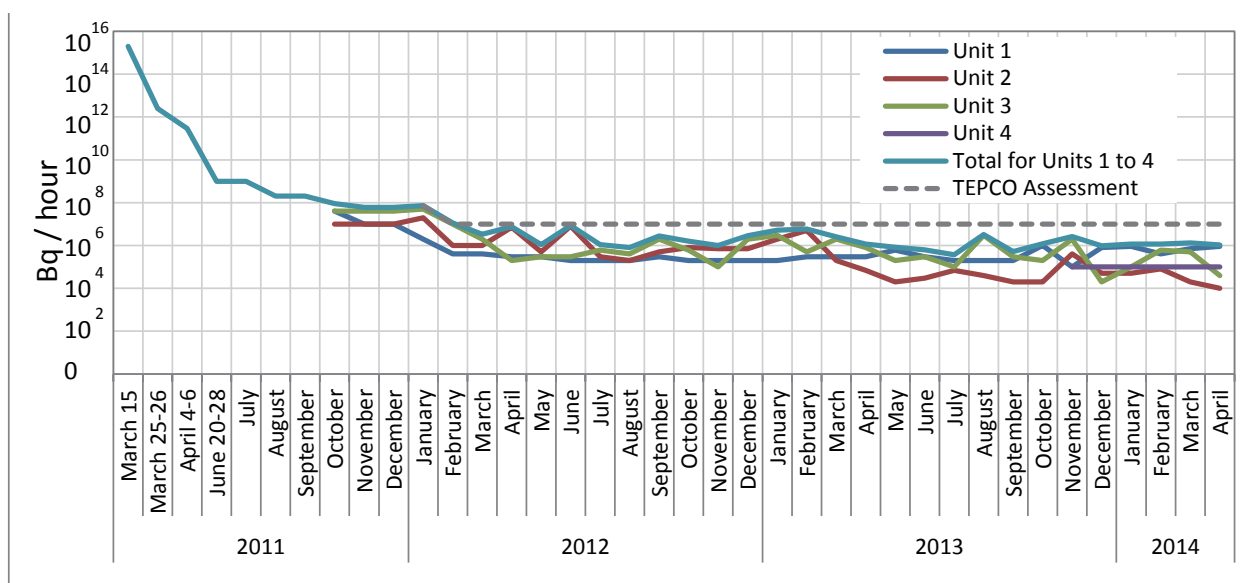


Figure 1. Releases of radioactivity from Units 1 to 4 of Fukushima Daiichi Nuclear Power Station

From materials prepared and submitted by the secretariat to the Government and TEPCO's Mid-to-Long Term Countermeasure Meeting and Secretariat of the Council for the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station. (However, this was for assessing leakage from exhaust outlets and gaps in building covers and does not include leakage to groundwater, etc.)

The removal of large debris from the operating floor in the upper part of the reactor building of Unit 3 is now complete and measures to reduce the dose rate are currently being implemented. From the first half of FY2014, it is planned to begin the work of installing a cover for removal of the nuclear fuel. Work to remove debris from the SPF has also begun, and was scheduled to be completed during the first quarter of FY2014.

Dismantling of the cover currently installed around the Unit 1 reactor building is due to begin around the beginning of FY2014 in order to carry out the removal of debris from the operating floor. The reactor building cover was installed to suppress releases of radioactive materials, and there are concerns that its dismantling will increase the amounts of radioactive material releases. Moreover, since the filtered ventilation equipment fitted on the reactor building cover has been turned off since September 2013, in preparation for the dismantling work, releases of radioactive material to the atmosphere from Unit 1 have increased since last October.

While there is no great damage to the reactor building of Unit 2, high dose rates have made it impossible to confirm details of the state of the interior of the building. According to the plan, the construction method for the cover for removal of the nuclear fuel is due to be determined during the first half of 2014.

Fuel assemblies removed from the Unit 4 SPF are to be transferred to the common pool for cooling, but the common pool itself is already close to its capacity limit. Spent fuel assemblies that were being kept in the common pool are therefore currently being transferred to dry casks, which are placed in a temporary storage facility that has been in operation since April 2013. (1,006 assemblies had been transferred as of April 23, 2014.)

3. The Problem of Contaminated Water

According to an estimate by TEPCO, roughly 800 m³ of underground water are flowing into the reactors of Units 1 to 4 per day, 400 m³ of which is flowing into the reactor buildings and the remaining 400 m³ being released into the ocean.

To suppress the inflow of groundwater, measures that include the following eight are being planned:

1. Operation of an "underground water bypass" to reduce the inflow of underground water by pumping up groundwater using pumping wells installed on the land side of the site and releasing the water into the ocean. (The pumping of underground water began in April 2014, after consent to the plan was obtained from the local and prefecture fisheries

cooperatives and JF Zengyoren, the national Federation of Japan Fisheries Cooperatives).

2. Management of the water level by restoration of the subdrains (scheduled to be operable starting from around September 2014).
3. Construction of an inland frozen earth barrier (an ice barrier created by burying refrigeration pipes at set intervals around Units 1 to 4 – scheduled to begin operation in the first half of FY2015).
4. Construction of an ocean side water barrier (scheduled to begin operation around September 2014).
5. Preventing water leakage from the Unit 1 to 4 reactor buildings through the (roughly 880) holes, etc. in the outer walls of the buildings (scheduled to be completed in FY2017).
6. Reduction of the volume of contaminated water using the Advanced Liquid Processing System (ALPS) to separate out the treated water still containing Tritium from other nuclides included in the waste effluent (scheduled to be fully operational in mid-2013, but experiencing frequent problems).
7. An increase in the number of waste water tanks (to be increased from 490,000 m³ as of March 25, 2014 to around 800,000 m³ by the end of FY2014).
8. Removal of contaminated water from trenches. (Removal of contaminated water from branch trenches was completed in September 2013 and preparatory work to remove contaminated water from the main trenches is now underway.)

A 10 m square scaled-down experiment conducted in April 2014 confirmed that the creation of a frozen earth barrier was possible, but many issues still remain. These include whether or not it will be possible to create a 500 m north-south and 200 m east-west frozen earth barrier; whether or not it will be possible to maintain the barrier in the long term; and whether or not land subsidence due to cessation of the inflow of groundwater will remain within assumed limits.

Further, TEPCO claims that, by use of the inflow suppression measures mentioned above, the amount of accumulating contaminated water will reach equilibrium by January 2021 at around 800,000 m³. However, TEPCO also says that the premise for this 800,000 m³ figure is ocean release of the water pumped up by the groundwater bypass and from the subdrains. Water pumped up by the groundwater bypass has been released into the ocean since April 2014, but already Tritium exceeding government safety standards has been detected in water from some of the groundwater bypass pumping wells.

(Hajime Matsukubo, CNIC)

Group Introduction

Thirty years of protest against the construction of the high-level radioactive waste disposal facilities

Osamu Azuma

Representative, Northern Hokkaido Network against the Invitation of Nuclear Waste Disposal Facilities

In Horonobe Town, Hokkaido, located in northern Japan at latitude 45° north and longitude 141° 50' east, the underground disposal of high-level radioactive wastes resulting from the reprocessing of spent fuel generated by nuclear power plants, is being studied. Horonobe is the only place in Japan that hosts such a study.

Horonobe is a small town with a population of slightly more than 2,600. In the early 1980s, the town initiated efforts to invite nuclear-related industry to the area to halt the decline in population and revitalize the town. The town succeeded in inviting the research and storage facilities for high-level radioactive wastes in 1984. However, the project was frozen due to strong opposition from municipalities around the town and the Hokkaido population. As a product of compromise, the Underground Research Project started in April 2001 under the condition that no nuclear material would be brought in and only research would be conducted. In the municipalities around Horonobe, many citizen groups were established in the year when the nuclear waste issue became a serious controversy, and in January 1985, the Northern Hokkaido Network against the Invitation of Nuclear Waste Disposal Facilities was established as an organization networking those groups. (Several such organizations were formed across Hokkaido.)

Japan's first small experimental nuclear reactor was commissioned in 1957, and in 1976, the Nuclear Fuel Cycle Project, which planned to produce plutonium and use it as fuel, became the core of Japanese nuclear policy. However, the issue of disposal of high-level nuclear wastes, which result from the nuclear fuel cycle, has remained unresolved. In 2000, it was determined that the wastes would be disposed of deep underground. The project has proceeded to date without determining the details of waste disposal.

Soon after the Great East Japan Earthquake of March 11, 2011, neighboring three reactors out of six at Fukushima Daiichi Nuclear Power Station suffered meltdowns. It was the world's worst ever industrial accident. Today, as a result, none of nuclear reactors of the 54 that existed in Japan before March 2011 is in operation. Many people in this country are against the restart of nuclear reactors.

To determine the site for the disposal of nuclear wastes and thus enable a swift restart for nuclear reactors, the government shifted the disposal-site nomination system from a voluntary municipality self-nomination system to a government designation system.

The deep underground research project in Horonobe Town has been conducted based on an agreement that the research would be discontinued



Rally against the Nuclear Waste Disposal Facility

in about twenty years. However, the Independent Administrative Institution Japan Atomic Energy Agency (JAEA), which oversees the project, has been attempting to extend this period, and has begun to deny the agreement confirmed with local municipalities that the land hollowed out for the underground facilities would be reclaimed after the research had ended. There are still some people in Horonobe Town voicing the opinion that nuclear waste disposal facilities should be invited to the town. Concerns are growing that the town might be designated to host the disposal facilities as a result of unreasonable maneuvering of the project.

To make this situation that is occurring in Horonobe known nationwide, the Northern Hokkaido Network against the Invitation of Nuclear Waste Disposal Facilities began to hold the Horonobe Meeting for a Nationwide Gathering on Nuclear Wastes in August 2009 in order to develop a voice against the disposal facilities. In Japan, there are many active volcanoes, earthquakes are frequent, and underground water is abundant. Scientists seriously question the viability of the underground disposal method. Geologically speaking, the geological structure of Hokkaido is rather new, having been formed only about 100,000 years ago. The area around Horonobe Town is still experiencing deformation and tectonic activity. Below the surface in the area around Horonobe lie mudstones, which contain large numbers of fissures and great amounts of underground water. (The water includes both water from the ground surface and fossiliferous seawater. The daily average drainage volume from the underground research facilities between April 2012 and March 2013 was 310.4 cubic meters.) There are also gaseous emissions. That research into the disposal of high-level radioactive wastes, which need to be isolated for as long as 100,000 years, is being conducted in such a place, indicates a fundamental problem with Japan's nuclear power policy.

NEWS WATCH

All Towns and Villages of Fukushima Prefecture Call for Decommissioning of All Nuclear Reactors in the Prefecture

In a general meeting of the council of local assembly chairpersons of Fukushima Prefecture on June 3, the council unanimously adopted a special resolution calling for decommissioning of all of the nuclear reactors in the prefecture. The next day, a general meeting of the Fukushima Prefectural Local Assemblies was held, and they also unanimously adopted the same special resolution.

The decision to decommission all six of TEPCO's nuclear reactors at Fukushima Daiichi Nuclear Power Station was finally taken last January, but despite repeated requests by Fukushima Prefecture, and resolutions by the prefectural assembly and all 59 of the prefecture's local assemblies, both the national government and TEPCO have delayed any decision on the four units at Fukushima Daini Nuclear Power Station. The resolutions by the council of local assembly chairpersons and the local assemblies are calling for early realization of the decommissioning of the reactors at Fukushima Daini Nuclear Power Station.

Complete Liberalization of Retail Electricity Sales

A revised Electric Industry Utility Law was established on June 11, stipulating complete liberalization of retail electricity sales by 2016. This ends the regional monopolies of the ten electric power companies of Japan (called "general electricity utilities"), which have divided Japan into the ten exclusive regions that they supply.

Retail sales to large consumers have already been liberalized. Starting in March 2000 with users able to receive 20,000 V or more and contracting for 2,000 kW or more, the scope was expanded to include smaller users from April 2004 and again in April 2005, but there has been considerable resistance from the general electricity utilities to full liberalization for households, small factories and other small-scale users, and thus liberalization has been repeatedly delayed.

Full liberalization has finally been achieved, and in fact, there are many new entrants. Future complications are thus predicted to occur along with the diversification of fees and services.

Members of the Nuclear Regulation Authority to Change

Two members of Japan's Nuclear Regulation Authority (NRA), which was established in September 2012, will be replaced this September after two years of service. Retiring from their posts will be Deputy chairman Kunihiko Shimazaki and Commissioner Kenzo Oshima. Commissioner Shimazaki, in particular, often confronted the power companies regarding recognition of active geological faults within or near nuclear power plant grounds, incurring opposition from nuclear energy proponents. His replacement is seen as stemming from this opposition.

Replacing them from September will be Tokyo University Graduate School Professor Satoru Tanaka and Tohoku University Professor Akira Ishiwatari, who were approved by the House of Representatives on June 10 and the House of Councilors on June 11. Prof. Tanaka received remuneration from a TEPCO-affiliated organization up to about two years ago as a director of the Japan Atomic Industrial Forum, Inc. This is in conflict with the selection standards applied for choosing NRA members during the Democratic Party administration, but the current administration has decided not to use those standards.

Tohoku Electric Power Applies for Review of Compliance of Higashidori NPP with New Standards

On June 10, in a move towards restarting the Unit 1 reactor of the Higashidori Nuclear Power Station (BWR, 1,100 MW), Tohoku Electric Power Co. applied with the Nuclear Regulation Authority for a review its compliance with the new safety standards. This brings the total to 19 units at 12 nuclear power plants for which applications have been filed.

**Come join the
"Goodbye to Nuclear
Power Plants" Rally!**

**September 23, 2014
At Yoyogi Park, Tokyo**



Nuclear Power Subcommittee Inaugurated

The Agency for Natural Resources and Energy (an advisory body to the Ministry of Economy, Trade and Industry (METI)) has established a Nuclear Power Subcommittee, which held its first meeting on June 19. CNIC Co-director Hideyuki Ban has been appointed as a member.

As the regional electric power monopolies erode, it will be more difficult for those companies to achieve returns on large investments over the long term. Thus, with the establishment of the revised Electricity Business Act, supplementary resolutions have been added, including appropriate measures that have been discussed and crafted on how to handle nuclear power in a competitive environment, and measures for creation of a business environment, including assigned roles for the government and nuclear power companies, toward smooth implementation of nuclear reactor decommissioning.

Nuclear power proponents have naturally been treating the Nuclear Power Subcommittee as a venue for pursuing policies to keep nuclear power alive. In the midst of this, Co-director Ban has announced his intention of discussing how Japan might proceed toward abolishing nuclear power. Of the 21 members and five expert advisors (including nuclear power representatives) and one observer (vice-president of The Chugoku Electric Power), there are only two other members who advocate abolishing nuclear power. They will have a big role to play in winning over opinions among the moderate members and deterring conspiracies among nuclear power businesses to shirk their responsibilities.

Sendai NPP passes the new regulatory requirements

At a meeting of the Nuclear Regulation Authority (NRA) on July 16, a screening report was approved that recognized the Kyushu Electric Power Company's Sendai Nuclear Power Station Units 1 and 2 (PWR, 890 MW each) as compliant with the new safety standards. Public comments restricted to scientific and technical opinions are being solicited for the 30-day period up to August 15.

While the NRA chairperson, Tanaka Shun'ichi, stated that "We have examined compliance with the standards, but that doesn't

Movement for Review of Act on Compensation for Nuclear Damages

The Senior Vice Minister Review Panel on the Act on Compensation for Nuclear Damage met for the first time on June 12. Participants included officials at the vice-ministerial level from MEXT, METI and other ministries. The panel is currently discussing the necessary legal framework for Japan's membership in the CSC (Convention on Supplementary Compensation for Nuclear Damage), but its biggest focus is on reviewing Japan's current law, which forces electric power companies to assume unlimited liability.

The CSC was created by the IAEA in 1997, but aside from the US, its membership is limited to three countries, Argentina, Morocco and Romania, and is therefore unable to fulfill condition precedent. The declared purpose of this convention is to help victims. Certainly, one CSC feature is that if large-scale damage from a nuclear accident exceeds liability limits, it can increase the actual minimum amount of compensation by drawing from a supplementary fund to which all member nations contribute.

On the other hand, it does not allow victims outside the country where the accident occurred to claim compensation for nuclear damage, and it eliminates the risk to companies exporting equipment and technology of liability for enormous sums of compensation in their home countries.

mean I'm saying they are safe," Chief Cabinet Secretary Yoshihide Suga said that the government policy that NPPs whose safety has been confirmed will be restarted is unchanged. The local Aira City council passed an opinion stating, "We are opposed to the restart of Sendai NPP Units 1 and 2, and demand the decommissioning of the reactors." The city council of Ichiki Kushikino City passed an "Opinion Demanding the Establishment of an Effective Evacuation Plan to Protect the Lives of Citizens" addressed to the Governor of Kagoshima Prefecture. Restart of the NPP requires, among other things, a procedure to obtain the consent of local residents, and is expected to take place, if it does, sometime in October, or later, this year.

Nuke Info Tokyo is a bi-monthly newsletter that aims to provide foreign friends with up-to-date information on the Japanese nuclear industry as well as on the movements against it. It is published in html and pdf versions on CNIC's English website: <http://cnic.jp/english/>

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