

Executive Summary

Toward a Comprehensive Solution for Nuclear Policy and Business Challenges

Akihiro Sawa, Senior Executive Fellow

Sumiko Takeuchi, Deputy Project Leader of Nuclear Policy issues

The 21st Century Public Policy Institute, Keidanren

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1. Introduction to the issue

The accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi Nuclear Power Plant revealed that the response measures stipulated in the conventional framework centered on the Act on Compensation for Nuclear Damages were insufficient in the event of widespread nuclear disaster. With this in mind, this paper will study a proposal for a new nuclear disaster response system and how Japan should set the stage for the sustenance and continuity of nuclear power operations (power generation and backend operations). It will discuss strategies to comprehensively manage the various risks related to nuclear power projects (nuclear accidents, enhanced regulations, reduced operation ratios, financing, etc.).

(1) Historical context of nuclear power in Japan

This subsection will reflect on the political and economic background of the initial introduction of nuclear power in Japan, and briefly look back on the context in which it has been “privately run under national policy,” the incompatibility between nuclear power business and the deregulation of the electric power system, and Japan’s nuclear fuel cycle backend policy.

(2) The current status of nuclear power in Japan

Important changes have occurred in the contextual background of nuclear power generation after the accident at the Fukushima Daiichi Nuclear Power Plant. A prominent change has been seen in the political

environment. Although the Innovative Energy and Environment Strategy, in which the DPJ government resolved to phase out nuclear power, was not endorsed by the new administration, the former pro-nuclear policy mood remains absent even with the comeback of the LDP-New Komeito coalition. This is a result of structural changes occurring to the diluting political support for nuclear policy.

The situation has evolved as such for the following reasons: 1) with anti-nuclear public opinion having sustained in the stalled resolution of the accident, the distrust towards the national government and companies has yet to be dispelled; 2) the acknowledgement that energy must be quantitatively secured has been undermined in the prolonged economic recession, along with receding memories of the oil crises; and 3) high expectations for nuclear technology and appreciation of it as state-of-the-art technology have been lost in the Fukushima Daiichi accident.

It is urgent that nuclear energy is both politically and administratively reconfirmed as a “particularly” vital energy source to Japan from the perspectives of energy security, economic growth, and climate change countermeasures. The national government should reconfirm its commitment to nuclear policy by means of the Basic Energy Plan and other Cabinet decisions from an administrative perspective, and in the form of party decisions adopted by the ruling party, in political terms. This will lay the groundwork for future system reforms and the establishment of relevant budgets.

A second change is the progress achieved in electric power system reforms. The scheduled blackouts and lack of capacity for mutual provision of electricity which occurred in the aftermath of the Great East Japan Earthquake exposed the flaws of the conventional power system; and therefore, the ongoing electric power system reforms aim to enable the Japanese system to balance supply and demand in the market by deregulating electricity prices. The most important feature of these reforms in relation to nuclear policy is the legal unbundling of the power transmission/distribution sector and the abolishment of tariff regulations based on fully distributed cost (FDC) pricing and general mortgage bonds. Those measures ensured the procurement of funds for installing generation and distribution equipment required for electric power

companies to fulfill their obligation to supply power under the Electricity Business Act. The abolishment of such measures and its ensuing changes in corporate finance that will result from the legal unbundling of the transmission/distribution sector will impose an unpredictable impact on nuclear power investment, which calls for stable long-term financing. In addition to detailed discussion on electric power system reforms, deliberation is needed on means to limit the financing risks of nuclear power, including public support measures.

Renewable energy, on the contrary, has been granted the status of a climate-friendly alternative energy source to replace nuclear energy by “national policy,” and its financing risks have been eliminated under the feed-in-tariff (FIT) program, which ultimately amounts to full-cost pricing. The structure of these issues is exhibited in Figure 1.

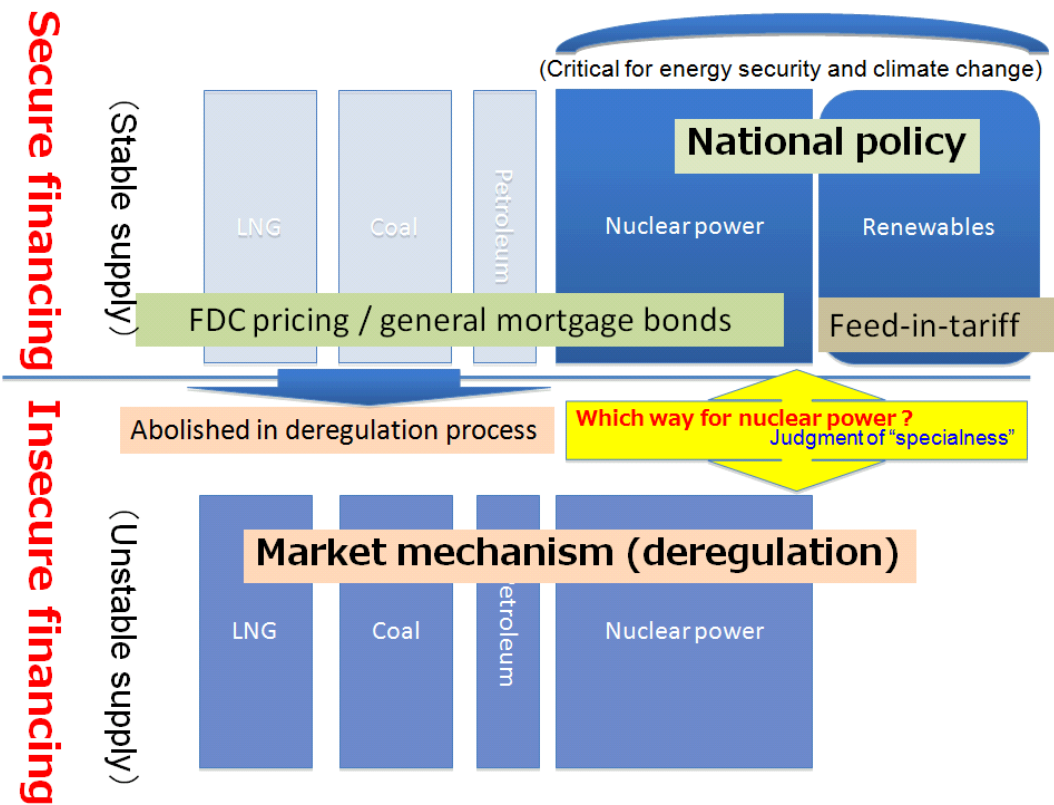


Fig.1 Structure of issue

The third change has occurred in safety regulations. The “backfitting” rule is an example of retroactive rules and standards that were not

effective at the time of licensing, and poses risks of impairing long-term investments. Therefore, regulatory risks must also be included among nuclear business risks in the future.

Requirements for sustaining nuclear power

The first requirement is the political and administrative confirmation of the “special importance” of nuclear power. Politicians and government officials share the responsibility to explain not only the necessity of nuclear power as a electric power source but also how the public will benefit from the advantages of sustaining nuclear technology and relevant human resources. If nuclear policy is to be steered in the direction of stronger national government intervention in the process of reviewing and reconstructing nuclear power operations, government assurance that the use of nuclear power is beneficial to the general public as well as to nuclear operators will serve as the rationale behind the policy.

The second requirement is to establish a secure financing environment including public support measures in light of the changes in the contextual background of the nuclear power operations aforementioned in subsection 2).

The third requirement is implementing regulations to promote and facilitate technological innovation. In order to advance human resources development and technological succession while encouraging voluntary safety competition among companies in the middle- to long-term as well as promoting the reinstatement of nuclear power and incorporating new technologically innovative elements, the Act on the Regulation of Nuclear Source Material,. Nuclear Fuel Material and Reactors (Nuclear Reactor Regulation Law) must be fundamentally reviewed (in terms of desirable regulatory standards, methods and activities). If the Nuclear Reactor Regulation Law and the Nuclear Regulation Authority are to specialize in regulating nuclear safety, then the current Nuclear Reactor Regulation Law, which covers a mixture of operational regulations and safety regulations should be fundamentally restructured from the viewpoint of securing nuclear material management and flexibility in nuclear operations. An administrative body to oversee the peaceful use of nuclear energy in place of the Atomic Energy Commission of Japan (AEC) is also called for.

2. Policy proposal for setting the playing field for nuclear power

This section will propose a policy package to comprehensively resolve the abovementioned challenges. It is important that the national government's commitment to nuclear power is reconfirmed both politically and administratively, for example by bundling the relevant law amendments and new policy measures composing the policy package into the form of a draft Act on the Management of the Operational Context of Nuclear Power. This would also be premised upon a clarification of the position of nuclear power in the electric power reforms.

The proposed policy package is illustrated in Figure 2 (TEPCO's position requires separate consideration):

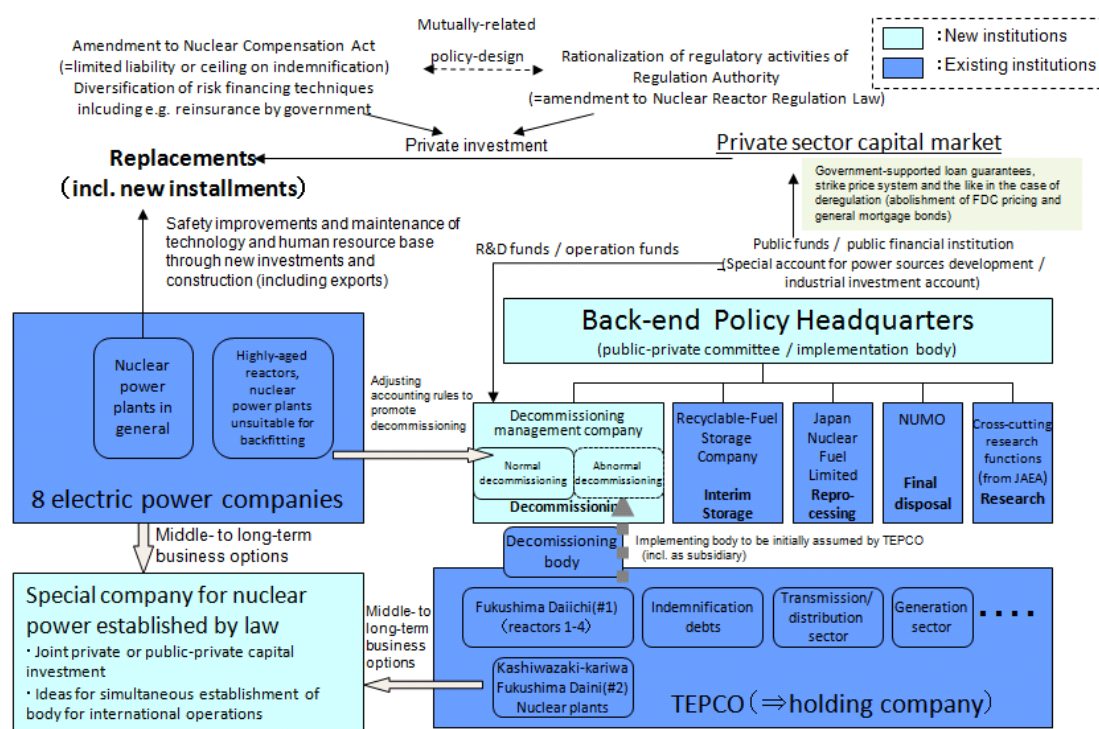


Figure 2 Framework for comprehensive resolution for nuclear issues

(Act on the Management of the Operational Context of Nuclear Power)

(Source) compiled by the author

(1) Private sector-led replacement of highly-aged reactors

The first important element of the proposed policy package is promoting the replacement (including reconstruction and new installments) of highly-aged nuclear reactors through private initiative. Human resources must be fostered for the robust technological succession required for the retention of nuclear technology. Furthermore, the knowhow and knowledge obtained through actual involvement in the construction work at nuclear power plant sites are indispensable for the improvement of safety at domestic nuclear power plants. International expansion of nuclear operators should also be proactively encouraged in light of promoting technological advancement through competition.

Commercial reactors should be replaced using private funds. However, deregulation will complicate fund procurement; and therefore, electric power companies will have to make decisions regarding the role of nuclear power in its business structure and how much money it will invest and where that money would come from.

In order to facilitate decision-making, the government must clarify whether nuclear power will be considered “public benefit electricity” gaining policy support under national policy, or a “competitive power source,” as in the case of thermal power, exposed to market competition. Another idea would be distinguish replaced power plants and those bearing high policy significance from existing power plants by designating the former as “public benefit electricity” while categorizing the latter under “competitive electricity.”

Firstly, if nuclear power will continue to be granted the status of “public benefit electricity,” alternative price regulations will be needed to replace the fully distributed cost method, which will be abolished. Some suggestions include: 1) a debt guarantee scheme backed by the national government (or other public institutions with equivalent credibility); 2) a strike price system as recently taken in UK 3) contracts between transmission/distribution companies or the wholesale electric power exchange and their choice of electric power companies to constantly purchase a fixed amount of electricity sourced by nuclear power.

If nuclear power should newly become “competitive electricity,” a framework will be needed to allow companies to capitalize lost earnings that have become unrecoverable as a result of regulatory changes,

including those regarding safety regulations, and to recover the stranded costs from wheeling charges.

Furthermore, as the debate on unbundling power generation and distribution develops and the financial management and fund procurement schemes of the holding company and group companies under a legal unbundling model are determined, nuclear power operations may have no other choice but to undergo restructuring (cf. “middle- and long-term business options” in Figure 2).

In the event that nuclear power operations are forced to undergo business restructuring, the government will be required to consider providing the funds entailed for restructuring (capital investments, debt guarantees, etc.), implementing tax incentives (registration and license tax exemptions), clarifying its approach to the abovementioned stranded costs, taking Antimonopoly Act-related measures (exemption, clarification of requirements, acceleration of investigation procedures, etc.), retaining operating licenses issued under safety regulations and accelerating other licensing procedures under relevant laws.

(2) National government-led approaches to backend issues

The backend issue, which has become the largest impediment to the sustenance and continuity of nuclear power generation must be addressed by the national government with more proactive responsibility. The government is required to perform its role of implementing policies and be responsible for the processing of spent fuels through to final disposal after reactor decommissioning. A “Backend Policy Headquarters” should be established directly under the Cabinet, as an administrative body that will plan and draft relevant integrated policies in place of the AEC.

Furthermore, in accordance with the basic principles determined by the “Backend Policy Headquarters,” a mechanism will be required to adjust the discrepancies between public and private sectors in the progress and scale of operations. Options for such a mechanism include: (i) establishing an “Organization for Nuclear Backend Operations,” a specially-approved corporate body or special company established by law (For example, the organization could be established as a permanent entity with the government holding a two-third share and electric power companies, a one-third share. Policy continuity and the assignment of responsibility is

made explicit.); and (ii) establishing a loose public-private partnership, such as a “Joint Committee for Public-Private Coordination of Nuclear Backend Operations.” (Nuclear interim storage and reprocessing are currently operated by the private sector; and therefore, this option will help avoid confusion induced by drastic changes.)

Backend operations should be assumed by an entity that will still exist in the distant future (at least one hundred years later), and since the operations do not generate profits, there is no incentive for private electric power companies to continue them. Even if operations are initiated under option (ii), they should appropriately be shifted to option (i) in the middle-to long-term. This will enable a single entity to integrate the entire nuclear backend process of decommissioning, interim storage, reprocessing, final disposal of radioactive waste and all cross-cutting research under its supervision and assume comprehensive responsibility for their implementation.

From the perspective of minimal costs and effective implementation, the Organization should make the decisions regarding operational strategy but basically outsource actual operations to the private sector, with reference to the UK Nuclear Decommission Agency (NDA)’s scheme.

Although the implementation structure for decommissioning the Fukushima Daiichi Nuclear Power Plant requires separate consideration (TEPCO should take the initiative in the immediate future), other commercial reactors as well as those installed by government institutions (Japan Atomic Energy Agency (JAEA) and the Power Reactor and Nuclear Fuel Development Corporation (PNC)) will eventually be faced with the issue of decommissioning. It will be important for the Organization for Nuclear Backend Operations to assume the disposal of “negative heritage” for a certain price.

A scheme for the efficient and effective implementation of long-term decommissioning operations –for example, injecting public funds from the Special Account for Energy Policy - is called for to cover disposal costs that will contribute to the advancement of decommissioning technology as a whole. Furthermore, institutional measures should be deliberated in order to recover a portion of the total public funds incurred in the entire decommissioning process by selling the decontaminated land upon completion of decommissioning operations.

(3) Rational Regulations by the Nuclear Regulation Authority

The Nuclear Regulation Authority is unnecessary if Japan is to end nuclear power generation. Nuclear power can be phased out both legally and politically by other means. Nevertheless, the NRA has been retained with the expectations that it will deliberate and implement the safety regulation standards and activities required to safely operate nuclear power generation facilities, which are economic assets based on large investments, and that the national economy will come to enjoy the provision of inexpensive and stable energy supply.

- 1) The general public as well as regulators and the regulated should share the acknowledgement that the safety standards established by the NRA are only requirements for approval of nuclear power operations and that they are not at all evidence of safety in nuclear power plants. A scheme should be designed with embedded incentives to promote safety improvements through competition among operators.
- 2) The regulatory activities of the NRA should no longer be focused on calculating hardware structure and checking for document flaws but should instead be shifted to assessing integrated risks, including organizational governance and human factors, and securing the human resources required for such activities in terms of both quality and quantity.
- 3) In order for thorough engineering technology-oriented deliberation between the NRA and operators on safety standards and regulatory methods to take place, the NRA should enhance its staff functions by establishing a Special Committee on Technology, and operators should establish an organization that will compile expertise and knowhow from operators and manufacturers and serve as a liaison for opinion exchange with the NRA.

Furthermore, the NRA has other critical tasks, which are equally as important as conformity assessments for backfitting standards and fracture zone surveys. These include the collection and announcement of scientific information on low-dose exposure and support for formulating regional disaster prevention plans.

(4) Structuring a new nuclear disaster response system

The accident at the Fukushima Daiichi Nuclear Power Plant brought to light the drawbacks of the current nuclear damage compensation program. The current program 1) fails to address the problem that once an accident occurs, entire communities collapse; 2) obligates nuclear power operators to continue to provide a stable supply of electricity despite being faced with limitless debts related to damage compensation, decontamination and decommissioning; and 3) does not embed incentives for operators to engage in self-governed competition with other operators over safety improvements.

With an aim to resolve such issues, a three-step nuclear disaster response scheme is proposed (Figure 3). This system reform plan is not limited to making amendments to the Act on Compensation for Nuclear Damage and seeks to be a comprehensive victim compensation measure as well as to distribute damage costs.

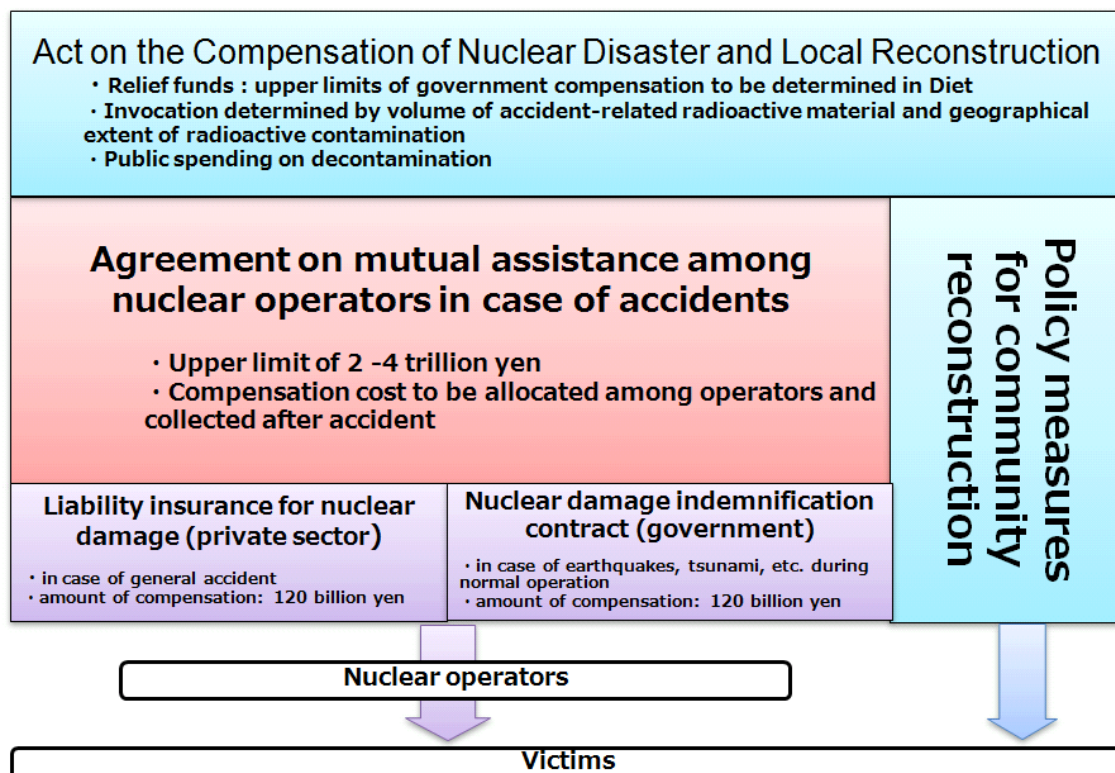


Figure 3 **Proposal for new policy architecture for nuclear damage recovery**

Taking into consideration the distrust prevailing in terms of the technological and organizational competence of all nuclear power operators in general in the aftermath of the accident at the Fukushima Daiichi Nuclear Power Plant, a scheme that penalizes (by imposing economic burden or weighted inspection items) operators that neglect to strive to improve safety levels and awards those who achieve high performance in safety operations is needed.

For example, Japan could adopt a program similar to the US Reactor Oversight Process (ROP), under which the Nuclear Regulatory Commission (NRC) links performance indicators of reactors with a weighted range of additional inspections and makes the findings available for public access. Reactors with high performance could be given the incentive of longer intervals between regular inspections. Furthermore, the insurance premium under the government-sponsored indemnity agreements for compensation of nuclear damage could be linked with performance indicators, and insurance premiums (rates) of the new nuclear energy liability insurances system, which is proposed below, could be associated with performance indicators and peer review assessments.

We propose the establishment of an “ex-post-levy-collection-based mutual assistance program,” a larger mechanism that embraces the abovementioned ideas. By introducing this scheme, nuclear power operators will “share a common destiny” in terms of safety operations. This means that once another operator causes an accident that inflicts damage, an operator will immediately suffer significant impacts on its corporate finances.

Since the Fukushima Daiichi Nuclear Power Plant accident, the Japan Nuclear Safety Institute (JANSI) has involved operators in a peer review process on safety at nuclear power plants. An “ex-post-levy-collection-based mutual assistance program” will help enhance the effectiveness of such processes. By limiting damage compensation payments to a certain range, for example 2 - 4 trillion yen, accident risk levels can be measured in advance, thereby resolving some financial issues.

The US’s Price-Anderson Nuclear Industries Indemnity Act (Price-Anderson Act) also contains a “mutual insurance” arrangement that functions similarly. Concerns that setting an upper limit to the damage

compensation payment to be made by operators may constitute moral hazard can be dismissed with the simultaneous establishment of an effective mutual supervision scheme. Currently in Japan, under the Nuclear Damage Compensation Facilitation Corporation Act, operators must pay a general contribution to the Corporation. The general contribution system will be abolished with the introduction of the new “mutual assistance program” proposed above.

In the case of TEPCO, various supporting and opposing opinions were presented regarding its legal liquidation, which was dismissed on the grounds that it would lead to delayed and inadequate damage compensation and pose serious operational problems in coping with the aftermath of the accident. This decision was based on the judgment that compensation for nuclear damage must be fully made, transactions related to the stabilization of the nuclear accident could be continued, and capital investments should be made for a stable electricity supply.

The establishment of a mutual assistance scheme and a mutual supervision scheme, accompanied by the introduction of upper limits to payments liable in compensation for nuclear damages promise higher safety levels and lower accident risks, and will significantly lower the possibility of operators being hammered by excessive debts, derived solely from compensation for damages. However, the chances of having to reorganize operations cannot be fully dismissed; and therefore a scheme should be considered in preparation for such cases.

Under a limited liability scheme, when total compensation costs exceed the sum of upper limits for operators and funds available from the mutual assistance scheme, the compensation of victims becomes a national government agenda, thereby invoking the “Act on the Compensation of Nuclear Disaster and Local Reconstruction” proposed in Figure 3. The Swiss nuclear damage indemnification law, which provides for the joint cooperation of the national government and nuclear operators in addressing cost-related issues in major nuclear disasters, should be referred to.

(5) Addressing local community collapses

In a major nuclear disaster, the damage is widespread geographically, as well as in content and time. Furthermore, damages such as lost local communities and employment issues are difficult to be resolved only by monetary indemnification. Therefore, it is more than obvious that attempts to resolve such issues according to the current Act on Compensation for Nuclear Damage, which is based on a tort law framework, can only be effective to a limited extent.

In the event of an accident that creates a massive number of victims across a wide geographical area and is likely to be followed by a prolonged aftermath, the government should importantly go beyond providing financial assistance based on the Nuclear Damage Compensation Facilitation Corporation Act to assuming the responsibilities of victim indemnification and restructuring affected areas, while requiring the concerned operator to cooperate in those activities..

This can be achieved by incorporating additional disaster compensation (the national government takes over the complaints extended to operators and an organization with pooled funds similar to a relief fund will address them) and various measures on local reconstruction into the same law. The “Act on the Compensation of Nuclear Disaster and Local Reconstruction” can cover decontamination operations run by government funds, industrial policy measures to attract companies to the region as well as encourage the establishment of new businesses in order to secure employment for victims, an increased ratio of public works subsidies available for the reconstruction of local infrastructure, continued free healthcare checkups, and measures to deal with and prevent economic losses and other damages incurred by the spread of bad rumors. Compensation methods employed in past dam construction projects may also be referred to.

3. Future processes

In order to advance the abovementioned measures to set the playing field for nuclear power operations, we must consider their correlation with the processes and schedules of the following related policy agenda.

- 1) Formulation of the Basic Energy Plan and preceding deliberations in the Energy Subcommittee of the Advisory Committee on Natural Resources and Energy (joint deliberations in the Industrial Structure Council and the Central Environment Council on global warming countermeasures are also closely related)
- 2) Timeline and details of the draft proposal for amendments to the Electricity Business Act (electric power system reforms)
- 3) Addressing revisions to the Act on Compensation for Nuclear Damage
- 4) Developments in the Nuclear Regulation Authority's conformity assessments related to backfitting
- 5) Reviewing TEPCO's Comprehensive Special Business Plan, including radiation-tainted water (restarting nuclear power plants, tariff-related issues, financing...)
- 6) Developments towards restarting the Japan Atomic Power Company's Tsuruga Nuclear Power Plant
- 7) Completion and operational status of Japan Nuclear Fuel Limited's reprocessing plant and status of the Recyclable-Fuel Storage Company (RFS)

The details of these elements should be more perceivable before the end of the year; and therefore the general framework for comprehensively resolving the nuclear issues proposed in this report should be brought to public attention before the turn of the year. Preparations should be made for submission to the ordinary diet session in 2015 so that concrete policy measures can be drawn up next year for implementation through various bills and budgets the following fiscal year.