Update of On-site and Off-site Activities and the Governmental Responses Concerning the TEPCO/Fukushima Accident

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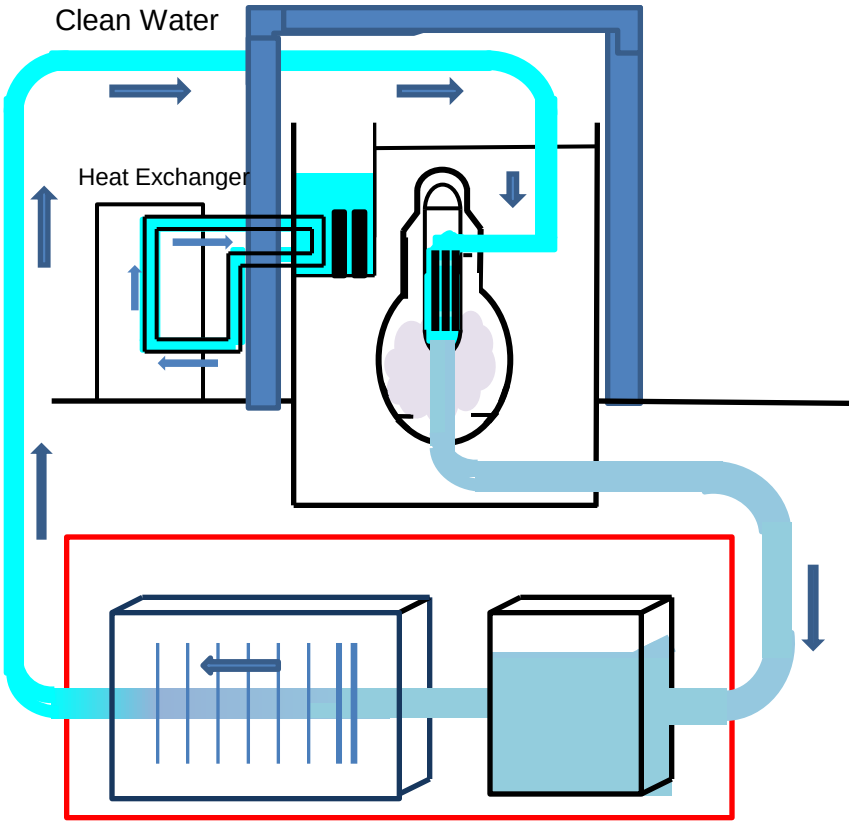
Attainment of the Step 2 of Stabilization of Damaged Units on Dec. 16, 2011

- Stable cooling of the damaged units by injecting the water recovered from the bottom of the units into each RPVs by way of water recirculation systems
- Reduction of the temperatures of RPVs and PCVs
- Reduction of the rates of radioactivity releases from the units
- Reduction of the risk of unexpected increase in the radioactivity release

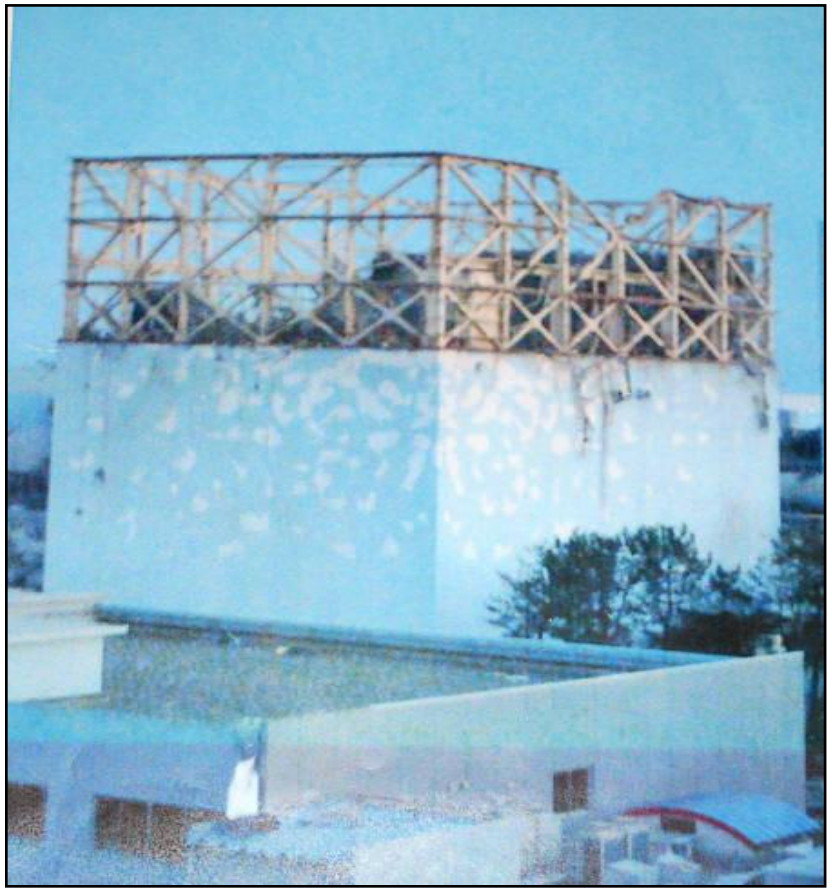
Water Injection and Recirculation System for Cooling Fuel Debris in the Units

- Continue reactor fuel cooling by injecting water recovered from reactor building and purified by WPS.
- Continue spent fuel pool cooling
- Establish measures to protect structural materials from corrosion/cracking
- Establish a water purification facility that can remove various elements from water
- Establish a system for managing radioactive waste recovered



Water Purification System (WPS)

Confine and Control Radioactivity Releases by Installing Reactor Building Covers



TEPCO

TEPCO

Major Milestones of Mid and Long-term Plan for Cleanup of Damaged Units

- Start removing spent fuel (SF) from SF pools in two years.
  - Maintain the damaged units in a safe condition by
    - ✓Continuing the injection of water recovered from reactor buildings after purification
    - ✓Protecting against corrosion/cracking of structural materials
    - ✓Treating contaminated water/wastes in a comprehensive manner.
  - Pursue the decontamination of reactor buildings and the recovery of the leak-tightness of CVs and RPVs.
- Start removing core debris in ten years.
- Complete decommissioning of the units in forty years.

Deliberation of Ways to Remove SFs and Core Debris and Technology R&Ds Necessary for Realizing Them

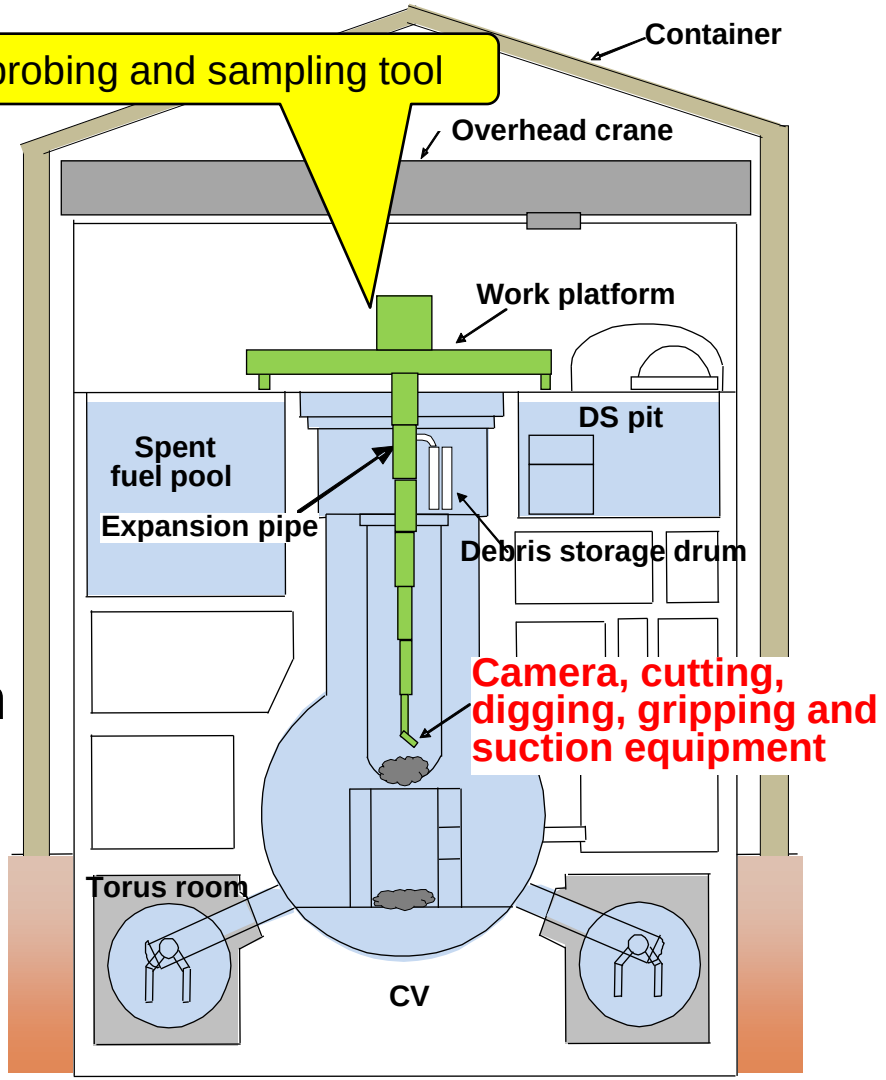
Example

Activity

- Probe the inside of RPV and take samples

Technology R&Ds necessary to

- Decontaminate the building
- Reestablish leak tightness
- Remotely probe and take samples in high radiation area
- Clarify properties of debris/material
- Treat contaminated water and waste



Solicitation of Knowledge and Enabling Technologies for the Cleanup

- To seek knowledge, experience and technologies for promoting these activities from all over the world, they are active in
  - dialogue and information exchange meetings
  - Announcement of request for proposals
- Technologies wanted
  - Remotely probing inside of the vessels
  - Taking samples of core debris located inside of the vessels where radiation level is high
  - Clarifying properties of debris/material

Strategy and Measures for Off-Site Activities

- Basic strategy for preventing excessive exposures in the contaminated area;
  - Reducing the number of exposed people
  - Modifying pathways of contaminant to a people
  - Removing existing sources by decontamination.
- The Measures the Government is adopting are
  - Restriction of inhabiting in the area where expected annual additional dose is larger than 20 mSv;
  - Strict shipping control for agricultural products, animal products and marine products through radiological surveys
  - Step-by-step decontamination of the land.

New limits for Radionuclides in Food

- Based on current scientific knowledge, commodities that meet current provisional regulation values are considered to be safe and in fact, food safety has been basically secured.
- However, in order to achieve consumer confidence further, Japan is planning to reduce maximum permissible dose from 5mSv/year to 1mSv/year from April 1, 2012.

Provisional limits for radioactive cesium[1]

Category	Limit
Drinking water	200
Milk, dairy products	200
Vegetables	500
Grains	
Meat, eggs, fish, etc.	

New limits for radioactive cesium [2]

Category	Limit
Drinking water	10
Milk	50
General Foods	100
Infant Foods	50

(Unit : Bq/kg)

NOTE: 1 These values take into account the contribution of radioactive strontium

2 These limits take into account the contribution of radioactive strontium, plutonium etc.

Source: Ministry of Health, Labour and Welfare

http://www.mhlw.go.jp/topics/bukyoku/iyaku/syoku-anzen/iken/dl/120117-1-03-01.pdf (in Japanese)

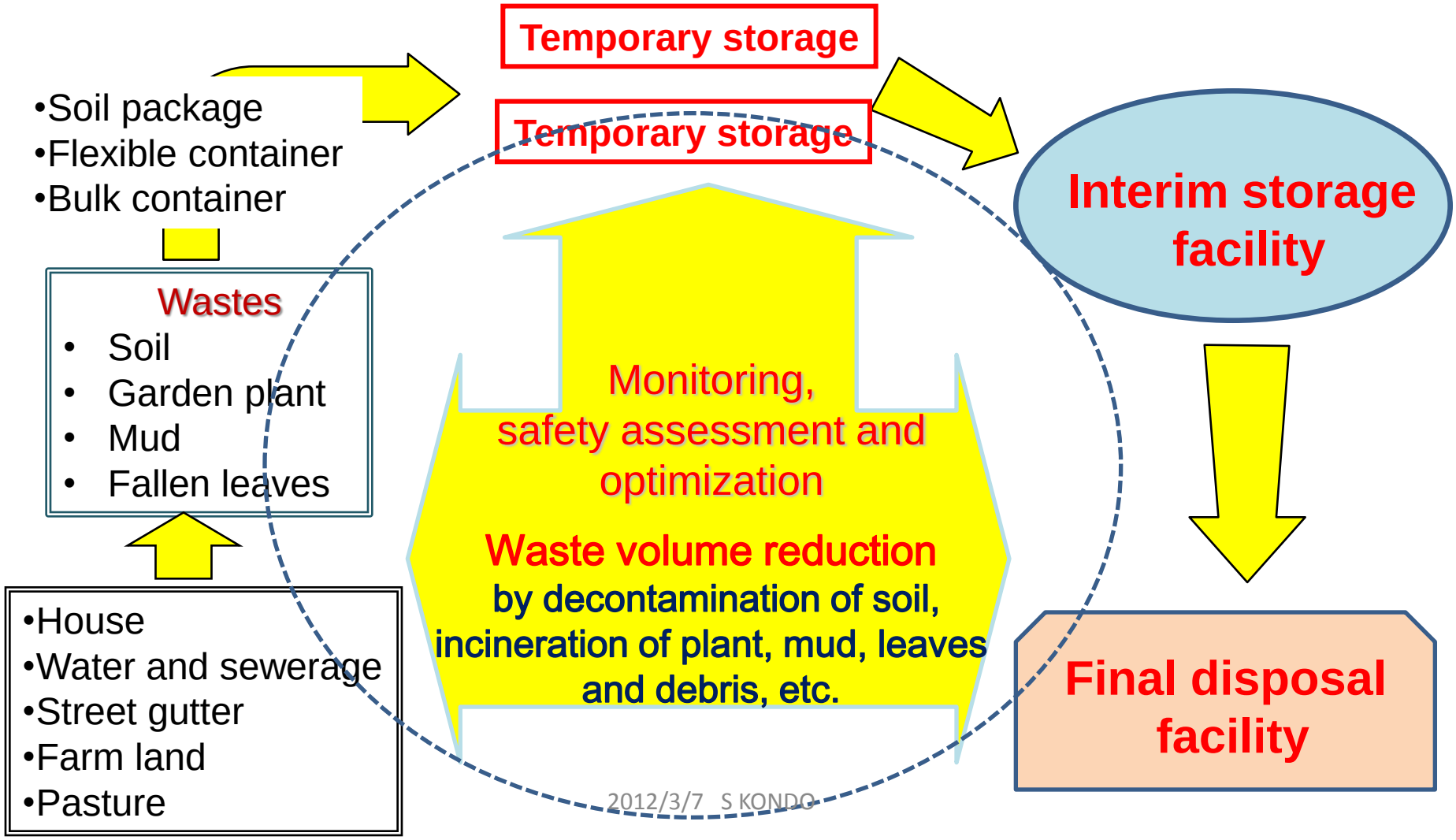
Activities in Restricted Area

- The Government has just started evaluating the results of demonstration decontamination projects performed in restricted areas so as to prepare guidelines for decontamination activities before the end of March.
- Utilizing such guidelines, the Government will start in April full-scale decontamination activities in the areas where annual dose is between 20 mSv and 50 mSv in cooperation with the municipal governments. The restoration of the operation of public services essential for living will precede the removal of the restriction of entrance, so that displaced residents can start living when they return home.
- In the areas where annual dose is higher than 50mSv, the Government will continue the demonstration of candidate technologies to decontaminate/remediate such areas in a safe and efficient manner, for the time being.

Decontamination of Non-restricted Area

- In non-restricted areas where the dose rate is currently below 20 mSv/y but above 1 mSv/y, municipalities are leading the activities to reduce the additional annual exposure below 1 mSv on a long term basis.
  - Pursuing both wide area decontamination activities in high dose areas and localized decontamination activities, identifying hot spots such as those locations where sludge has collected in the drains or gutters .
  - Pursuing exhaustive decontamination of children's' environment (schools, play grounds, etc.), aiming at reducing the annual additional exposure of children to 1 mSv as soon as possible and pursue further reduction incessantly.

Pathways of Contaminant in the Decontamination Activities



Current Difficulties

- Citizen's distrust in the governmental administration and academia due to their perception of disarray as to ;
  - Explanation of the effect of internal exposure by Cesium;
  - Introduction of new limit for radionuclides in food;
  - Introduction of low dose limit of workers who participates in the decontamination of residential area
- Citizen's fear for health effect of low-level radiation exposure and that for children in particular
- Citizen's discrimination against products from Fukushima
- Lack of opportunity to measure and understand the radiation and contamination level of everything citizen is concerned about

The Statement of PM Noda at the United Nations on September 22, 2011

- Japan is determined to raise the safety of nuclear power generation in Japan to the highest level in the world. As a part of the determination, we plan to establish "The Nuclear Regulatory Agency" around April of next year.
- Japan will redouble efforts to increase development and use of renewable energies. Japan will present practical strategies and plans around the summer of 2012 concerning the composition of energy sources over the medium and long terms.
- Japan stands ready to respond to the interest of countries seeking to use nuclear power generation. For several years, Japan has been supporting emerging nations around the world to explore ways of using nuclear energy, including their improvements of nuclear safety. Japan remains steadfast in responding positively to their interest in our undertakings.

Measures to Prevent / Mitigate Severe Accidents

- Measures to prevent the severe accidents in SBO & LUHS events caused by earthquake and tsunami.
  - Improve water tightness of rooms for DC batteries and power centers
  - Store spare electric motors for sea water pump
  - Deploy mobile electricity generator and high pressure fire pump car with hoses to transport sea water
- Measures to mitigate the severe accidents
  - Habitability of control room in the case of severe accidents
  - Hydrogen management features

The Interim Report of the Governmental Investigation Committee on the Accidents at Fukushima NPP of TEPCO Dec. 26, 2011

- Preliminary conclusions
  - Lack of measures to manage severe accident caused by tsunamis
  - Lack of recognition of complex nature of nuclear disaster caused by external events in designing emergency preparedness, i. e. planning, organizing, equipping, exercising emergency activities
  - Lack of recognition of responsibility to take the whole picture of accidents including beyond design basis extreme events into consideration of accident management
- Closing
  - Whatever to plan, design and execute, nothing can be done without setting assumptions. At the same time, however, it must be recognized that things beyond assumptions may take place.
  - The accident this time presents us crucial lessons on how we should be prepared for such incidents beyond assumptions.

Nuclear Regulatory Agency

- The Nuclear Regulatory Agency (NRA) will be created next April as an affiliated organization of the Ministry of Environment, separating the nuclear safety regulation section of the Nuclear and Industry Safety Agency (NISA) from the METI and integrating the function of the Nuclear Safety Commission (NSC).
- The NRA will be in charge of safety regulation on the use of reactors and nuclear fuel materials, nuclear security, leading function in environmental monitoring and crisis management including emergency response. It will secure regulatory independence in the government. The NRA Commissioner is legally delegated its authority to make an administrative decision on nuclear safety regulation from the Minister for Environment.
- Nuclear Safety Investigation Committee (NSIC), a council to be created with NRA, will review the effectiveness of regulatory actions taken by NRA and provide guidance to the NRA Commissioner. In case of a nuclear accident, the NSIC will investigate its causes.

New Regulatory Requirements to be Introduced Based on the Deep Reflection of Fukushima Accident

- Impose severe accident management requirements that ask the implementation of features for preventing and mitigating severe accidents, putting emphasis on the prevention of abnormal radioactivity releases and land contamination.
- Impose requirement for defense-in-depth features that would prevent a disproportionate increase in radiological consequences from an appropriate range of external events that are more severe than the design basis events.
- Limit the period of the validity of operating license to 40 years. Its renewal will be allowed up to 20 years under the condition of exceptional safety records and state of the art safety status of the plant.
- Clarify the licensees' responsibility to pursue continuous safety improvement and impose the backfitting of any new requirement introduced.

Nuclear Operators Actions Planned to Enhance Safety

Federation of Electric Power Company

Previous actions
~Securement of safety through emergency safety measures~

Perspective of measures

To never cause a "Fukushima accident" again

"Redundancy" and "diversification"

- **Securement of power**
  - Securement of power in the Main Control Rooms, etc., through the deployment of power source cars, etc.
- **Securement of cooling**
  - Securement of feed water to the reactor and steam generator, etc., through the deployment of fire pumps, etc.
- **Anti-flooding measures**
  - Anti-flooding measures for the switchboards, batteries, and pumps

Evaluate and confirm using stress tests

Further actions
~Aiming for the world's highest level of safety~

Aim

To secure the world's highest level of safety

① Organizational actions

- **Establishment of a new organization as a mechanism to continuously promote safety enhancement measures**

② Continuous improvement of facilities

- **Core damage prevention measures**
- **Containment vessel failure prevention measures**
- **Measures to minimize long-term evacuation areas due to soil contamination**

Restart of NPPs after Completion of Scheduled Maintenance Outage

- The NISA deliberated under the guidance of the Nuclear Safety Commission the content of a stress test called “comprehensive safety assessment (CSA) that clarifies the beyond design basis margin or distance between design basis event and the threshold of events beyond which the occurrence of a severe accident will be inevitable.
- Plant operators have submitted the result of their preliminary CSA for restarting the plants from scheduled maintenance outage state: the evaluation of the result has started but no decision has yet been made on restarting any units.
- The government should work hard for restoring the public trust in their activities before allowing the restart.

Mid- and Long-term Energy Policies

- The Energy and Environment Council, a ministerial committee in the cabinet, has initiated the work to formulate mid- and long-term energy policy.
- They decided the energy policy after March 11 should pursue stability of supply, economy, friendliness to environment and safety & peace of mind, based on the deep reflection on the March 11 event at Fukushima.
- The Council has started from the beginning of 2012 the discussion about the best mix of fossil, renewable, nuclear and efficient use of energy for the attainment of this goals.

Reduce Dependency On Nuclear Power Wherever Possible

Position A: Japan should move away from nuclear power as quickly as possible because of

- The risk of earthquakes and tsunamis to which Japan is prone
- The enormous cost and suffering caused by the nuclear accident, destruction of regional economies and damage to the environment
- High risk potential due to insufficient safety and management technologies as well as aging facilities
- Concerns for safety and security in people's lives
- The handling nuclear waste remains unresolved and thus must be passed on to future generations
- The importance of paying attention to the majority opinion of citizens

Reduce Dependency On Nuclear Power Wherever Possible

Position B: Although Japan needs the fundamentally review of its nuclear power policy, it should continue giving a certain degree of importance to nuclear power, as it it important for Japan to maintain nuclear power generation and technical infrastructure and specialists necessary for them as Japan can

- fulfill its international responsibility of demonstrating a way to utilize nuclear power for peaceful purposes:
- contribute to nuclear power safety in other countries, which has a direct bearing on Japan's own safety, based on awareness of our duty to civilization as human beings that have evolved together with technology.

Position C: We should deliberate whether it is wise for Japan—a country with few natural resources—to so easily abandon nuclear power as an energy option.

Conclusions

- The accident at Fukushima was caused by tsunami of unprepared violence and contaminated a wide area around the plant. The root cause of this accident seems to be the weak recognition by the operators and regulators of the paramount importance of incessant pursuance of a safety culture and emergency preparedness.
- It is a prime task for the Government and nuclear community to recover the life of suffered people and society by way of on-site and off-site activities, though we are facing difficulties related with low-level radiation risk in diverse areas, not to mention a huge sum of resources need of which will extend over a long period of time.
- The deliberation of future energy policy has been started, searching the possibility to reduce the dependence on nuclear in future: the nuclear community is asked to rectify the defect and talk to the public its merit and demerit to recover the credibility.