

Japanese Nuclear Energy Policy and the Role of Fusion

Kanji Fujiki

*Deputy Minister of Education, Culture, Sports, Science and
Technology(MEXT)*

Key Points

1. Nuclear energy policy in Japan
2. Fusion research and development in Japan

Use of Nuclear Energy in Japan

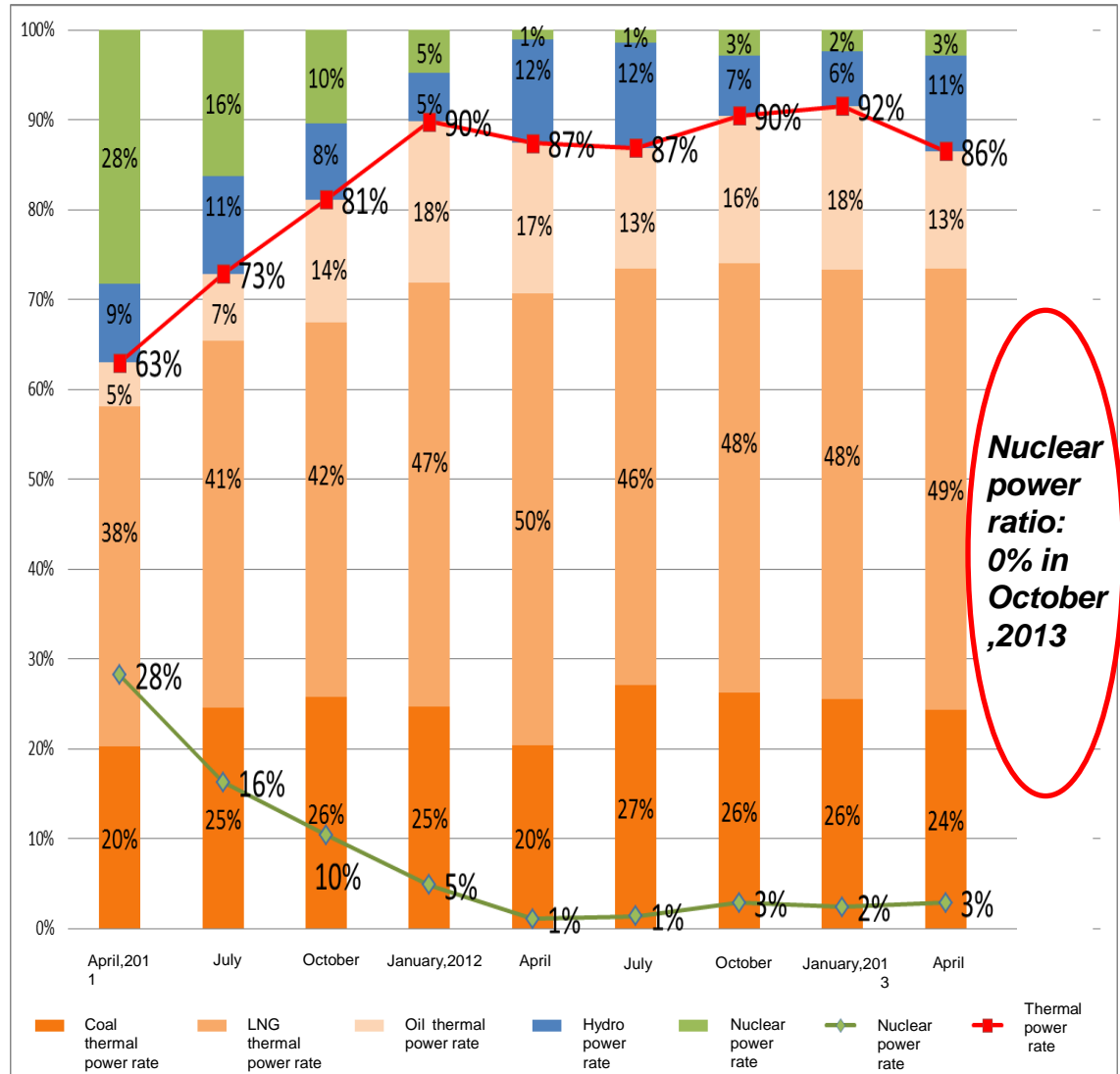
Shift in relative contributions of energy sources to total electricity production since the Great East Japan Earthquake

Nuclear Power

- In 2010, before the earthquake, nuclear power accounted for 32% of electricity production.
- In October 2013, after the earthquake, it accounted for 0%.

Number of Nuclear Power Reactors

- Total number: 50 reactors
 - 14 reactors are in the process of reviewing.
 - Other reactors are in the process for preparation for application)
- Under construction: 3 reactors



Abe Administration's Nuclear Energy Policy

1. Direction of Nuclear Energy Policy

Statement by Prime Minister Abe (Press conference on September 7, 2013)

● We will develop a robust and responsible energy policy from various perspectives, including stable supply of energy and the reduction of energy costs. In this process, we will lower the ratio of nuclear power and maximize the efforts to promote renewable energy and energy saving measures in the coming three years or so.

2. Restart of Nuclear Power Plants

"Japan Revitalization Strategy" (Decided by the Cabinet on June 14, 2013)

- The government will leave the safety of nuclear power plants to the specialist judgment of the Nuclear Regulation Authority. When the Nuclear Regulation Authority admits the compliance to its new regulatory standards, the government will respect the judgment and will proceed with the restart of the nuclear plant. In this case, the government will make efforts to obtain the understanding and cooperation of relevant parties including municipalities hosting nuclear facility sites.

Nuclear Energy Administration in Japan

Utilization of nuclear energy

【Cabinet Office/Atomic Energy Commission】

- To plan, deliberate, and decide basic policies or strategies for the promotion of research, development, and utilization of nuclear energy

【Ministry of Education, Culture, Sports, Science and Technology】

- To promote R&D and human resource development in nuclear energy

【Ministry of Economy, Trade and Industry】

- To promote energy policy and nuclear policy which ensures a stable energy supply over the long term

Regulation

【Nuclear Regulation Authority(NRA)】

- To formulate and implement new safety regulation that reflects lessons learned from Fukushima Nuclear Power Plant Accident of March 11, 2011.

Main Nuclear R&D activities in Japan

(1) Nuclear safety research

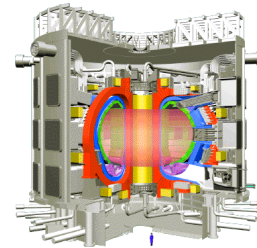
- ◆ Research on safety of nuclear facility
- ◆ Research on safe handling of radioactive waste
- ◆ Research on radiation protection for human and environment



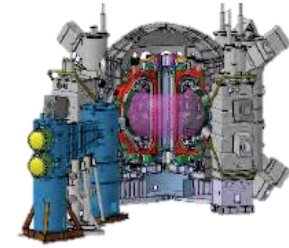
NSRR(Nuclear Safety Research Reactor)

(2) Fusion R&D

- ◆ The ITER Project, Broader Approach (BA) activities, and academic researches



ITER



JT-60SA

(3) R&D on advanced nuclear technologies

- ◆ Fast reactor development
- ◆ Reduction of hazardous radioactive waste
- ◆ Basic research on nuclear physics and radiation applications
- ◆ Charged particle therapy



Charged particle therapy

(4) Human resource development

- ◆ Education of young people and training of researchers and engineers



Training at a hot laboratory

Fusion R&D

1. Policy Framework
2. Fusion R & D activities in Japan
3. The ITER Project in the Context of Japanese Fusion
R & D policy
4. The ITER Project and Broader Approach Activities

Policy Framework

- A new nuclear energy policy for Japan is under development, while the government steadily promotes R&D on fusion energy in accordance with the policy indicated in the report published by the Atomic Energy Commission in 2005 and reconfirmed in 2009.
- *The Innovation Plan for Environmental and Energy Technology*, formulated in 2013 by the Council for Science and Technology Policy of Japan, pointed out that fusion R&D should be carried out over the long term perspective for future energy supply.

Fusion R&D activities in Japan

- Key R&D areas
 - Tokamak
 - Stellarator
 - Inertial Fusion

- Budget for major fusion R&D projects around 270 million € (FY2012)

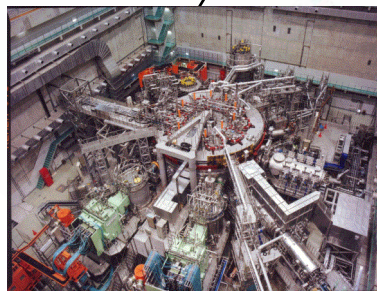


BA Rokkasho Site



Inertial Fusion

Gekko-XII (Osaka Univ.)



Stellarator/Heliotron LHD (NIFS)



BA Naka Site

Tokamak JT-60

(Currently being upgraded to advanced facility JT-60SA)

The ITER Project in the Context of Japanese Fusion R&D policy

- The ITER Project is an essential step for realizing fusion energy and the most important project in Japan's fusion program.
- Japan is deeply committed to it.
- Japan actively manufactures components as agreed by ITER Parties.

(Main components)

○ Superconducting coils

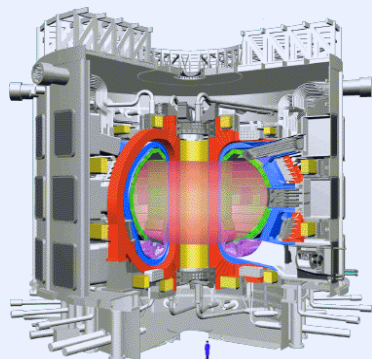
○ Plasma Heating and Current Drive Devices

○ Remote Handling Equipment

○ Divertor

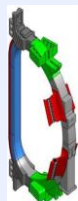
The ITER Project & Broader Approach Activities

ITER



- Site: St Paul-lez-Durance
- Parties: CN, EU, IN, JA, KO, RF, US

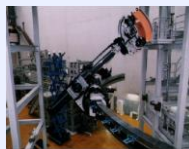
Japan's contributions to ITER



Toroidal Field Magnet



Plasma Heating & Current Drive



Remote Handling Equipment

Broader Approach Activities

Objective:

- To contribute to establishing technological basis for DEMO
- To play supporting and complementary role for the ITER Project

Parties: EU, JA

Site: Rokkasho and Naka, Japan

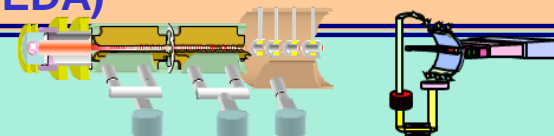
Plan: 10 years (remain in force thereafter unless terminated by either party)

① International Fusion Energy Research Centre Project (IFERC)

- Designing activities of the Demonstration Reactor (DEMO)
- Computational simulation of fusion plasma etc.
- ITER remote experimentation

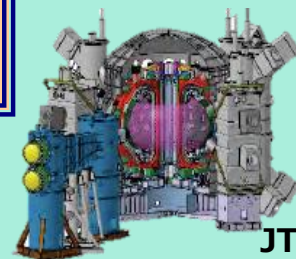
② Engineering Validation and Engineering Design Activities for the International Fusion Materials Irradiation Facility Project (IFMIF/EVEDA)

- To obtain data of irradiation on materials in DEMO



③ Satellite Tokamak Project (JT-60SA)

- Analysis on operational conditions to optimize ITER experiments
- Development of advanced operation scenarios for DEMO

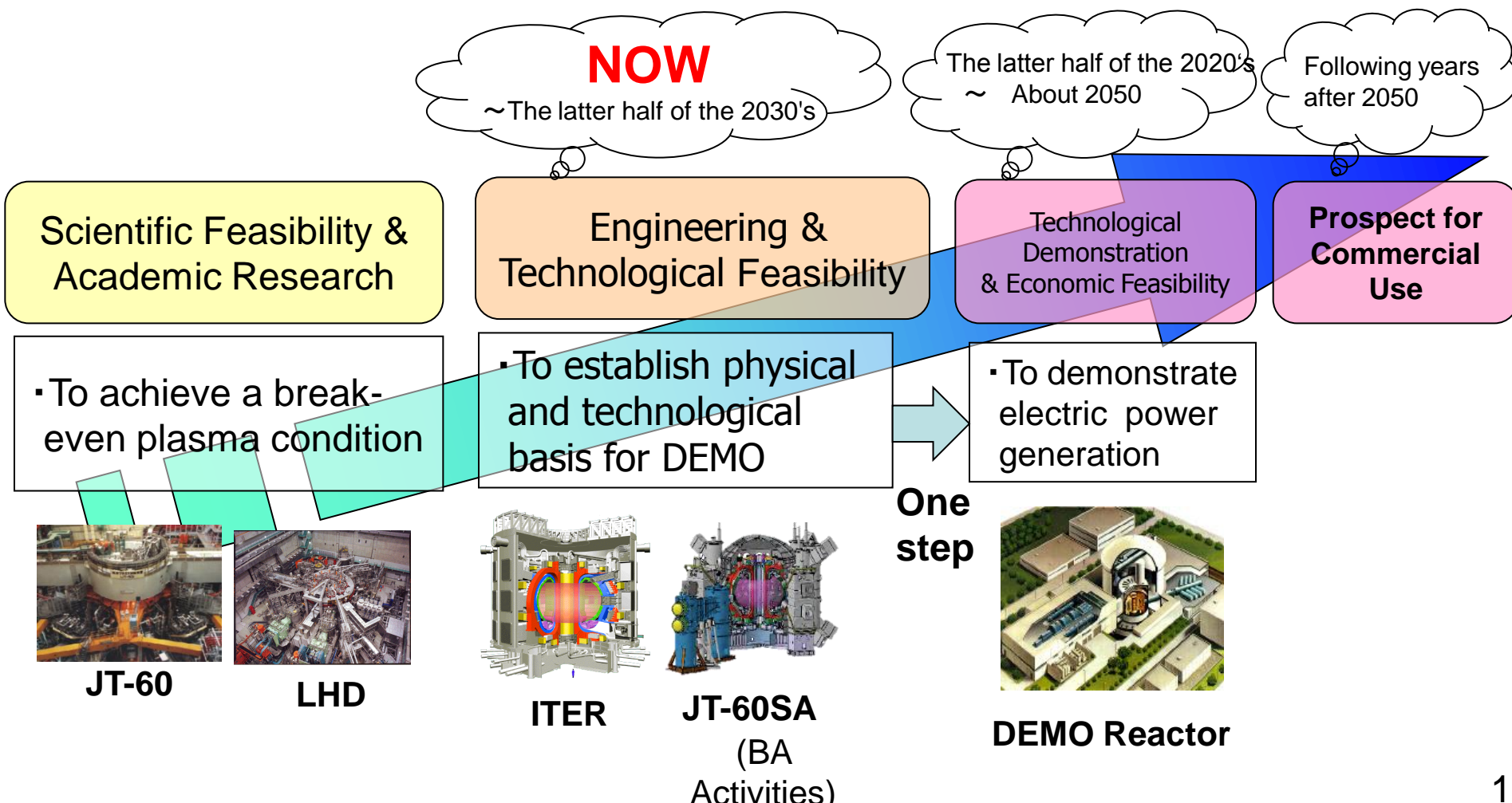


JT-60SA

Japan's Roadmap to a DEMO Reactor

“Promotion Strategy for Future Fusion Research and Development” by the AEC of Japan

“Toward Establishment of Technological Basis for DEMO Reactor” by the Council for Science and Technology of MEXT of Japan



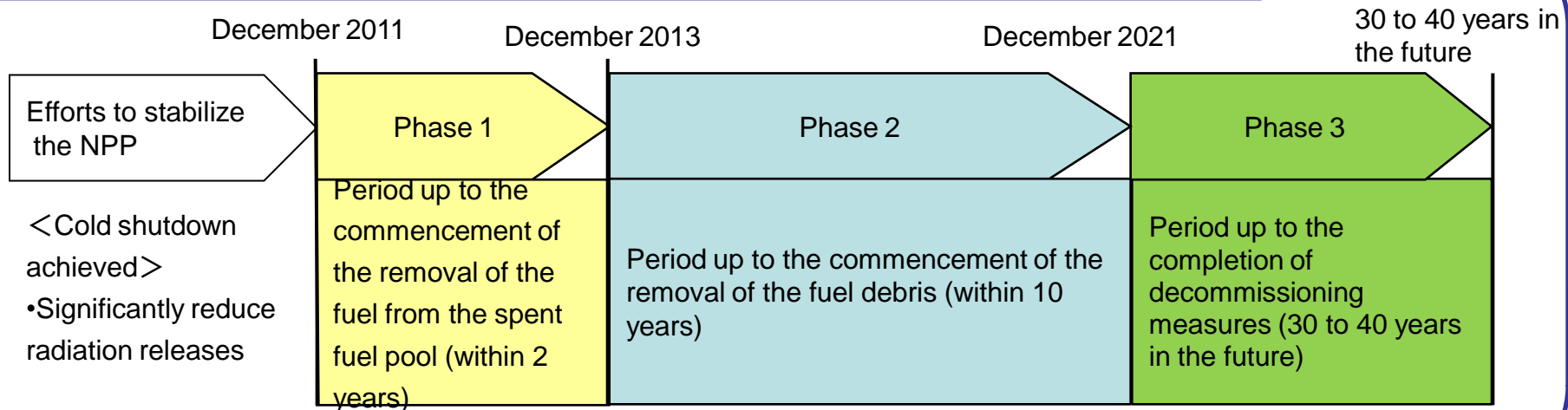
Future

- Japan recognizes fusion energy as one of the most promising energy sources for the future.
- Japan steadily promotes fusion researches both domestically and through international cooperation.
- Japan is firmly committed to fulfilling it's role and responsibility for ITER.

Thank you for your attention.

Update on TEPCO's Fukushima Daiichi NPP 1-4

Decommissioning



Contaminated Water Issue

Three Principles for Contaminated Water Issue

- ① **ISOLATING** the contamination source
- ② **REMOVING** the contamination source
- ③ **PREVENTING LEAKAGE**

○ The results of monitoring of sea water in Japan are constantly below the standard of 10 Bq/L (WHO's "Guidelines for drinking-water quality")

○ Radioactive influence is observed in the limited area (smaller than 0.3 km²)