経済産業省
Ministry of Economy, Trade and Industry

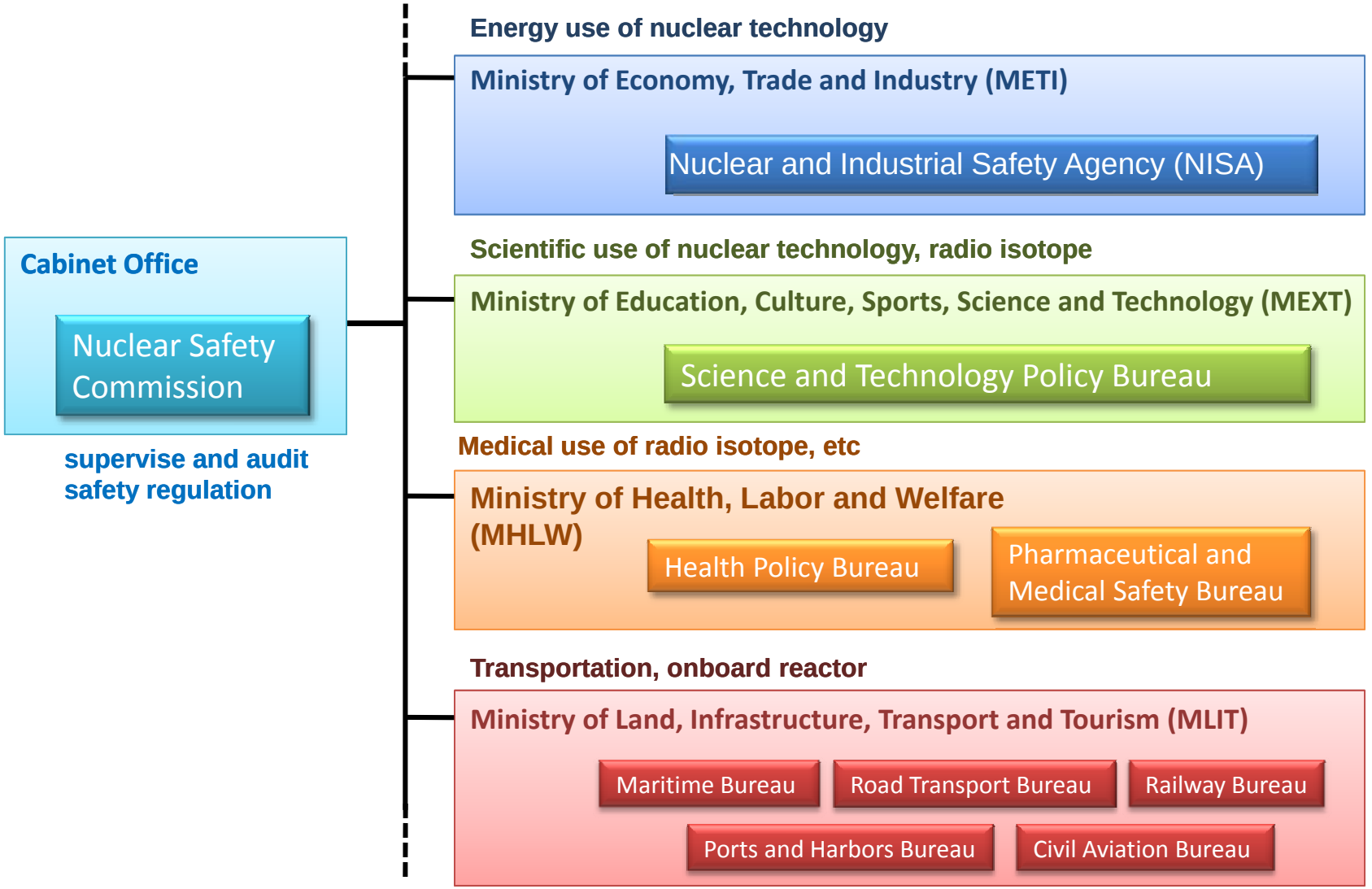
Back End of Fuel Cycle(BEFC) Regulation in JAPAN

Hisanori NEI
NISA, METI
Government of Japan

Outline of Japan's Nuclear Policy

- Strict "Peaceful-Purposes Only" policy.
  - Explicitly declared in the Atomic Energy Basic Law (1955).
  - Member of IAEA since 1957.
  - Ratified NPT Treaty in 1977.
- Nuclear Programs based on "Framework for Nuclear Energy Policy".
  - Periodically reviewed -- the newest version issued in 2005.
- Independent committees to audit relevant Ministries.
  - AEC (Atomic Energy Committee), for general policy affairs;
  - NSC (Nuclear Safety Committee), for safety affairs.

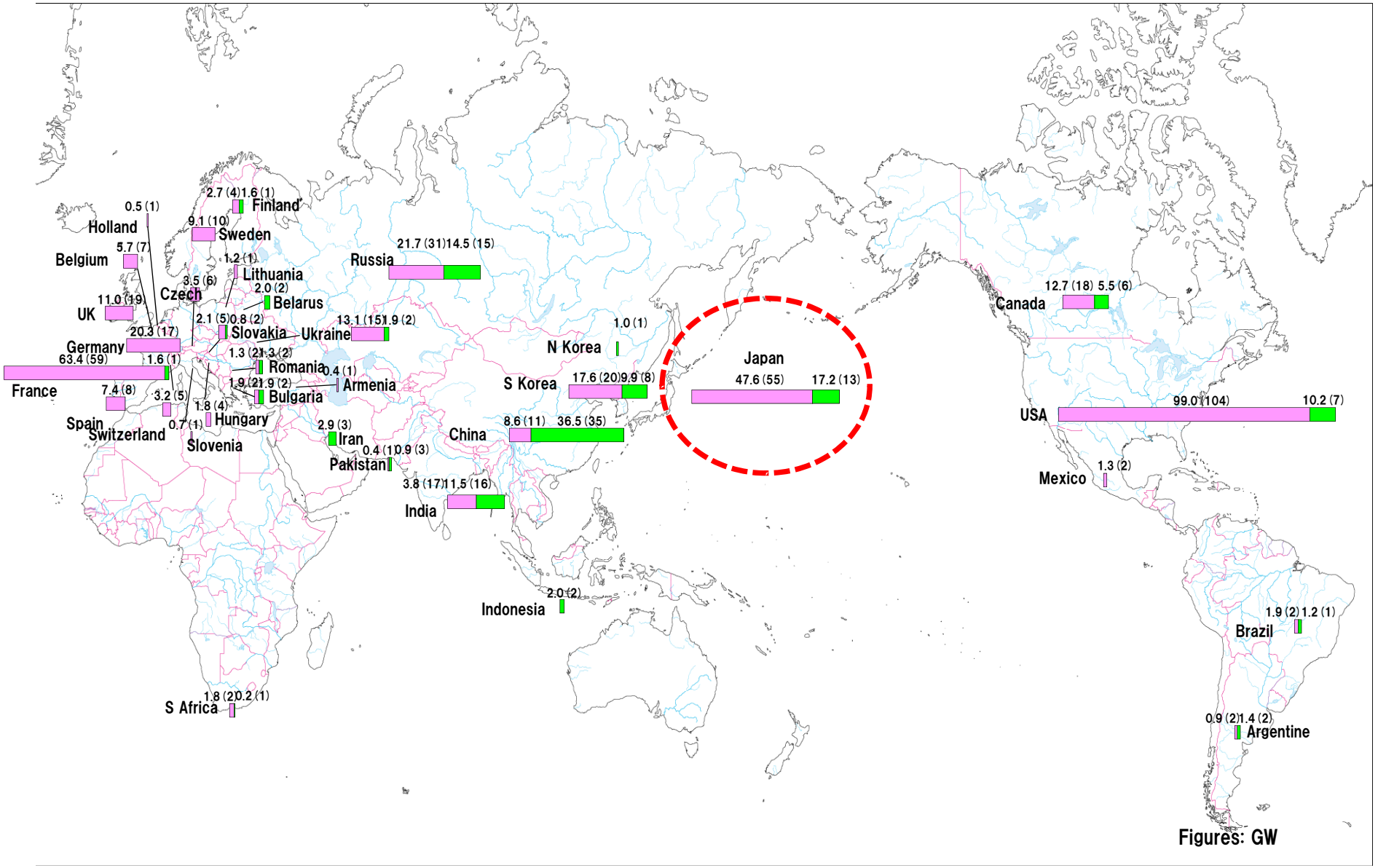
– Legislative and Regulatory Framework –



Outline of Japan's Nuclear Program

- Low "Energy Self-Sufficiency Ratio".
  - 4% -- the lowest among major developed countries.
  - Counting Nuclear Energy as "Semi-domestic", this ratio will rise goes up to 20%.
- Nuclear Power expected to account as much as 30 to 40% of the total electricity generation in years after 2030.
  - To meet the common challenges such as Global Warming, Resources Constraints, while securing safety and security.
  - Japan as the leading player in the world's nuclear program.
- Pursue "closed" BEFC from the start of the Nuclear Program.
  - Commercial introduction of Reprocessing around 2010.
  - Commercial introduction of FBR cycle around 2050.
- Spent Fuel recognized as Resources, not Wastes.

Japan as one of the leading players in Nuclear Program



Nuclear Installations in Japan

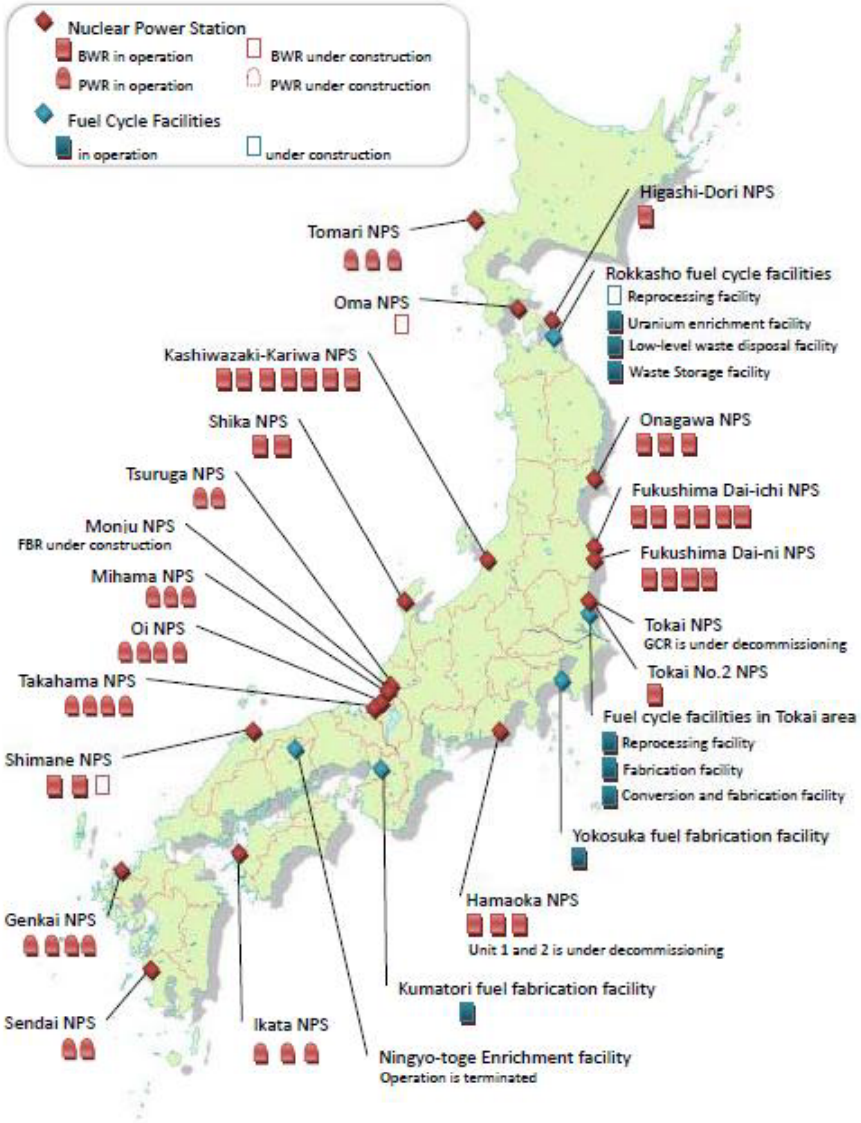


Figure: Location of nuclear installations in Japan

As of October 2010

Management of Spent Fuel in Japan

- About 1,000tU of Spent Fuels arises from 54 NPPs annually.
- Volume of Spent Fuels produced so far;

Total volume Produced		
Reprocessed in Tokai	1,140 tU	1975 to 2007
Transported outward for reprocessing (France, UK)	7,130 tU	1969 to 2001
Transported to Rokkasho	2,926 tU	1998 and after
Stored in NPP sites	12,840 tU	

- All the amount of Spent Fuel produced are supposed to be reprocessed. As Rokkasho reprocessing plant (800tU/year capacity) is not designed to reprocess all the amount of spent fuel from domestic NPPs, we need to secure adequate storage capacity in NPP sites or in storage facilities.

BEFC in Japan (1) Reprocessing

➢ Domestic Reprocessing

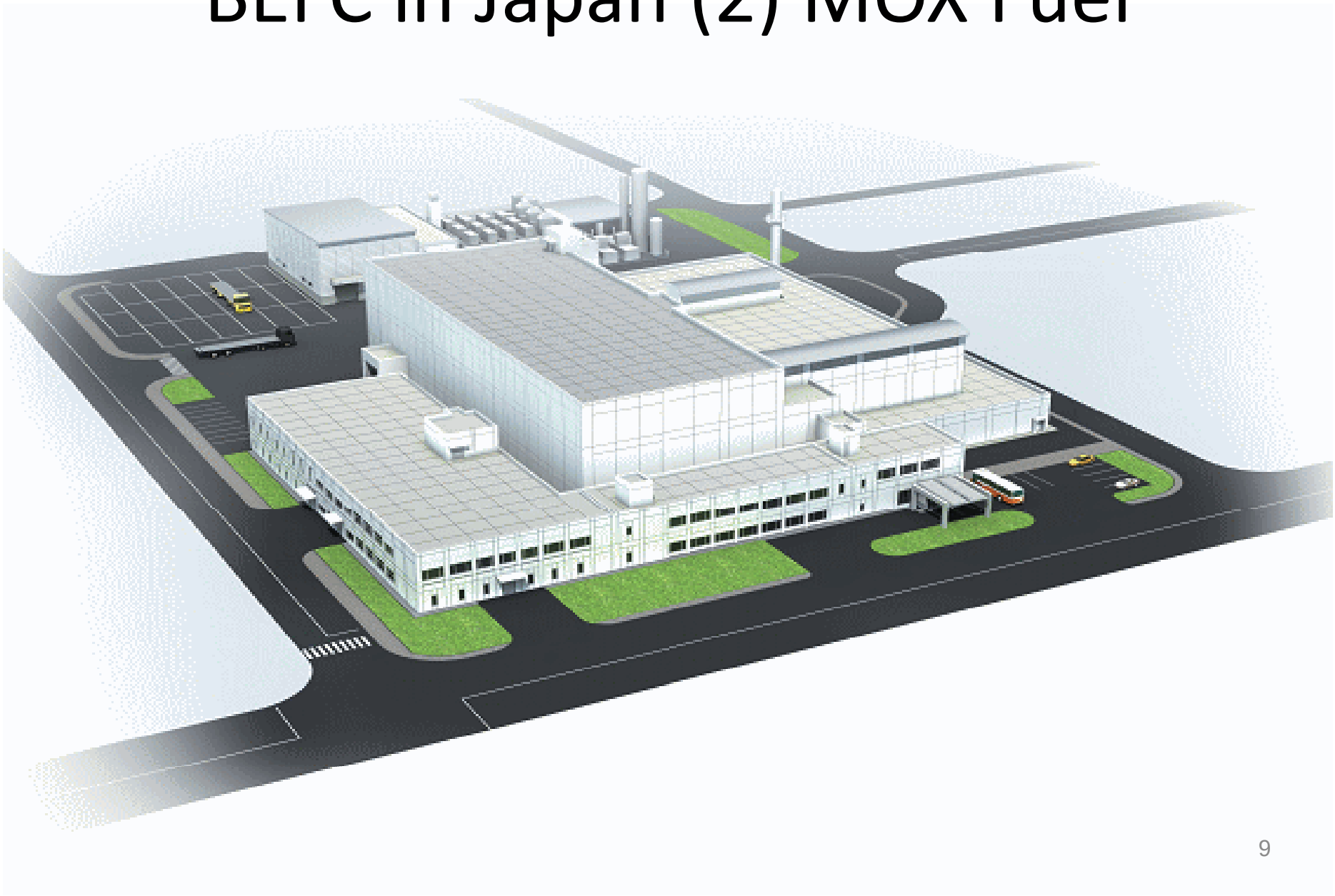
	Method	License Issued in	Max. Annual Capacity
Tokai (JAEA)	Purex	1980	210tU/year
Rokkasho (JNFL)	Purex	1992	800tU/year

- In the Tokai, 1,140 tU of spent fuel have been processed so far. This facility was converted into the “R&D purpose” in 2006.
- In the Rokkasho, the final phase of “active test” is in progress aiming at the completion by October 2012.
- The receiving pond of the Rokkasho has a capacity of 3,000 tU and was commissioned in December 1999.

➢ Overseas Reprocessing

- Final shipment for the overseas reprocessing has been conducted in 2001.
- Total amount of spent fuel shipped to overseas rises up to 7,130 tU.
- Spent Fuels reprocessed overseas are fabricated into MOX fuels and transported to Japan.

BEFC in Japan (2) MOX Fuel



- Plutonium extracted in overseas reprocessing plant are converted into MOX fuels, and are applied in LWRs in Japan.
  - Application started in 2009 in Genkai NPP of Kyushu Electric Power Company, and in 2010 in Ikata NPP of Shikoku Electric Power Company.

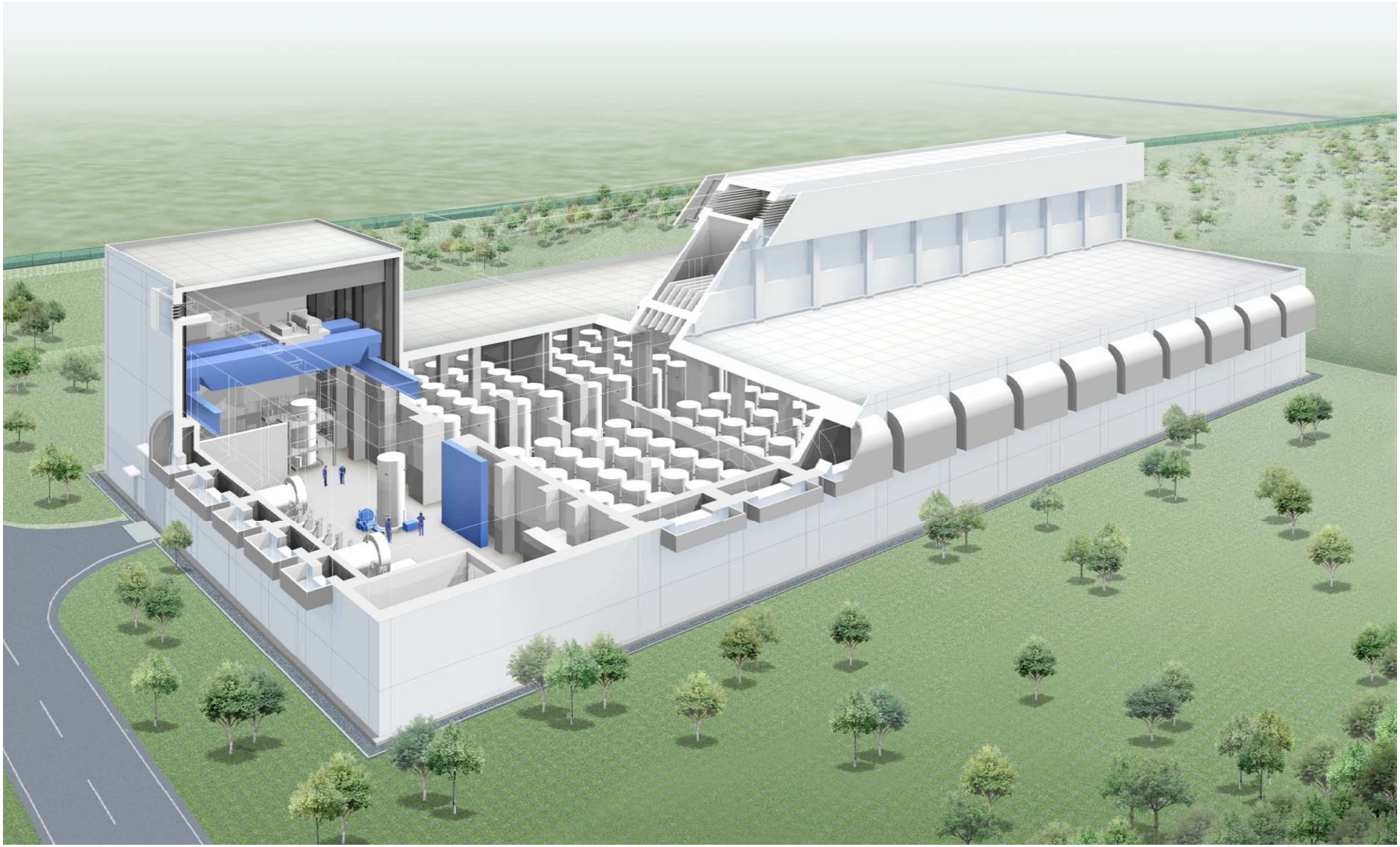
Public audit conducted before application to MOX fuels in LWRs.

- Domestic MOX Fabrication Plant expected to start up by 2015.
  - Designed capacity of domestic MOX fabrication plant is 130 t-HM/y.
  - NISA issued operation license for this facility in May 2010.

BEFC in Japan (3) FBR

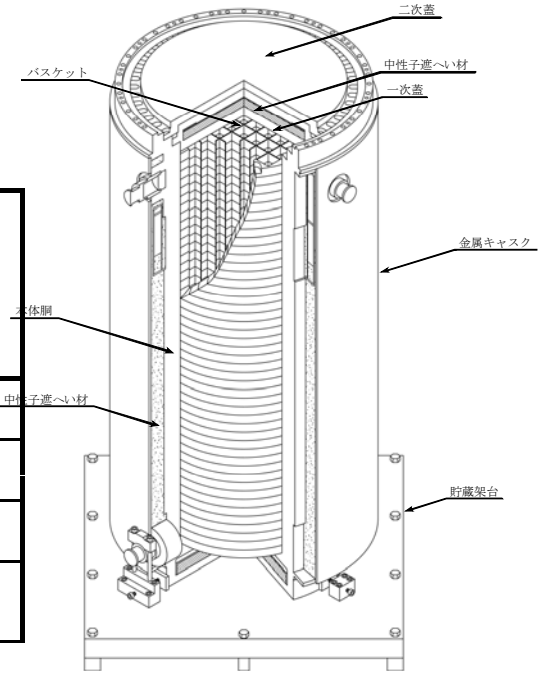
- Expected to introduce full-scale commercial FBR reactors in around 2050, on condition of reliability and economic feasibility.
- Re-started “MONJU” prototype reactor in May 2010.
  - MONJU is a sodium-cooled, MOX-fueled prototype FBR of 280 MWe.
  - Achieved its first criticality in 1994, but was closed in 1995 following a sodium leak incident. (INES 1)
- Fast Reactor Cycle Technology Development Project launched in 2006.
  - Expected to launch a demonstration reactor by 2025.
  - Mitsubishi Heavy Industries, Ltd. (MHI) was selected as a “core enterprise”, and a new company Mitsubishi FBR Systems, Inc. (MFBR) was established to carry out conceptual design in 2007.

BEFC in Japan (4) Interim Storage

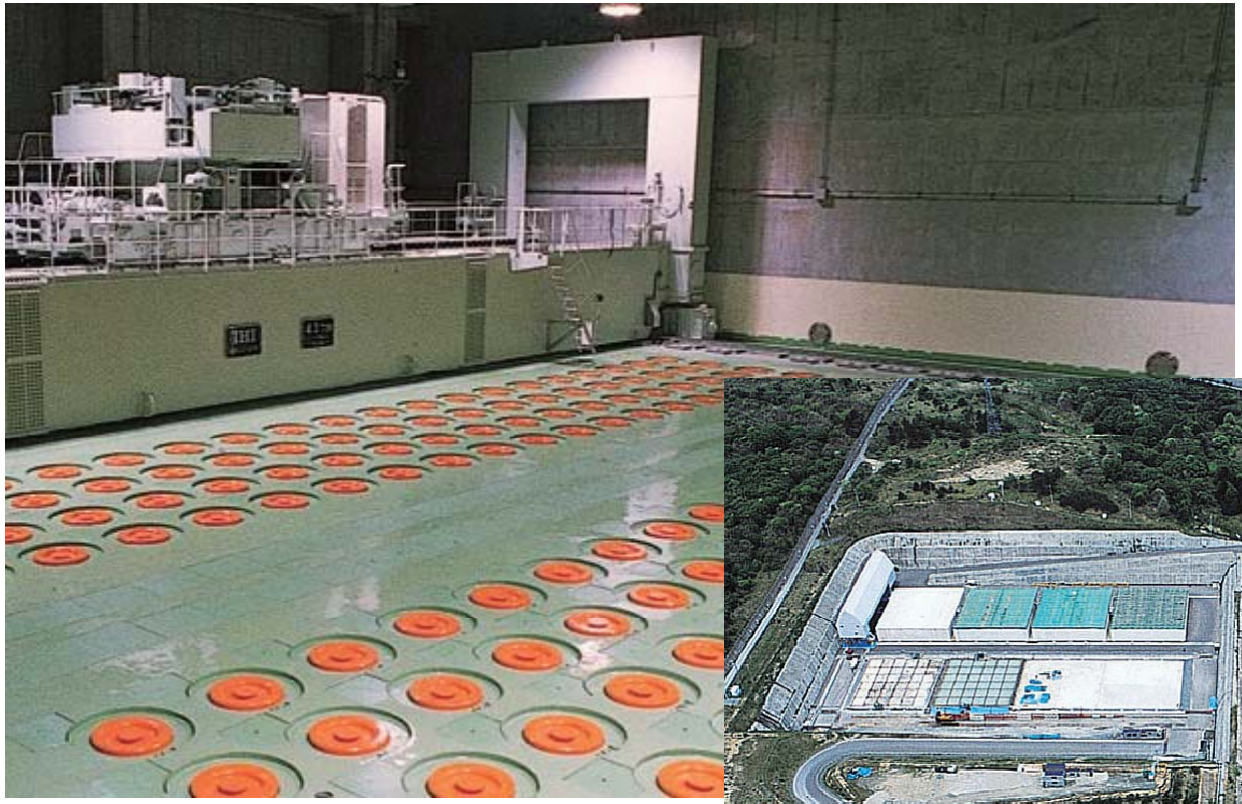


- Japan's first Away-from-reactor type Interim Storage Facility is scheduled to begin operation in 2014.
  - The proposed facility is located in Mutsu city, Aomori prefecture. The proposed capacity of the facility is 3,000 tU, with a future plan to expand up to 5,000 tU.
  - The facility is designed to use Dual Purpose Dry Metal Casks for storage.
  - NISA has issued operation license for this facility in May 2010.
  - The Recyclable-Fuel Storage Company started the construction of the facility in August 2010.

		BWR large scale casks		BWR medium scale casks	PWR casks
		Type 1	Type 2		
Scale	Length	5.4m	5.4m	5.5m	5.1m
	Diameter	2.5m	2.5m	2.4m	2.6m
Weight (fuels included)		118t	119t	116t	117t
No. of fuels stored in each cask		69	69	52	26



BEFC in Japan (5) Disposal

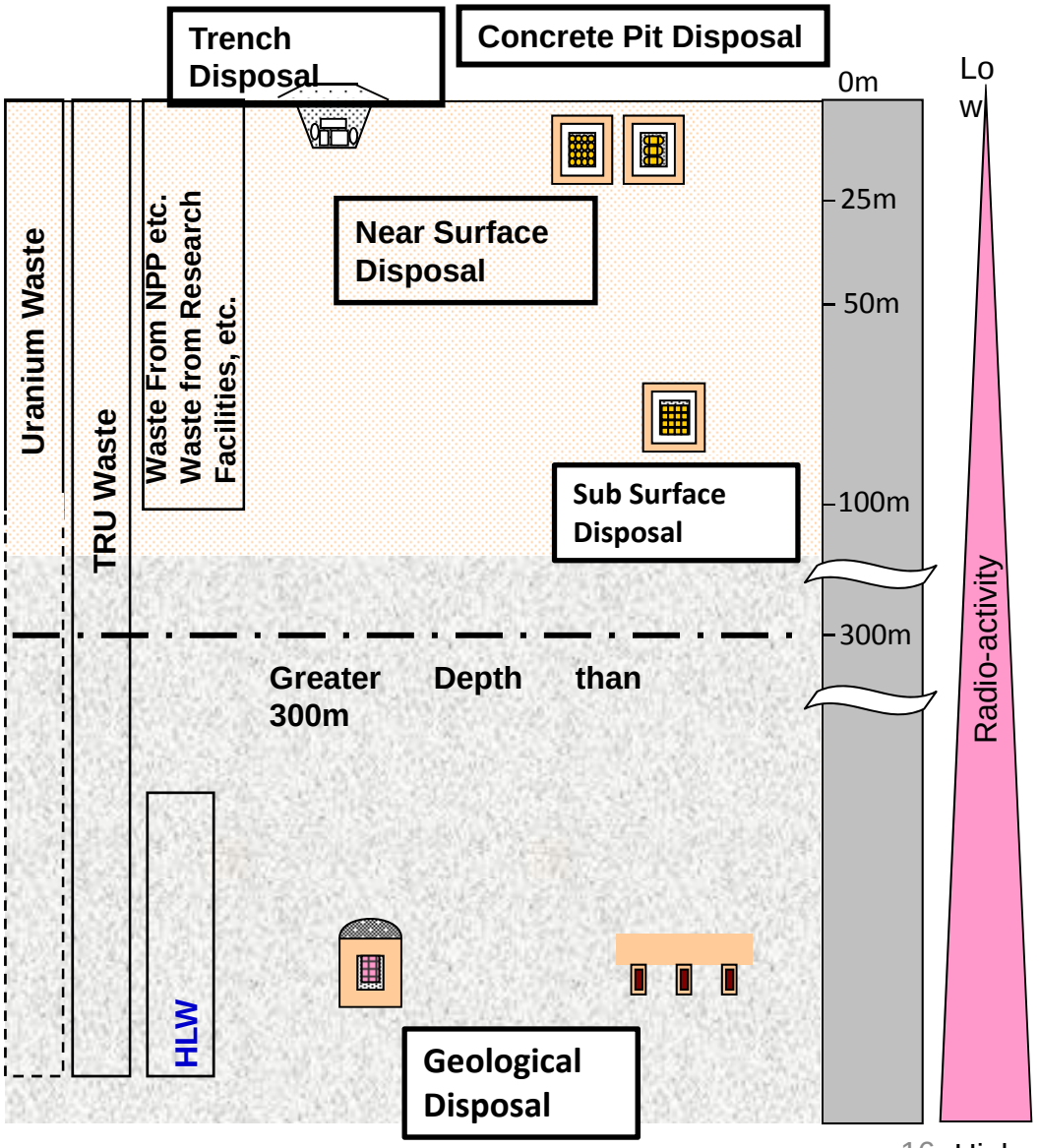


Low-Level Radioactive Waste

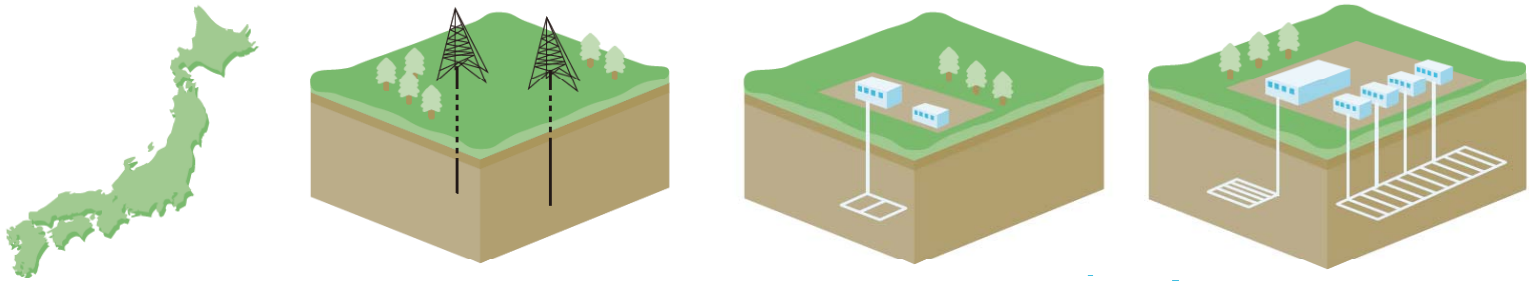
- **Shallow-land trench disposal**
  Near surface disposal without artificial barrier
- **Shallow-land concrete pit disposal**
  Near surface disposal with artificial barrier
  (concrete pit)
  Operated by JNFL at Rokkasho-mura
- **Sub Surface disposal**
  Sub-surface disposal at the depth of 50 – 100m.
  Tested by JNFL at Rokkasho-mura

High-Level Radioactive Waste

- **Geological Disposal**
  Disposed at deep geological environment at greater depth than 300m below the surface
  Started site selection program by NUMO



- “Specified Radioactive Waste Final Disposal Act” enacted to deal with HLW in 2000.
  - NUMO (Nuclear Waste Management Organization in Japan) was established as an entity to implement final disposal of HLW in October 2000.
  - NUMO announced to commence the first step of site selection process (literature survey) , to which, more than 10 municipalities have expressed their interests.



Public solicitation

Proposal by the central government

Selection of preliminary investigation areas based on the literature survey※

Selection of detailed investigation areas based on the preliminary investigation investigation by boreholes around

Selection of site for construction detailed investigation based on the investigation by underground facilities around 2028※

Construction of disposal facility
↓
Commencement of disposal (Around middle of 2030s)

※ If mayor of municipality and governor are opposed, NUMO dose not to go to the next phase.
※ Cabinet decision is necessary at the selection of the sites.

Communication and Cooperation

Stakes-Holders Communication

- Recognize the importance of Communications with Stakes-Holders.
  - Integrate communication activities with residents around nuclear facilities into NISA's regulatory processes (i.e., licensing, inspection).
  - Improve systems to provide safety related information through cell-phone based web systems ("Mobile NISA").
  - Enhance communications between regulator and industries in a broad sense (including researchers and workers), in order to share the challenges for improving safety standards.
    - ✓ NISA started to convene a new annual conference for this purpose.

      The first conference conducted on 7 and 8th of last October.

International Cooperation

- Recognize the importance of international cooperation in fields such as;
  - Regulatory information exchange,
  - Operation experience exchange,
  - International cooperation in safety researches,
  - Personnel Training.

Thank you for your attention!

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