

A photograph of Mount Fuji, the highest mountain in Japan, under a sunset sky. The mountain is silhouetted against a sky with soft orange and pink hues. The foreground shows a layer of white clouds and the dark silhouette of other mountains.

# Country Report of Japan

**The 23<sup>rd</sup> FNCA Ministerial Level Meeting**

**October 31, 2022**

**Mr. KAKUDO Takafumi, Deputy Director General**

**For**

**Science, Technology and Innovation Policy**

**Cabinet Office**

# Contents

1. Nuclear Energy Use to achieve Carbon Neutrality in 2050 and Economic Growth
2. The basic policy on handling of ALPS (Advanced Liquid Processing System)treated water (as of October 2022)
3. Promoting utilization of radiation and radioisotopes
4. Strengthening the foundation for using nuclear energy (Human Resource Development and Exchange)

# 1. Nuclear Energy Use to achieve Carbon Neutrality in 2050 and Economic Growth

## 1. Policy Objectives

- (1) **Carbon neutrality:** UNFCCC COP26 held in November 2021 built a consensus on maintaining the effort to achieve the 1.5°C target.
  - (2) **Medium- to long-term economic growth:** It is essential to take the response to global warming as an opportunity for growth and to create a “virtuous cycle of the economy and the environment.”
  - (3) **Stable energy supply:** The unprecedented supply shortage of natural gas caused by Russia's invasion of Ukraine have made energy security be a common global issues.
- One option that could be taken to achieve these policy objectives is nuclear power.

## 2. Situation in Japan

### 1. Positioning of nuclear energy use

#### ① On the premise of ensuring safety,

the use of nuclear energy is to be promoted by extending the operation period of existing reactors and taking other actions as a means to respond to global warming, to secure a stable energy supply, to ensure the economic-efficiency of the power supply, and serve other purposes.

#### ② The Green Growth Strategy Through Achieving Carbon Neutrality in 2050 embodied in June 2021 provides goals and a processing schedule for small modular reactors (SMRs), high-temperature gas reactors, and nuclear fusion.

#### ③ The "Sixth Basic Energy Plan" approved by the Cabinet in October 2021 positions nuclear energy, on the major premise of ensuring its safety, as an important low-carbon baseload power source that contributes to the stability of the energy supply-demand structure in the long term. The plan includes the prospects of nuclear power to compose approximately 20–22% of the total power generation mix by FY2030.

### 2. Status of nuclear power generation

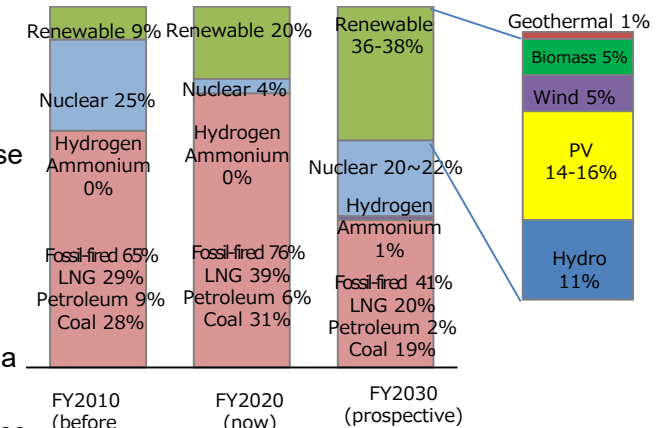
#### ① Mihama Nuclear Power Plant Unit 3 was restarted in July 2021, becoming the first to operate for more than 40 years in Japan.

## Progress of Energy-Mix and its Prospect

① Carbon neutrality by 2050 has been declared.

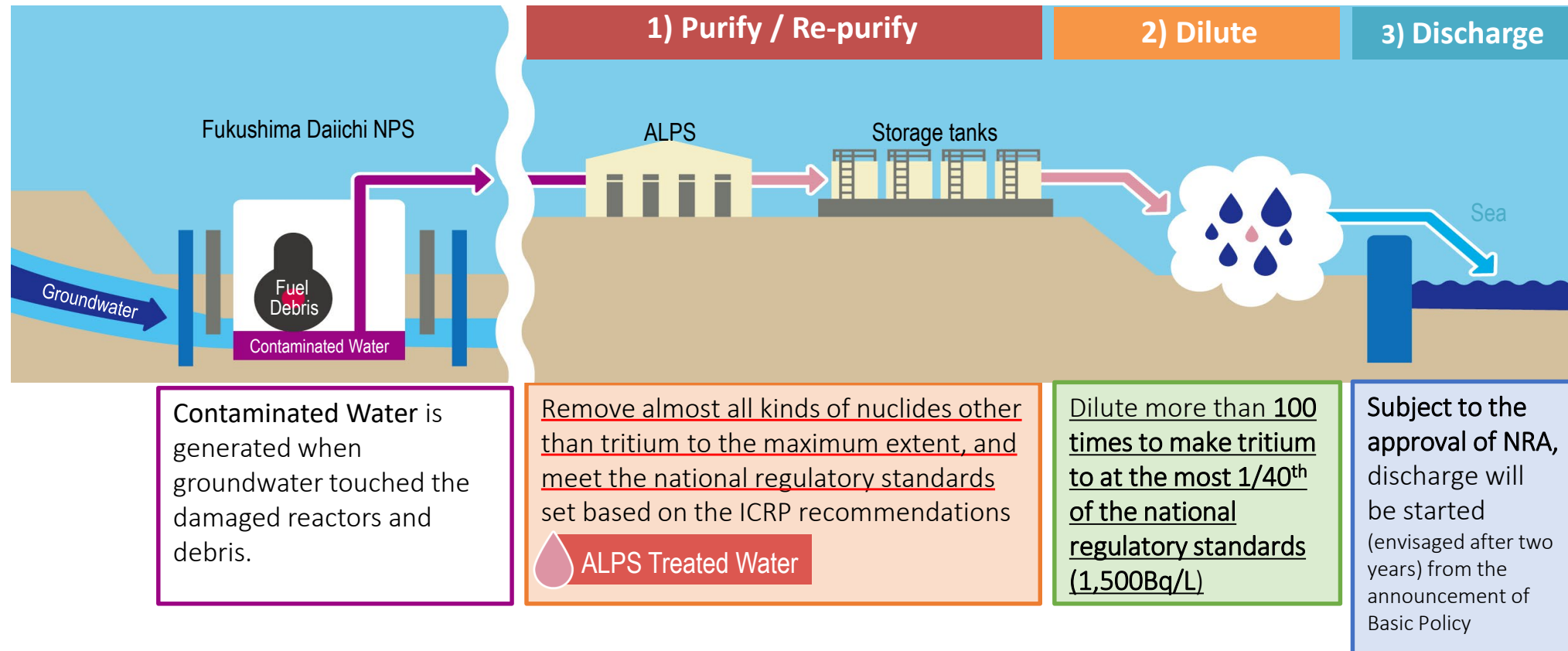
② Nuclear power is expected to compose approx. 20-22% of the total generation mix in FY2030.

③ In March 2022, the government issued a power crunch warning in the service areas of Tokyo EPCO and Tohoku EPCO.



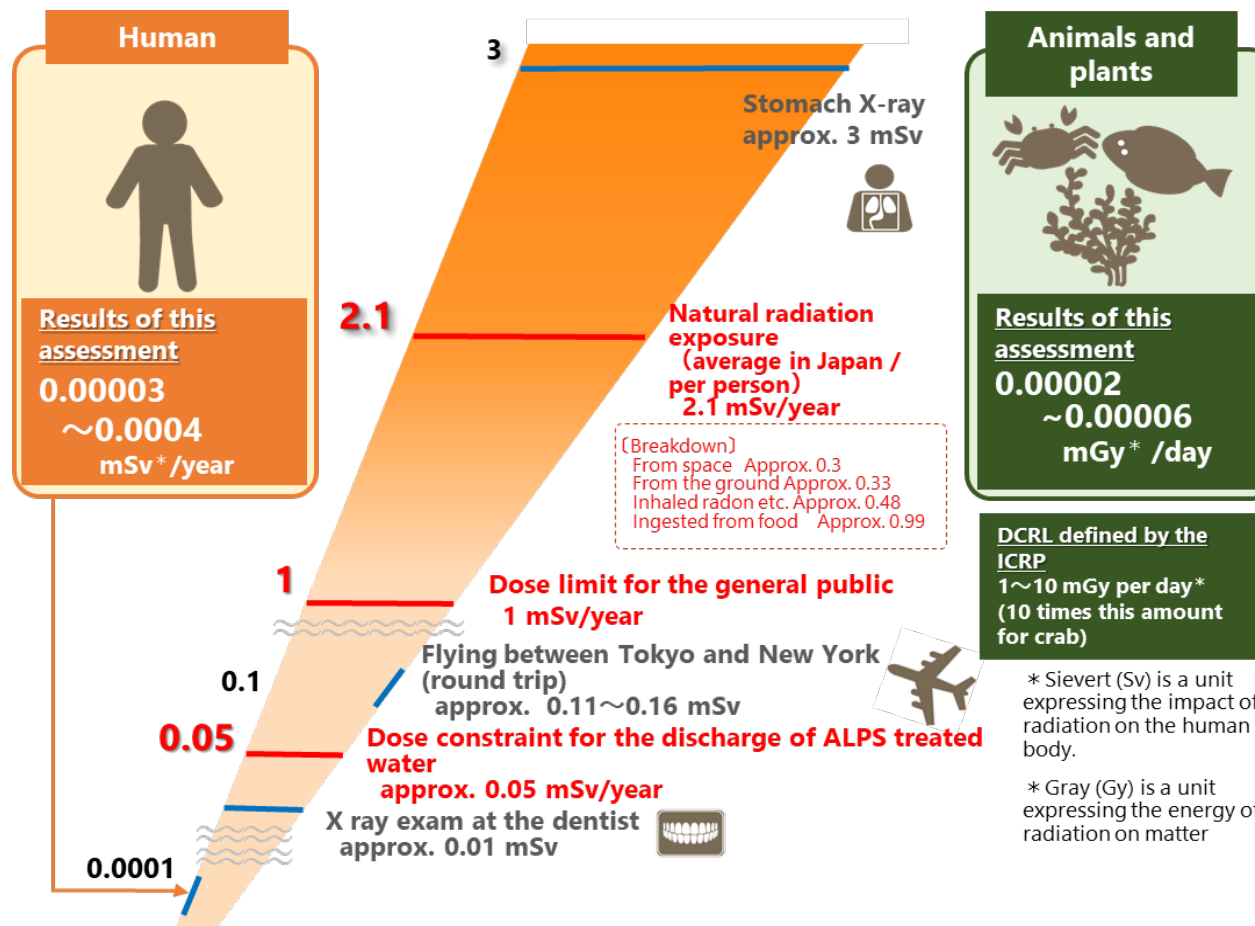
## 2. Basic Policy on handling of ALPS treated water (1/2)

- The discharge will be implemented only when TEPCO complies with the regulatory standards set based on the recommendations of ICRP, and implementation of the discharge will be in line with international practice.
- Measures to minimize adverse impacts on reputation are thoroughly implemented.
- The IAEA conducts reviews of the safety aspects of discharge of ALPS treated water.



## 2. Basic Policy on handling of ALPS treated water (2/2) (The radiological impact on the public and the environment)

- Results of the assessment on the public found that the exposure dose was **approx. 1/70,000 to approx. 1/5,000 of natural radiation exposure** (average in Japan : 2.1 mSv/year).
- Results of the assessment on animals and plants (flatfish, brown seaweed) found that the exposure dose was **approx. 1/50,000 to approx. 1/20,000 of the derived consideration reference level (DCRL)** defined by the ICRP. (In the case of crab, approx. 1/500,000 to approx. 1/200,000)



Reference :  
Radiological Impact  
Assessment Report  
Regarding the Discharge of  
ALPS Treated Water into the  
Sea (design stage)

# 3. The Action Plan for Promotion of Production and Utilization of Medical Radioisotopes (Outline)

31<sup>st</sup> May, 2022 Atomic Energy Commission, Japan

## Background

### Expectations for Radioisotope Therapy

- Increased focus on “*theranostics*” (therapy + diagnosis)

### Movements and Problems in Japan

- *Restart of research reactors* that can produce large amounts of radioisotopes (JRR-3, “Joyo”) On the other hand, insufficient number of
  - *Hospital beds* for radioisotope therapy
  - *Human resources* who promote production and utilization of radioisotopes

### International Situation

- *Vast investment* for radioisotope production and R&D
- Forming network of research reactors and accelerators
- Accelerated *competition for acquisition* of radioisotopes and their raw materials

## Developing the Action Plan that aims to provide domestic radioisotopes to patients

The Action Plan contributes to

- Improvement of people’s welfare by enhancing the medical system through cutting-edge nuclear science and technology
- Ensuring economic security in terms of medical services

## Goals to be Achieved during next decade

- ① Establishment of a Stable Radioisotope Diagnostic System through *partial domestic production of Mo-99/Tc-99m*
- ② Implementation of *Radioisotope Treatment Using Domestic Radioisotopes*
- ③ *Dissemination of Radioisotope Treatment* in Medical Setting
- ④ Making Radioisotope-Related Fields, centered on Medicine, as a “*Strength*” of Japan

## Contents of the Action Plan

### (1) Promoting Initiatives for Domestic Production and Stable Supply of “Important Radioisotopes”

- Stable supply of *Mo-99/Tc-99m* using JRR-3 and accelerators (Manufacturing approximately *30% of domestic demand* by the end of FY2027 as far as possible, and supply to domestic)
- Strengthening R&D for mass production of *Ac-225* using “Joyo” and accelerators (Production demonstration by FY2026 with “Joyo”)
- Strengthening efforts to commercialize *At-211* (Indicating usefulness as a pharmaceutical product by FY2028)

### (2) Establishment of systems and structure to promote utilization of radioisotopes in medical setting

- Establishment of hospital rooms for radioisotope treatment (Average number of months to wait for radioisotope treatment: *3.8m (2018) ->2m (2030)* )
- Preparation for commercialization of new radiopharmaceuticals (Th-227, Ga-68)

### (3) Promoting R&D Contributing to Domestic Production of Radioisotopes

- Technical development support for production by research reactors and accelerators
- Promotion of initiatives by the Fukushima International Research and Education Organization
- Establishment of systems of non-clinical studies of radiopharmaceuticals

### (4) Strengthening Research Infrastructures, Human Resources, and Networks for Production and Utilization of Radioisotopes

- Strengthening Human Resources in the Field of R&D and Medical Setting
- Strengthening the Supply Chain in line with Domestic Production
- Study of Mechanisms for Waste Treatment and Disposal

# 4. Human Resource Development and Exchange (Nuclear) Example of Activity – MEXT

Concerns about sustainability of nuclear education



- Lack of young faculty members to replace retiring faculty members
- Aging of research facilities, which are being closed and not replaced

Collective measures to maintain and strength nuclear education foundation

## ANEC: Advanced Nuclear Education Consortium for the Future Society

Consortium of Japanese nuclear education and training established in October 2021





**Thank you**