Reconstruction and Decommissioning in Fukushima

Ministry of Economy, Trade and Industry (METI)

April 2023

Today's presentation

1. Progress of Decommissioning in Fukushima

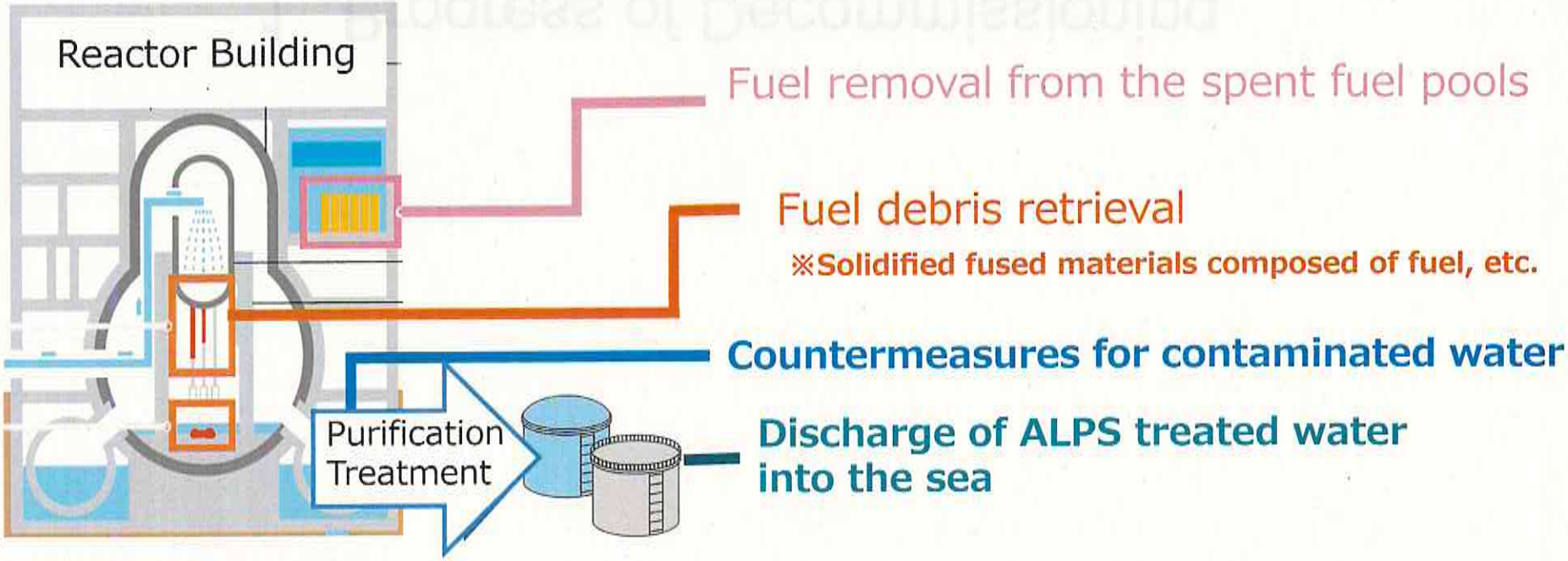
2. ALPS Treated Water Discharge

3. Progress of Reconstruction

1. Progress of Decommissioning

Decommissioning of the Fukushima Daiichi NPS

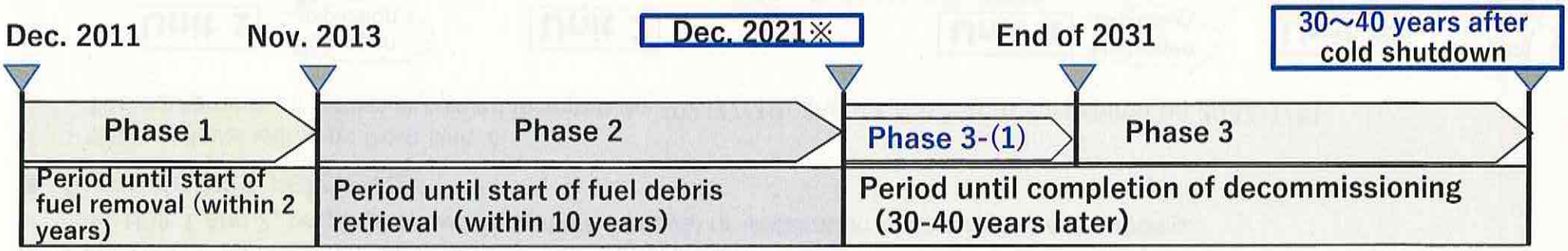
- **The decommissioning of the Fukushima Daiichi NPS is essential for the reconstruction of Fukushima**, as it will lead to the safety and security of local residents.
- **The decommissioning** reduces the overall risk to Fukushima Daiichi NPS by **removing fuel debris and spent fuel, taking measures to deal with contaminated water and discharging ALPS treated water into the sea**.



Mid-and-Long-Term Decommissioning Roadmap

- First adopted in December 2011, the Mid-and-Long-Term Decommissioning Roadmap clarified that the Government of Japan (GOJ) lead the entire decommissioning effort.
- Since then, GOJ revised the roadmap several times to set appropriate milestones and timeline.
- **Fukushima Daiichi Decommissioning is a continuous risk reduction activity** to protect the people and the environment from the risks associated with radioactive materials.
- **Safe and steady decommissioning is a prerequisite for reconstruction of Fukushima.**

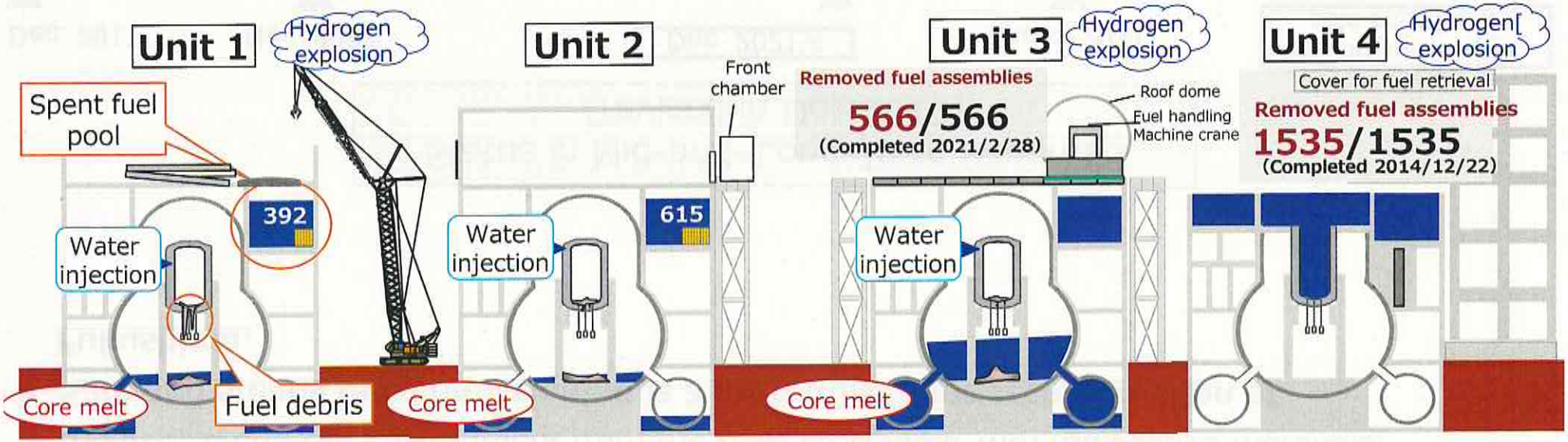
Status in Mid-and-Long-Term Roadmap
(revised in Dec.2019)

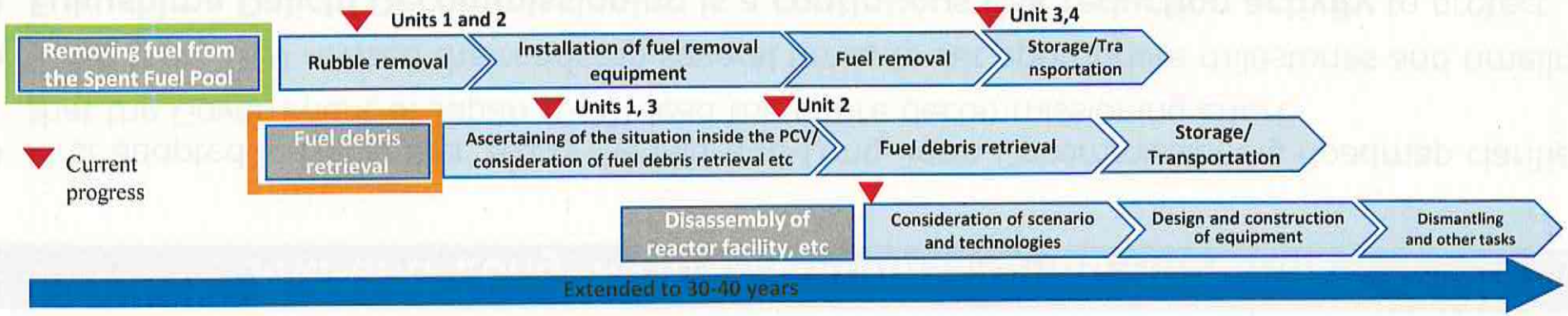


※ Based on the development status of the robot arm required for the trial retrieval of fuel debris, it is assumed that retrieval will start in the second half of FY2023.

State of TEPCO Fukushima Daiichi NPS (FDNPS)

- **Spent fuel removal**
  - For Unit 3, fuel removal was completed on 2021/2/28.
  - For Unit 1 and 2, preparation works (rubble removal or installation of cover etc.) are ongoing.
- **Fuel debris retrieval**
  - Trial retrieval will start from Unit 2.
  - The equipment for retrieval arrived in Japan on 2021/7/10, and transferred to Fukushima on 2022/1/31.

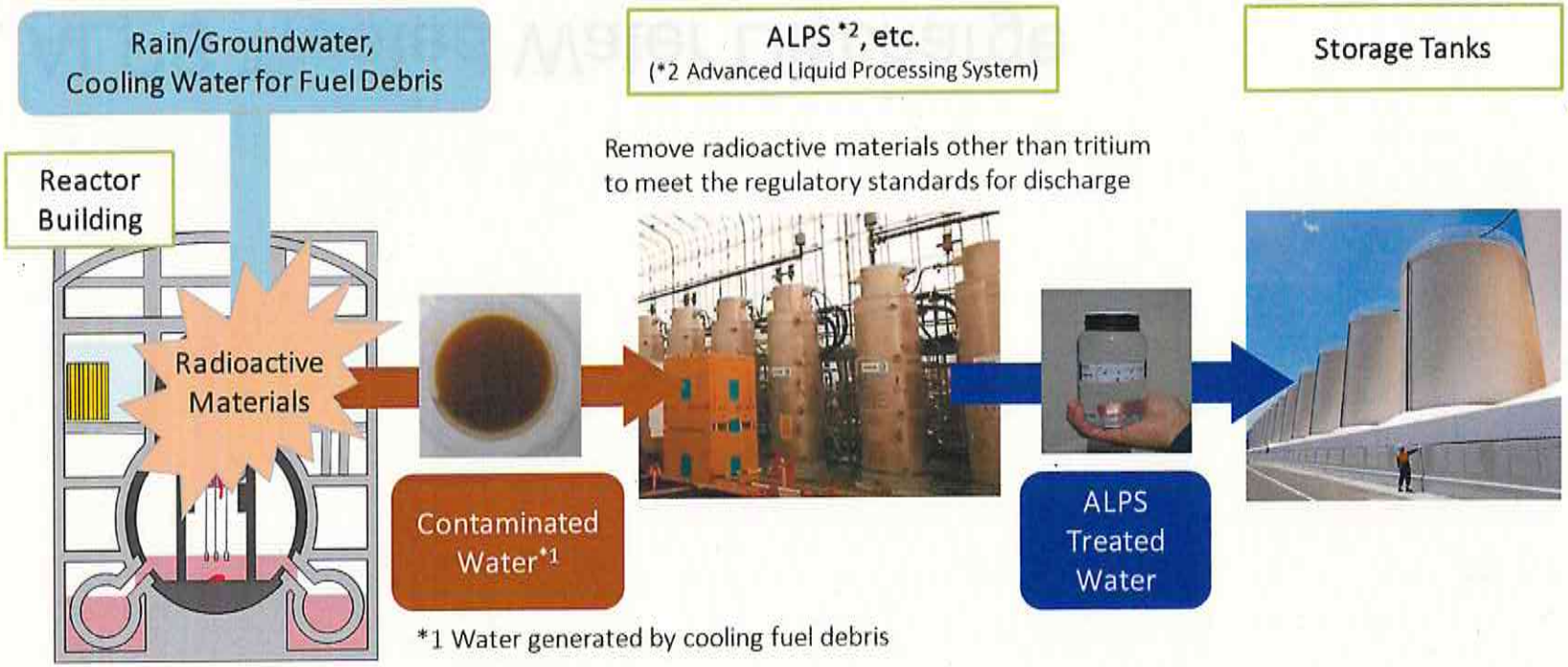




2. ALPS Treated Water Discharge

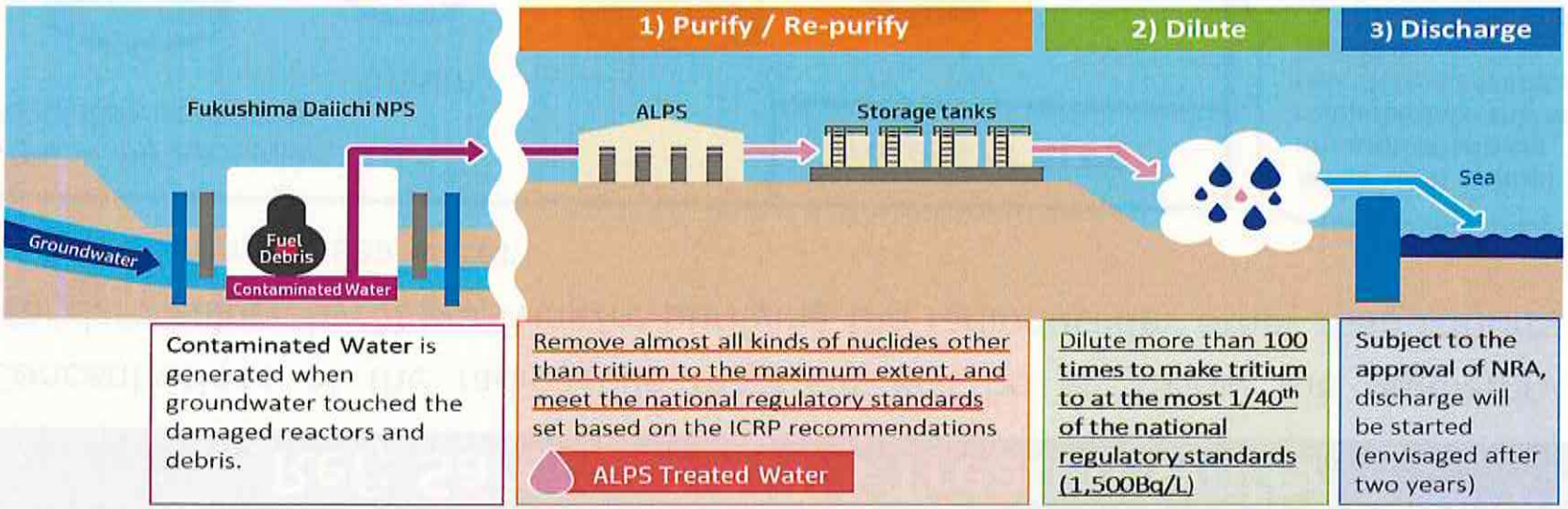
Why ALPS treated water must be discharged into the sea ?

- Decommissioning of FDNPS is premise of reconstruction of Fukushima, which is continuous activity to gradually reduce the risk of radioactive materials to the surrounding area.
- The storage tanks exceed a thousand could be an obstacle to secure a site for the planned decommissioning of the FDNPS.
- Also, maintaining tanks could pose other risks (aging and leakage due to a disaster).
- Therefore, it is necessary to properly discharge ALPS treated water into the sea.



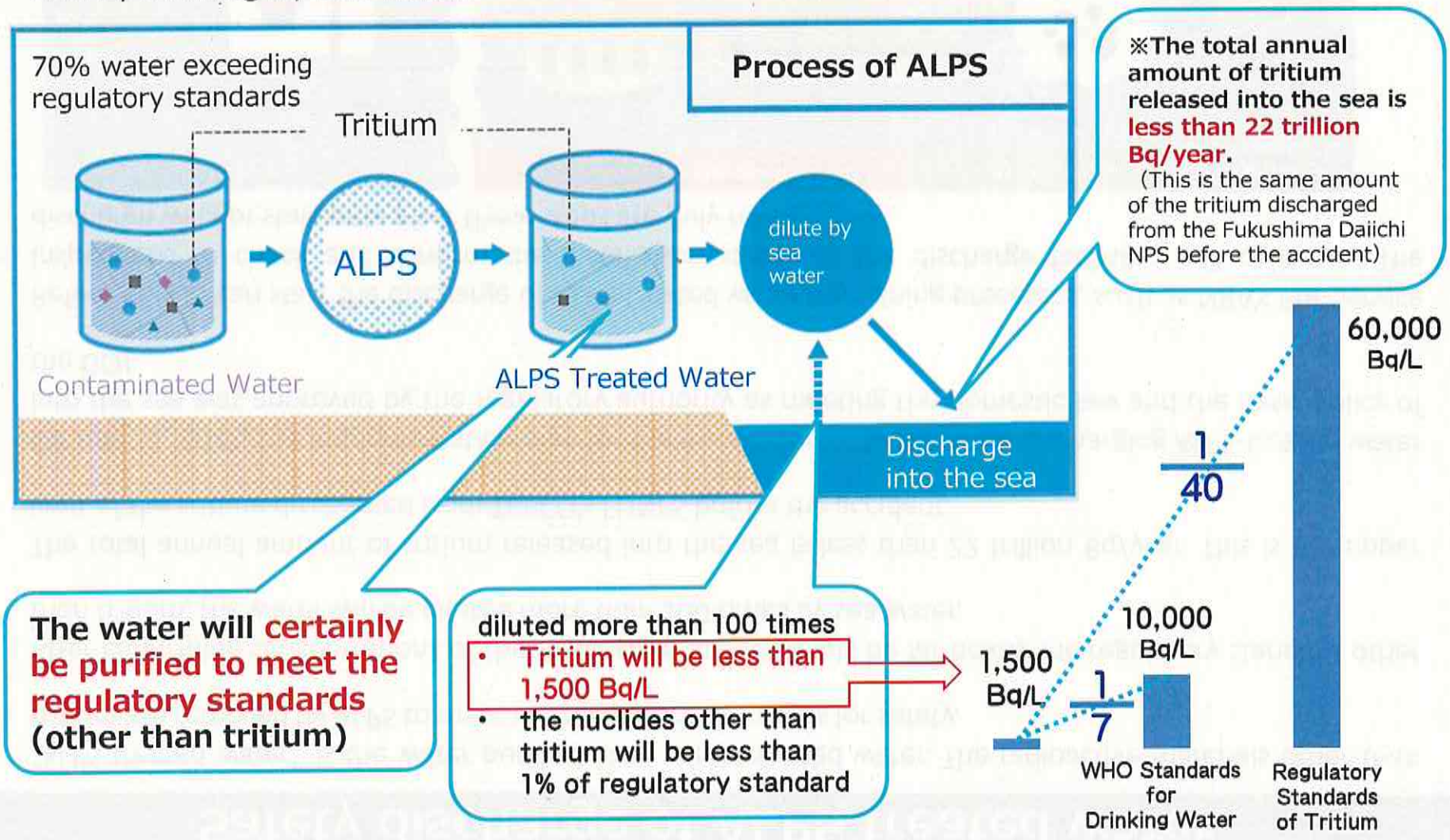
Safety discharge of ALPS treated water

- "ALPS treated water" is the water purified from contaminated water. The radioactive materials other than tritium are removed by ALPS to meet the regulatory standards for safety.
- After confirming concentrations of the radioactive materials will be far below the regulatory standard other than tritium, the water will be diluted more than 100 times by sea water.
- The total annual amount of tritium released into the sea is less than 22 trillion Bq/year. This is the upper limit of the tritium discharged from TEPCO's FDNPS before the accident.
- On July 22, 2022, the implementation plan for the installation of facilities for discharging ALPS-treated water into the sea was approved by the regulatory authority as meeting the domestic law and the basic policy of the GOJ.
- Before TEPCO can start the discharge of ALPS treated water, remaining processes, such as NRA's Pre-Service Inspections to check and confirm the installation status of the discharge facilities, will continue. The discharge will not start until after these steps are duly taken.



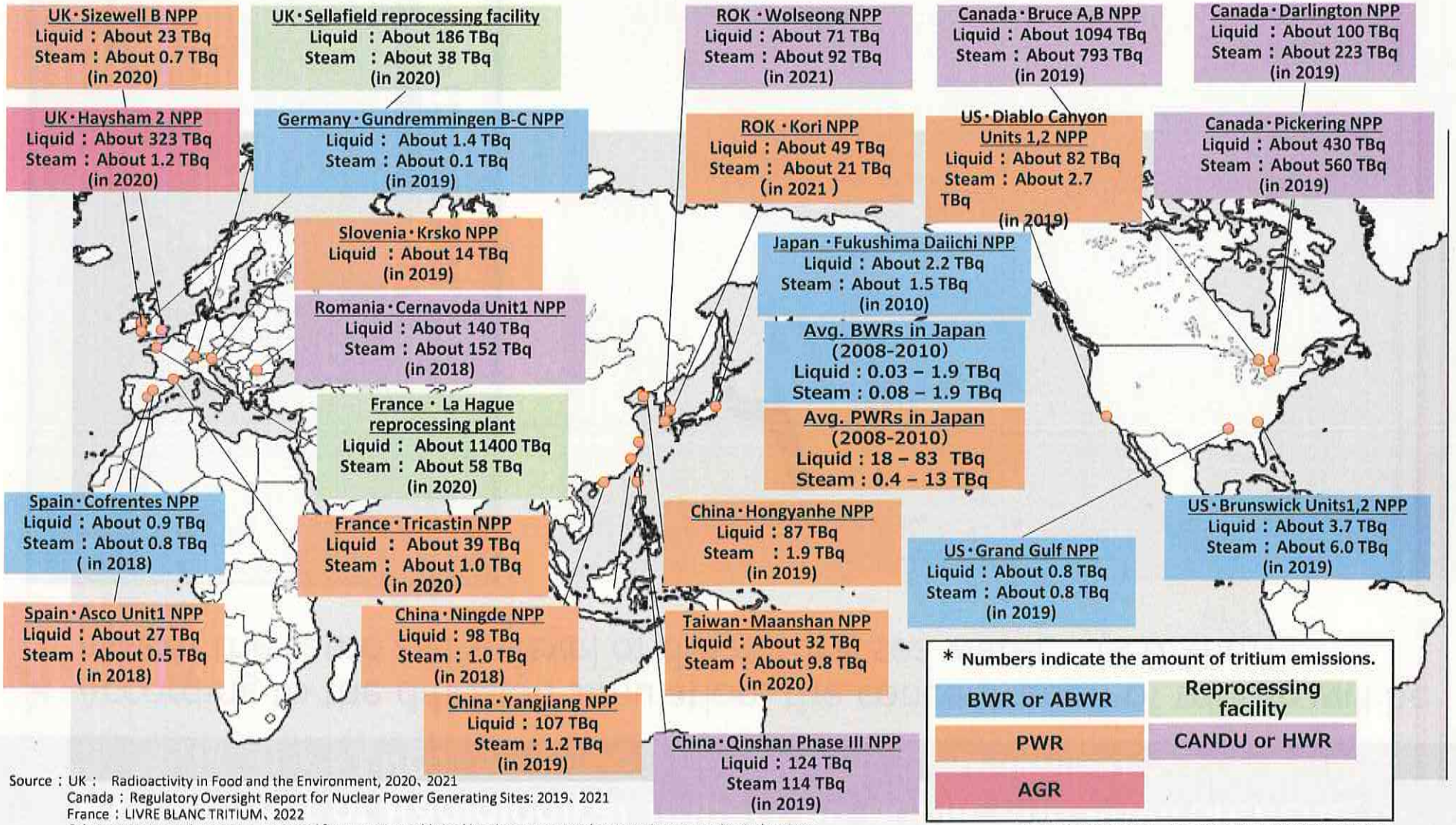
Ref; Safety of ALPS Treated Water

- Concentrations of the radioactive materials will be far below the regulatory standard values by 1) purifying/re-purifying the radionuclides other than tritium; and 2) diluting by sea water.



Can ALPS treated water be safely discharged into the sea ?

- Liquid radioactive waste is discharged into the sea at various nuclear facilities around the world based on the common international understanding of safety.



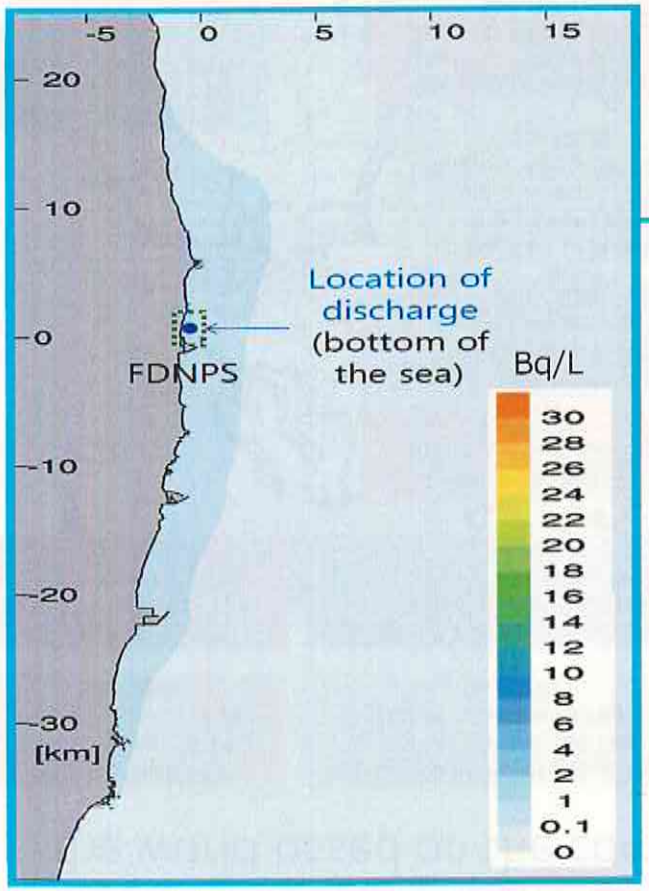
Source : UK : Radioactivity in Food and the Environment, 2020、2021
Canada : Regulatory Oversight Report for Nuclear Power Generating Sites: 2019、2021
France : LIVRE BLANC TRITIUM、2022
Other countries and regions : Prepared from reports published by electricity providers in various countries and regions.

<Ref.> 1×10^{12}Bq≒ about0.019g (Tritiated water)

Assessment of Radiological Impact on public and environment ①

～ Effect on the environment is quite limited ～

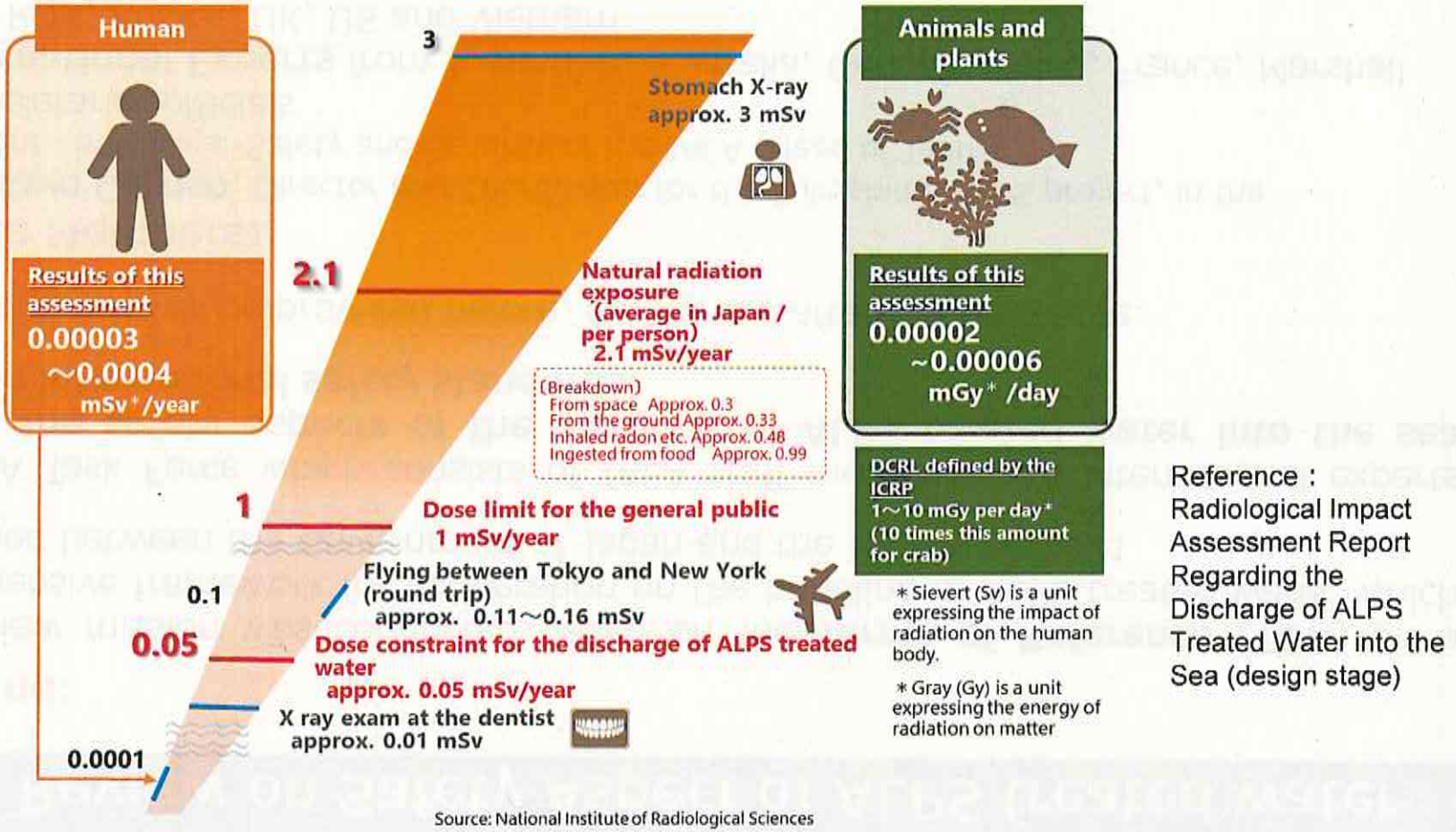
- According to the diffusion simulation, the concentration of tritium will be almost the same as the level of the natural sea water (< 0.1Bq/L).



Discharged amount:
22 trillion becquerels/year

Assessment of Radiological Impact on public and environment ②
～ Effects on the public and the environment were minimal～

- 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)



Source: National Institute of Radiological Sciences

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

IAEA Review on Safety Aspect of ALPS treated water

Background:

- This review mission was conducted based on the **Terms of Reference (TOR)** on a comprehensive framework for cooperation on the handling of ALPS treated water, which was signed between the Government of Japan and the IAEA July, 2021.
- The IAEA Task Force which consists of IAEA staff members and international experts **reviews the safety aspects of the handling of ALPS treated water into the sea based on international safety standards.**
- IAEA assistance will be provided before, during and after the discharge.

Task Force Members:

- **Mr. Gustavo Caruso**, Director and Coordinator for the Fukushima ALPS project, in the Department of Nuclear Safety and Security of the IAEA (Head of Team)
- IAEA Secretariat officials
- **11 International Experts** from Argentina, Australia, Canada, China, France, Marshall Islands, ROK, Russia, UK, US and Vietnam

Components of the Review:

1) **Assessment of Protection and Safety (TEPCO/METI)**
2) **Regulatory Activities and Process (NRA)**
3) **Independent Sampling, Data Corroboration and Analysis (TEPCO/METI/NRA/MOE etc)**

Schedule of the IAEA Review Mission

- Feb 2022 **1st Safety Review Mission**
- Mar 2022 **1st Regulatory Review Mission**
- April 2022 **The Report of 1st Safety Review Mission (Report 1) was published**
- June 2022 **The Report of 1st Regulatory Review Mission (Report 2) was published**
- Nov 2022 **2nd Safety Review Mission**
- Dec 2022 **The Report of IAEA'S corroboration activities (Report 3) was published**
- Jan 2023 **2nd Regulatory Review Mission**
- April 2023 **The Report of 2nd Safety Review Mission (Report 4)**
- Near future **The Report of 2nd Regulatory Mission (Report5) will be published**
- **A comprehensive report will be published in the 1st half of 2023.**

Message by IAEA DG Grossi

Posting on SNS by IAEA Director General Grossi

IAEA Director General Grossi's Comments on SNS (May 19th, 2022)

"The discharge of processed water goes into the Pacific Ocean, that is right behind us, it will be done in full conformity with the international standards, and therefore it will not cause any harm to the environment."

【The IAEA official page related to the ALPS treated water】

Official page ⬇

Japanese page ⬆

Example of the web topics

- Overview of the review mission
- Publication of the report of the review
- Explanation of construction of the ALPS facility
- Monitoring methods of ALPS treated water by the IAEA etc.

⬅ The IAEA official page

The IAEA official page in Japanese ➡

Providing information to the international community

The GOJ has been providing information to the international community since the nuclear accident, in particular, more transparent information on ALPS treated water.

For example…

- Briefing sessions for Diplomatic Missions in Tokyo and for the Foreign Press in Tokyo
- Monthly Reports on the discharge record and the seawater monitoring results are being sent to all the DMT and the IAEA.
- Technical briefings on the occasions of international conferences and bilateral dialogue
- Briefing session for the Government of the Republic of Korea were held on several times.
- Briefing session to the Pacific Islands Forum (PIF) Secretariat were organized several times.
- Responded to the joint questionnaire from China and Russia, which was also published on the IAEA website


IAEA

Information Circular

INFCIRC/1007

Communication dated 20 July 2022 received from the Permanent Mission of Japan to the Agency


NOTE VERBALE

https://www.iaea.org/sites/default/files/publications/documents/infcircs/2022/infcirc1007.pdf

Responses to the Joint China-Russia Questionnaire

Stakeholder involvement

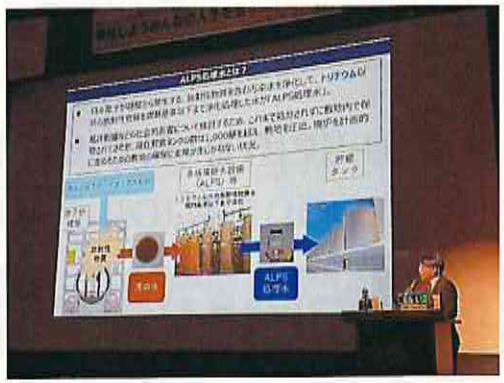
- GOJ has conducted **frequent communication with various stakeholders**. **Meetings** with agriculture, fishery industries, tourism industries and municipalities etc. are held frequently after announcement of "Basic Policy"
- Since April 2021, **about 1,000 briefing sessions and opinion exchanges** have been held for farmers, foresters and fishermen, tourism operators, distributor, retailers, consumers, local government officials, etc.

Briefing session to press

Fukushima Council

Meeting between Minister Nishimura and fishery industry

Briefing session to tourism industry



Briefing to municipalities

3. Progress of Reconstruction

Progress of Reconstruction (2012～2013)

Decommissioning Roadmap

Period up to start of fuel removal → Period up to start of fuel debris retrieval → Period up to start of end of decommissioning

2012 — 2013

- Unit 4: Removal of rubble on reactor building roof completed (Oct)

- Unit 4: Fuel removal from spent fuel pool and transfer to common pool started (Nov)
- Test operation of multi-nuclide removal equipment (ALPS) started (Mar)

➢ First commercial fishing resumed in Fukushima offshore

Snow crab

Yanagi octopus

Japanese flying squid

➢ First normal rice growing resumed in previously restricted areas

Photo: Paddy fields in Tamura City
(Shooting date: June 4, 2013)

Referenced from: https://www.meti.go.jp/earthquake/nuclear/osensuitaisaku/committtee/takakusyu/pdf/003_04_00.pdf
Referenced from: https://www.pref.fukushima.lg.jp/uploaded/attachment/266089.pdf

Referenced from:
https://www.mext.go.jp/b_menu/shingi/chousa/kaihatu/016/shiryo/__icsFiles/afieldfile/2013/09/10/1339417_1_2.pdf

Progress of Reconstruction (2014～2015)

Decommissioning Roadmap

Period up to start of fuel removal → Period up to start of fuel debris retrieval → Period up to start of end of decommissioning

2014 — 2015

- Unit 4: Fuel removal (1,535 assemblies) from spent fuel pool completed (Dec)

- Sub-drain pumping and discharge started (Sep)
- Sea-side impermeable wall closed (Oct)
- Unit 3: Removal of large rubble (fuel handling machine) from spent fuel pools completed (Aug)

➢ Evacuation order lifted for the first time in some areas (Tamura City)

Reopening of school

Referenced from:
https://www.reconstruction.go.jp/portal/chiiki/2014/20140421100603.html

➢ Joban Expressway is fully reopened (major arterial road in the disaster area)

Referenced from:
https://www.reconstruction.go.jp/portal/chiiki/2015/20150319152955.html

Progress of Reconstruction (2016～2018)

Decommissioning Roadmap

Period up to start of fuel removal → Period up to start of fuel debris retrieval → Period up to start of end of decommissioning

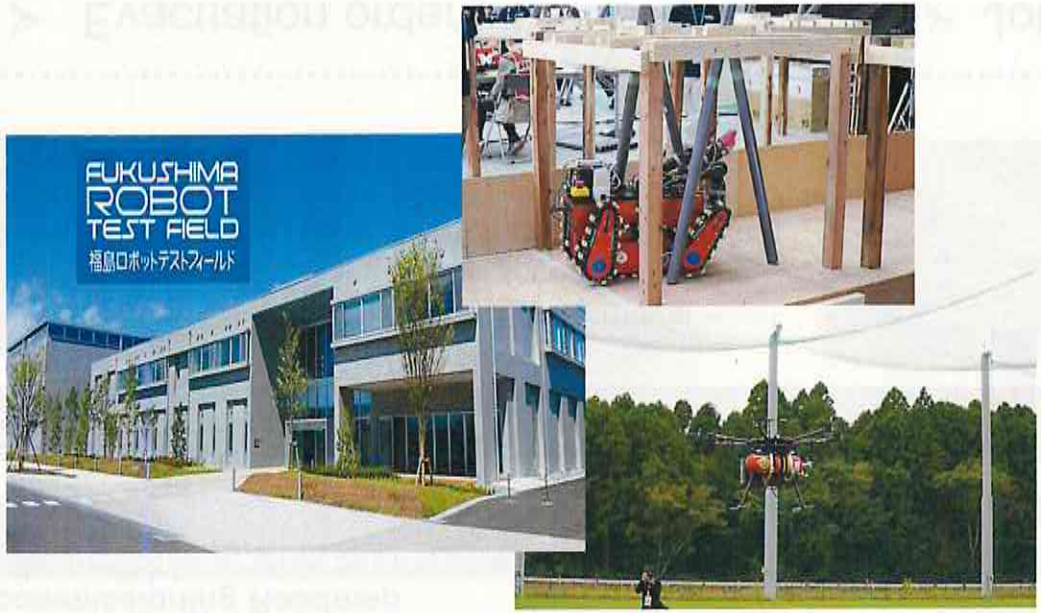
2016 — 2017 — 2018

- Unit 1: Removal of wall panels of the building cover completed

- Unit3:Lower part of RPV surveyed (Jul)

- Frozen-soil land-side impermeable wall Completed. 5–6 m gap in groundwater level created on the mountain side
- Generation of contaminated water reduced to one-third of the amount before (from 540 m3 to 170 m3/day)

➢ Fukushima Robot Test Field in service



(fully opened in 2020 after a phase-in)

➢ J-Village reopened

(fully opened in 2019)

Referenced from: https://www.facebook.com/robottestfield/photos/pb.100063135885143.-2207520000../335919594999936/?type=3

Progress of Reconstruction (2019~2021)

Decommissioning Roadmap

Period up to start of fuel removal → Period up to start of fuel debris retrieval → Period up to start of end of decommissioning

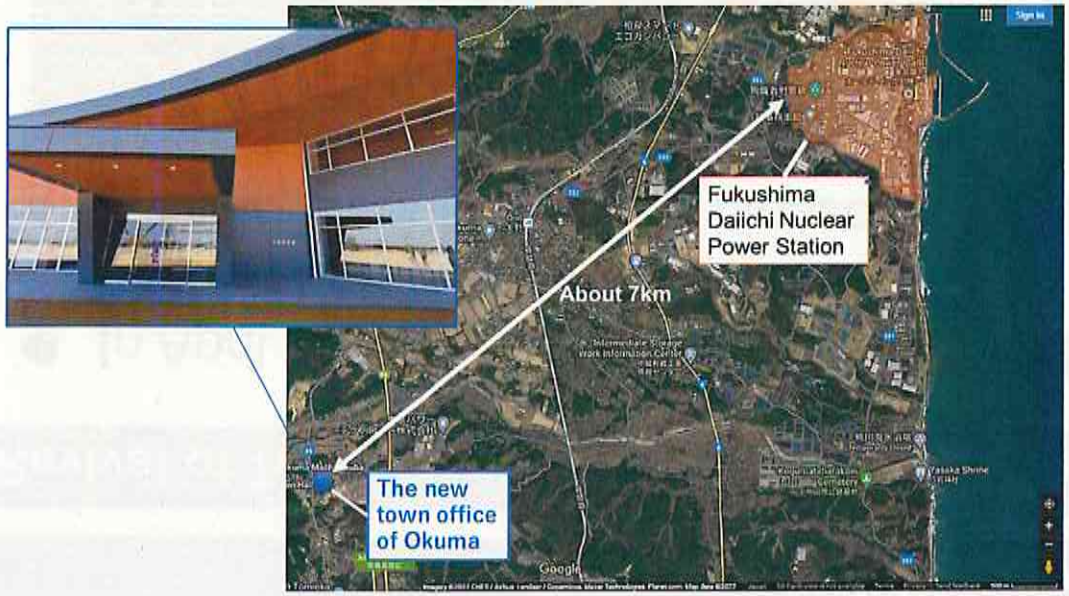
2019 **2020** **2021**

- Unit 3: Fuel removal from spent fuel pool started (Apr)

- Complete the treatment of stagnant water in buildings
- Generation of contaminated water reduced to 140 m3/day

- Unit3: Removal of all 566 fuel assemblies completed (Feb)

➢ Evaluation order partially lifted in Okuma Town where the Fukushima Daiichi NPS is located, allowing municipal services to start at a new town hall building



➢ Fukushima Hydrogen Energy Research Field opened

Referenced from:
https://www.nedo.go.jp/news/press/AA5_101293.html

Progress of Reconstruction

Revival of Tradisional Sakura Festival and Gathering People

- In April 2022, Yonomori Sakura Festival was held in Tomioka, another town near the Fukushima Daiichi NPS.
- A row of beautiful cherry blossoms trees was loved by many people.

Referenced from: https://www.tomioka-town.jp/soshiki/kikaku/kochokoho/sakura/index.html

Thank you for your support for Fukushima

More info from here

https://www.meti.go.jp/english/earthquake/index.html