Status Update of Fukushima Daiichi Decommissioning

Ministry of Economy, Trade and Industry, Japan (METI)
March 2022

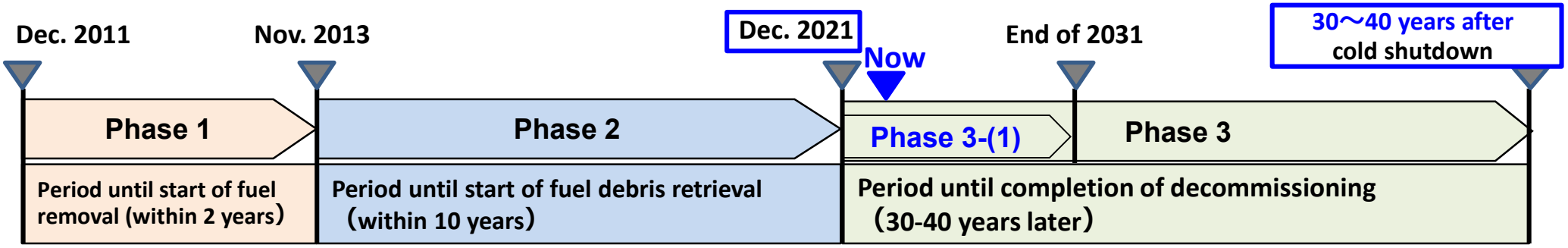
1. Progress of the Decommissioning of FDNPS
2. Major Challenges:
   - Water Management
   - Fuel Removal & Fuel Debris Retrieval
   - Waste Management

3. Outline of the IAEA Review Mission on ALPS Treated Water

Mid-and-Long-Term Decommissioning Roadmap

- Firstly 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.**

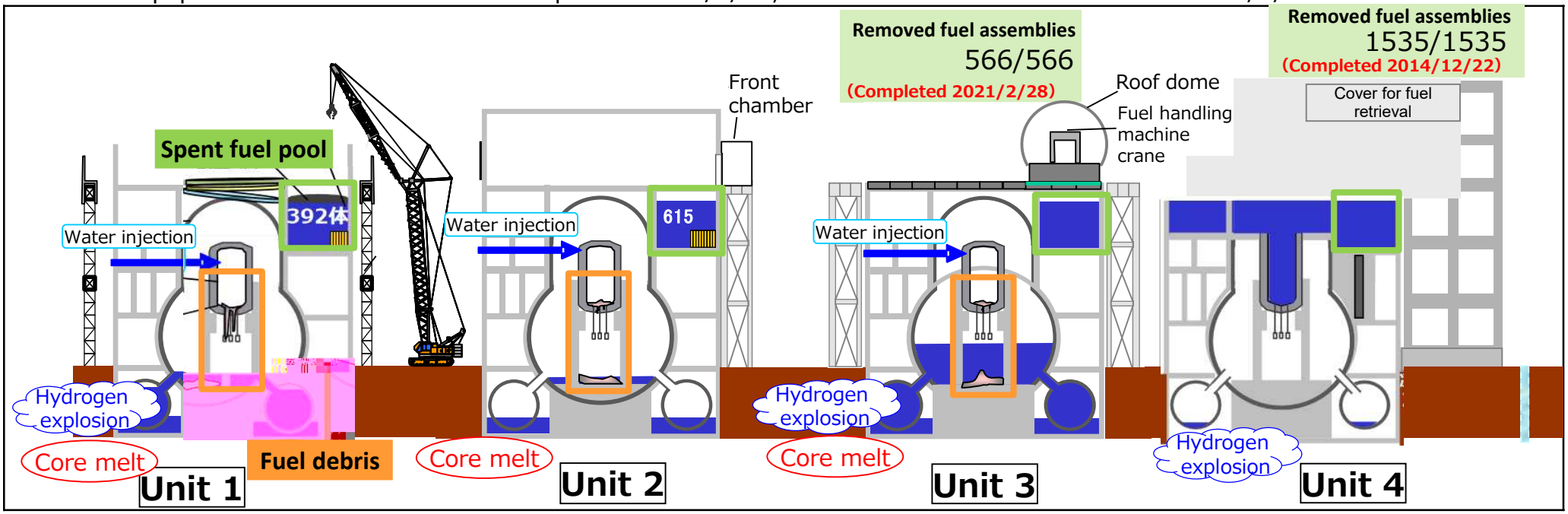
Status in Mid-and–Long-Term Roadmap
(revised in Dec.2019)

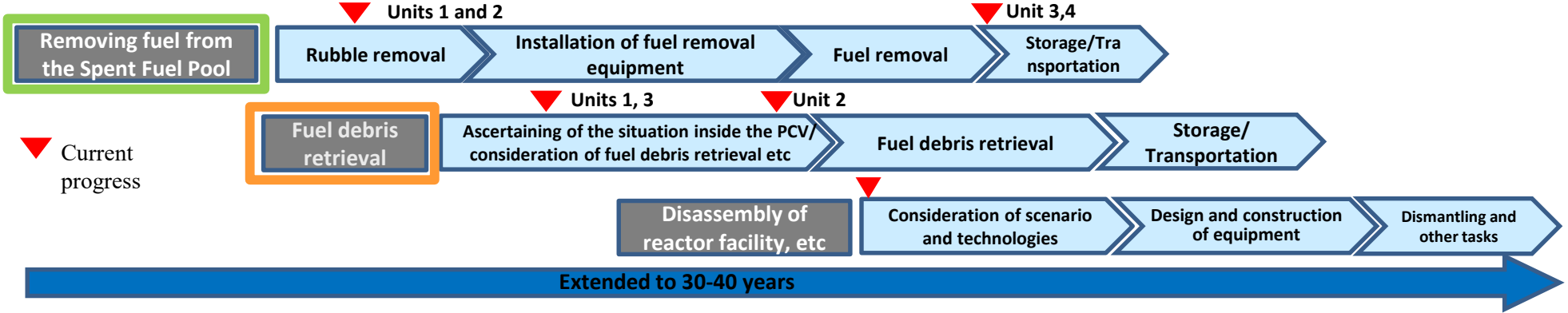


※ Due to the pandemic of COVID-19, start of trial fuel debris retrieval will be about 1 year behind schedule.

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.

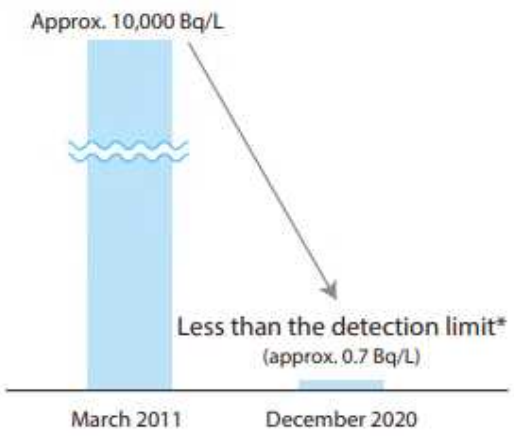




Effects on surrounding areas

- **The radioactive impact on the environment has been significantly reduced.**
- **The level of radioactive materials is far lower than the safety standard.**

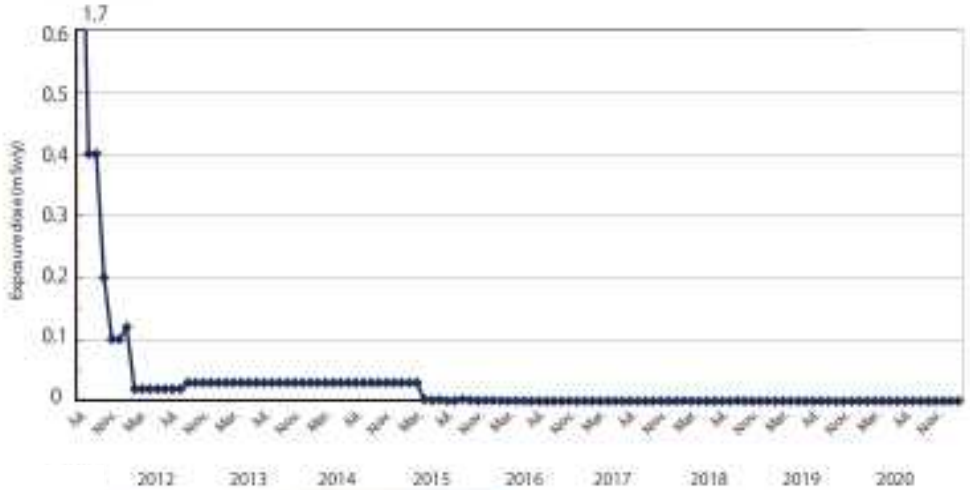
Sea



* The concentration of radioactive materials in the sea around the site refers to the Cs-137 level near the south discharge channel
* The international standard for drinking water quality is 10 Bq/L

Use of quay for mooring ships resumed in February 2017 (Namie Town)

Air



IAEA Review on Decommissioning

- Since the accident happened in 2011, IAEA has conducted five reviews of Japan's decommissioning plan of FDNPS.
- Most recently, IAEA reviewed the progress of decommissioning efforts through online discussions among others from June 30 to August 27,2021.
- On August 27, 2021, State Minister of METI received the 5th review report from IAEA.

METI State Minister Ejima received the report from IAEA Director Xerri (right side).

IAEA

Review Report

IAEA INTERNATIONAL PEER REVIEW OF MID-AND-LONG-TERM ROADMAP TOWARDS THE DECOMMISSIONING OF TEPCO'S FUKUSHIMA DAIICHI NUCLEAR POWER STATION

(Fifth Review)

Vienna, Austria
Tokyo and Fukushima Prefecture, Japan

June – August 2021

The Published 5th IAEA Report
https://www.meti.go.jp/press/2021/08/20210827004/20210827004-2.pdf

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Major milestones of Mid-and-Long-Term Roadmap (Dec. 2019)

- **Some of the milestones that were set in 2019 have already been achieved.**

Major milestones

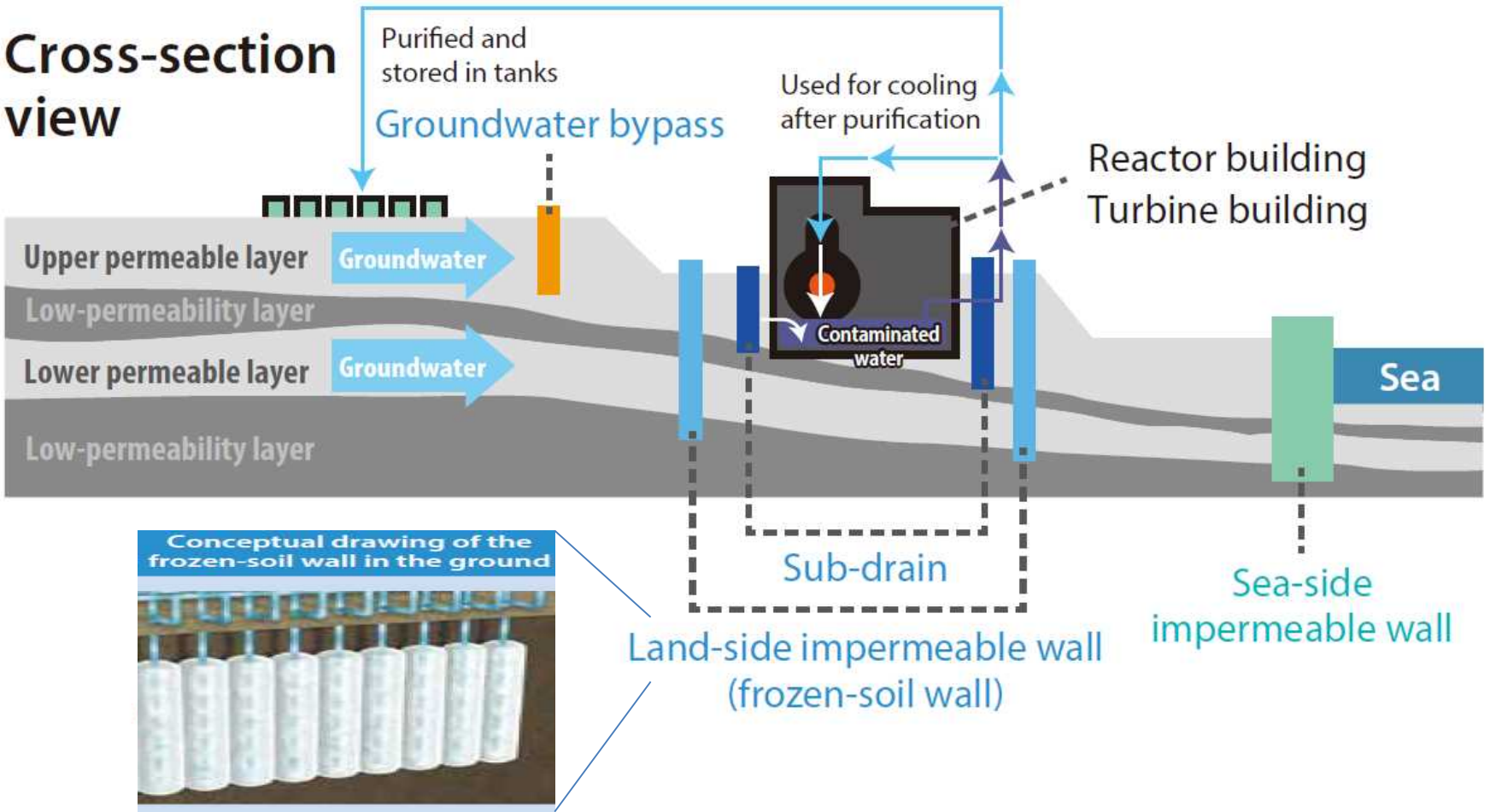
		Revised Roadmap	
Contaminated water management	Reduce to about 150 m^3/day **Reduce to about 100m^3/day or less** (Further reduction of generation)	Within 2020 **Within 2025**	achieved **NEW**
Stagnant water removal / treatment	Complete stagnant water removal / treatment in buildings* Excluding the reactor buildings of Units 1-3, Process Main Buildings, and High Temperature Incineration building. **Reduce the amount of stagnant water in reactor buildings to about a half of that in the end of 2020**	Within 2020(*) **FY2022 - 2024**	achieved **NEW**
Fuel removal	**Complete of fuel removal from Unit 1-6**	**Within 2031**	**NEW**
	Complete of installation of the large cover at Unit 1	**Around FY2023**	**NEW**
	Start fuel removal from Unit 1 (Methods have changed to ensure safety and prevent dust scattering)	**FY2027 – 2028**	**REVISED**
	Start fuel removal from Unit 2	**FY2024 - 2026**	**REVISED**
Fuel debris retrieval	Start fuel debris retrieval from the first Unit （Start from Unit 2, expanding the scale gradually）	Within 2021	*Expected to be delayed by approximately 1 year
Waste management	Technical prospects concerning the processing/disposal policies and their safety	Around FY2021	
	Eliminating temporary storage areas outside for rubble and other waste	**Within FY2028**	**NEW**

Water Management

- Counter measures are taken based on the following three principles:

1. Redirecting ground water from contamination sources
2. Preventing leakage of contaminated water
3. Removing contamination sources

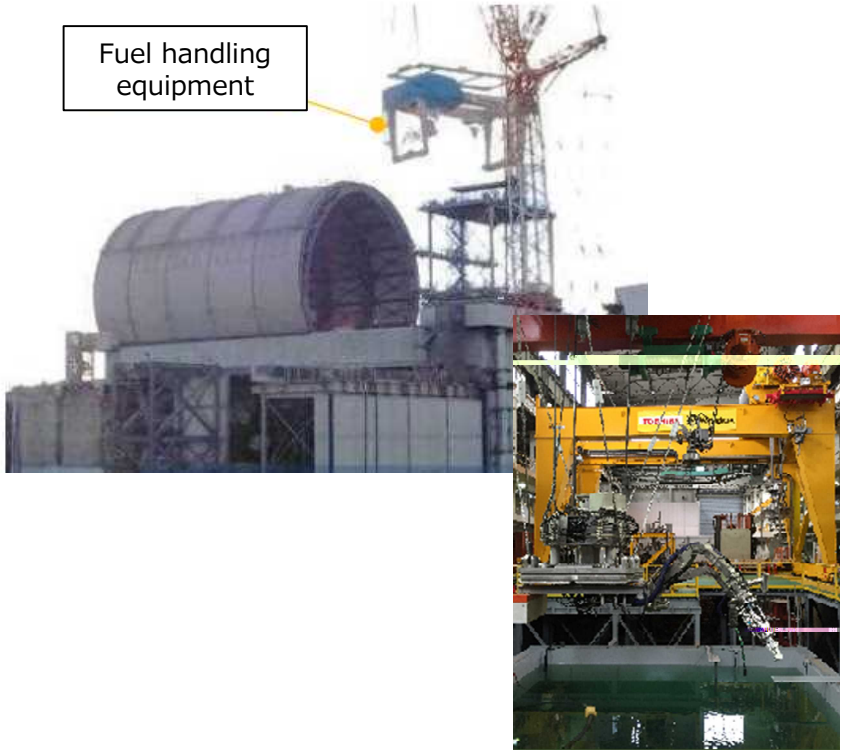
- For example, putting impermeable (frozen-soil) wall led successful reduction of the amount of generating contaminated water and removal of stagnant water.



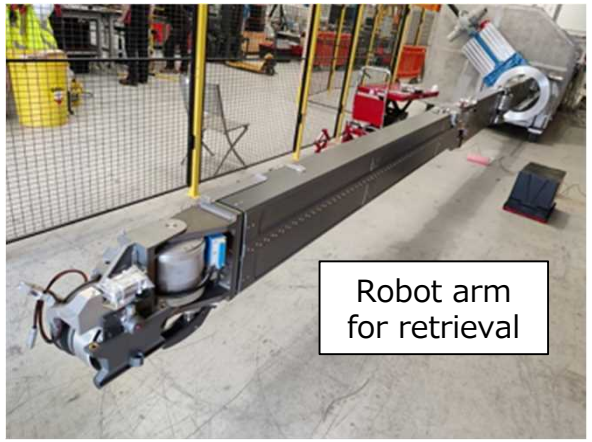
Fuel Removal & Fuel Debris Retrieval

- Fuel removal from the Unit 3 was completed in February 2021 by remotely-controlled fuel handling equipment. Preparation work for Unit 1 and 2 is ongoing.
- Next step is to retrieve fuel debris, which is more technically challenging.
- Manufactures from Japan and the U.K. have been working together for developing and testing the robot arm used for safely accessing and retrieving debris.

Fuel Removal in Unit 3



Robot Arm for Fuel Debris Retrieval



Fuel debris collecting device

Metallic brush

Vacuum vessel

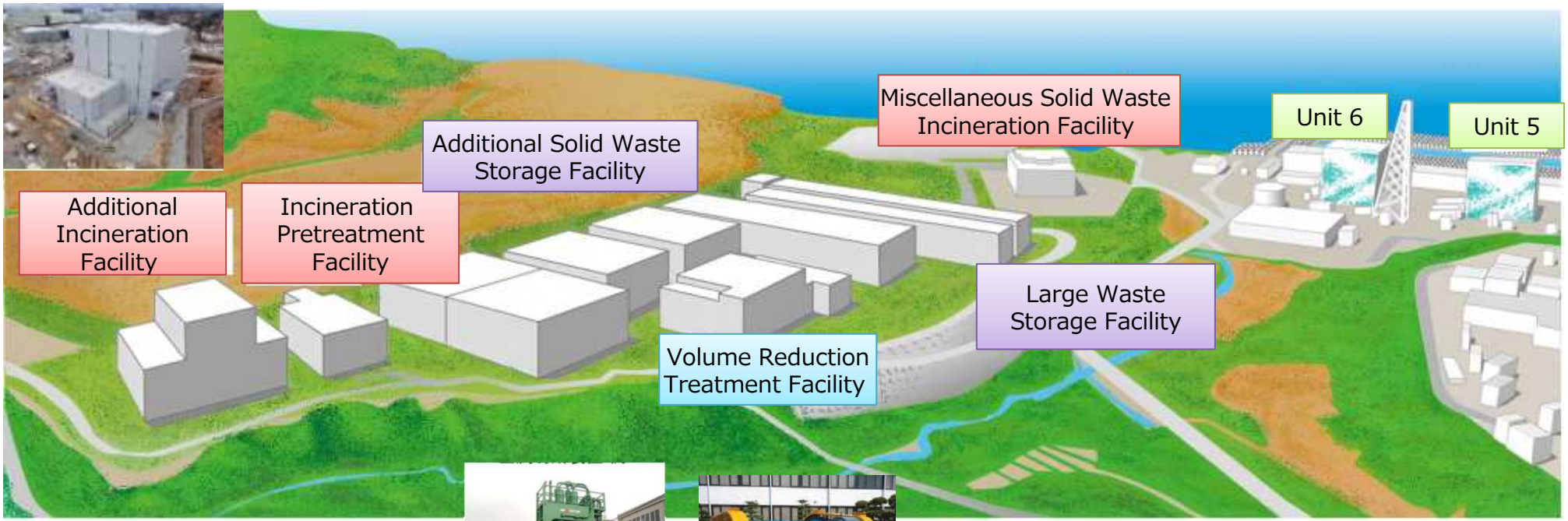
- Not bend when being stretched up to 22 meters.
- In a trial, retrieved fuel debris by the scale of a couple of grams with its collecting device.
- Retrieval work will be started in 2021 and expanded its scale with great care.

Source: TEPCO

Waste Management

- Based on the forecast of the amount of radionuclide waste, relevant facilities for incineration, volume reduction, and storage are now under construction in FDNPS.
- With those facilities, generating amount of waste from the station will be decreased by one-third.

Planned Waste Materials-related Facilities in FDNPS



Source: TEPCO

Images of the Volume Reduction Treatment Facilities

Stakeholder Involvement

- Stakeholder involvement is a necessary piece of safe and successful decommissioning.
- The following two activities are good examples of such efforts.

1. The International Forum on the Decommissioning of the FDNPS

- Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF) hosts the international conference in every year since 2016 to discuss a wide varieties of topics on decommissioning with various stakeholders from Japan and abroad.
- Its 5th forum was held on October 31st and November 1st , 2021 in Fukushima.

Source: NDF

2. Fukushima Council for the decommissioning, contaminated water, and treated water counter measures.

- The Fukushima Council chaired by the State Minister of METI gathers local governments industrial groups and resident representatives.
- It started from February 2014. As of the end of February 2022, they met 24 times.

Source: METI

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Outline of IAEA Review Mission

Background of the mission:

- 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 last July.
- 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.

Date: From 14th to 18th February in 2022

Visitors: Mr. Gustavo Caruso, Director and Coordinator for the Fukushima ALPS project, in the Department of Nuclear Safety and Security of the IAEA (Head of delegation) and its staff members
International Experts from **Argentina, China, France, ROK, Russia, US, UK and Vietnam**

Schedule:

Date	Topic	Venue
14th Feb	Opening session and Meeting with METI/TEPCO	Tokyo
15th Feb	Site Visit to FDNPS and Meeting with METI/TEPCO	Fukushima
16th Feb	Meeting with METI/TEPCO	Fukushima
17th Feb	Meeting with METI/TEPCO	Tokyo
18th Feb	Meeting with METI/TEPCO	Tokyo

Next Steps

- METI/TEPCO will follow up on the points raised during the mission.
- The IAEA will release **a report on this mission in April**.
- **A comprehensive report** will be published **before the water discharge starts**.

(Chronology of the mission of Safety aspects of the handling of ALPS treated water at FDNPS)

July 2021	Government of Japan and IAEA signed **TOR** on cooperation of the handling of ALPS treated water
Sep 2021	IAEA senior officials visited Japan to discuss the implementation of the review on the safety of ALPS treated water
Nov 2021	**A preparatory meeting** for the review mission *Three IAEA officials and three international experts (France, Russia, Republic of Korea) visited Japan
Feb 2022	**The Review Mission was conducted**

METI
Ministry of Economy, Trade and Industry

Thank you for your support for Fukushima!

More info from here !

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

Appendix

Current Situation of Evacuation Order Areas in Fukushima

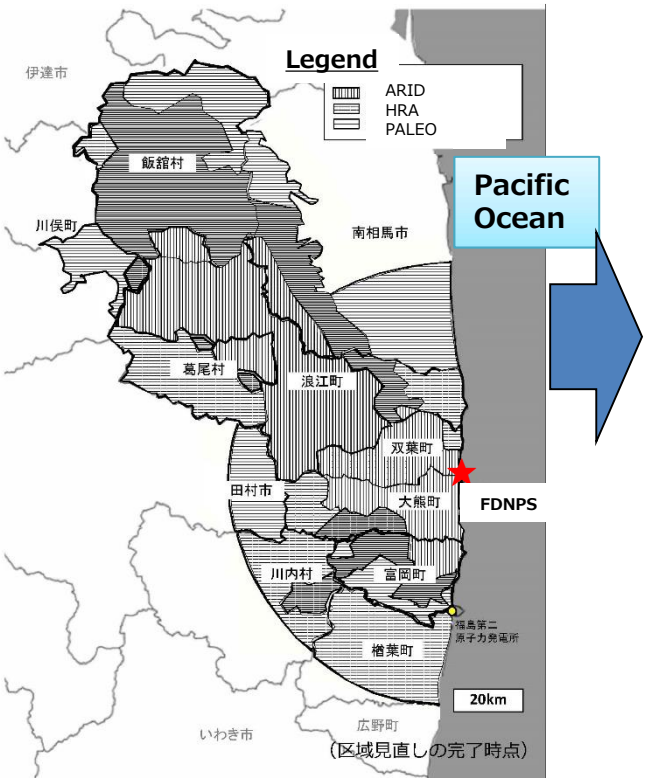
Preparation Areas for Lift of Evacuation Order (PALEO) → **Lifted**
【Annual Radiation level as of 2011*: Below 20mSv. Entry: Permitted】

Habitation Restricted Area (HRA) → **Lifted**
【Annual Radiation level as of 2011*: 20-50mSv. Entry: Permitted】

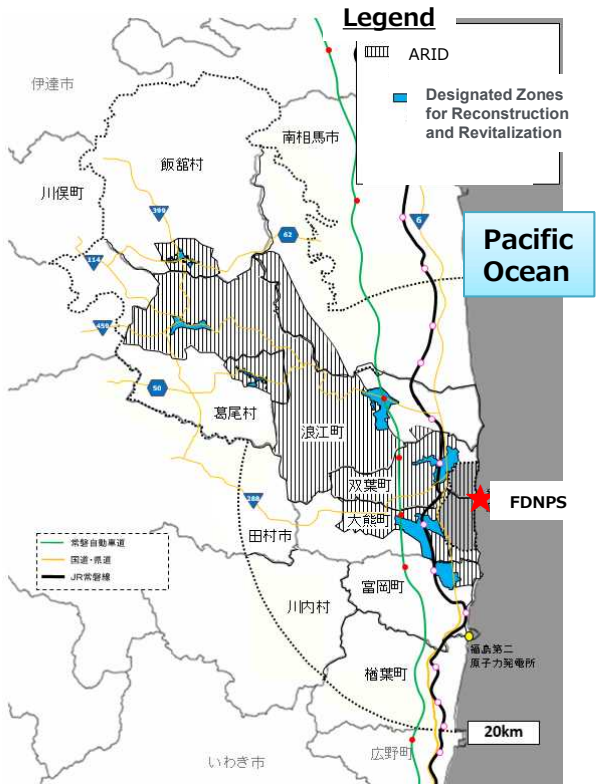
Areas for Returning Is Difficult (ARID) → **Parts of Futaba, Okuma, Tomioka were lifted. (March 2020)**
【Annual Radiation level as of 2011*: above 50mSv. Entry: Prohibited】

Evacuation Order Areas

August 2013



March 2020



Next Steps

- Lifting remaining orders in the Designated Zones for Reconstruction and Revitalization in 2022 or 2023.
- People are expected to return to the Areas for Returning Is Difficult other than the designated zones sometime in 2020s.

Status of regional economic center

- Reconstruction of the regional economic hub is also making steady progress with restoration of infrastructure, renovation and reopening of facilities such as shopping malls, industrial facilities.

Number of people and area subject to the evacuation order

	(August 2013)	(March 2020)
Number of people subject to the evacuation order	81 thousand	22 thousand
Area under evacuation order	1,150㎢	340㎢

Situation of agricultural and fishery industry (2010=100%)

Agricultural production (Fukushima)	89% (2018)
Fishery production (Coastal fishing and offshore trawl fishery)	17% (2020)

Joban Line resumed full service (March, 2020)

Futaba Station
(reopened; 2020.3.14)

Fish market at Ukedo port (April, 2020-)

Industrial exchange facilities

Futaba Town Industrial Exchange Center
(New open; 2020.10)

Roadside markets

Michi-no-eki Namie
(New open; 2020.8)

Reconstruction of the regional lives

School

Kusano Elementary・ Iitoi Elementary・
Usuishi Elementary・ Iitate Junior High
School in Iitate
New open 2018.4

ODAKA Industrial Technology and
Commerce High School in Odaka
New open 2017.4

Medical service

Futaba Medical Center
in Tomioka
New Open 2018.4

A clinic in Katsurao
Reopened 2016.7 and 2018.11

Shopping mall

Sakura Mall Tomioka
Opened in 2017

Michi-no-eki Namie
Opened in 2020

Sports facility

J-Village
(Reopend 2018.7 and 2019.4) in Naraha
(National soccer training center)

Public facility

Okuma town hall in Okuma
Reopened 2019.5

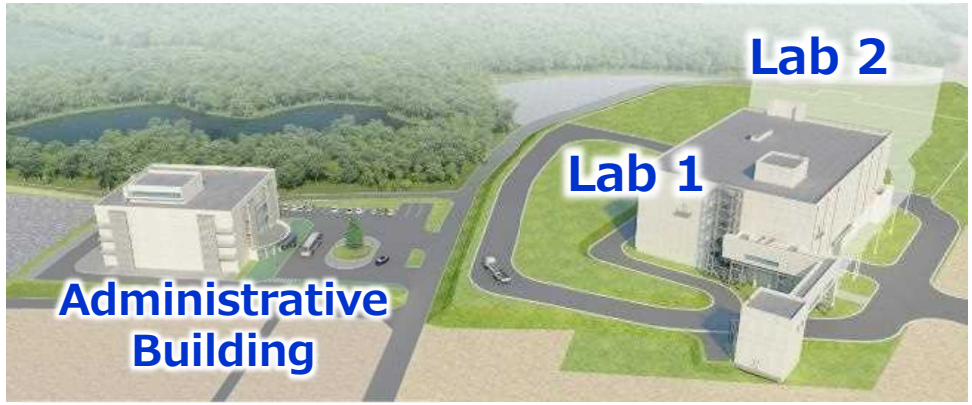
Decommissioning Research and Development Centers in Fukushima (i)

- The coastal Fukushima region was chosen for establishing the Japan Atomic Energy Agency's (JAEA) following two research and technology centers for decommissioning.
- The government of Japan allocated its budget of 85 Billion Yen (approx. 75 Million USD) to JAEA for building two centers.

①Naraha Center for Remote Control Technology Development (NARREC)

- Full operation in 2016
- R&D hub for remote control technology such as robots.
- Mock-up test with full-scale of the actual station.

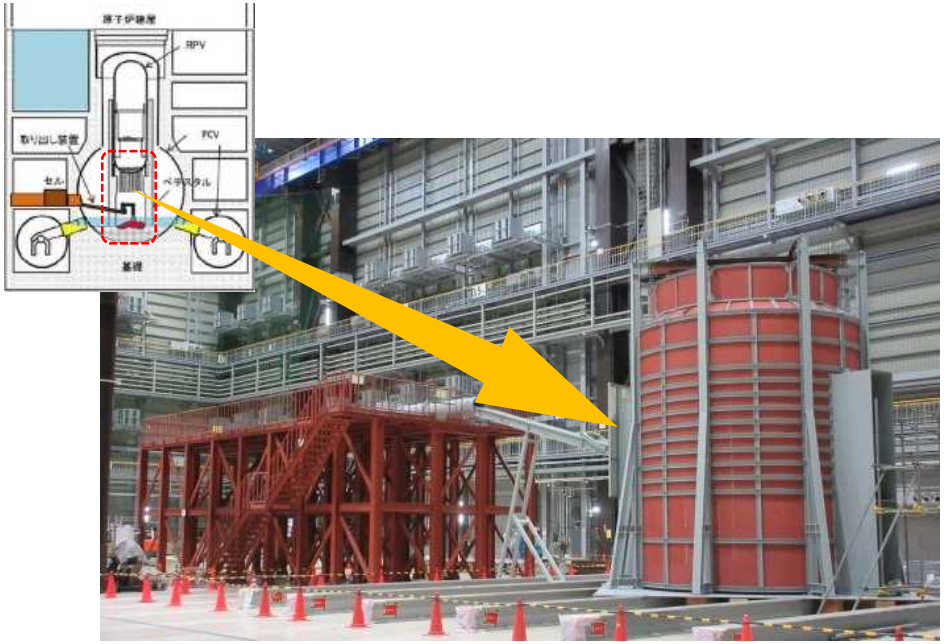
②Okuma Research and Analysis Center



- Expected to conduct analysis and research of radioactive wastes and fuel debris.
- Administrative building was opened in 2018.
- Now preparing for full operation.
- Laboratory 1 is scheduled to open in 2022.

Decommissioning Research and Development Centers in Fukushima (ii)

- NARREC provides demonstration and training opportunities of remote-controlled equipment in the mock-up testing environment.



Mock-up Containment Building
(Used for R&D project conducted by International Research Institute for Nuclear Decommissioning (IRID))

Virtual reality simulation