

# Steps for decommissioning at Fukushima Daiichi NPS

# 廃炉を知る

Learn about decommissioning

March 15, 2020 Vol. 11

Next issue schedule: June 15, 2020

Fukushima Prefecture Nuclear Safety Management Division

http://www.pref.fukushima.lg.jp/sec/16025c/



## What is happening NOW in Fukushima.

### Mid-and-Long-Term Roadmap revision

In the Mid-and-Long-Term Roadmap, the government has established basic concepts and major target processes for the decommissioning of the Fukushima Daiichi Nuclear Power Station. The official name is "Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station". This was the fifth revision since it was formulated in December 2011, and was approved by the Inter-Ministerial Council for Contaminated Water and Decommissioning Issues on December 27 last year.

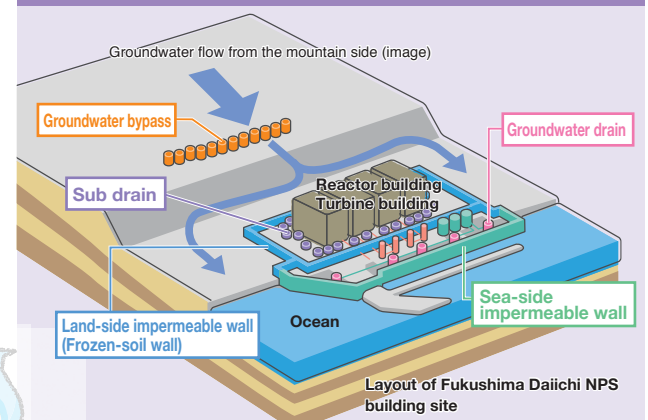
### Mid-and-Long-Term Roadmap

The revised Mid-and-Long-Term Roadmap and the changes from the last revision are shown below.



	2011 Phase 1	2013 Phase 2	2021 Phase 3
Contaminated water management		<ul style="list-style-type: none"> <li>FY2015 490 m<sup>3</sup>/day</li> <li>September 2018 Completion of frozen-soil wall</li> <li>FY2018 170 m<sup>3</sup>/day</li> </ul>	<ul style="list-style-type: none"> <li>Stagnant water in the reactor building will be decreased to half of what it is in 2020 by 2022 - 2024. (target)</li> <li>By end of 2025 100 m<sup>3</sup>/day or less (target)</li> <li>By end of 2020 150 m<sup>3</sup>/day (target)</li> </ul>
Removal of spent fuel	Unit 1	<ul style="list-style-type: none"> <li>November 2016 Building cover dismantling</li> <li>January 2018 Start removal of small rubbles (on going)</li> </ul>	<ul style="list-style-type: none"> <li>Around FY 2023 Large cover installation</li> <li>FY 2027-2028 Start removal of spent fuel (target)</li> </ul>
	Unit 2	<ul style="list-style-type: none"> <li>June 2018 Completion of preparation construction for internal investigation</li> <li>November 2018 Start internal investigation on the top floor (on going)</li> </ul>	<ul style="list-style-type: none"> <li>FY 2024-2026 Start removal of fuel (target)</li> </ul>
	Unit 3	<ul style="list-style-type: none"> <li>February, March 2018 Install covers, cranes, etc.</li> <li>April 2019 Start removal of spent fuel (completion planned in FY 2020)</li> </ul>	
Fuel debris retrieval	Unit 1	<ul style="list-style-type: none"> <li>March 2017 Investigation inside PCV starts</li> <li>Examination of retrieval method</li> </ul>	<ul style="list-style-type: none"> <li>Examination of retrieval, treatment, and disposal methods</li> </ul>
	Unit 2	<ul style="list-style-type: none"> <li>February 2019 Contact with fuel debris in PCV</li> </ul>	<ul style="list-style-type: none"> <li>By end of 2021 Trial retrieval (target)</li> </ul>
	Unit 3	<ul style="list-style-type: none"> <li>July 2017 Investigation inside PCV starts</li> <li>Examination of retrieval method</li> </ul>	<ul style="list-style-type: none"> <li>Examination of retrieval, treatment and disposal methods</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>Mach 2016 Establish solid waste storage management plan</li> </ul>	<ul style="list-style-type: none"> <li>Around FY 2021 Technical prospect of treatment/disposal methods</li> </ul>	<ul style="list-style-type: none"> <li>By end of FY 2026 Eliminate temporary storage areas outside for rubble and other waste</li> </ul>

### Contaminated water management



- Main changes from last revision
- Reduce generation amount of contaminated water from 150 m<sup>3</sup>/day to 100 m<sup>3</sup>/day or less
  - In FY2022 - FY2024, amount of stagnant water will be reduced to half of that in the end of 2020

#### Fukushima Daiichi NPS Unit 1

**392** assemblies (Stored fuel)  
**400** assemblies (Melting fuel)

**Changes from last revision**

- Spent fuel removal:** As an installation of a large cover (see below) has been decided to be needed in order to prevent the scattering of radioactive materials during removal of large rubble, the process is expected to be delayed by 4 to 5 years.
- Fuel debris retrieval:** As the radiation dose inside the building is extremely high, no access route to fuel debris has been established. We will continue to examine the retrieval method through investigation.

#### Fukushima Daiichi NPS Unit 2

**615** assemblies (Stored fuel)  
**548** assemblies (Melting fuel)

**Changes from last revision**

- Spent fuel removal:** An internal investigation revealed that the radiation dose was lower than expected, and a fuel removal work platform (see below) will be installed on the south side without dismantling the building. The construction period is expected to be delayed by one to three years.
- Fuel debris retrieval:** First contact with fuel debris in February 2019. The radiation dose inside the building was relatively low, so it was decided to start fuel debris retrieval with Unit 2.

#### Fukushima Daiichi NPS Unit 3

**482** assemblies (Stored fuel)  
**548** assemblies (Melting fuel)

**Changes from last revision**

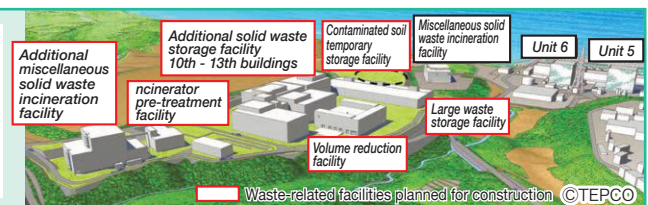
- Spent fuel removal:** It is expected that all spent fuel will be removed from the spent fuel pool by end of FY 2020 as scheduled.
- Fuel debris retrieval:** As the radiation dose inside the building is relatively high and the airtightness of PCV is low, it is necessary to retrieve the fuel debris while confining the gas inside. The retrieval method is being examined.

\*Numbers A to F are as of February 25

### Waste management

**Changes from last revision**

- Establish a technical prospect on treatment and disposal measures and safety around FY 2021. Specifically, develop a method to reduce the amount of solid waste generation and an efficient analysis method for its properties, etc., and create a mechanism that can compare and examine multiple methods for safely treatment and disposing of solid waste.
- Eliminate the storage of solid waste (trimmed trees, rubble, contaminated soil, protective clothing, etc.) that is temporarily stored outside by the end of FY 2028 by installing solid waste incineration facilities and waste volume reduction facilities.



### Voices from the Fukushima prefecture regards to the Mid-and-Long-Term Roadmap

Safety Monitoring Council\* on the Decommissioning of the Fukushima Daiichi NPS was held on December 5 last year, and after receiving an explanation from the Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (ANRE, METI) regards to the revision of the Mid-and-Long-Term Roadmap, many questions, requests, and proposals were received from the Expert Committee during the Q&A session. The prefecture gathered the opinions of these expert committee members and submitted their opinions to the METI on December 17 after a meeting of the governors with the related directors.

#### \*About Safety Monitoring Council

An organization consisting of 19 experts and a group of employees from Fukushima prefectural government and related municipal, who monitors on-going decommissioning activities and response status to troubles through on-site inspections and meetings, and makes proposals to the government and TEPCO based on the results.



#### Main opinions submitted

- While the return of residents is progressing, the highest priority should be given to ensuring safety so that radioactive materials will not be scattered again in the process of decommission. And the appropriate method should be selected through the consideration of the process and the risks that might be generated.
- The contaminated water generation amount target should be further reduced from 150 m<sup>3</sup>/day.
- Gather the wisdom from around the world to select the most appropriate method, and to show a detailed plan regards to the temporary storage and management plan of the retrieved fuel debris.

### Inter-Ministerial Council for Contaminated Water and Decommissioning Issues

#### Chair's remark (Chief Cabinet Secretary Yoshihide Suga)

The safe and steady decommissioning of the Fukushima Daiichi Nuclear Power Plant is a major prerequisite for the reconstruction of Fukushima. To ensure the decommissioning is carried out as expected, we strongly request that the relevant ministries and agencies, TEPCO, will continue to take measures against decommissioning and contaminated water in a steady manner based on the Mid-and-Long-Term Roadmap.

#### Governor's remark

Representing the voices of the citizens in the Fukushima prefecture, we ask the government and TEPCO to call forward to build trust with the local community, carry out the decommissioning in a safe and steady manner, work to avoid harmful rumors and help gain confidence in the region, and lead to a full recovery of Fukushima.

# Fukushima Daini Nuclear Power Station decommissioning decided.

Last year, on September 30, TEPCO Holdings submitted the notification of a power generation business change based on the Electricity Business Act to the METI regards to decommissioning of all reactors, Units 1 to 4 of Fukushima Daini Nuclear Power Station, and it was decided. At the time of the Great East Japan Earthquake, all four reactors of the Fukushima Daini NPS were in operation. Although some cooling equipment for Units 1, 2, and 4 were damaged by the tsunami, the power supply was secured and the reactor water level was maintained by water injection, therefore the units escaped a severe accident, and have served as a logistics support base in the Fukushima Daiichi accident, such as receiving injured persons and resting workers.



## Overview of Fukushima Daini Nuclear Power Station

The Fukushima Daini NPS was constructed in Naraha-machi and Tomioka-machi, and started operation in April 1982, 11 years after Daiichi NPS started operating in 1971. It has supplied electricity to the Tokyo metropolitan area for about 29 years until the Great East Japan Earthquake.

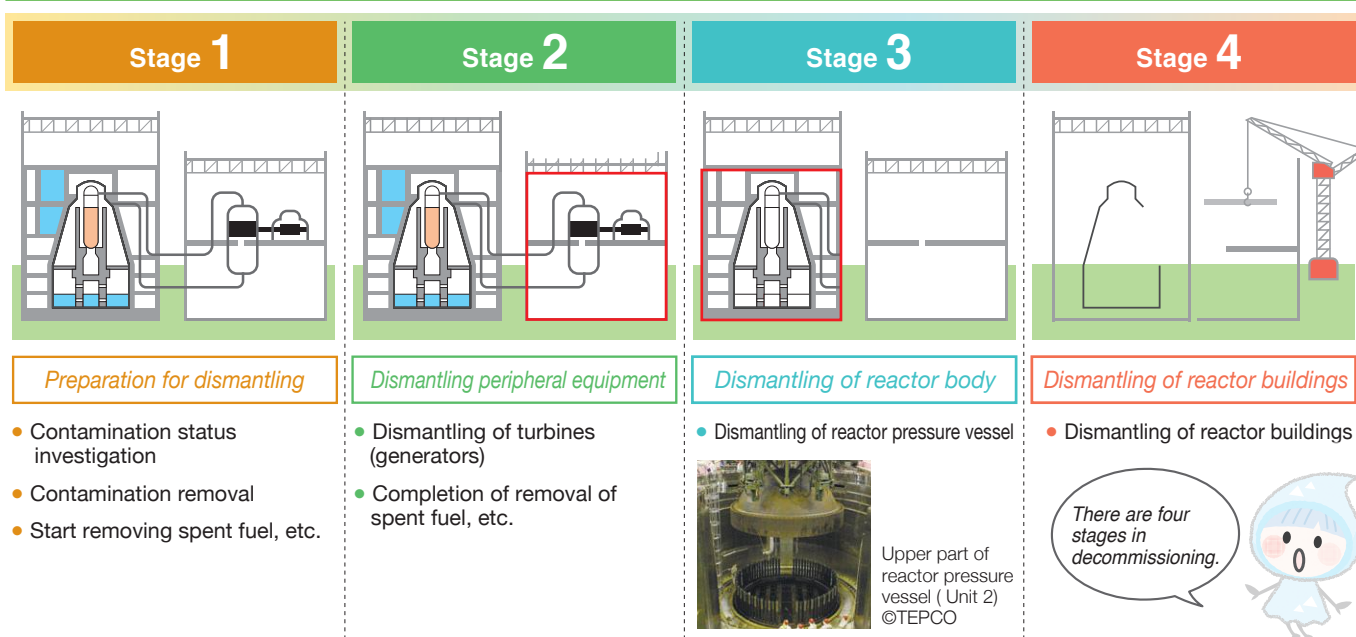


Plant Name	Fukushima Daini Nuclear Power Station			Fukushima Daiichi Nuclear Power Station (Reference)	
	<p><b>Unit 1</b></p> <p>Spent fuel 2534 assemblies</p> <p>Inner diameter 6.4 m</p> <p>Spent fuel pool</p> <p>Height approx. 23 m</p> <p>Reactor pressure vessel</p> <p>Primary Containment Vessel</p> <p>Vent pipe</p> <p>Diameter approx. 26 m</p> <p>Building height approx. 76 m</p>	<p><b>Unit 2</b></p> <p>Spent fuel 2482 assemblies</p> <p>Inner diameter 6.4 m</p> <p>Spent fuel pool</p> <p>Height approx. 23 m</p> <p>Reactor pressure vessel</p> <p>Primary Containment Vessel</p> <p>Vent pipe</p> <p>Diameter approx. 29 m</p> <p>Building height approx. 76 m</p>	<p><b>Unit 3</b></p> <p>Spent fuel 2544 assemblies</p> <p>Inner diameter 6.4 m</p> <p>Spent fuel pool</p> <p>Height approx. 23 m</p> <p>Reactor pressure vessel</p> <p>Primary Containment Vessel</p> <p>Vent pipe</p> <p>Diameter approx. 29 m</p> <p>Building height approx. 76 m</p>	<p><b>Unit 4</b></p> <p>Spent fuel 2516 assemblies</p> <p>Inner diameter 6.4 m</p> <p>Spent fuel pool</p> <p>Height approx. 23 m</p> <p>Reactor pressure vessel</p> <p>Primary Containment Vessel</p> <p>Vent pipe</p> <p>Diameter approx. 29 m</p> <p>Building height approx. 76 m</p>	<p><b>Unit 1</b></p> <p>Spent fuel 392 assemblies</p> <p>Spent fuel 400 assemblies</p> <p>Inner diameter 4.8 m</p> <p>Spent fuel pool</p> <p>Height approx. 20 m</p> <p>Reactor pressure vessel</p> <p>Primary Containment Vessel</p> <p>Fuel debris</p> <p>Diameter approx. 18 m</p> <p>Building height approx. 59 m</p>
<b>Reactor type</b>	Boiling water reactor (Mark II)			Boiling water reactor (Mark II Advanced type)	
<b>Power generation output</b>	1.1 million KW			0.46 million KW	
<b>Operation start date</b>	April 1982			Unit 2: February 1984 Unit 3: June 1985 Unit 4: August 1987	
<b>Abolition date</b>	September 2019			April 2012	

## Decommissioning of Fukushima Daini NPS

TEPCO Holdings will submit an application toward the Nuclear Regulation Authority (NRA) regarding decommissioning plans and changes to safety regulations, and then will start decommissioning work once the plans are approved. It is expected to take more than 40 years to complete the decommissioning of all four units. In addition, all spent fuel currently being stored will be transported outside the prefecture by the time the decommissioning is completed. In order to start the decommissioning work, based on new agreement concluded with the towns where plant is located, prior consent must be obtained by the prefecture, Naraha-machi and Tomioka-machi.

### Decommissioning process



## Conclusion of agreement to ensure safety for decommissioning

Last year, on December 26, the Fukushima prefecture, the towns where nuclear power plant is located, and surrounding municipalities have concluded new agreements with TEPCO regarding the implementation of the decommissioning of the Fukushima Daini Nuclear Power Station. The purpose of these agreements is to ensure the safety of the surrounding local residents by the safe and steady progress of decommissioning.

### Main items (Responsibilities of TEPCO)

- The decommissioning of the Fukushima Daini Nuclear Power Station should be comprehensively proceeded together with the decommissioning of the Fukushima Daiichi Nuclear Power Station which caused the nuclear accident.
- Regards to safety-related matters, it should be notified in a timely manner.
- When trying to add, change, or abolish major facilities, it should be explained in advance and the consent of the Fukushima prefecture and the towns where nuclear power plant is located should be obtained. (Agreement with towns where plant is located)

### Municipalities involved in the conclusion

- |  |   |
|--|---|
| Towns where nuclear power plant is located | Naraha, Tomioka   |
| Surrounding municipalities                 | Iwaki, Tamura, Minamisoma, Kawamata, Hirono, Kawauchi, Okuma, Futaba, Namie, katsurao, Iitate |

**Nuclear power Station where decommissioning is underway (boiling water reactor case)**

- Shizuoka Prefecture Chubu Electric Power Co., Inc. Hamaoka Nuclear Power Station (Units 1 and 2)
- Fukui Prefecture Japan Atomic Power Company Tsuruga Power Station (Unit 1)
- Shimane Prefecture Chugoku Electric Power Co., Inc. Shimane Nuclear Power Station (Unit 1)

"Nuclear Disaster Prevention Drill" which was announced in the paper, "Learn about decommissioning Vol.10" was canceled due to the Typhoon 19 and the December issue was not released.