Mid-to-Long-Term Roadmap and R&D Plan towards the Decommissioning of Fukushima Daiichi NPP Unit 1-4, TEPCO

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Ministry of Economy, Trade and Industry (METI), Japan
Primary Targets of Mid-to-Long-Term Roadmap

“Mid-to-Long-Term Roadmap” defines the term of decommissioning into the three phases, and details major schedule of on-site works and R&D projects

- Phase 1: From the completion of Step 2 to the commencement of fuel removal from the Spent Fuel Pools (Target: Accomplish in 2 years)

- Phase 2: From the end of Phase 1 to the commencement of fuel debris removal (Target: Accomplish in 10 years)

- Phase 3: From the end of Phase 2 to the end of the decommissioning (Target: Accomplish within 30 to 40 years)
## Organizational Structure 1)

### Government and TEPCO Council on Mid-to-Long Term Response for Decommissioning

**Co-Chair:** Mr. HOSONO, Minister for the Restoration from and Prevention of Nuclear Accident, Cabinet office  
Mr. EDANO, Minister of Economy, Trade and Industry (METI)  
**Vice-Chair:** Parliamentary Secretary of Cabinet Office, Vice Minister of METI, President of TEPCO  
**Members:** Agency of Natural Resources and Energy (ANRE), The Nuclear and Industrial Safety Agency (NISA)

### Management Board

**Co-Chair:** Mr. SONODA, Parliamentary Secretary of Cabinet Office  
Mr. KITAGAMI, Vice Minister of METI  
Mr. AIZAWA, Executive Vice-President of TEPCO  
**Adviser:** Ms. KAMIMOTO, Vice Minister of MEXT  
**Members:** METI/ANRE, TEPCO, NISA (Nuclear and Industrial Safety Agency), MEXT (Ministry of Education, Culture, Sports, Science and Technology), JAEA (Japan Atomic Energy Agency), Toshiba, Hitachi-GE, and Academic Advisors

### R&D Management Headquarters

**Chair:** Mr. KITAGAMI, Vice Minister of METI  
**Vice-Chair:** Mr. SONODA, Parliamentary Secretary of Cabinet Office  
**Adviser:** Ms. KAMIMOTO, Vice Minister of MEXT  
**Members:** METI/ANRE, TEPCO, MEXT, AEC (Atomic Energy Commission), JAEA, AIST, CRIEPI, Toshiba, Hitachi-GE, and Academic Advisors
Fuel debris treatment technologies

Working team for preparation of fuel debris removal

Sub-working team (SWT) for equipment/device development, etc.

SWT for core status assessment and treatment preparation

Working team for radioactive waste treatment and disposal

Joint task force for remote technologies

Organizational Structure 2)

R&D Management Headquarters

[Overall management]

Working team for spent fuel pool countermeasures

Sub-working team (SWT) for equipment/device development, etc.

[Specific R&D projects]

- Long-term stability of fuel assemblies
- Damaged fuel processing technologies
- Remote decontamination of the reactor building interior
- PCV/RPV soundness evaluation
- Identification of leak areas in the reactor building/PCV
- Sealing and repair in the reactor building/PCV
- Investigation of the PCV interior
- Investigation of the RPV interior
- Removal of fuel debris and structures in the reactor
- Fuel debris storage technologies
- Fuel debris criticism control
- Accident development analysis
- Assessment of simulated fuel debris characteristics
- Analysis of fuel debris properties
- Fuel debris measuring and management measures
- Analysis of fuel debris properties
- Stability of contaminated water processing
- Examination of waste treatment and disposal

[Report/Examination]

Fundamental Philosophy for Implementing R&D

- Address on-site technological needs

- Government involvement and support

- Open and flexible framework for implementation with support from international engineering and science communities
# Research and Development Roadmap (Example)

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period by when fuel removal from SFP started</td>
<td>Period by when fuel debris removal started</td>
<td>Period till end of decommissioning</td>
</tr>
<tr>
<td>(Prior Period)</td>
<td>(Middle Period)</td>
<td>(Late Period)</td>
</tr>
<tr>
<td>Within 2 years</td>
<td>(Late Period)</td>
<td>Within 10 years</td>
</tr>
</tbody>
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**Research and Development Roadmap (Example):**

- **Decontamination of building interiors**
  - Evaluation of applicability to actual units
  - Evaluation of applicability to actual units
- **Survey of iodine in PCV**
  - Measurement of water in buildings
  - Repair of PCV
  - Filling water of PCC concrete vessels
- **Decontamination of building interiors**
  - Evaluation of applicability to actual units
  - Evaluation of applicability to actual units (Lower part)
  - Evaluation of applicability to actual units (Upper part)
- **Investigate Outside of PCCV**
  - Evaluation of applicability to actual unit
  - Evaluation of applicability to actual unit
  - Evaluation of applicability to actual unit
- **Development of Technologies for Investigation of the PCV Interior**
  - Survey of existing technologies / Drafting of a survey plan
  - Evaluation of applicability to actual unit
  - Measurement of radioactive substances
  - Development and manufacture of inspection equipment
- **PCV Leakage Point Investigation**
  - Lower part of PCCV
  - Repair the PCV's Lower Part / Stopping Inbuilding
  - Determine Repair Method / Determine Water Seal Method
- **PCV Internal Investigation and Sampling**
  - Complete Flushing PCV's Lower Part
  - Determine PCV Internal Inspection Method
- **RPP Internal Investigation and Sampling**
  - Complete Flushing RPP's Upper Part
  - Determine RPP Internal Inspection Method
- **RPP Internal Investigation and Sampling**
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  - Complete Flushing RPP's Upper Part
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Objectives of Today’s Symposium

- To identify challenges and technical needs for the decommissioning of Fukushima Daiichi NPP
- To share relevant practices and experience among domestic and international technical experts
- To explore possible areas for international cooperation to address these challenges