



INPP Decommissioning Overview

Ignalina Nuclear Power Plant

Technical Seminar No.1
Dismantling of nuclear facilities


Visaginas, Lithuania, 07-11.09.2015
Speaker: Dmitrij Jekaterinichev


General Information

- ☐ Largest and the most advanced RBMK design (also with later safety upgrading)
- ☐ It was intended to build 4 units
- ☐ Construction of 3rd unit was suspended in 1989 (about 60% of construction works were accomplished)
- ☐ Supplied 70-80% of LT national demand
- ☐ Closed at around mid-life
- ☐ No funds accumulated for decommissioning due to early closure of the Plant


| | | | |
|------------------|------------------|---------------------------------|---------------|
| Basics | Plant type | RBMK-1500 | |
| | Number of units | 2 (of 4 planned) | |
| | Power per unit | 1500 MW | |
| | Staff in 2014 | ~2100 (max 5600 during operat.) | |
| Operation | | Unit 1 | Unit 2 |
| | First operation | Dec 1983 | Aug 1987 |
| | Final Closure | Dec 2004 | Dec 2009 |
| | Power generation | 137 TWh | 170 TWh |



Construction
1974-1987



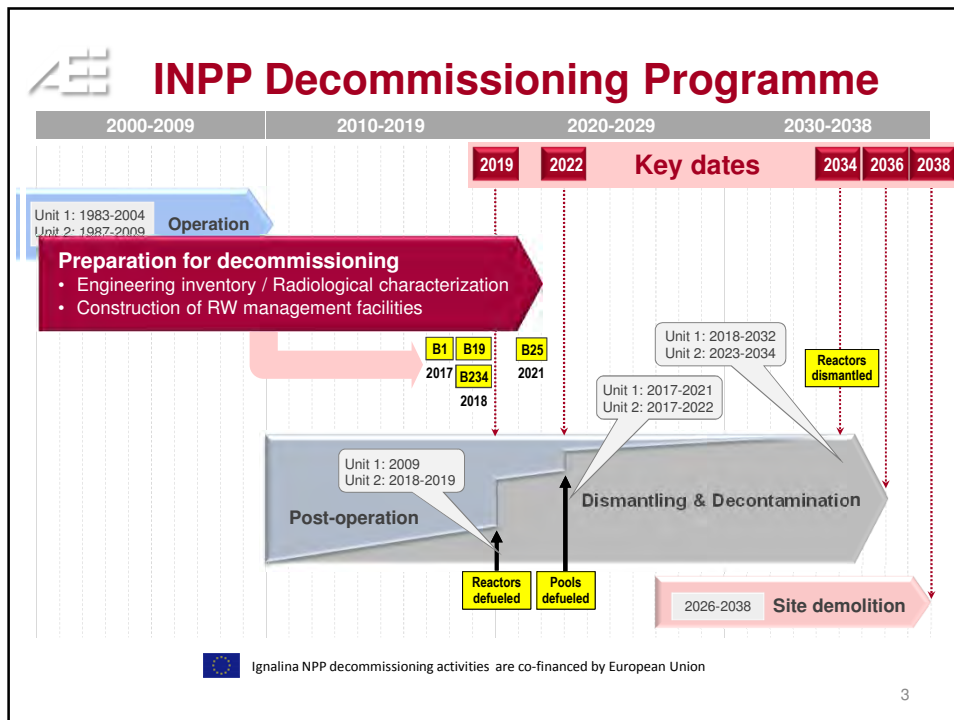
Operation
1983-2009



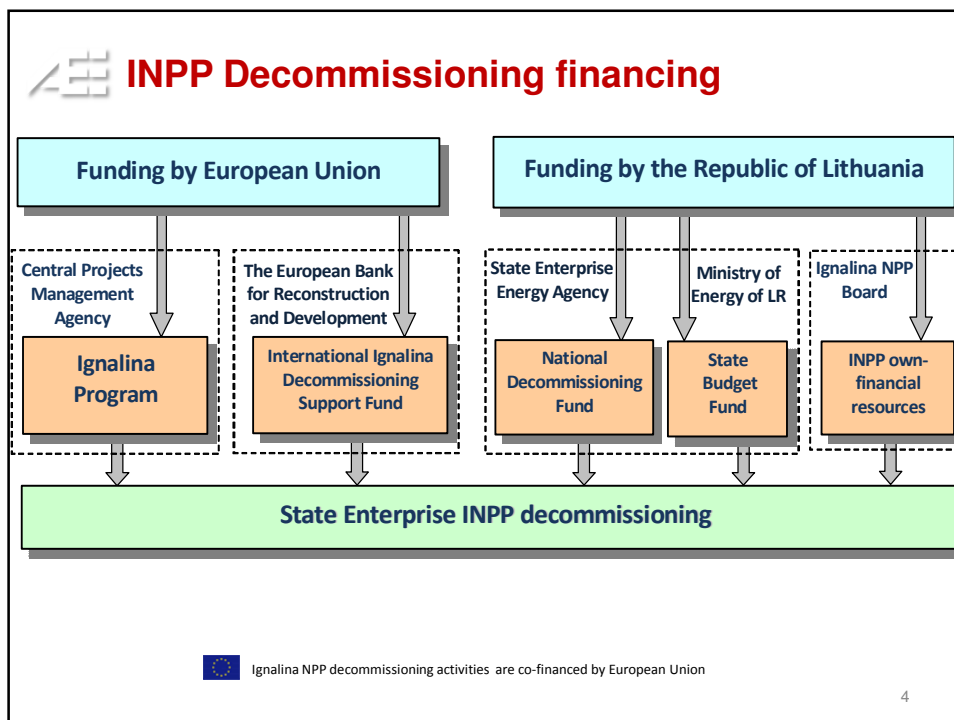
Decommissioning
2010-2038

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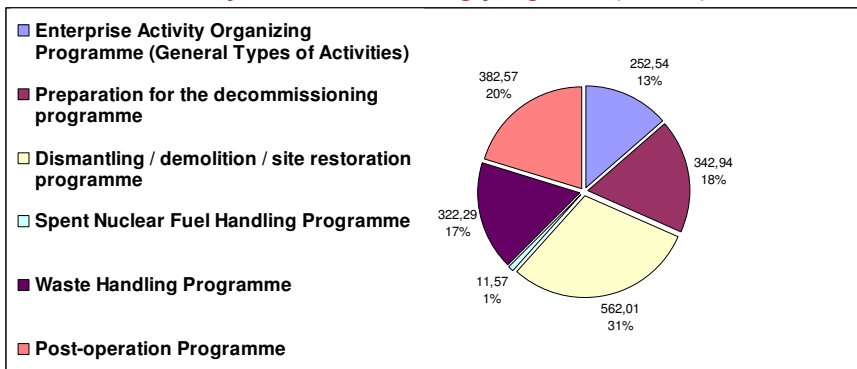
INPP Decommissioning cost


In accordance with Final Decommissioning Plan (amended in 2014):

Total for the remaining decommissioning period 2014-2038 (including inflation)

2658,68 MEUR

Cost distribution by decommissioning programs (MEUR):



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Status of Spent Nuclear Fuel

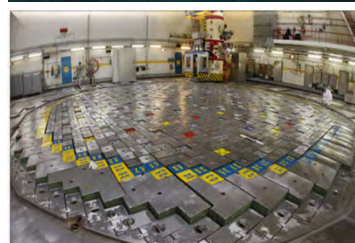
Unit 1: final closure Dec 2004


- core fully defueled in 2009;
- 7175 fuel assemblies in pools.

Unit 2: final closure Dec 2009

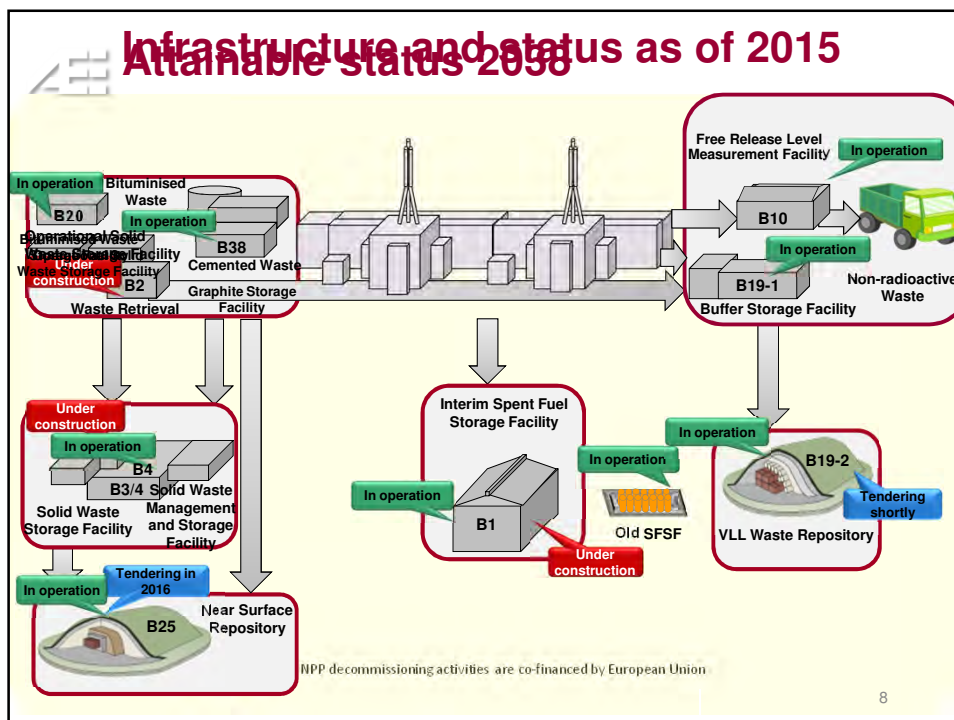
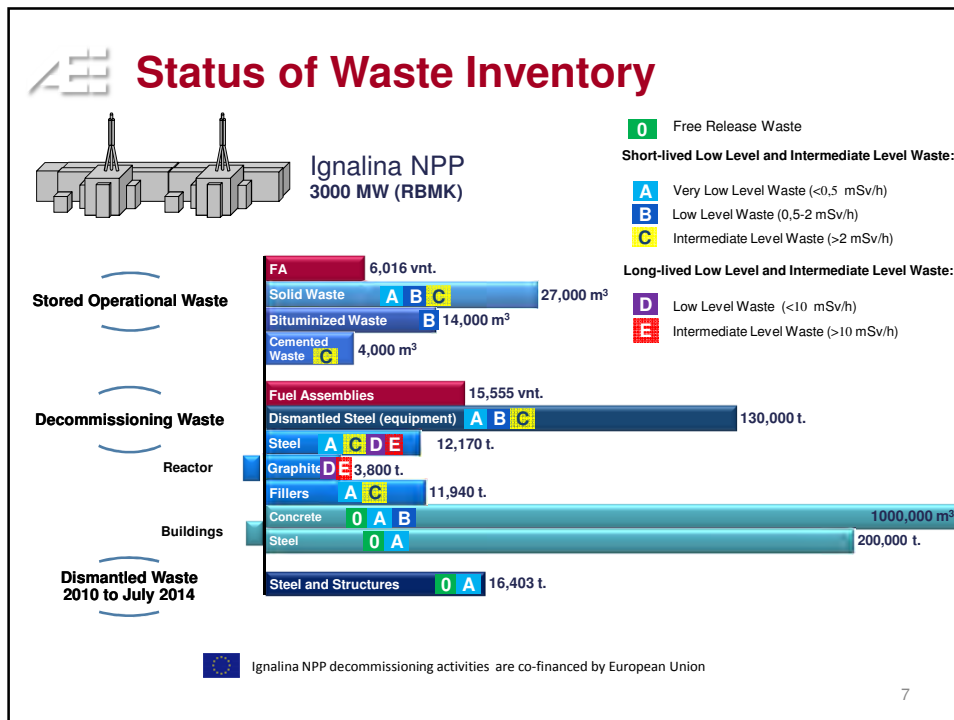
- 1134 fuel assemblies remain in the core to be removed;
- Planned defueling – starting 2017;
- 7246 fuel assemblies in pools.

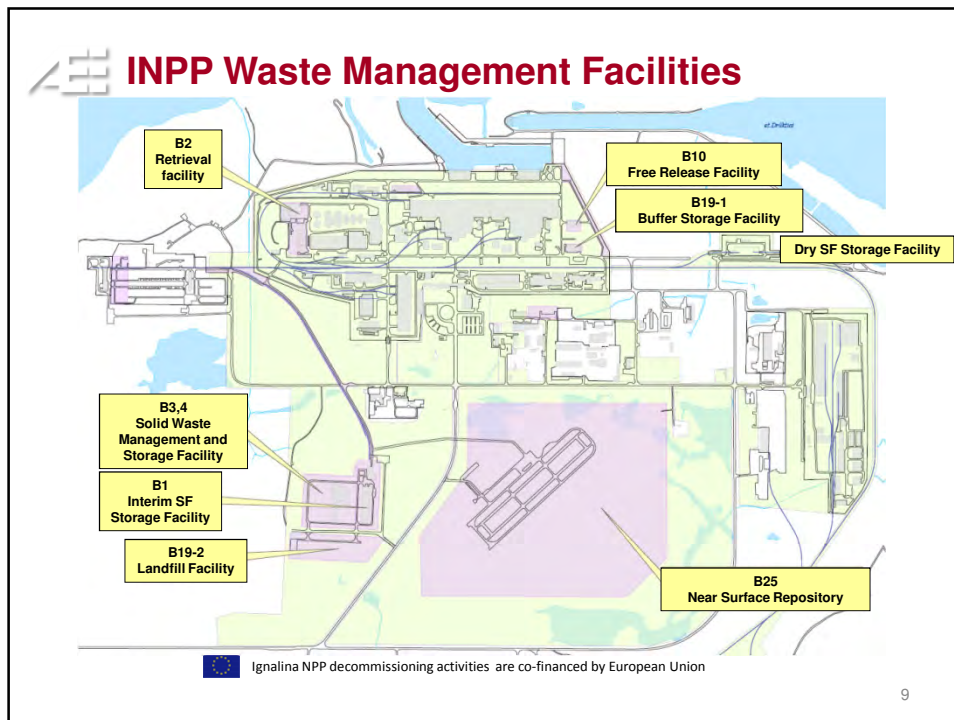
Final defueling from SFP – 2022.



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Interim Spent Fuel Storage Facility (B1)

(financed by IISF administrated by EBRD)

Objective of the Project B1:

- To build an Interim SF Storage Facility, to manufacture and install all related equipment;
- To design and manufacture new-type casks with 80% increased capacity for INPP RBMK-1500 type reactor spent fuel (incl. damaged),
- To develop the technologies for its loading and transportation to ISFSF and to install it.

Results:

- Spent fuel will be stored in casks CONSTOR RBMK-1500/M2 (full weight – 118 t)
- 191 new-type casks will be manufactured
- Total storage capacity – 202 casks

| | |
|--------------------------------|-------------------------------|
| Contractor | NUKEM Technologies GmbH / GNS |
| Contract signed | 5 January 2005 |
| Start of operations (foreseen) | 2017-10 |
| Operational period | 50 + 5 years |

The photograph shows the large, industrial structure of the Interim Spent Fuel Storage Facility (B1) with its distinctive red and white striped chimney. The diagram illustrates a CONSTOR RBMK-1500/M2 cask, showing its internal structure and the spent fuel elements being loaded.

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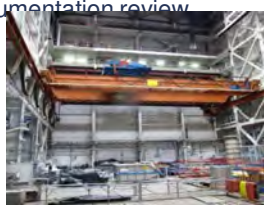
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Interim Spent Fuel Storage Facility (B1)

(financed by IISF administrated by EBRD)

Key works are in progress:

- ISFSF cold trials completed in June 2015
- Spent Fuel Pools Unit 1, 2 Modification is progressing
- Leaking fuel classification system is under implementation
- Heavily Damaged Fuel Design / PSAR review
- Main SPH-1,2 cranes 125 t modification is progressing



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Interim Spent Fuel Storage Facility (B1)

(financed through EBRD)

Key Milestones (as to technical delivery schedule)

| Task Name | 2015 | | | | 2016 | | | | 2017 | | | | 2018 | | |
|--|------|----|--------------|----|------------------|----|----|----------------|-----------------|----|----|----------------|-----------------|----|----|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| ISFSF Cold Trial completion | | | 2015 July 03 | | | | | | | | | | | | |
| SPH-1 Main Crane is ready for operation | | | | | 2015 December 04 | | | | | | | | | | |
| INPP preparedness to Unit 1 Cold Trial | | | | | 2015 December 05 | | | | | | | | | | |
| SPH-2 Main Crane is ready for operation | | | | | 2016 January 22 | | | | | | | | | | |
| INPP preparedness to Unit 2 Cold Trial | | | | | 2016 January 23 | | | | | | | | | | |
| Approval of Updated SAR/TDD by VATESI | | | | | | | | 2016 August 04 | | | | | | | |
| VATESI Licence for Operation | | | | | | | | 2016 August 11 | | | | | | | |
| Hot Trial completion | | | | | | | | | 2017 January 06 | | | | | | |
| Approval of Final SAR by VATESI | | | | | | | | | 2017 March 09 | | | | | | |
| ISFSF Construction Completion Act | | | | | | | | | | | | 2017 August 09 | | | |
| VATESI Permission for Industrial Operation | | | | | | | | | | | | | 2017 October 02 | | |



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Solid Waste Management & Storage Facilities (B2/3/4)

(financed by IIDSF administrated by EBRD)

Objective:

- To build facility for treatment of solid operational and from dismantling radioactive wastes, comprising:
 - Retrieval Facility (B2)
 - Processing Facility (B3)
 - Storage Facility (B4, for long and short lived waste)

Results:

- ✓ Radioactive wastes will be retreated from the existing interim storages and transported to new treatment facility;
- ✓ Wastes will be sorted and treated (resized, incinerated and compacted);
- ✓ Treated wastes will be packed into containers and stored in new treatment facility until the repository facilities will be built.

| | |
|---------------------------------|-------------------------|
| Contractor: | NUKEM Technologies GmbH |
| Contract signed: | 30 November 2005 |
| Start of operations (foreseen): | November 2018 |



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Solid Waste Management & Storage Facilities (B2/3/4)

(financed by IIDSF administrated by EBRD)

Key works are in progress:

- Pre-commissioning is in progress
- B2,3,4 Facilities construction completion phase
- B3,4 process equipment and engineering networks installation
- B3,4 Updated TDD/SAR preparation
- Operational documentation preparation



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Solid Waste Management & Storage Facilities (B2/3/4)

(financed by IIDSF administrated by EBRD)

Key Milestones:

| Task Name | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|-------------|-----------------|------------------|------------------|-------------|----------|
| | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 |
| Start of Pre-Commissioning (Cold Trials) | | 2015 August 25 | | | | |
| Pre-Commissioning (Cold Trials) | | 2015 October 23 | | | | |
| Approval of Updated SAR/TDD by VATESI | | | 2016 December 30 | | | |
| Operational license | | | 2016 December 30 | | | |
| Start of Commissioning (Hot Trials) | | | 2017 January 09 | | | |
| Commissioning (Hot Trials) | | | 2017 May 08 | | | |
| Approval of Final SAR by VATESI | | | | 2018 June 26 | | |
| VATESI Permission for Industrial Operation | | | | 2018 November 26 | | |



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Landfill Facility for Short-lived Very Low Level Waste (B19)

(financed by IP administrated by CPVA)

The Landfill Facility will consist of:

- **The Buffer Storage Facility B19-1** - a temporary closed building of 0.2 ha area where the systems designed for radiological measurement, transportation and temporary storage of wastes are installed. Capacity of Buffer Storage Facility is 4000 m³ *In operation since May 2013*
- **Disposal Modules B19-2** - an above ground structure, in which carbon steel 20 feet ISO half-height containers with waste will be closely placed in five layers on the concrete slab.



| | |
|---|--|
| Contractor (B19-1 design and construction, B19-2 design): | Concortium (Speciaulus-Montažas NTP, Vilstata, LEI, PramProjektas,) |
| Contract signed: | December 2007 |
| Contractor (B19-2 design correction): | Joint Venture Partnership (Eksortus, PramProjektas) |
| Contract signed: | August 2014 |
| Start of B19-2 operations : | 2018 |



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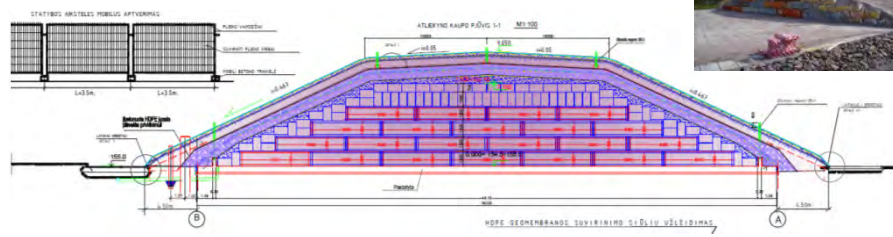


Landfill Facility for Short-lived Very Low Level Waste (B19)

(financed by IP administrated by CPVA)

Key works / plans are:

- **2015-08** – Agreement of the corrected Technical Design by regulating institutions
- **2015-09** – Tender on Landfill construction announcement
- **2016-02** – Commencement of Landfill construction
- **2017-05** – Commencement of operation, first (trial) disposal campaign
- **2018-02** – Issue of permission on commercial operation



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Near Surface Repository (B25)

(designing - financed by IIDSF administrated by EBRD)

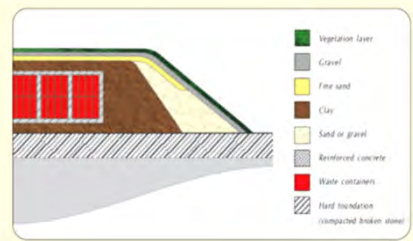
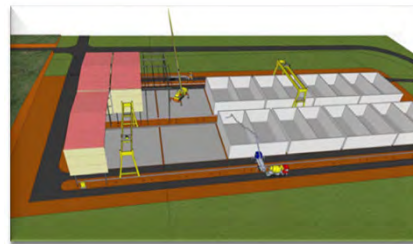
Objective:

- To design and construct Near Surface Repository for Low and Intermediate Level Short-lived Radioactive Waste.

Results:

- ✓ Cellular reinforced concrete repository will be build which will consist of several groups of sections designed for final disposal of 100 000 m³ of treated radioactive waste packed into concrete containers and cemented radioactive wastes.
- ✓ Upon completion of radioactive waste disposal the repository will be closed and its surface will be covered with erosion resistant multilayer engineered protection barriers. After its closure the surveillance of the repository will be carried out for at least 300 years.

| | |
|---------------------------------|--|
| Contractor: | Joint Venture Partnership (Areva-TA, ANDRA, LEI, PramProjekta, Specialus-Montazas NTP) |
| Contract for designing signed: | 23 October 2010 |
| Start of operations (foreseen): | 2020 |



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Near Surface Repository (B25)

(designing - financed by IIDSF administrated by EBRD)

Key works / plans are:

- **June 2015** – Technical Design General Expertise B25 Site Layout is in progress
- **August 2015** - TDD/PSAR accepted by INPP
- **September 2015** - Submission of TDD/PSAR to Lithuanian Authorities
- **September 2016** - Obtaining Permit for Construction from the Ministry of Environment
- **December 2016** - Obtaining License for Construction and Operation from VATESI
- **April 2017** - Construction works tender and the contract signing



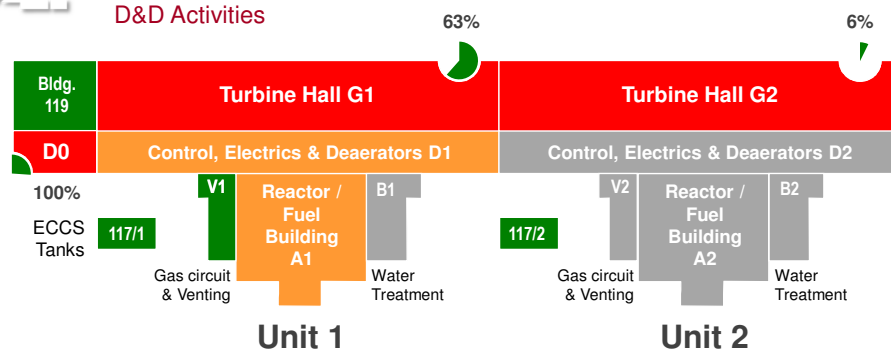
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Dismantling & Decontamination

D&D Activities



| | Completed | In progress | Design stage | Future |
|--|-----------|-------------|--------------|--------|
|--|-----------|-------------|--------------|--------|

| x 1000 tons | 2010-2014 (in all) | 2015 (7 months) | 2015 (plan) | 2010-2038 (in all) |
|----------------------|-----------------------|--------------------|----------------|-----------------------|
| Equipment dismantled | 26.5 | 4.9 | 7.0 | 131.0 |
| Waste free-released | 23.8 | 4.0 | 5.6 | 110.0 |



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Progress in D&D activities



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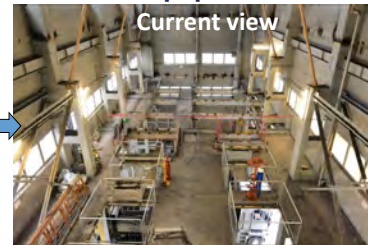
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Progress in D&D activities

D&D of Boiler House Equipment (bld.119)



D&D of Dismantling of Bld. 117/2 equipment

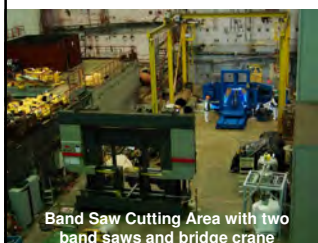


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Progress in D&D activities - VLLW size reduction (fragmentation) / decontamination



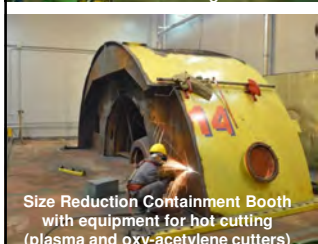
Band Saw Cutting Area with two band saws and bridge crane



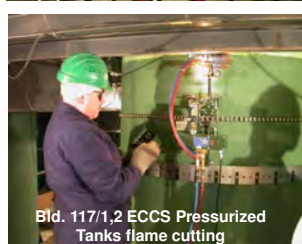
Manual Decontamination Booth with equipment for dry decontamination



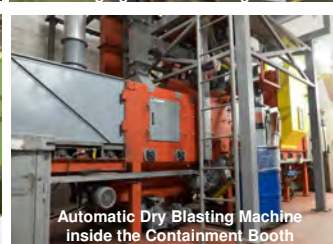
Technical cleaner used for discharging an ion exchange resin



Size Reduction Containment Booth with equipment for hot cutting (plasma and oxy-acetylene cutters)



Bld. 117/1,2 ECCS Pressurized Tanks flame cutting



Automatic Dry Blasting Machine inside the Containment Booth



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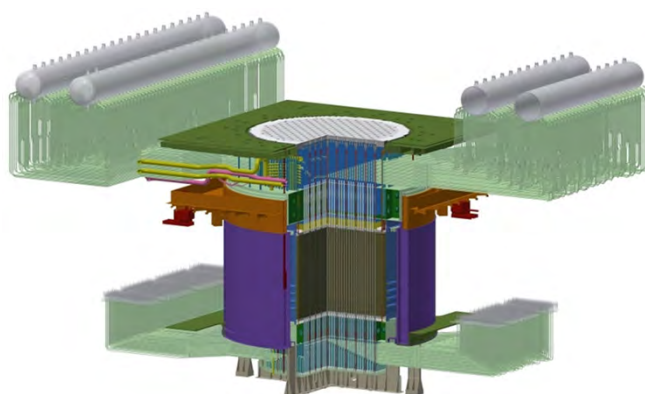
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D&D activities: Reactor Shaft (Unit 1, UP01)

Project Objectives:

- To develop the dismantling technologies for structures and equipment from INPP Unit 1 reactor shafts
- To dismantle the reactor structures and equipment from INPP Unit 1 reactor shafts applying the developed technologies



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