

Ignalina NPP strategy for key D&D projects implementation



Decommissioning of Ignalina NPP is co-financed by the European Union

Ignalina NPP - Westinghouse meeting
20 February 2020, Visaginas, Lithuania

Content



Overview of current status of INPP decommissioning

D&D of RBMK-1500 reactor building systems and equipment

D&D of reactor's zones R1 and R2, approach for graphite waste treatment

RBMK-1500 reactor core dismantling and associated Engineering Services



Overview of current status of INPP decommissioning



Design: Unique, 2 × RBMK-1500 water-cooled, graphite-moderated channel-type power reactors. Designed and staffed for fully autonomous operation.



Capacity: Intended to supply NW region of former USSR (not Lithuania). After independence, one unit could produce 80% of Lithuanian electricity needs.



Operation:

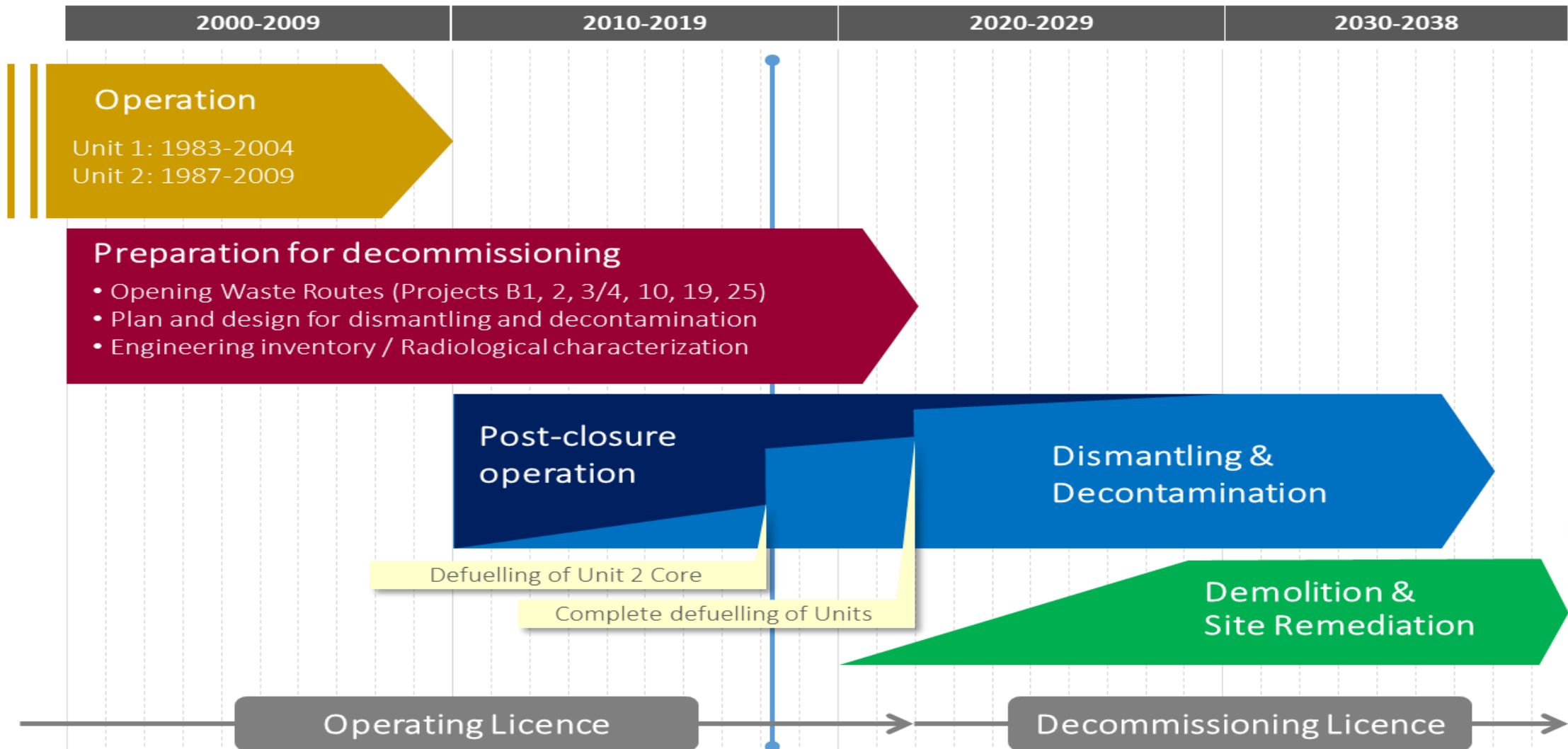
Unit 1 commissioned Dec 1983 / closed Dec 2004
Unit 2 commissioned Aug 1987 / closed Dec 2009



Early closure: Required to facilitate EU accession. **First decommissioning of RBMK-type NPP**



Overview of current status of INPP decommissioning

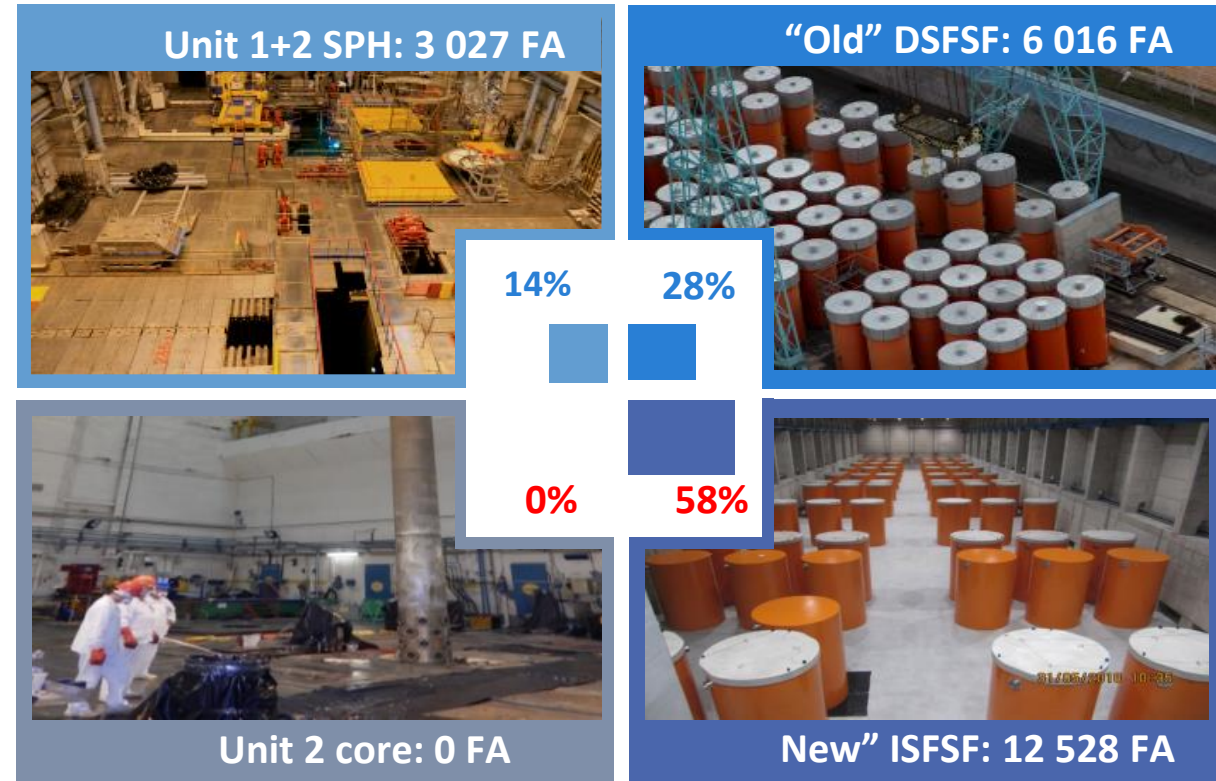
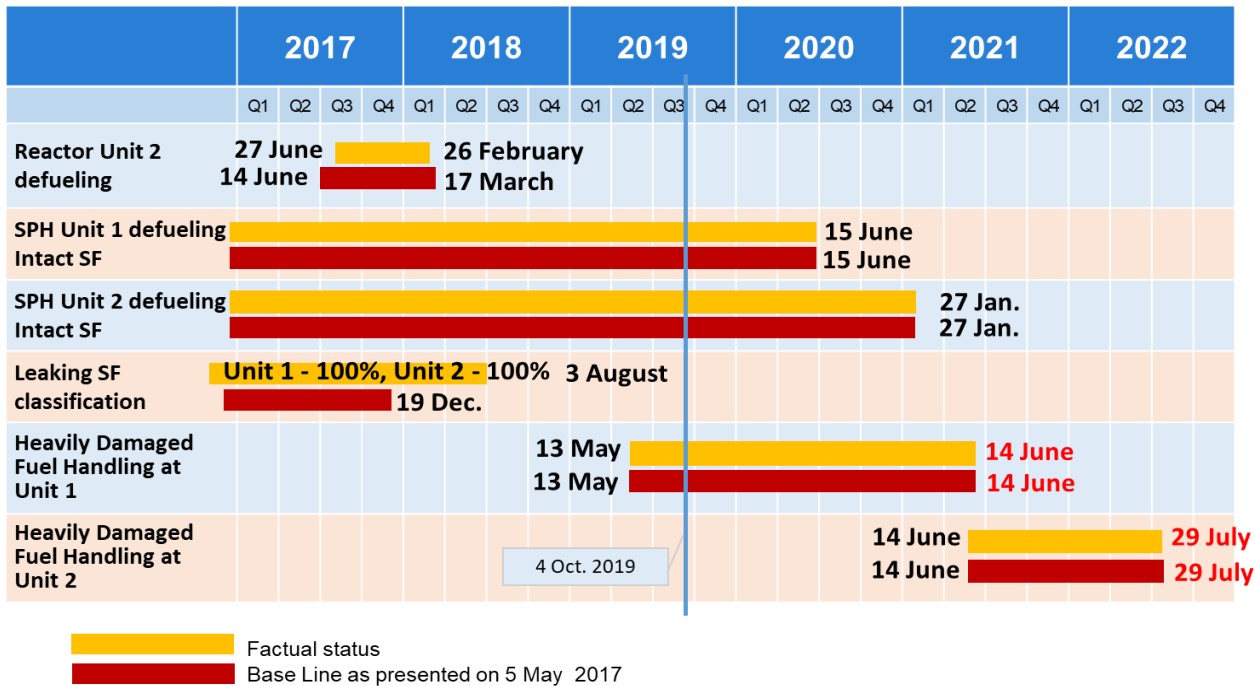


Overview of current status of INPP decommissioning



Progress in spent fuel management

- 140 casks have been loaded to date
- The defueling is in accordance with schedule.
- Last cask forecast loaded 29 July 2022.
- **Operational since September 2016**

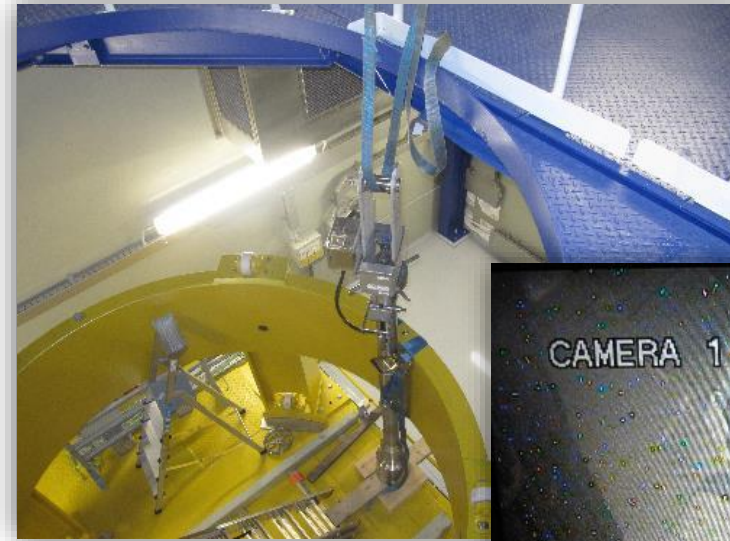
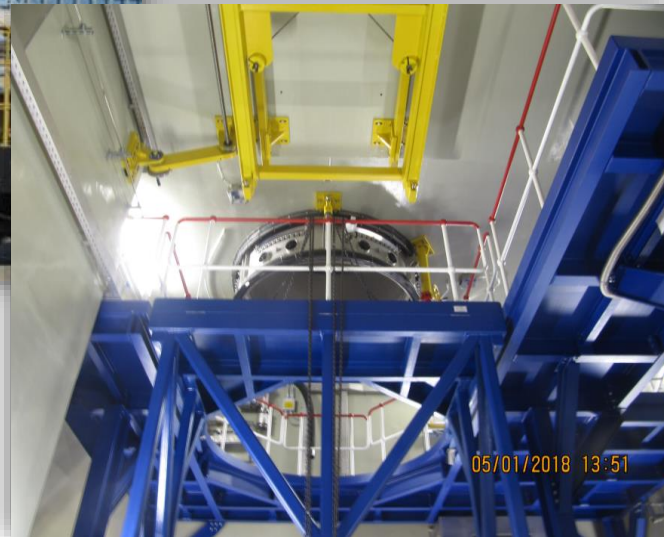


Overview of current status of INPP decommissioning



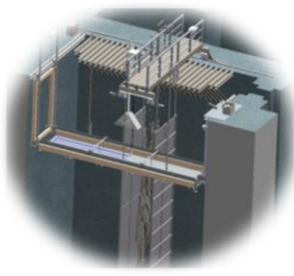
Remaining tasks for timely & safe defueling of INPP Units

- Fuel Inspection Hot Cell modification at ISFSF – regulator requirement to ensure handling of old design casks
- Removal of nuclear fuel pellets & metal debris from spent fuel storage pool's Unit 1&2 and transfer to ISFSF with the **last 190th cask – July 2022**





Key waste-route projects



Project B1 - Interim Spent Fuel Storage Facility

- Industrial operation since May 2017 – defueling on schedule
- 140 new casks in the new ISFSF as at February 2020



Project B2 - Solid Waste Retrieval Facility

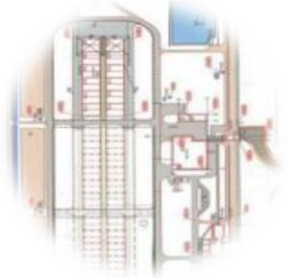
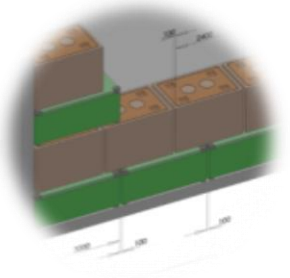
- RU1 industrial operations have continued since 30 April 2019



Project B3/4 - Solid Waste Management & Storage

- Additional B3/4 incineration campaign performed in May / June 2019
- Extended B3/4 Hot Trial programme is being continued until Industrial Permit obtained to avoid interrupting continuous waste treatment activities

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Key waste-route projects

Project B19 - New Very Low Level Short Lived Waste Storage Facility

- Disposal of 60,000 m³ of Class A wastes, comprising:
- B19-1 Buffer Storage/Characterisation – in operation since 2013
- B19-2 Disposal Facility – under construction, completion of Waste Disposal Modules construction – June 2020
- Completion of the first campaign – December 2020

Project B25 - Near Surface Repository Low and Intermediate Level Short-lived Radioactive Waste

- Technical Design and PSAR completed and agreed with state institutions
- Preparation of Tender for construction is ongoing

Project B20 - Bituminised waste vault conversion

- Engineering studies and repository concept development:
 - ✓ topographic mapping performed – January 2019.
 - ✓ geological and geotechnical site investigations performed in June 2019
 - ✓ expert examination of storage facility building performed in June 2019

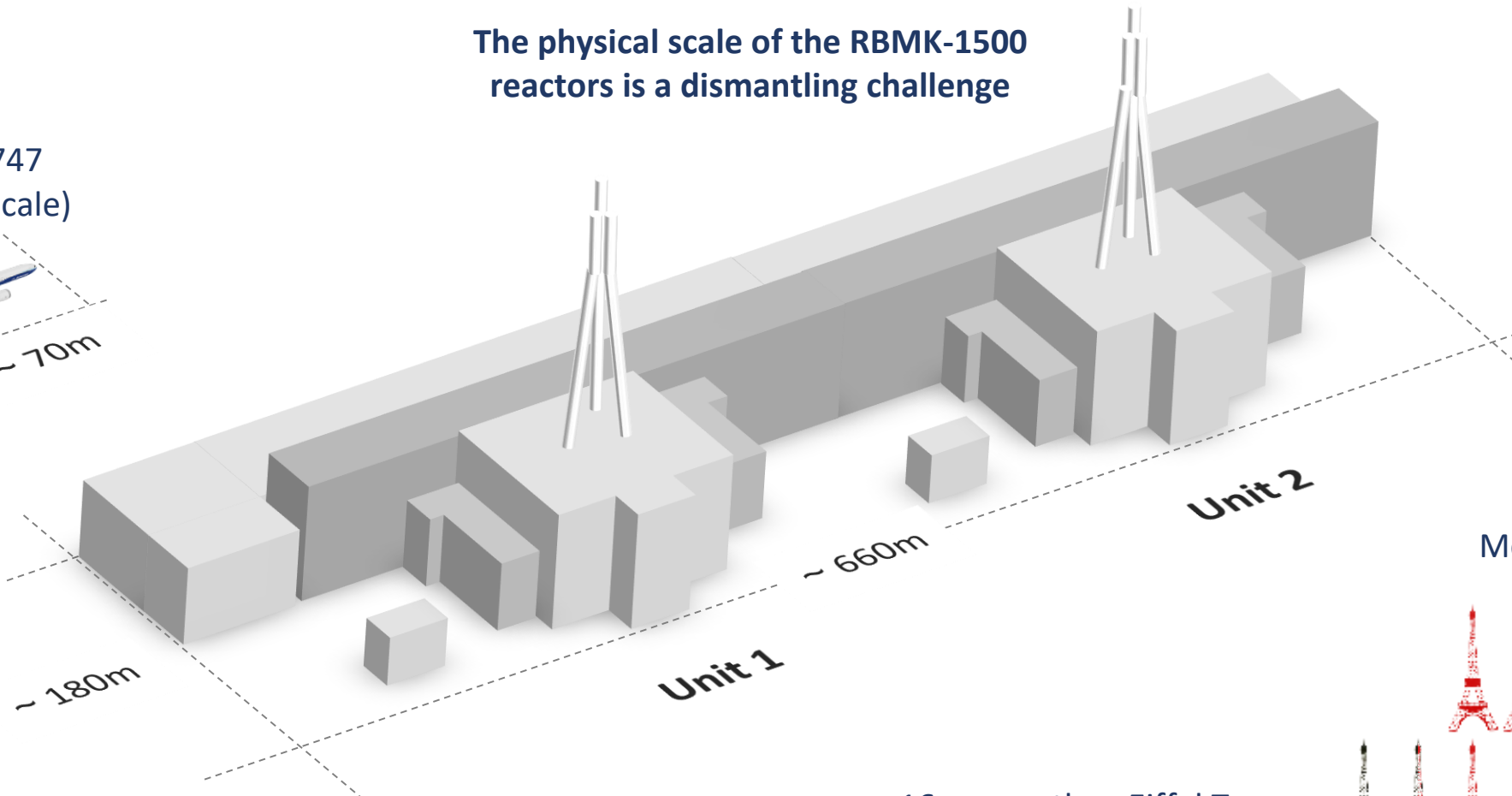
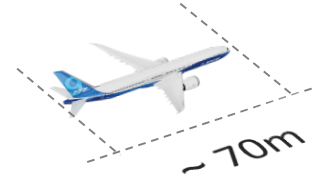


Overview of current status of INPP decommissioning



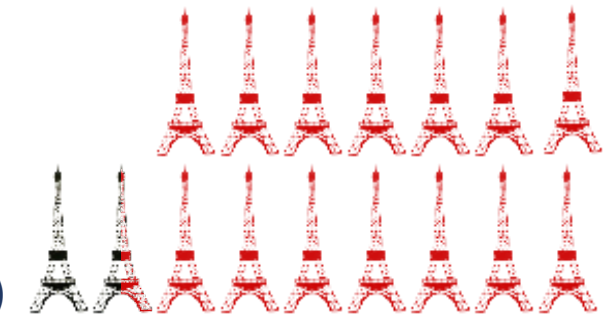
The physical scale of the RBMK-1500 reactors is a dismantling challenge

Boeing 747
(to same scale)



Metal to dismantle

16x more than Eiffel Tower
(of which 14½ contaminated)

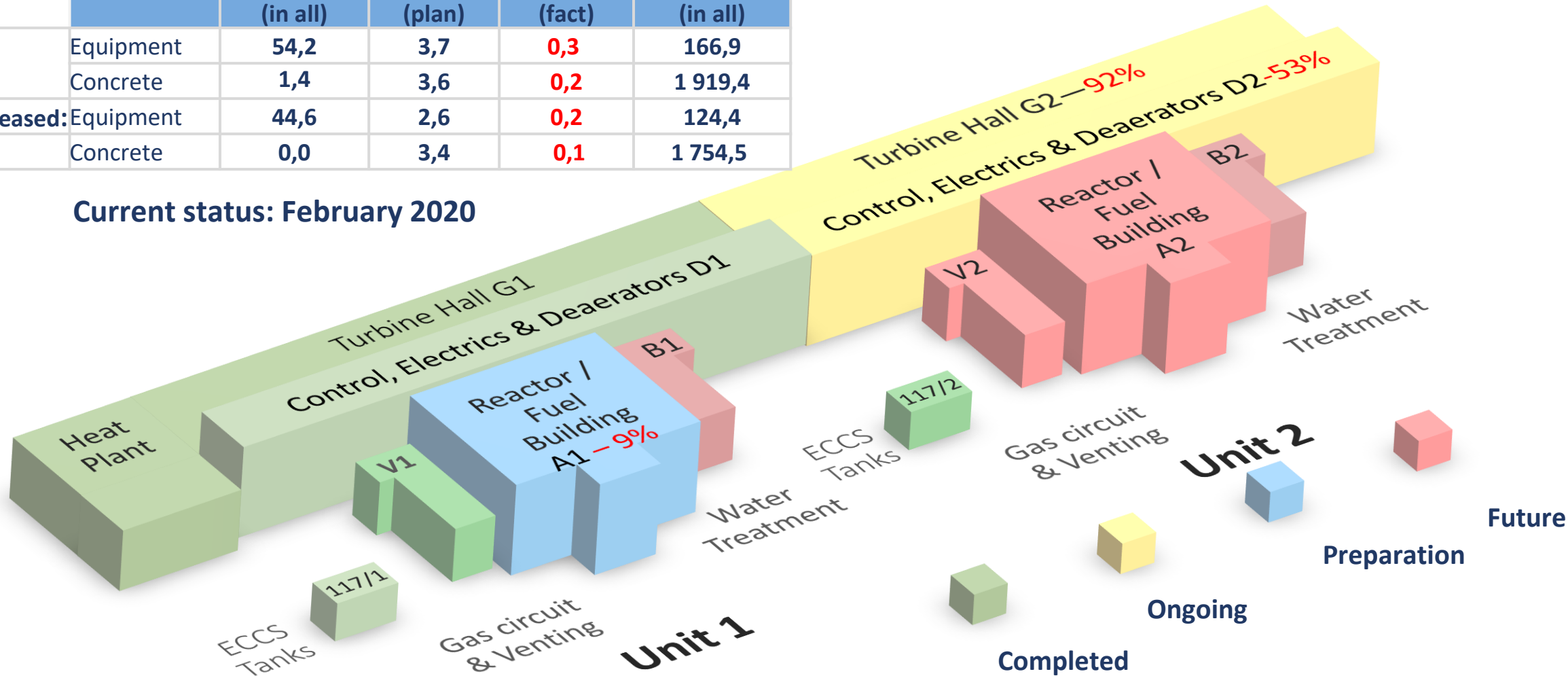


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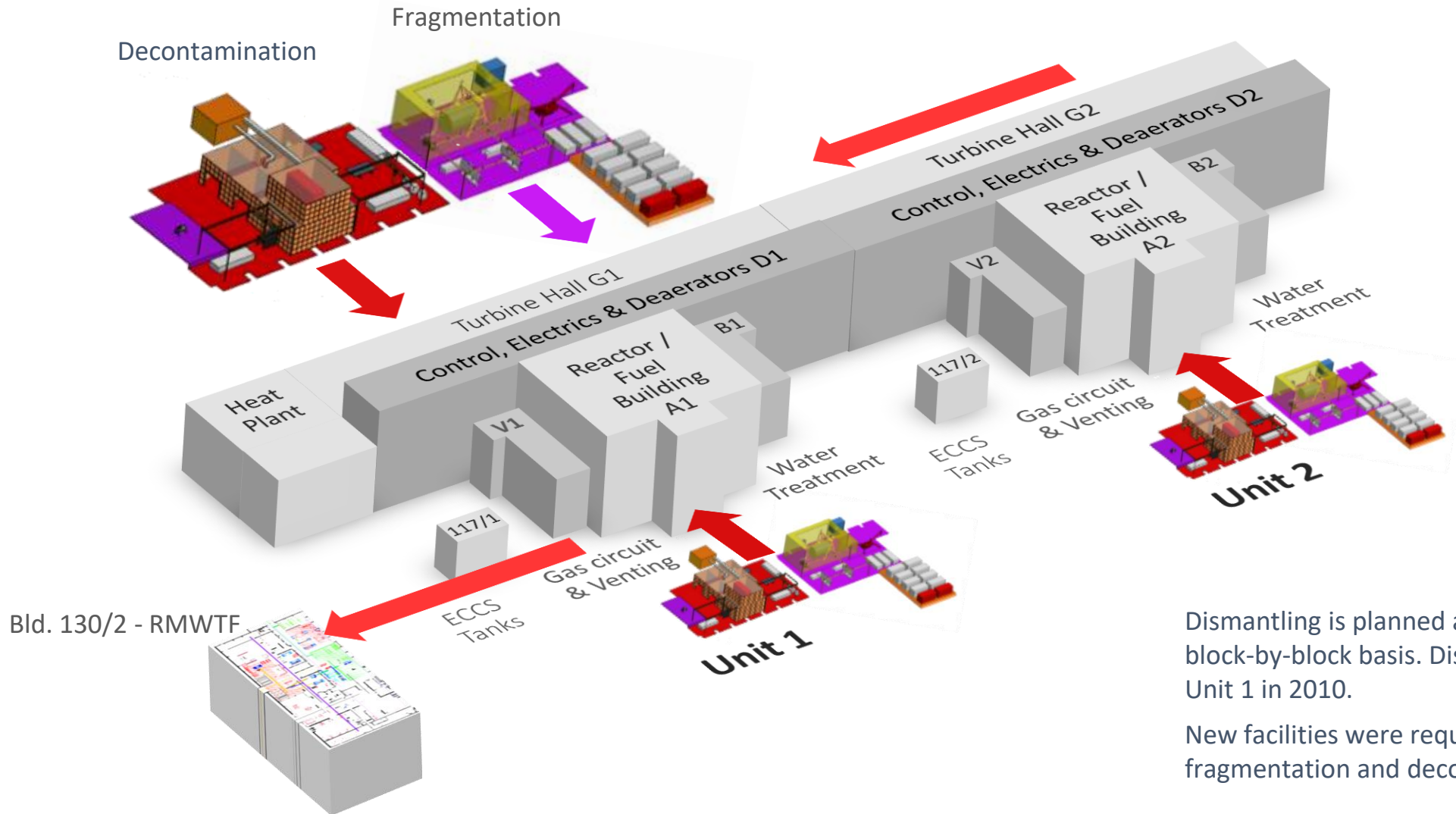


	x 1000 tons	2010-2019 (in all)	2020 (plan)	2020 (fact)	2010-2038 (in all)
Dismantled:	Equipment	54,2	3,7	0,3	166,9
	Concrete	1,4	3,6	0,2	1 919,4
Waste free-released:	Equipment	44,6	2,6	0,2	124,4
	Concrete	0,0	3,4	0,1	1 754,5

Current status: February 2020



Overview of current status of INPP decommissioning



Dismantling is planned and executed on a block-by-block basis. Dismantling started in Unit 1 in 2010.

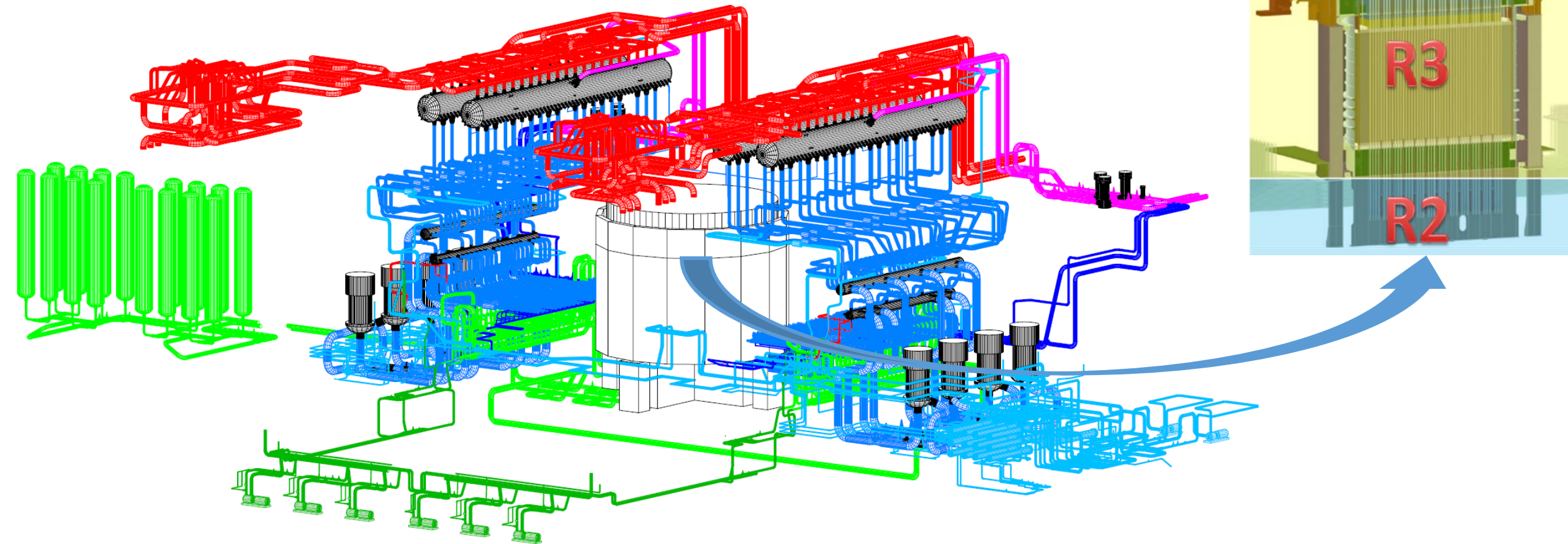
New facilities were required for fragmentation and decontamination



Overview of current status of INPP decommissioning



New projects: Unit A1, R1/R2 and R3 zones D&D



Content



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RBMK-1500 reactor core dismantling and associated Engineering Services

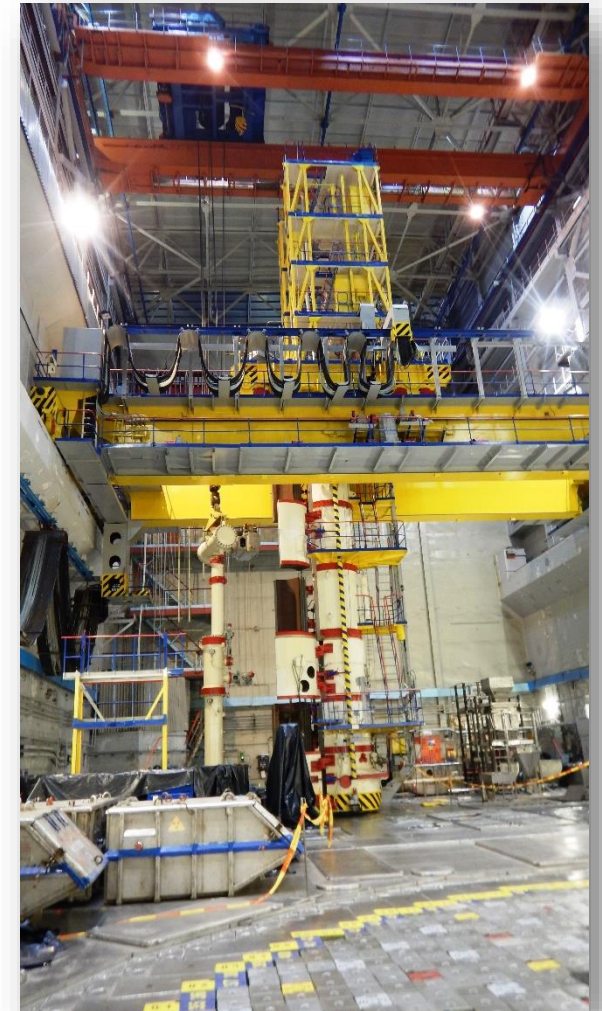


D&D of RBMK-1500 reactor building systems and equipment



Project progress:

- **D&D TD and SAR Issue 02** - preparation of responses on VATESI and TSO experts' comments is ongoing. All responses to be prepared and discussed with VATESI in **March 2020**
- **Pre-treatment Workshop (project APW.01)** – preparation is ongoing
- **Unit 1 Refuelling Machine D&D** - D&D completed in **December 2019**.
- **Main D&D activities** – July 2020



D&D of RBMK-1500 reactor building systems and equipment



SE Ignalina Nuclear Power Plant (INPP) is planning to launch procurement of service for Dismantling of Technological Equipment of Unit A1 (Drum Separators)

The purpose of these procurements is to dismantle and fragment the following technological equipment of Unit A1 INPP:

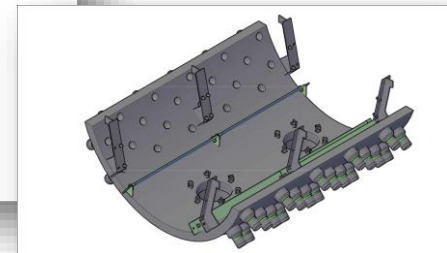
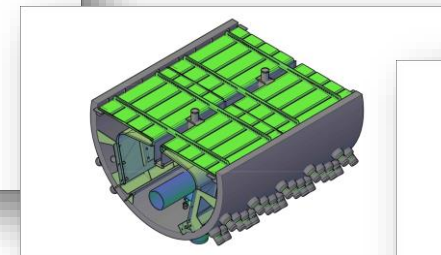
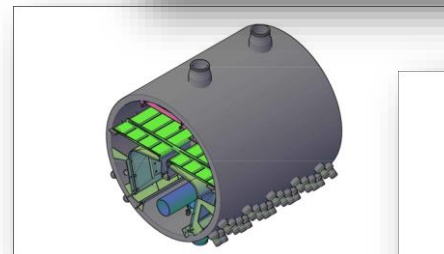
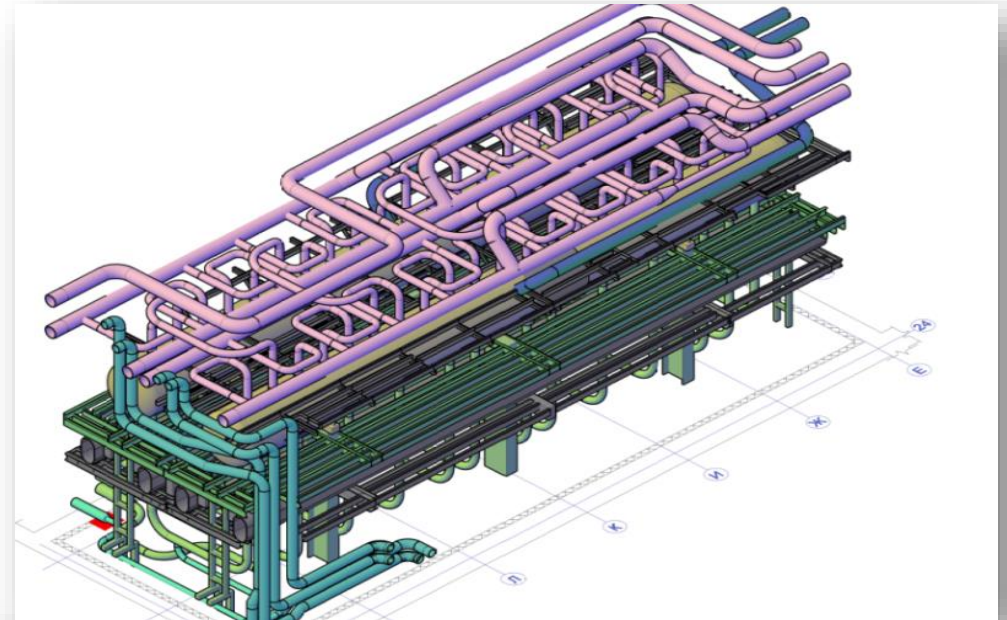
- drum-separators with pipelines
- fuel claddings integrity monitoring system
- control measuring devices and metal structures

Preliminary data on equipment to be dismantled:

- mass of equipment to be dismantled – 3 100 t;
- mass of class 0 waste – 0.8 t;
- mass of class A waste – 1 861 t;
- mass of class B waste – 37t;
- mass of class C waste – 1 200 t

Next main steps:

- Preparation of technical specification for service procurement – **February 2021**
- Tender announcement – **June 2021**



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D&D of reactor's zones R1 and R2, approach for graphite waste treatment

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D&D of reactor's zones R1 and R2, approach for graphite waste treatment



Project progress:

- **D&D TD and SAR Issue 02** - preparation of responses on VATESI comments completed. TD and SAR are under regulator review.
- **GDS** was approved by RPC, VATESI, and MoE in **September 2018**.
- **“Cold” trials** of technology and equipment for graphite treatment (rings and sleeves) are ongoing.
- **“Hot” trials** of technology and equipment for graphite treatment (rings and sleeves) are under preparation and to be started after Unit 1 Refuelling Machine D&D completion.
- **Start of D&D – July 2020.**



Cold tests of Graphite Crushing Device



Cold tests of Bunker-batcher for drum loading

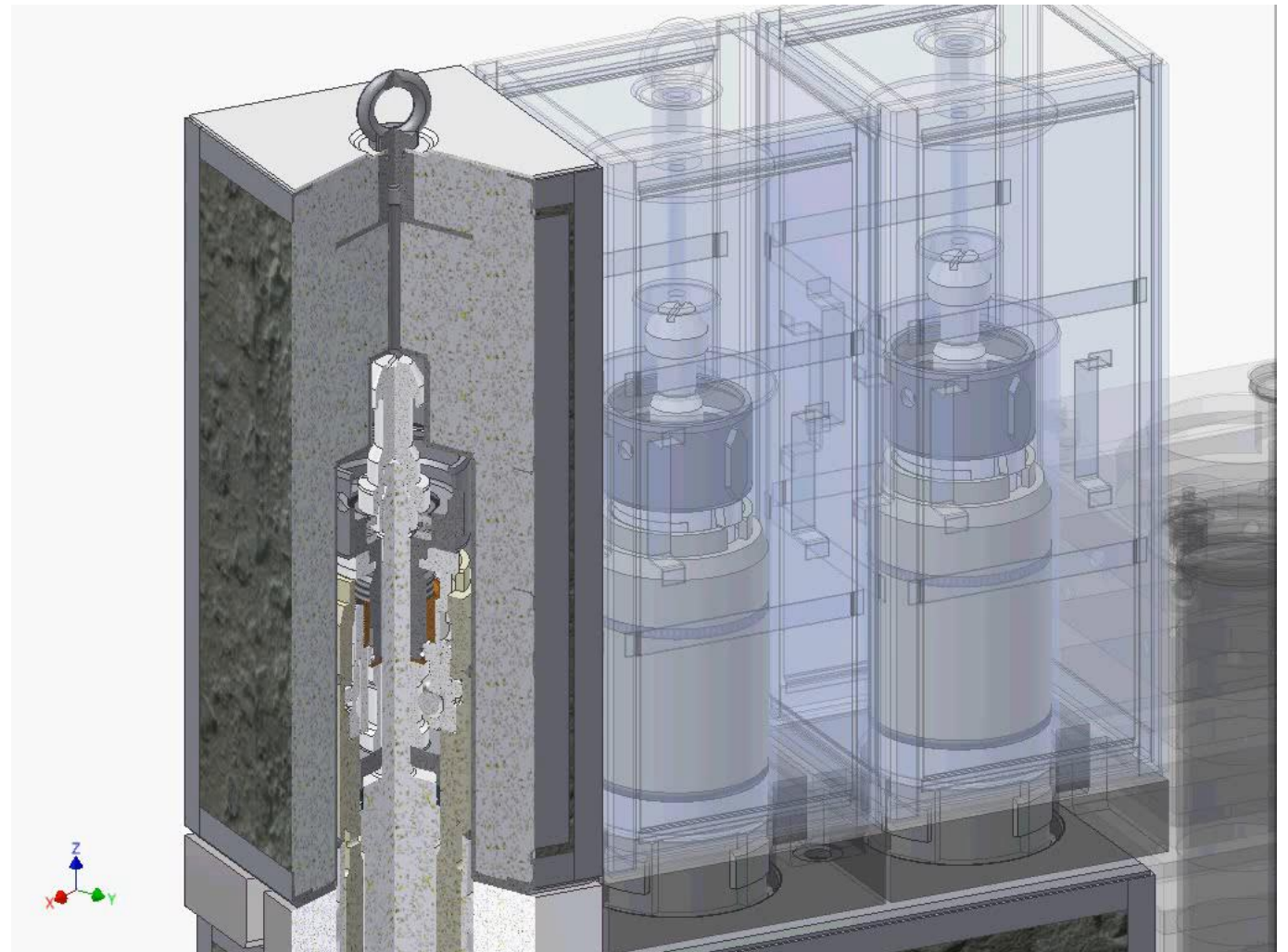


D&D of reactor's zones R1 and R2, approach for graphite waste treatment



R1 and R2 zones D&D challenges:

- 1661 technological channels for each Unit shall be removed from reactor core
- D&D schedule – not more than 10 channels per week
- i-Graphite rings and sleeves (from channels) treatment– 250 t
- a few waste streams due to the different nuclide vectors and activated materials



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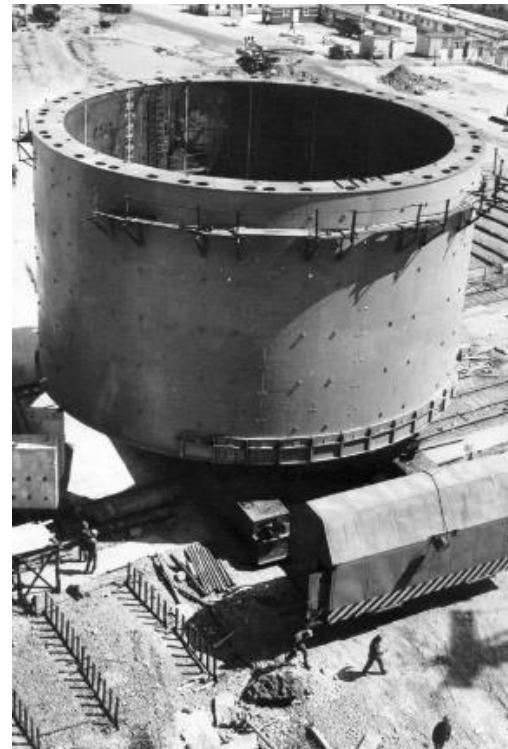
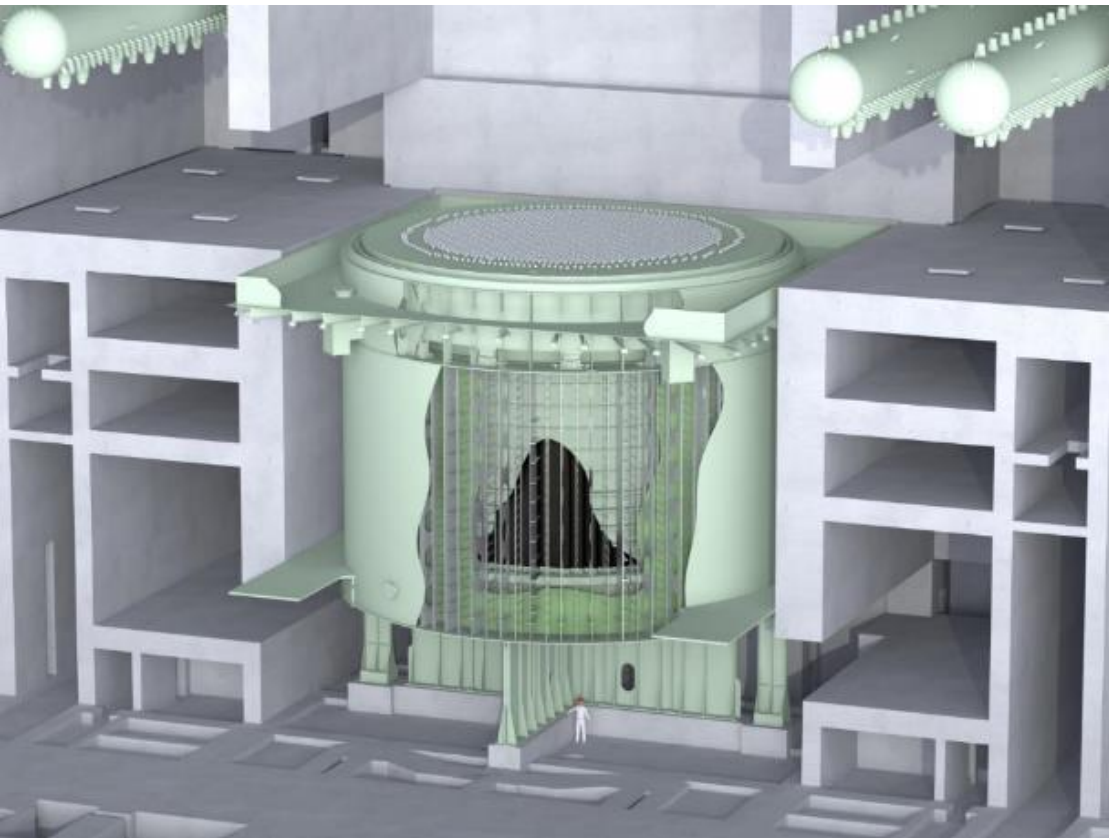
RBMK-1500 reactor core dismantling and associated Engineering Services



RBMK-1500 reactor core dismantling and associated Engineering Services



New project: Reactor dismantling and graphite storage
(focus on optioneering study)



RBMK-1500 reactor core dismantling and associated Engineering Services



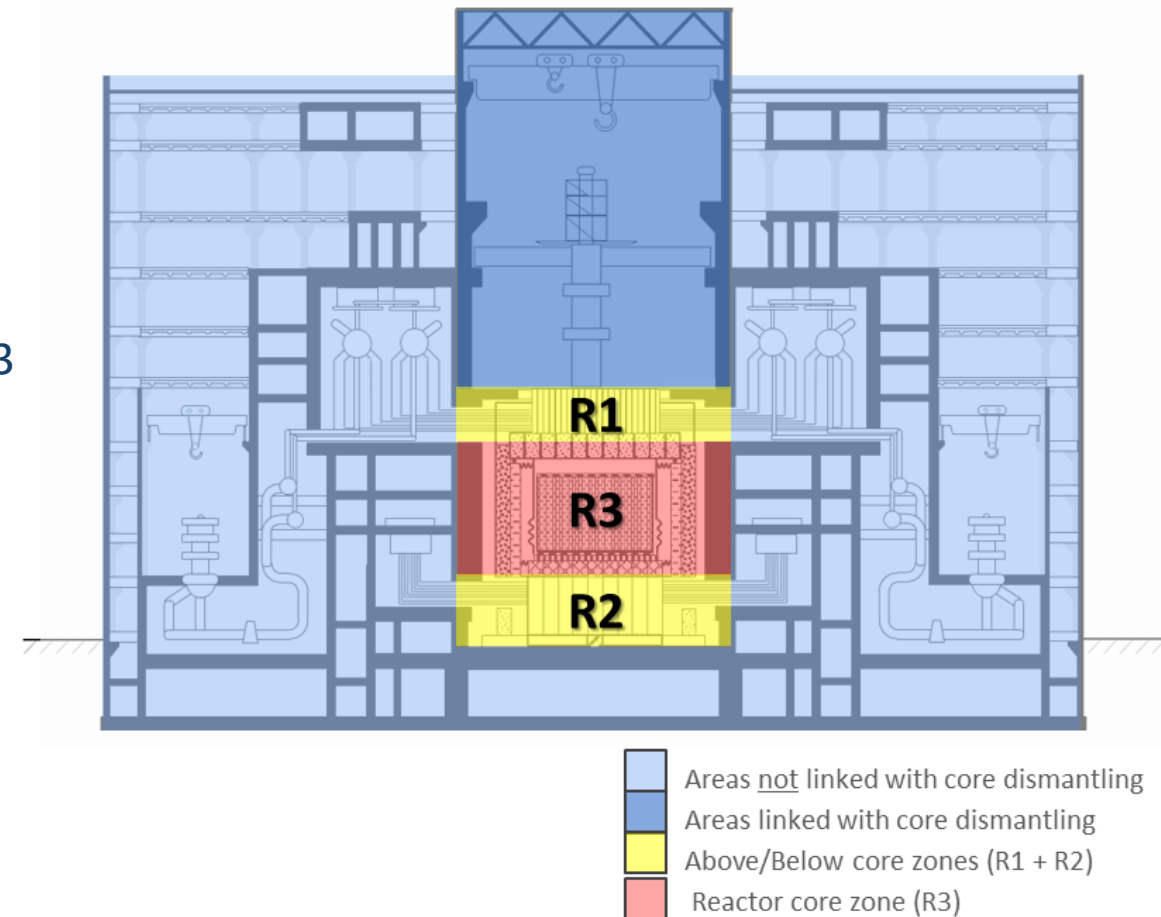
R3 reactor core dismantling is the key project for INPP decommissioning critical path

Name of Project:

RBMK-1500 reactor cores dismantling in Zone R3 and RWISF (UP01/R3)

Project objective:

- To develop the dismantling technologies for structures and equipment from INPP Units 1 and 2 reactor shafts (in the R3 area)
- To develop the technologies for radioactive waste management generated as a result of both units graphite stacks dismantling
- To dismantle the reactor structures and equipment from INPP Units 1 and 2 reactor shaft applying the developed technologies



D&D of reactor's zones R1 and R2, approach for graphite waste treatment



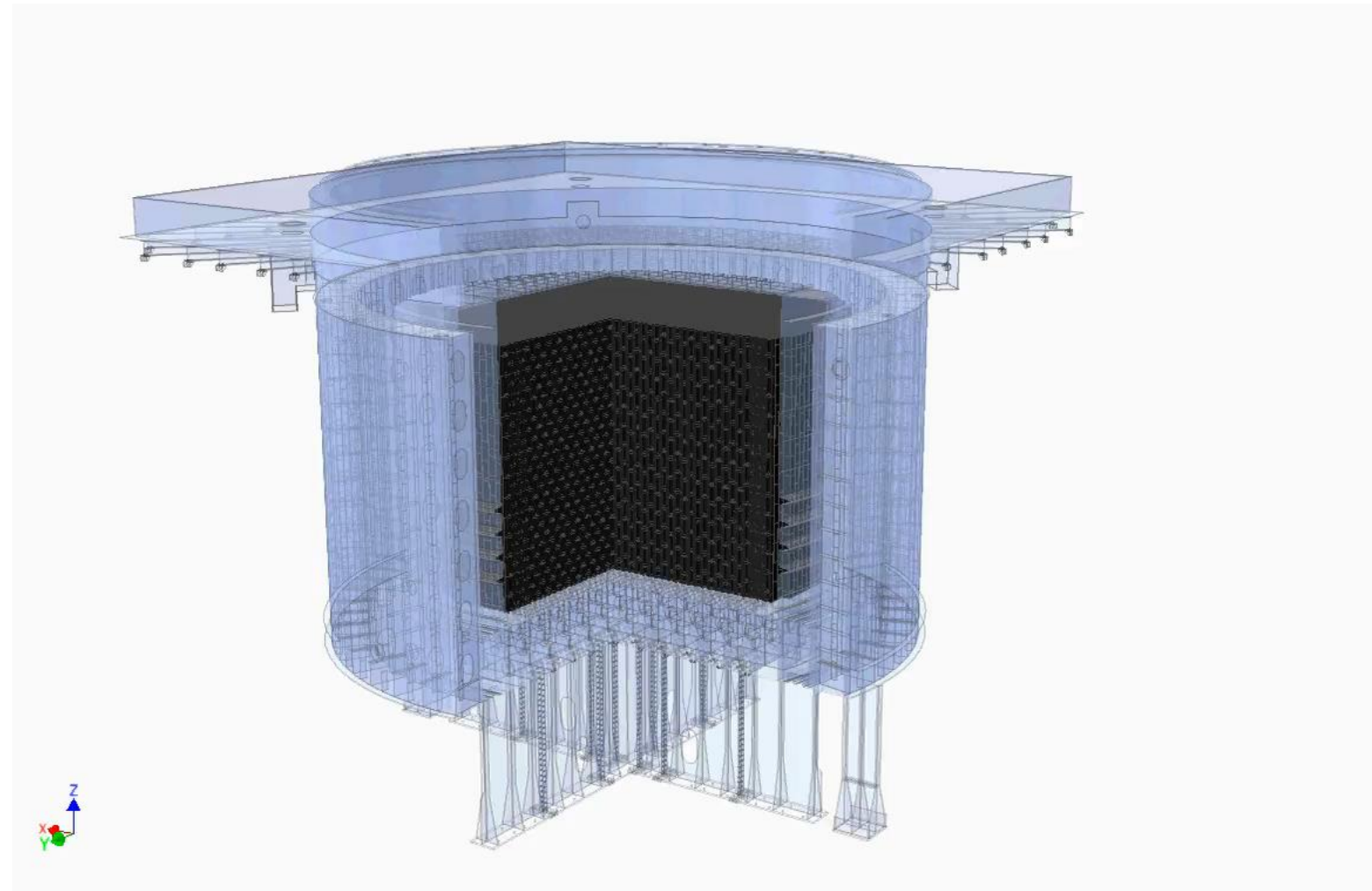
I-graphite treatment challenges

I-graphite inventory:

- 1 760 t per Unit
- 2 488 graphite columns
- $N > 30\,000$ items

I-graphite treatment challenges:

- insufficient experience,
- difficult accesses
- in-core irradiation, contamination in periphery
- no commercial available solution for graphite treatment



RBMK-1500 reactor core dismantling and associated Engineering Services



SE Ignalina Nuclear Power Plant (INPP) is planning to launch two procurements:

- „Engineering Services Associated with Dismantling of Ignalina NPP Reactor Cores“
- „Support to Ignalina NPP in the fields of project/contract management and technical appraisal“.

The purpose of these procurements is to contribute to the main decommissioning objective of dismantling Unit 1 and Unit 2 zones R3.

One-day seminars „Reactor Core Dismantling“ were organized four times in 2018:

- Seminars were attended by representatives of 46 companies from EU, as well as by representatives of the European Commission, Ministry of Energy, Central Project Management Agency, State Nuclear Power Safety Inspectorate (VATESI), INPP.
- The material of these mentioned seminars is available on the INPP website <https://www.iae.lt/naujienos/pateiktys/25>

INPP has prepared and made public a pre-announcement notice:

<https://ted.europa.eu>

<https://cvpp.eviesiejipirkimai.lt>

Responses to received questions were published 20 December 2019:

[R3 QUESTIONS-ANSWERS SESSION SUMMARY](#)

The screenshot shows the website for the Ignalina nuclear power plant. The header includes the IAE logo and the text 'Ignalina nuclear power plant'. A navigation menu contains links for 'ABOUT US', 'NEWS', 'STRUCTURE AND CONTACTS', 'LEGAL INFORMATION', 'ACTIVITY', 'CORUPTION PREVENTION', and 'ADMINISTRATIVE'. The main content area features a blue banner with the title 'Reactor Core Dismantling Project R3'. Below the banner, the text states: 'SE Ignalina Nuclear Power Plant (INPP) is planning to launch two procurements: 1. „Engineering Services Associated with Dismantling of Ignalina NPP Reactor Cores“ 2. „Support to Ignalina NPP in the fields of project/contract management and technical appraisal“.' It then explains the purpose of these procurements and provides links to the pre-announcement notice on TED and the CVPP website. A note mentions that potential bidders can submit comments until December 6, 2019, via email to artiom.valujev@iae.lt. A link to the 'R3 QUESTIONS-ANSWERS SESSION SUMMARY' (published 2019 12 20) is also provided. The bottom of the page notes that the dismantling of two of the world's most powerful RBMK reactors is a decommissioning project with no analogues in the world, and that publicizing information on planned activities is an effective means of attracting experts and multinational companies.



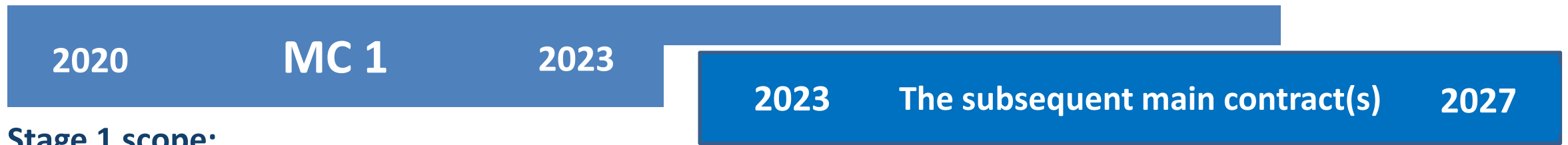
RBMK-1500 reactor core dismantling and associated Engineering Services



Procurement 1. Engineering Services Associated with Dismantling of Ignalina NPP Reactor Cores

Form of contract - Single contractor framework agreement + main contracts

The planned **procurement budget** of the R3D Framework is **20M€** (excluding VAT) of which **7 MEUR for MC 1**



Stage 1 scope:

- Methodology for the first main contract and confirmation of basic data
- Design Options Report
- Conceptual Design
- Gap Analysis Report
- Environment Impact Assessment Report (EIAR)

Stage 2 scope of the R3D Framework may include, but may not be limited to:

- Reactor D&D Technological Design development
- Reactor D&D SAR development
- RWSIF SAR development
- Design for Construction Works inside of Reactor Building
- Basic Design for RWISF development
- Specifications for Reactor D&D tools procurement
- Training and Knowledge Transfer
-

The scope of the services to be provided is described in detail in Terms of Reference for :

- Framework Agreement https://www.iae.it/data/public/uploads/2019/11/00_r3d_fa_ts_eng.pdf
- Main Contract No.1. https://www.iae.it/data/public/uploads/2019/11/00_r3d_mc1_ts_eng.pdf



RBMK-1500 reactor core dismantling and associated Engineering Services



Procurement 2. Support to Ignalina NPP in the fields of project/contract management and technical appraisal

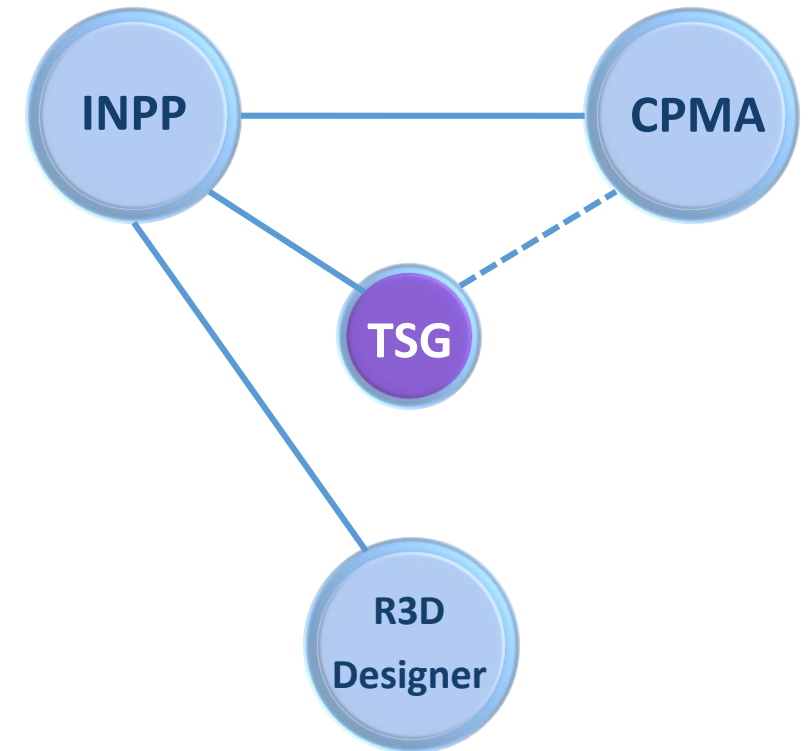
The purposes of the procurement is to assist SE INPP in the implementation of project R3D in the fields of on-site project/contract management support and back-office technical appraisal (“Technical Support Group”)/ “project R3S”)

The TSG procurement will be fee-based, bids will be evaluated according to economically advantageous criteria (price/quality ratio)

The planned procurement budget for this services is 5 M€ (excluding VAT)

The scope of the services to be provided is described in detail in:

- Terms of Reference for INPP consultancy services” <https://www.iaea.lt/data/public/uploads/2019/11/tor-for-r3d-tsg-1810.pdf>

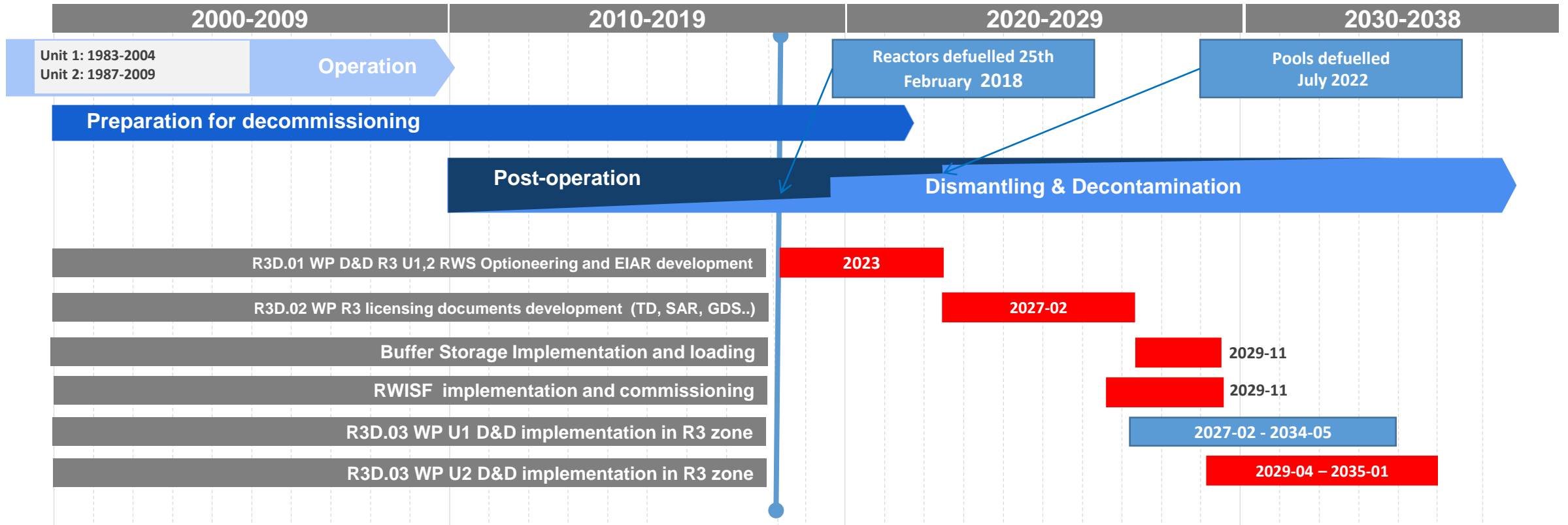


RBMK-1500 reactor core dismantling and associated Engineering Services



Next main steps:

- To complete **tender documents** preparation
- **R3D.01 and R3S Tenders** announcement by **2020/Q1**



SE Ignalina Nuclear Power Plant

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Decommissioning of Ignalina NPP is
co-financed by the European Union