POCATOM

FCNRS

STATE CORPORATION "ROSATOM" GROUP OF COMPANIES

Development Program of Cask Technologies for Management of Spent Fuel Assemblies from Russian NPPs as Means of Harmonization of Decisions for SNF Long-Term Storage

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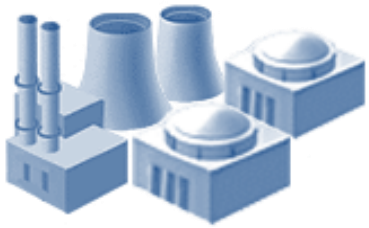
Main SNF management options

Transport and/or Storage cask



NPP → SF Storage pool

Long-term storage

- Wet (pool type)
- Dry Vault
- Dry Single-purpose casks
- Dry Double-purpose casks

Transport and/or Storage cask

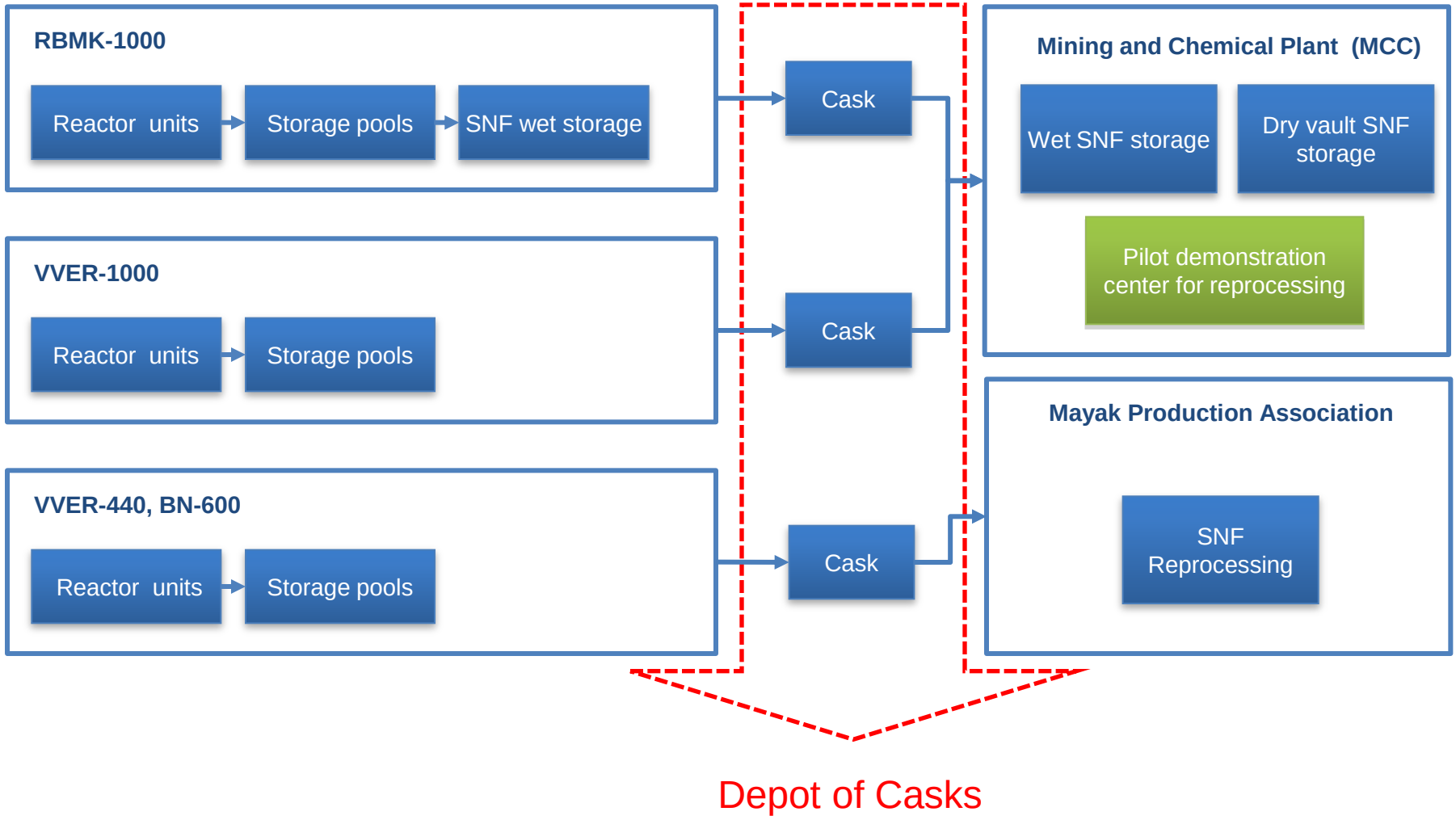
- Reprocessing → Recycle product
- Reprocessing → HLW disposal
- Final disposal

Transport cask

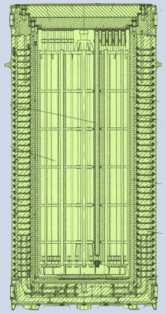
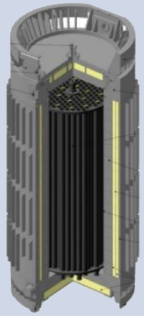
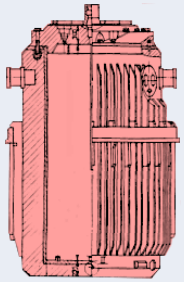
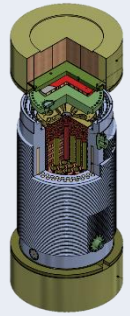
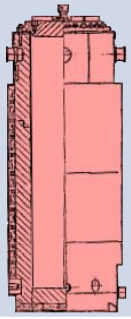
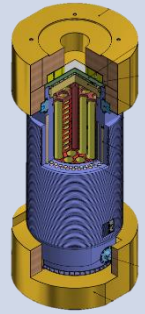
- Reprocessing → Recycle product
- Reprocessing → HLW disposal
- Final disposal

The cask for SFA transportation and/or storage is used for all SNF management options

Russia strategy of SNF management

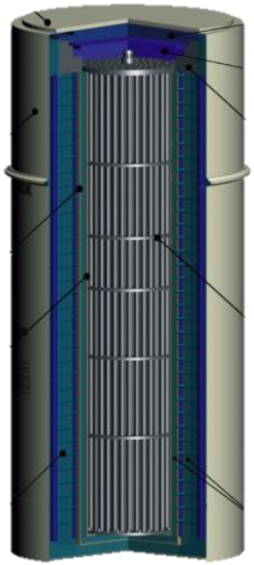


Modernization of Depot Casks

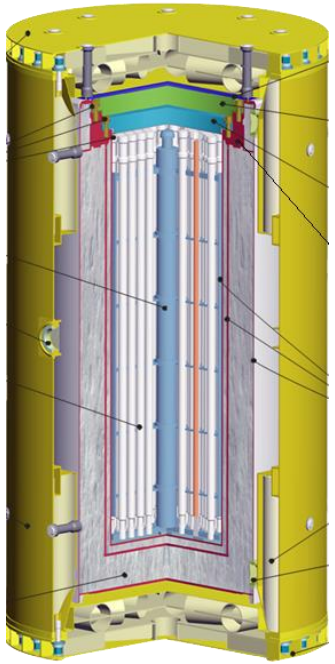
RBMK-1000	TUK-109 	144 ПТ SFA 5,6 kW 2,6 % 30 GWd/t_{HM} Transportation and storage	Capacity Decay heat Enrichment max Burn-up max	155 ПТ SFA 8,4 kW 3,2 % 37 GWd/t_{HM} Transportation	TUK-109T 
		Modernization is carried out			
VVER-440	TUK-6 	30 SFA 20 kW 3,6 + 4,4 % 57 GWd/t_{HM}	Capacity Decay heat Enrichment max Burn-up max	36 SFA 30 kW 4,87% 67,9 GWd/t_{HM}	TUK-140 
VVER-1000	TUK-13 	12 SFA 20 kW 4,4 % 58 GWd/t_{HM}	Capacity Decay heat Enrichment max Burn-up max	18 SFA 36 kW 4,87% 67,9 GWd/t_{HM}	TUK-141 

Cask technologies for RBMK-1000 SNF management

TUK-109 – dual-purpose metal-concrete cask for transportation and long-term storage of RBMK-1000 SNF



UKKh-109
Storage cask



TUK-109
Transport cask
UKKh-109 + ZDK (damper container)

Family of dual-purpose casks based on metal-concrete cask technologies

UKKh-109 (TUK-109)
RBMK-1000 SNF

UKKh-121
HLRW

UKKh-123 (TUK-123)
BN-350 SNF

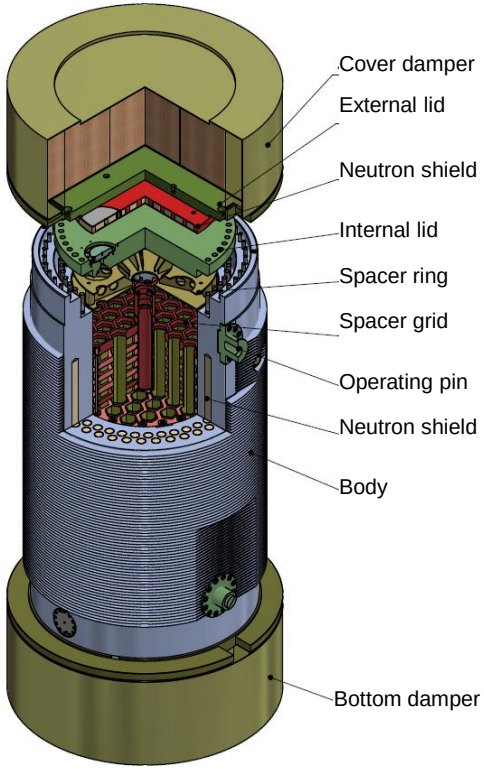
TUK-108/1
Navy SNF

ТУК-120
Icebreaker SNF

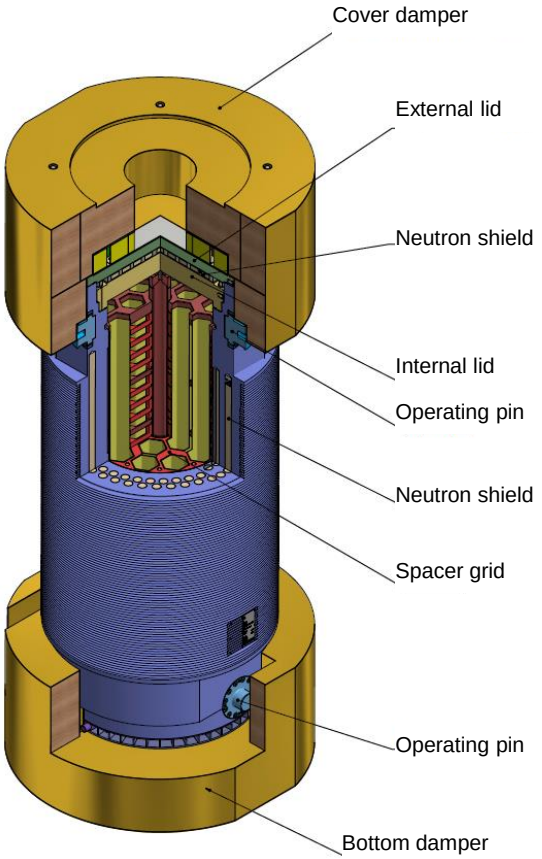
Infrastructure for RBMK-1000 SNF cask handling

TUK-140 and TUK-141 casks

TUK-140

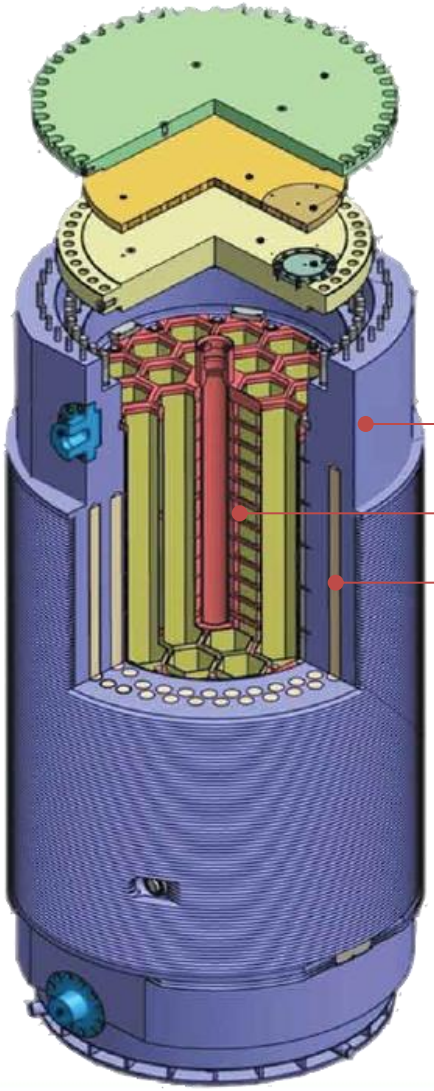


TUK-141



TUK-140 and TUK-141 are packages of B(U) type for transportation of VVER SFA having higher enrichment by U-235 and burn-up

TUK-141 dual-purpose cask for higher burn-up fuel



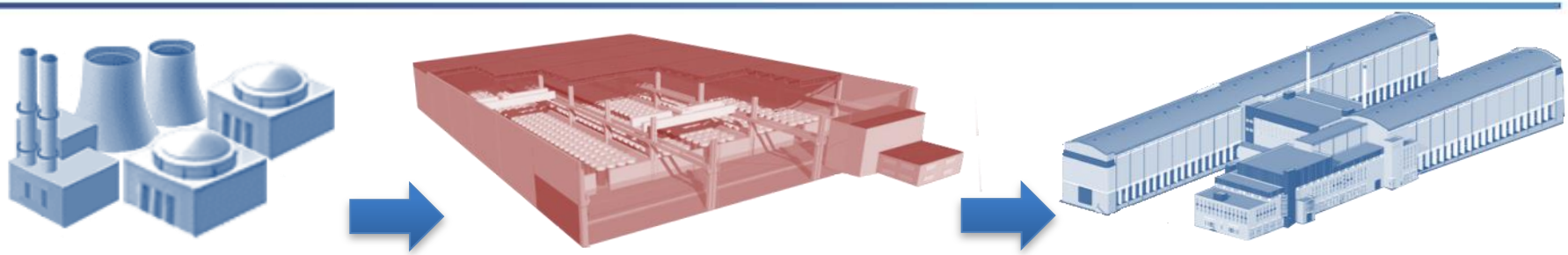
Body – high-strength cast iron with spheroidal graphite

Spacer greed– stainless and boron steel

Solid neutron shielding

SFA capacity, pcs.	**18**
TUK lifetime, years	**60**
SNF storage period, years	**60**
Full weight (with SFA) of TUK including dampers, t	**125**
Weight of empty TUK including dampers, t	**98**
Max height including dampers (without dampers), mm	**7120 (5860)**
Max diameter including dampers (without dampers), mm	**3120 (2770)**

Dry SNF cask storage concept



NPP

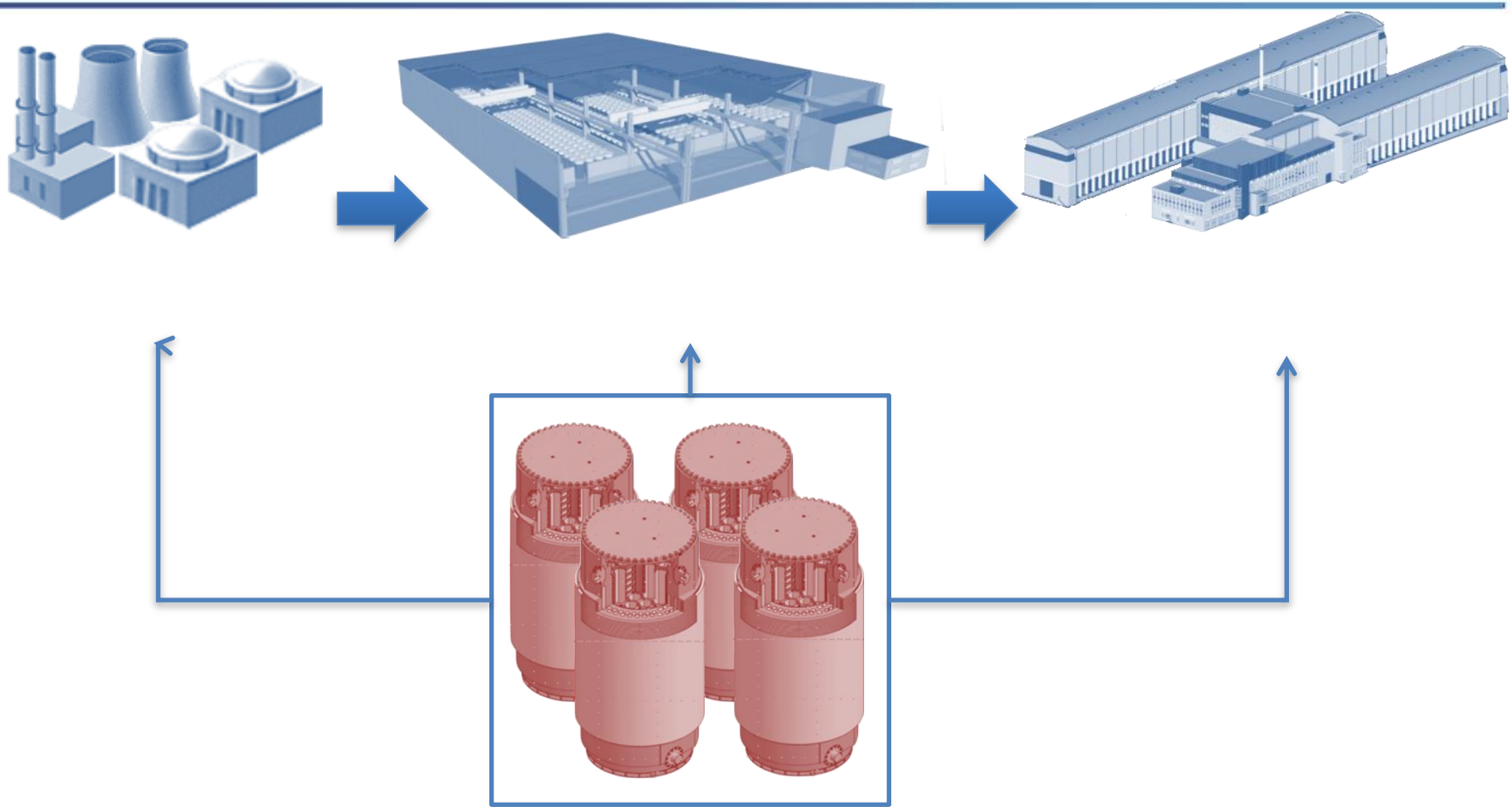
Dry cask storage facility

Reprocessing or disposal

Advantages of dry storage using dual-purpose casks

- Reduction of operation costs
- Modular design – possibility to expand the storage facility
- Independence of infrastructure facilities commissioning for reprocessing
- Enhanced storage safety
- Less number of SNF reloading operations (reactor cooling pool - cask)
- Mobility in decision-making on further SNF management strategy
- Technology unification

Cask unification



Using of unitized dual-purpose cask will decrease SNF management cost

Global experience

Open site storage

The dry RBMK-1500 spent fuel cask storage site at the Ignalina NPP (Lithuania)

The Independent Spent Fuel Storage Installation (ISFSI) Maine Yankee NPP (USA)

Closed-in storage

Interim VVER-440 Spent Fuel Storage Facility Dukovany (Czech Republic)

The Dry VVER-440 Spent Fuel Storage in Kozloduy NPP (Bulgaria)

VVER-1000 Spent fuel storage facility (SFSF) Temelín NPP (Czech Republic)

Programme of Development

FCNRS programme of cask technologies development

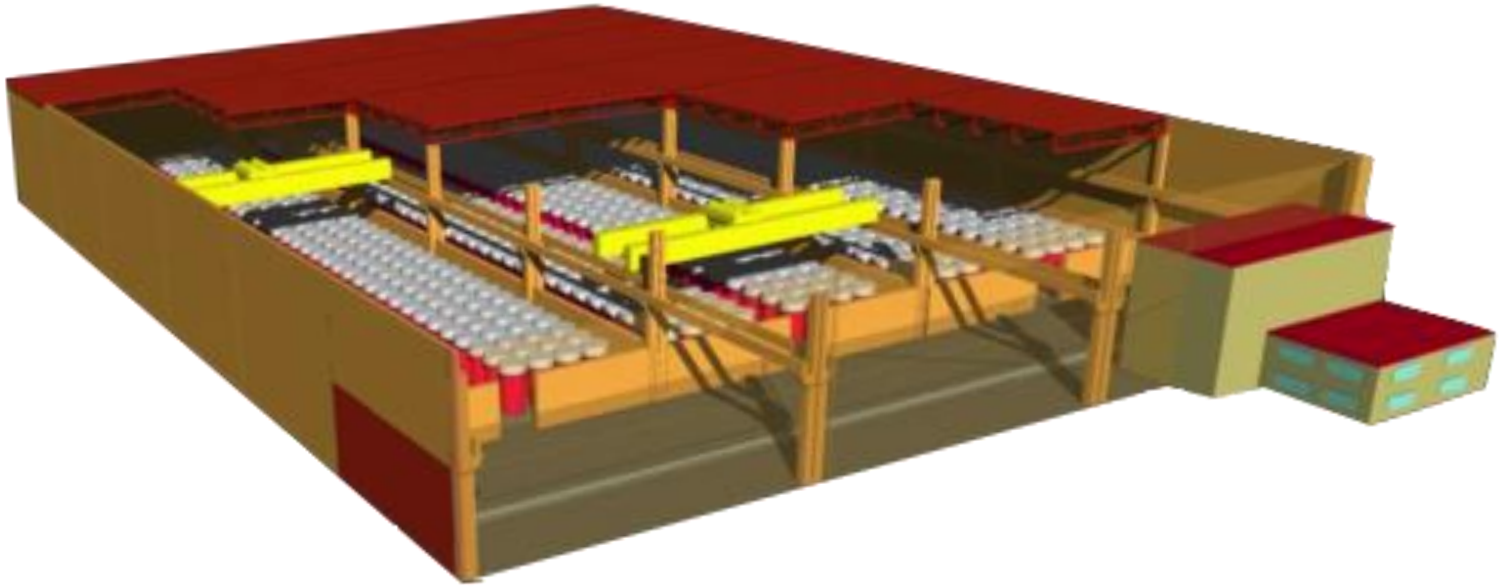
Development and manufacturing of new transport casks for VVER-1000 and VVER-440 SNF

Development and manufacturing of dual-purpose casks for VVER-1000 SNF

Development and building of storage site

Loading of SFA into dual-purpose cask and placing it on storage site

Objective



Commercial operation of dry cask storage facilities for VVER-1000+ SNF

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