



KOZLODUY NUCLEAR POWER PLANT PLC

Spent Nuclear Fuel Inventory and Future generation of SNF

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Spent fuel inventory

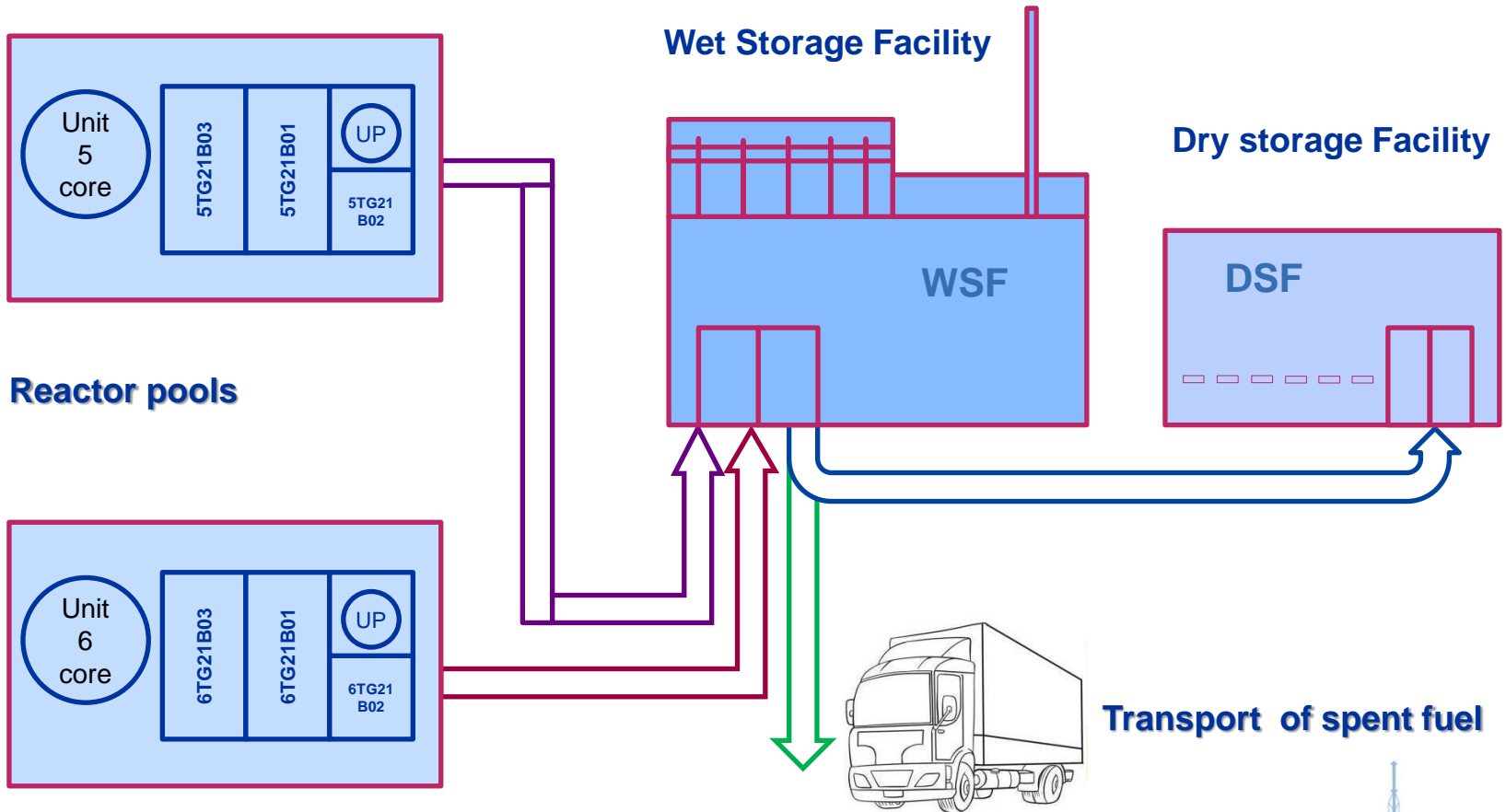
as of 20.10.2020

The accumulated spent nuclear fuel at the site of Kozloduy NPP, stored in spent nuclear fuel facilities, as of **20.10.2020** totals **~995.5 tHM**. This quantity is distributed in **2864 WWER-440** spent fuel assemblies and **1635 WWER-1000** spent fuel assemblies, sum total of **4499 assemblies**.

Reactor type	Number of assemblies	Weight of heavy metal [kg]	Approximate activity [Bq]
WWER-440	2864	330901	$0,31 \times 10^{19}$
WWER-1000	1635	664619	$1,58 \times 10^{19}$
TOTAL	4499	995520	$1,89 \times 10^{19}$

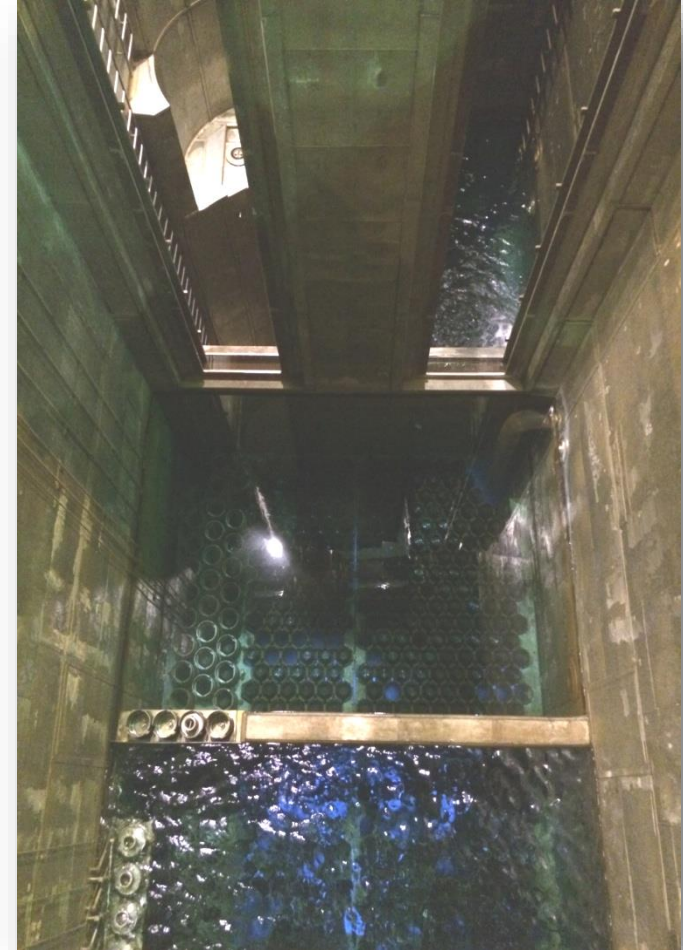


NFC Management Facilities



Reactor pools

- ❖ Full capacity of Unit 5 and Unit 6 pools is **612 fuel assemblies** each (at least 163 have to be free when the reactor is operational);



Wet Storage Facility

- ❖ Full WSF capacity is 168 baskets
- ❖ Each WWER-440 basket contains up to 30 fuel assemblies;
- ❖ Each WWER-1000 basket contains up to 12 fuel assemblies;
- ❖ Fuel storage for a period of 50 years.



Dry Storage Facility



- Dry Spent Fuel Storage Facility (DSF) stores spent fuel **only** from WWER-440 reactors;
- ❖ Full DSF capacity is 72 casks;
- ❖ Cask “dry storage” technology - Constor 440/84;
- ❖ design lifetime 50 years;



Prognoses for generation of SNF

After 20.10.2020

According to the Kozloduy NPP Program for Spent Fuel Management, the prognoses for generating of SNF are based on the following concerns:

- Currently only the Russian Federation offers temporary technological storage and following reprocessing service for fuel, manufactured in Russia.
- After 2025 there is possibility for nuclear fuel supply by alternative vendor also.

There are 3 main options resulting from these concerns.

(follows)



Prognoses for generation of SNF

After 20.10.2020

Option 1: Operation of units 5 and 6 with fuel assemblies, supplied by TVEL JSC and alternative supplier, including transport of SNF after 2020

After 2020 performing an annual transport for reprocessing of ~42 tHM (5 transportations of SNF each with 96 assemblies within each 4 years) from WWER-1000, the SNF from WWER-1000 stored onsite before the end of 2020 and the SNF which will be generated until the shutdown of the two units (2047 for unit 5 and 2051 for unit 6) could be transported for reprocessing until 2060.

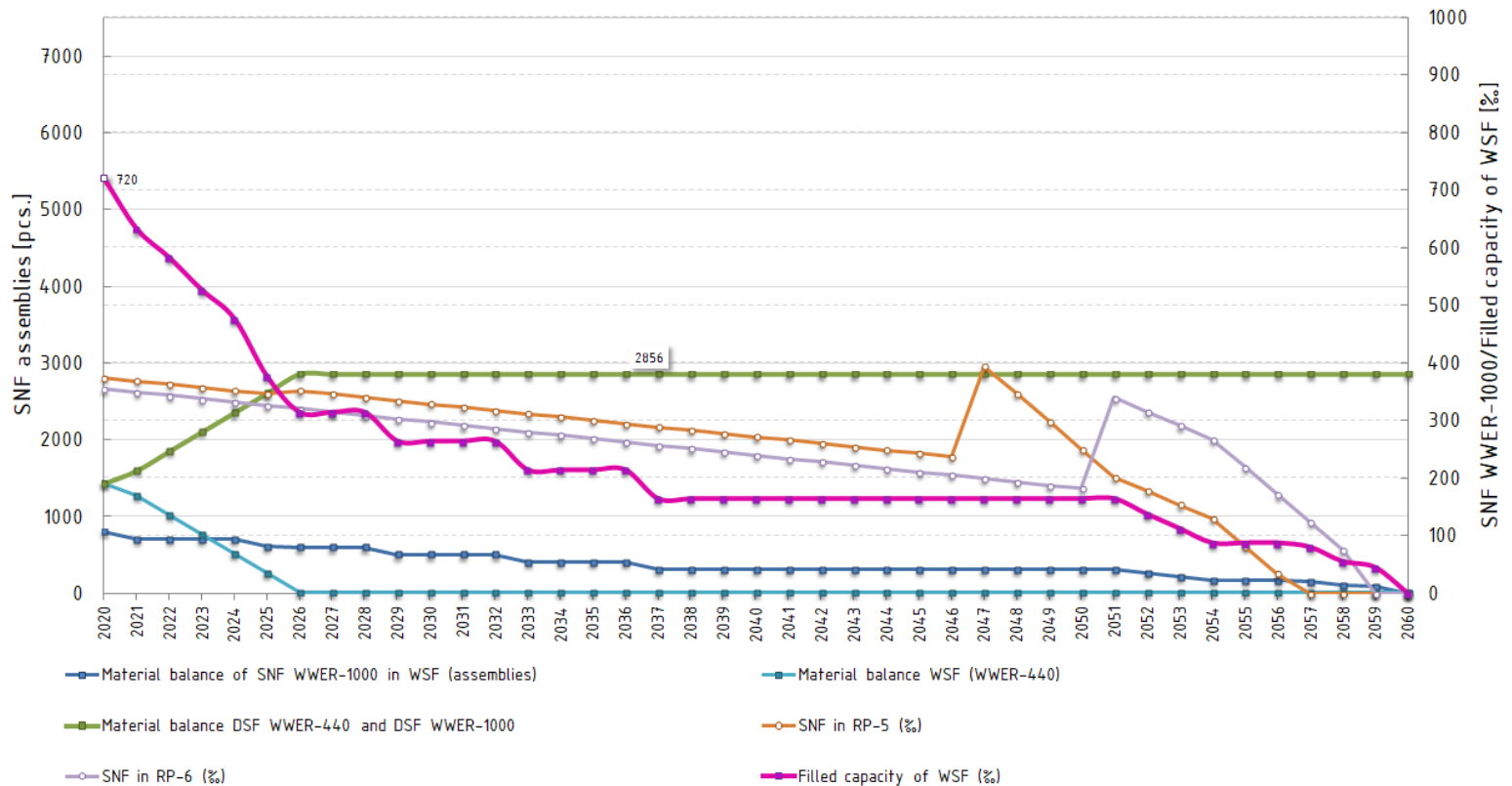


Prognoses for generation of SNF

After 20.10.2020

Material Balance of SNF for Option 1

Operation of units 5 and 6 with fuel assemblies, supplied by TVEL JSC and/or alternative vendor, including transport of SNF after 2020 for reprocessing until 2060



Prognoses for generation of SNF

After 20.10.2020

Option 2: Operation of units 5 and 6 with fuel assemblies, supplied by TVEL JSC and/or alternative vendor **without** transport of SNF after 2020

In case of building of DSF for WWER-1000 assemblies and its commissioning in 2030, the SNF stored onsite before the end of 2020 and the SNF that will be generated until the shutdown of the units could be transferred from the reactor pools and the WSF until 2060. Filling of 6 containers (114 assemblies) with SNF from WWER-1000 for dry storage and 10 containers (190 assemblies) per year after 2047, the transferring from WSF to DSF for WWER-1000 will finish approximately in 2064.

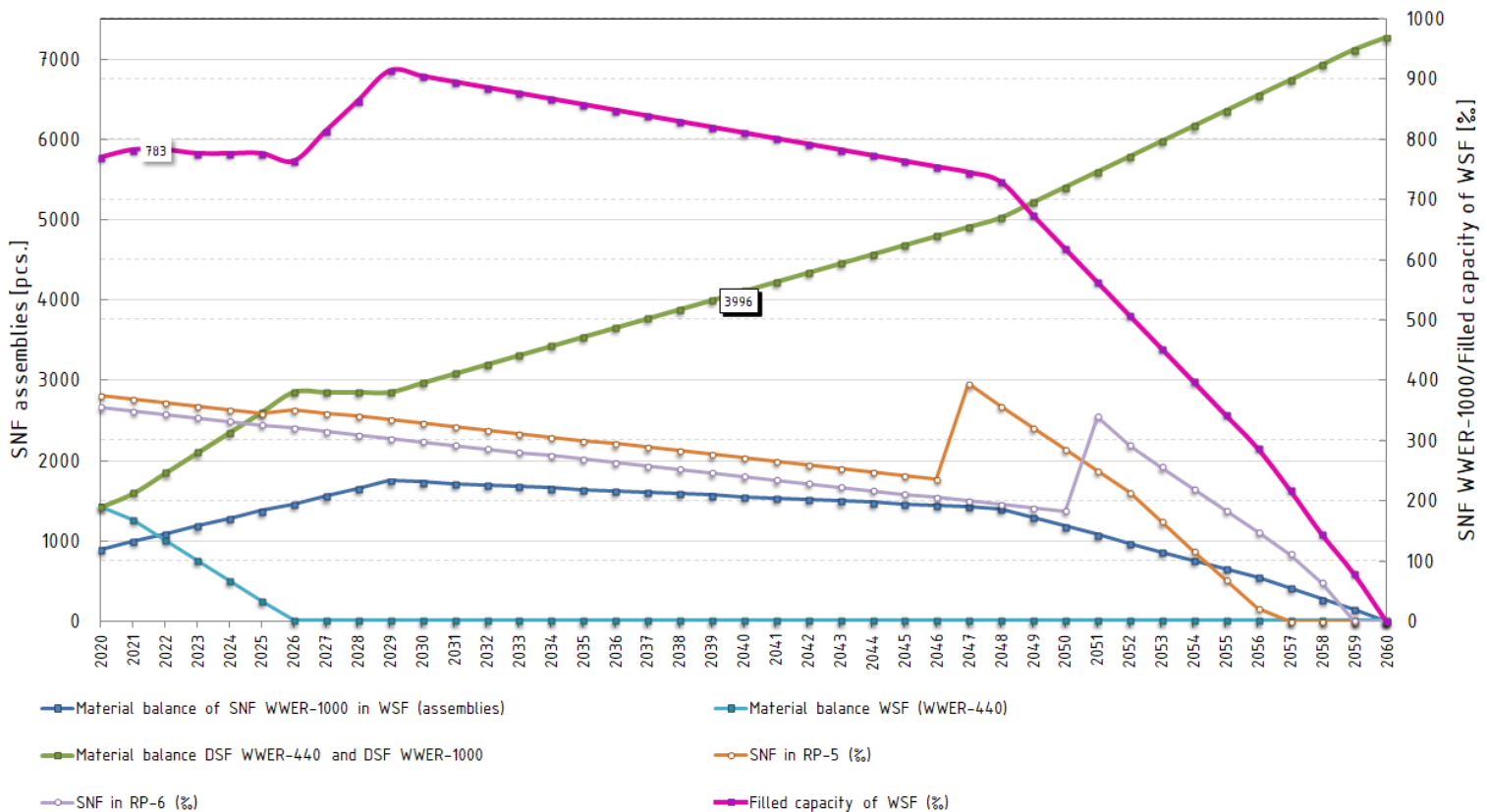


Prognoses for generation of SNF

After 20.10.2020

Material Balance of SNF for Option 2

Operation of units 5 and 6 with fuel assemblies, supplied by TVEL JSC and/or alternative vendor without transport of SNF after 2020 for reprocessing until 2060

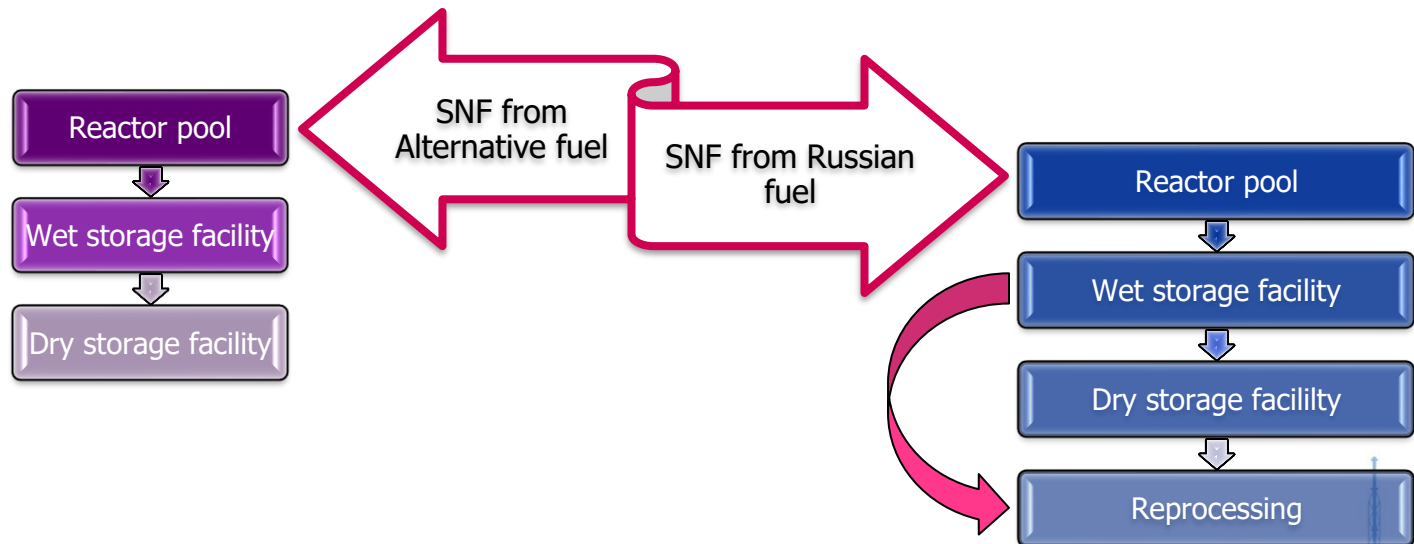


Prognoses for generation of SNF

After 20.10.2020

Option 3: Operation of units 5 and 6 with fuel assemblies, supplied by TVEL JSC and/or alternative vendor **with** transport of SNF after 2020 :

In case of building of DSF for WWER-1000 SNF assemblies and its commissioning in 2030, as long as performing of transport of ~42 tHM (1 transportation of 96 TVEL assemblies) SNF after 2020, the SNF stored onsite until the shutdown of the units could be transferred/transported from the reactor pools of units 5 and 6 and the WSF until 2060.

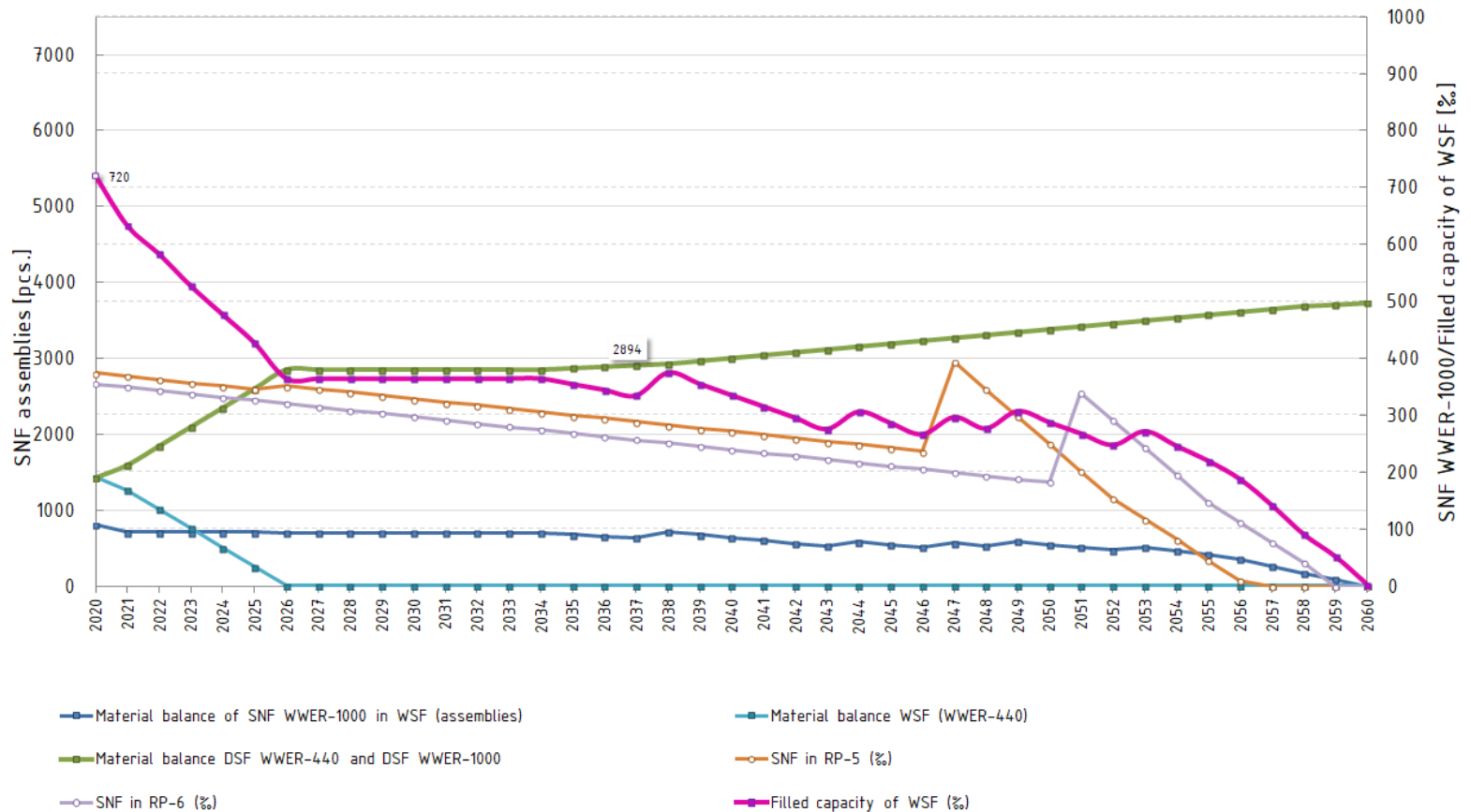


Prognoses for generation of SNF

After 20.10.2020

Material Balance of SNF for Option 3

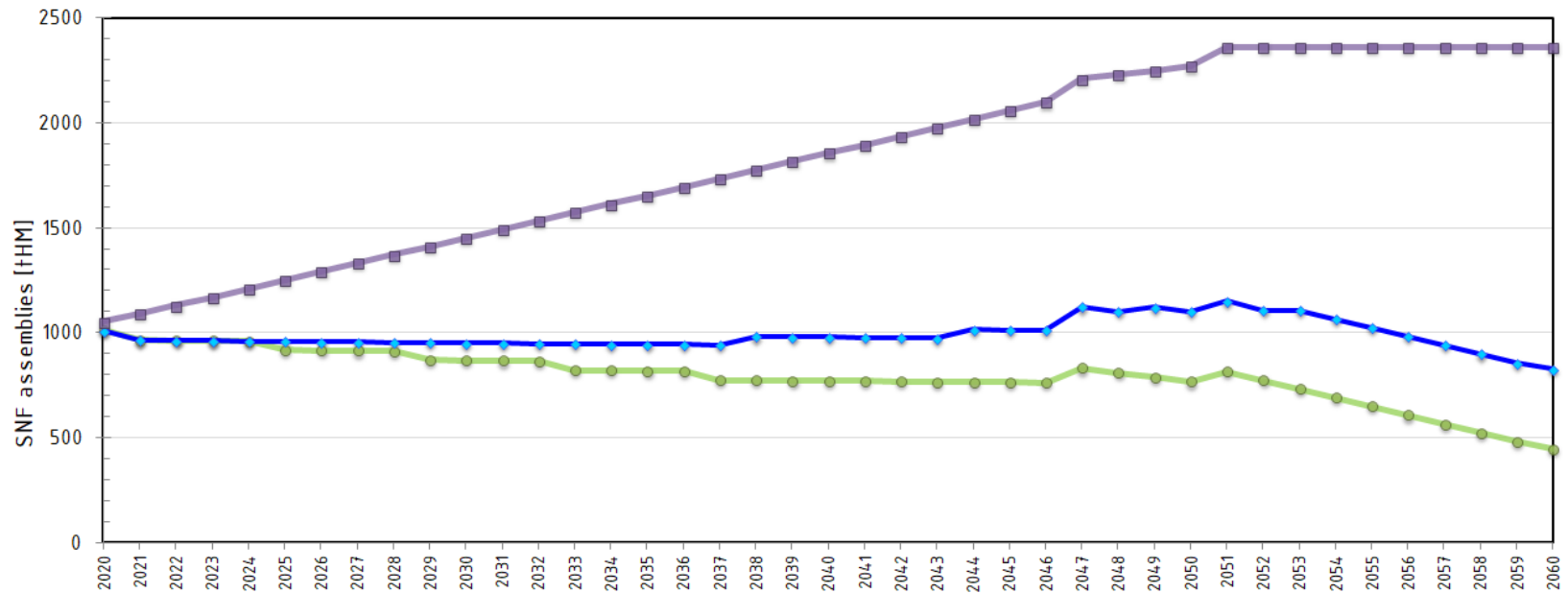
Operation of units 5 and 6 with fuel assemblies, supplied by TVEL JSC and/or alternative vendor with transport of SNF (supplied by AO TVEL) after 2020 for reprocessing



Prognoses for generation of SNF

After 20.10.2020

SNF stored on the site of KNPP with and w/out transportation of WWER-1000 SNF assemblies for reprocessing after 2020



—●— SNF stored onsite with transportation for reprocessing of WWER-1000 FAs from unit 5 and 6, generated until 2047 and 2051 respectively

—◆— SNF stored onsite with transportation for reprocessing of WWER-1000 FAs from unit 5 and 6, generated until 2047 and 2051 respectively and without transportation of SNF assemblies from alternative vendor

—■— SNF stored onsite without transportation of any fuel assemblies (resident and/or alternative)



SF Management

❖ Short-term SF management :

- Freeing storage space for SF from WWER-1000 in WSF by transferring SF from WWER-440 to Constor 440/84 and transporting them for interim storage to the DSF.
- Supplying baskets for storage of SF assemblies from WWER-1000 reactors in the WSF;

❖ Long-term SF management :

According to the Kozloduy NPP Nuclear Fuel Management Program, one or a combination of the two following approaches will be used :

- building Dry Spent Fuel Storage Facility for SF from WWER-1000;
(construction and commissioning until 2030)
- transport SF from WWER-1000 for reprocessing in Russian Federation.



THANK YOU
for YOUR
ATTENTION!

