

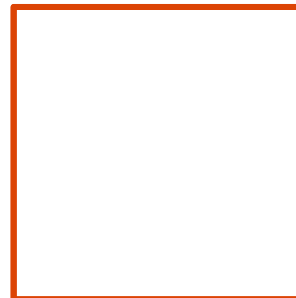
# Slovak concept of SNF treatment and its economic aspects

Juraj ROVNY - Nuclear Fuel Cycle and Radioactive Waste manager

ATOMEXPO 2015 Moscow, June 2015



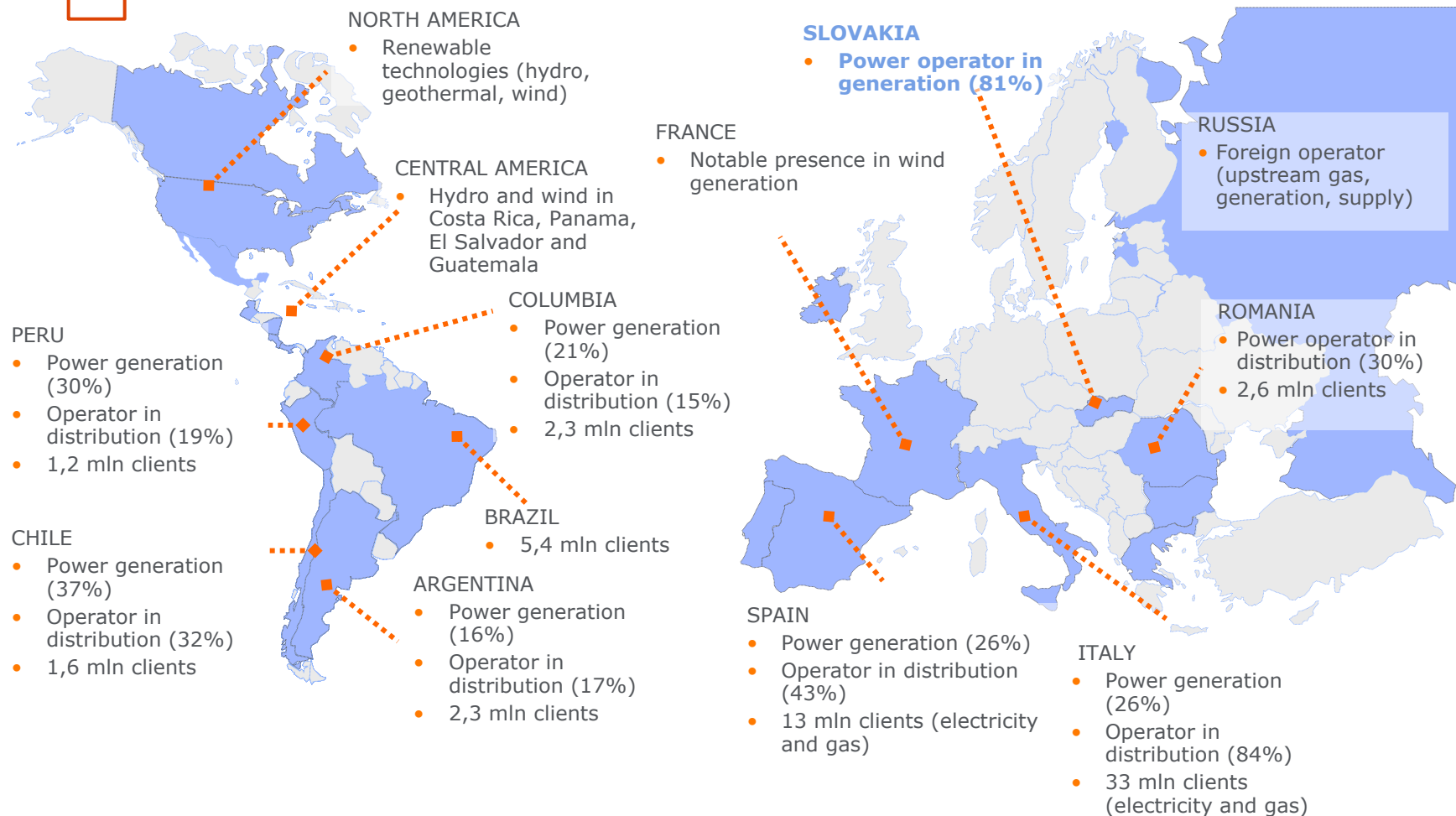
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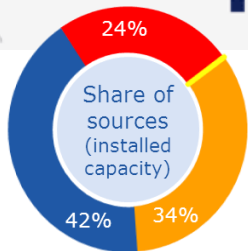
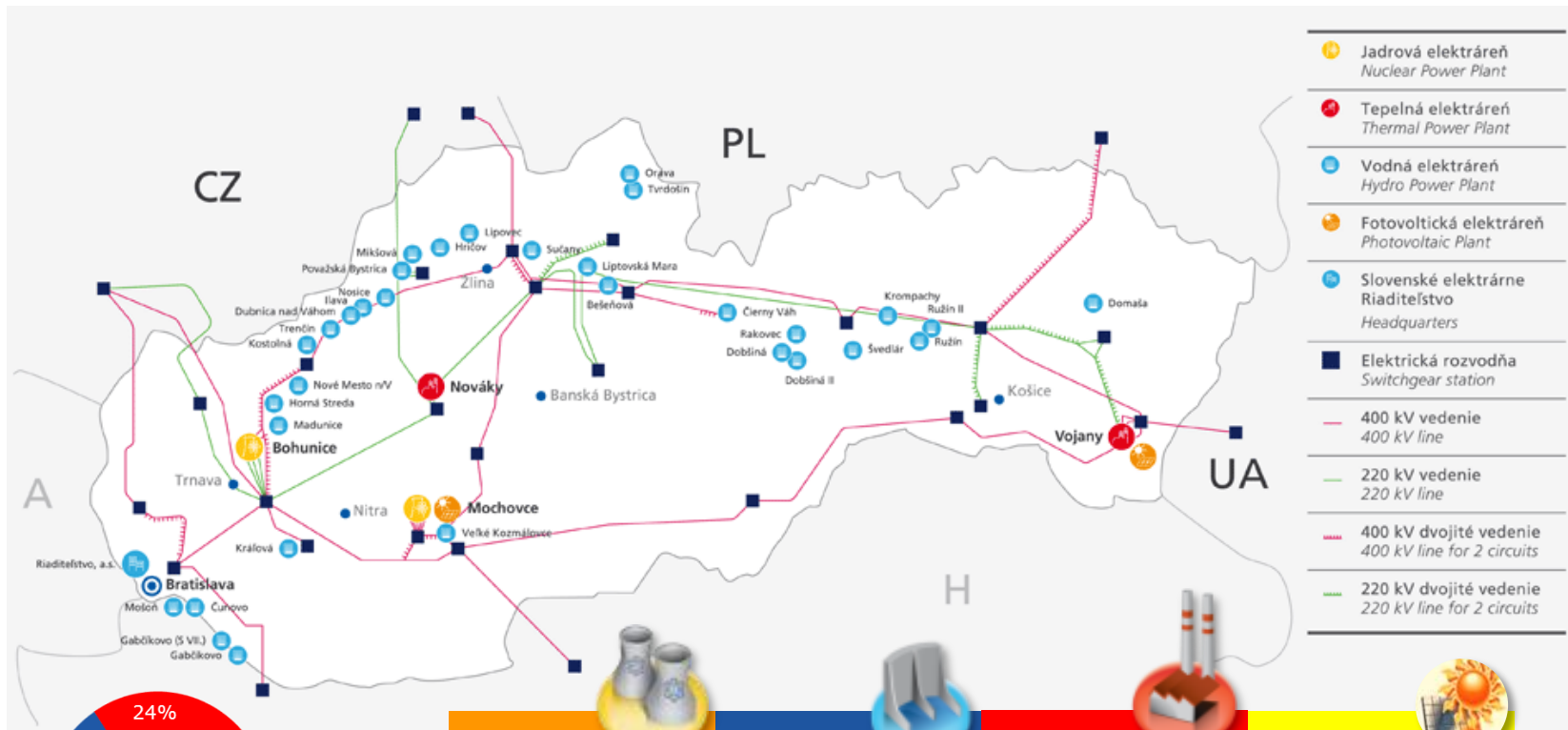


# Nuclear energy in Slovakia

## The key building block of SE portfolio



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 <b>NUCLEAR</b> Bohunice NPP 1000 MW Mochovce NPP 940 MW	 <b>HYDRO</b> 34 HPPs 2 399 MW	 <b>THERMAL</b> Vojany TPP 880 MW Nováky TPP 518 MW	 <b>PHOTOVOLTAIC</b> 2 MW
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# Nuclear installations in Slovakia

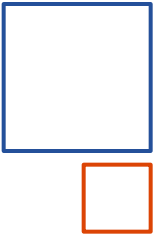


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Name	State	Type	Start of operation	End of operation	Licence holder
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Bohunice site					
Bohunice 1,2 NPP	under decom.	VVER 440 – V230	1978,1980	2006, 2008	JAVYS,a.s.
Bohunice 3,4 NPP	in operation	VVER 440 – V213	1984,1985	-	<b>SE, a.s.</b>
A-1 NPP	under decom.	KS 150	1973	1977	JAVYS,a.s.
Interim spent fuel storage	in operation	wet pool	1987	-	JAVYS,a.s.
RW treatment technologies	in operation	cementation and bituminization	1994 resp. 2002	-	JAVYS,a.s.

Mochovce site					
Mochovce 1,2 NPP	in operation	VVER 440 – V213	1998,2000	-	<b>SE, a. s.</b>
Mochovce 3,4 NPP	under constr.	VVER 440 – V213	-	-	<b>SE, a. s.</b>
Final liquid RW treatment	in operation	-	2007	-	JAVYS,a.s.
National RW repository	in operation	surface	2001	-	JAVYS,a.s.

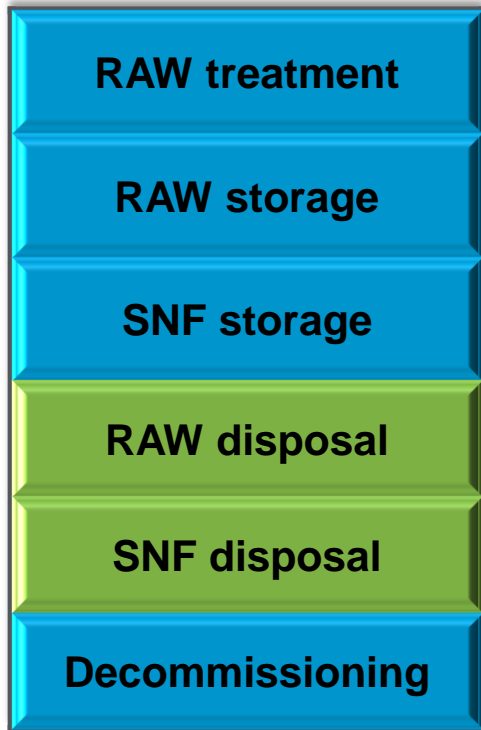


# Division of responsibilities in the nuclear back-end in Slovakia

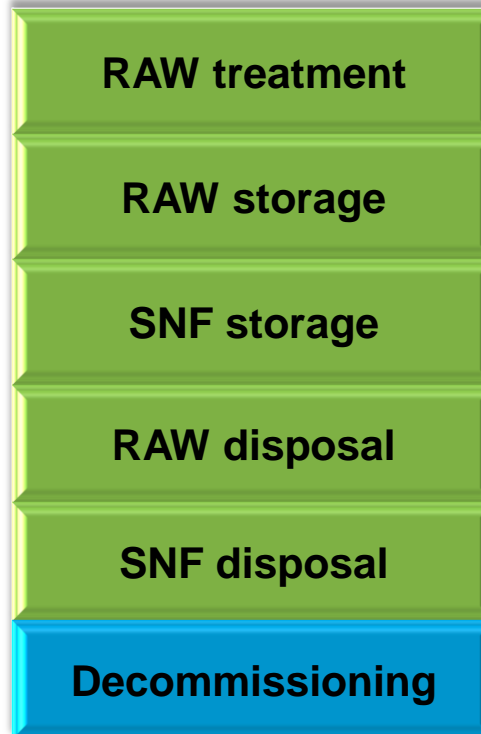


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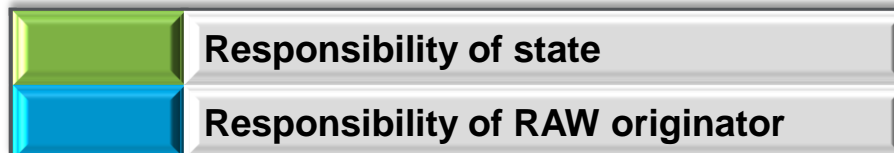
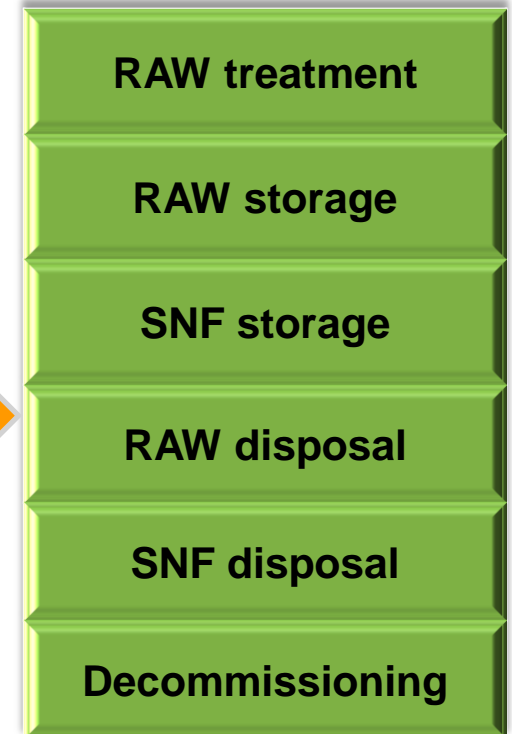
## Before 2013



## Since 08/2013



## Planned from 2016





# Modification of legislation in 2013



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## According to the amendment of the Atomic Act since August 2013:

- **NPP operator is obliged to hand over all RAW and SNF to the appointed organization only (JAVYS) that is state-owned.**
- **NPP operators are not allowed to build own SNF storage facilities.**

## Remaining issues:

- **New regulatory regime does not correspond with responsibilities related to RAW and SNF (operators remain fully responsible despite obligation to hand over).**
- **Regardless the absence of other options, prices for these services are subject to mutual agreement between the operator and the appointed organization (JAVYS).**

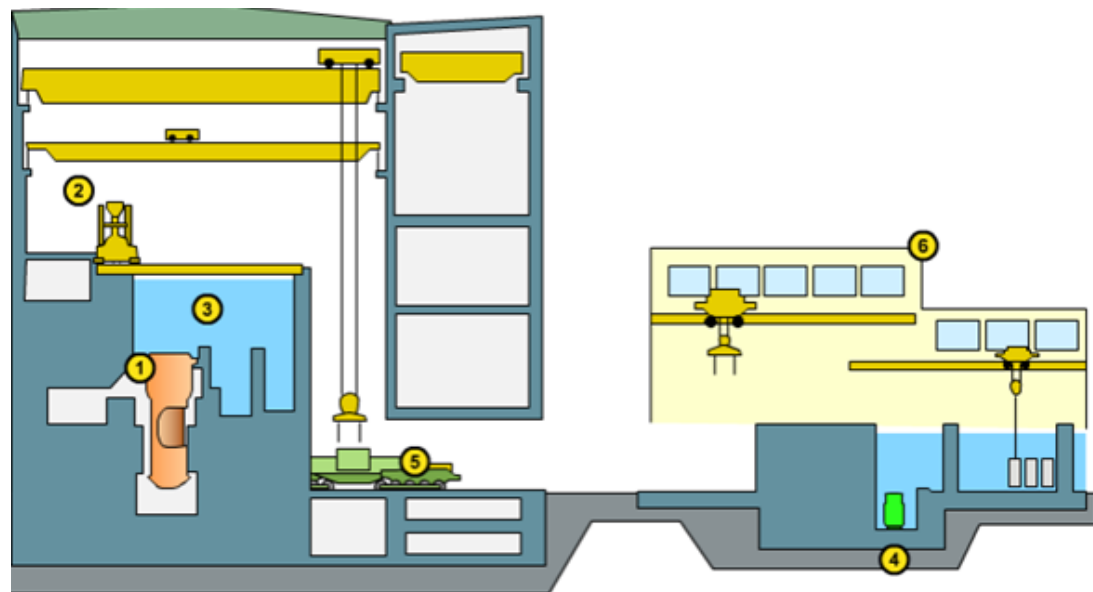
**This situation called for broader modification of legislation**

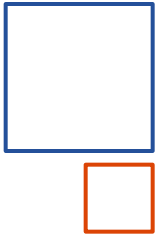
# Interim Spent Fuel Storage in Slovakia



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- SNF currently stored in Wet type storage in Bohunice
- Transports from Mochovce done by railway, transports from EBO34 within the site
- Commissioned in 1987, large modernization 1996 – 1999





# Interim Spent Fuel Storage in Slovakia Wet Storage



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## Basic Technical Parameters of the ISFS

Maximum project storage capacity	14,112 spent fuel assemblies
Number of storage pools	3 in operation + 1 reserve
Pool dimensions (l × w × d)	23.4 × 8.4 × 7.2 m
Storage magazine types	KZ-48, T-13
Storage method	Wet storage in demineralized water
ISFS maximum number of magazines	294 pcs. KZ-48
Number of magazines in one pool	98 pcs. KZ-48
Designed cooling power	2,533 kW
Cooling medium	Demineralized water
Maximum cooling medium temperature	50 °C



# SNF Quantities

NPP	Spent fuel assemblies
EBO12	5 143
EBO34	4 606
EMO12	1 536
Total	11 285 (= 1 350 t)

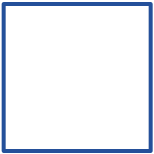


# Transportation of SNF



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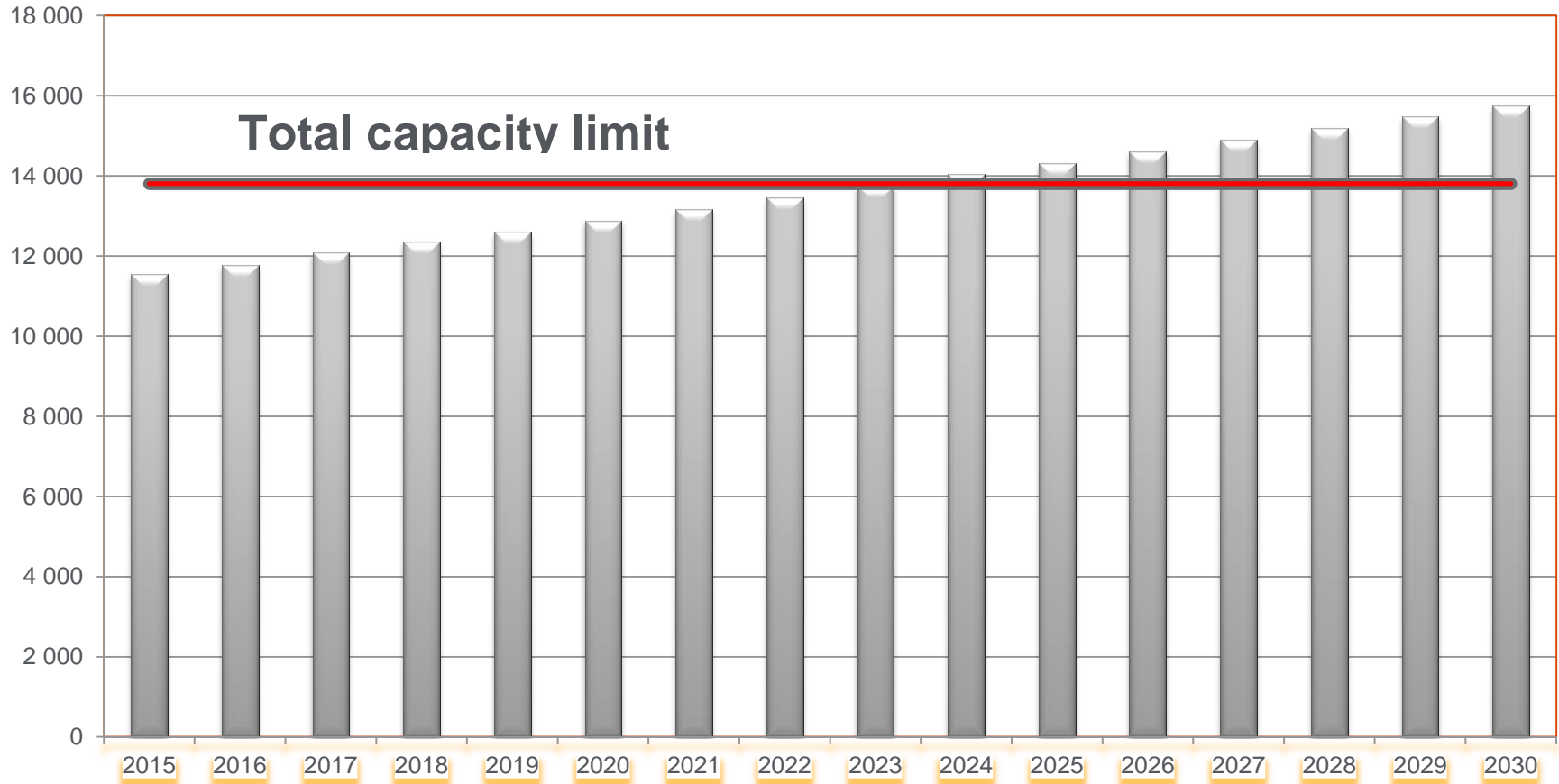




# Capacity of the storage



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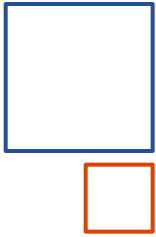
# New storage capacity



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- **Needed from about 2023**
- **Project of new dry storage has been already launched – currently in Environmental Impact assessment phase**
- **Technology/supplier has not been selected yet**





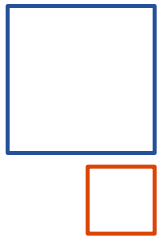
## Final Solution



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- **Wet storage is the last currently existing stage**
- **National strategy on Nuclear energy back end counts on **Deep geological repository** on either international or national level (2065)**
- **National nuclear fund collects necessary financial resources to finance the project**



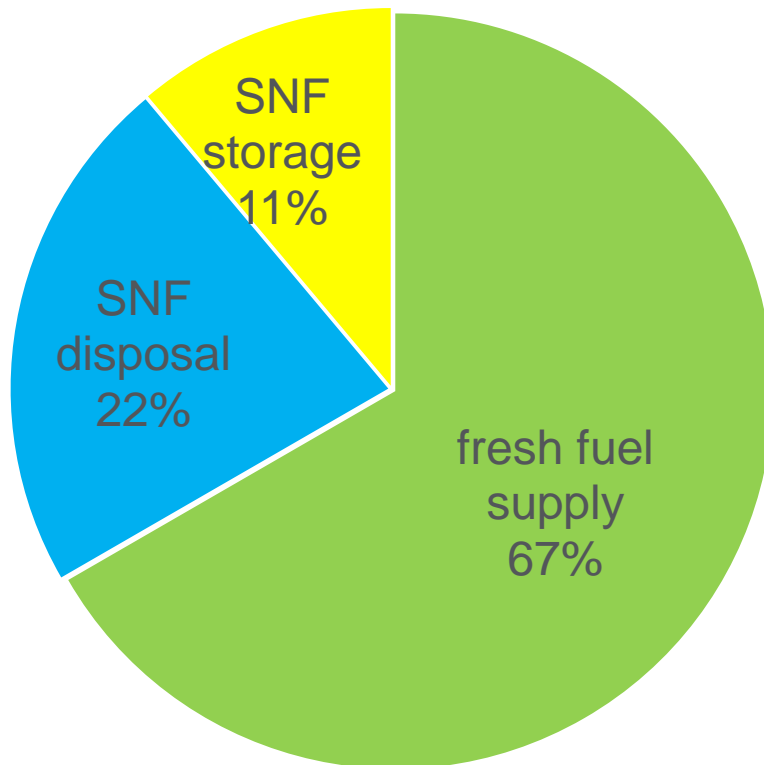


## Fuel cycle economy



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### Nuclear fuel cycle **front-end** vs. **back-end** costs



- **Total fuel cycle back-end costs reach about 50% of the fresh fuel supply costs.**
- **Total estimated costs of Deep geological repository is 3 200 mil. Eur (in 2015 Eur).**
- **Would reprocessing bring cost savings?**

# Conclusions



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- **Slovakia has well developed infrastructure for safe SNF handling**
- **Recent changes in legislation provide re-define responsibilities between the operator and state**
- **The final solution of the fuel cycle is determined also by the economy.**
- **SNF reprocessing is being investigated as an alternative – needs consensus of all stakeholders in the country inc. government**



# Juraj ROVNY

juraj.rovny@enel.com

Slovenske elektrarne – ENEL

Mlynske nivy 47, 821 09 Bratislava



Slovenské elektrárne is an Enel Group Company

Juraj Rovny graduated from the Czech Technical University in Prague where he had gained a Master degree in the theory and techniques of nuclear reactors at the Faculty of nuclear sciences and physical engineering. He made part of his studies at the Royal institute of Technology in Stockholm and took his second degree in industrial management at the University in Leuven in Belgium.

He worked shortly as a researcher for Framatome ANP in Germany and Nuclear Research Institute in Rez in Czech Republic. In 2005 he joined the Nuclear regulatory authority of the Slovak Republic where he worked as a Director of nuclear safety division.

Since 2012 he works as Nuclear fuel cycle and radioactive waste manager in Slovenske elektrarne – ENEL in Bratislava, Slovakia. He is responsible for nuclear fuel cycle front end and back end and radioactive waste matters at the corporate level. He has participated at the development of national legislation in nuclear energy back end.