



Plans for deployment SMR in the Czech Republic

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Regional Workshop on Safety Benefits and Challenges in the Development of the Adoption of Small
Modular Reactors

31 March - 4 April 2025, Daejeon, Republic of Korea

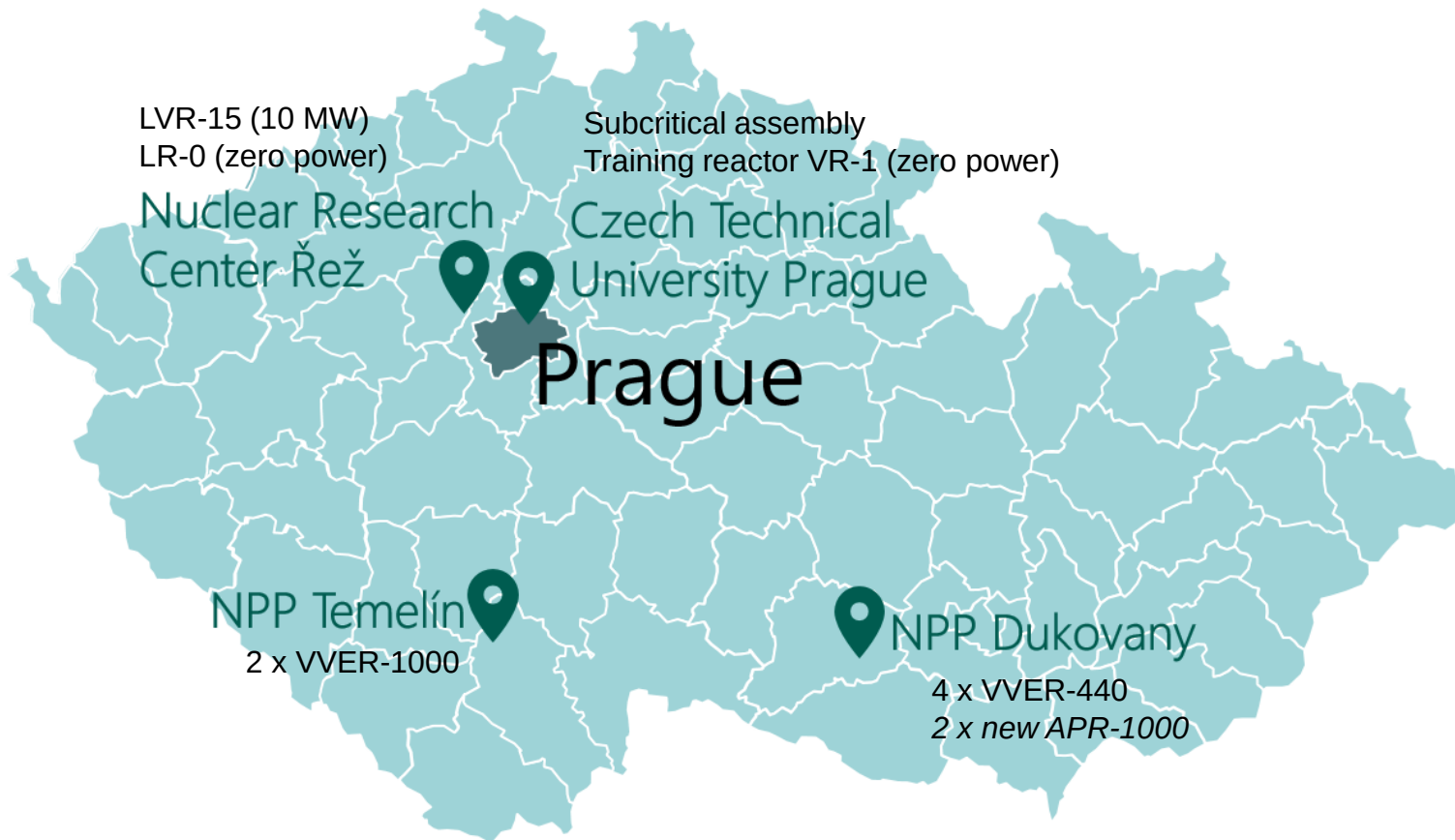


Outline

- Czech nuclear profile
- Energy sources – current situation and strategy for future
- Plans and activities regarding SMRs



Nuclear instalations with a nuclear reactor



Nuclear facilities – key facts

Site	Nuclear installation	No. of units	Type	Commissioning	Operator
Dukovany	NPP	4	VVER 440/213	1985-1987	ČEZ
	Interim Spent Fuel Storage Facility	1		1995	ČEZ
	Spent Fuel Storage Facility	1		2006	ČEZ
	Radioactive Waste Disposal Facility	1		1995	SÚRAO
Temelín	NPP	2	VVER 1000/320	2000-2004	ČEZ
	Spent Fuel Storage Facility	1		2010	ČEZ
	Fresh Fuel Storage Facility	1		2000	ČEZ
Řež	Research Reactor	1	LVR 15	1972	CV ŘEŽ
	Research Reactor	1	LR-0	1995	CV ŘEŽ
	Spent fuel and high level waste storage facility	1		1997	ÚJV ŘEŽ
Prague	Training Reactor	1	VR-1	1992	ČVUT
	Subcritical Assembly	1	VR-2	2025	ČVUT
Litoměřice	Radioactive Waste Disposal Facility RICHARD	1		1964	SÚRAO



Nuclear power plants

- Dukovany NPP – LTO regime, 2x power uprate
- Temelin NPP – preparing for LTO

Source: IAEA Power Reactor Information System, and CEZ

Facility Name		Dukovany NPP			
Location		Dukovany			
Owner		CEZ			
Operator		EDU			
Reactor Supplier		SKODA			
Reactor Typy		WWER 440 213			
Net Capacity		4 x 500 MW			
	Status	Construction started	First criticality	First grid connection	Commercial operation
Unit 1	Operational	1 Jan 1979	12 Feb 1985	24 Feb 1985	3 Nov 1985
Unit 2	Operational	1 Jan 1979	23 Jan 1986	30 Jan 1986	21 Sept 1986
Unit 3	Operational	1 Mar 1979	28 Oct 1986	14 Nov 1986	20 July 1987
Unit 4	Operational	1 Mar 1979	1 June 1987	11 June 1987	19 Jan 1988

Facility Name		Temelín NPP			
Location		Temelín			
Owner		CEZ			
Operator		ETE			
Reactor Supplier		SKODA			
Reactor Typy		WWER 1000			
Net Capacity		2 x 1000 MW			
	Status	Construction started	First criticality	First grid connection	Commercial operation
Unit 1	Operational	1 Feb 1987	1 oct 2000	1 Dec 2000	1 May 2001
Unit 2	Operational	1 Feb 1987	1 Jan 2002	1 Mar 2002	1 Aug 2002



Current state of generation capacities of the Czech electricity system

The current structure of the production and energy mix of the electrical grid of the Czech Republic by source categories

Fig. 4.7 Concurrent operation of nuclear sources

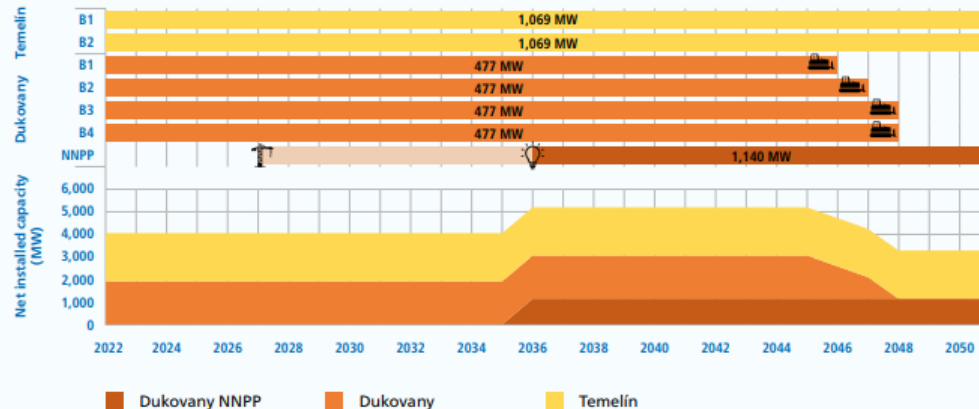
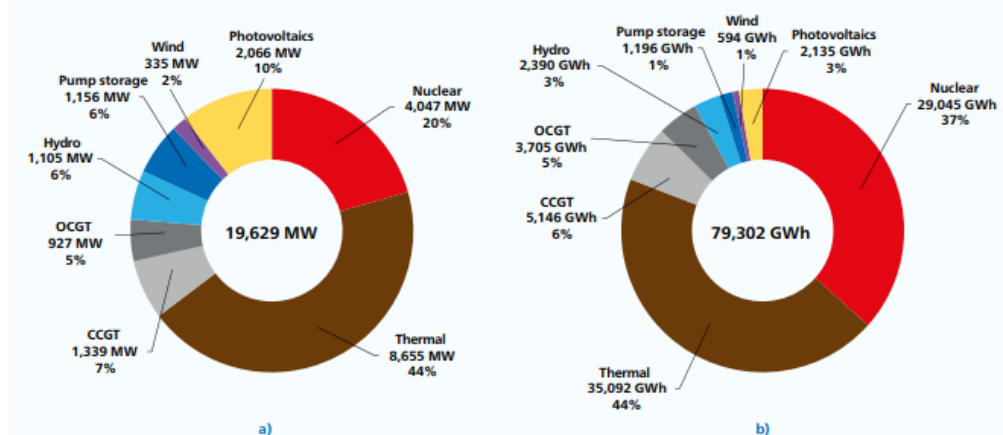


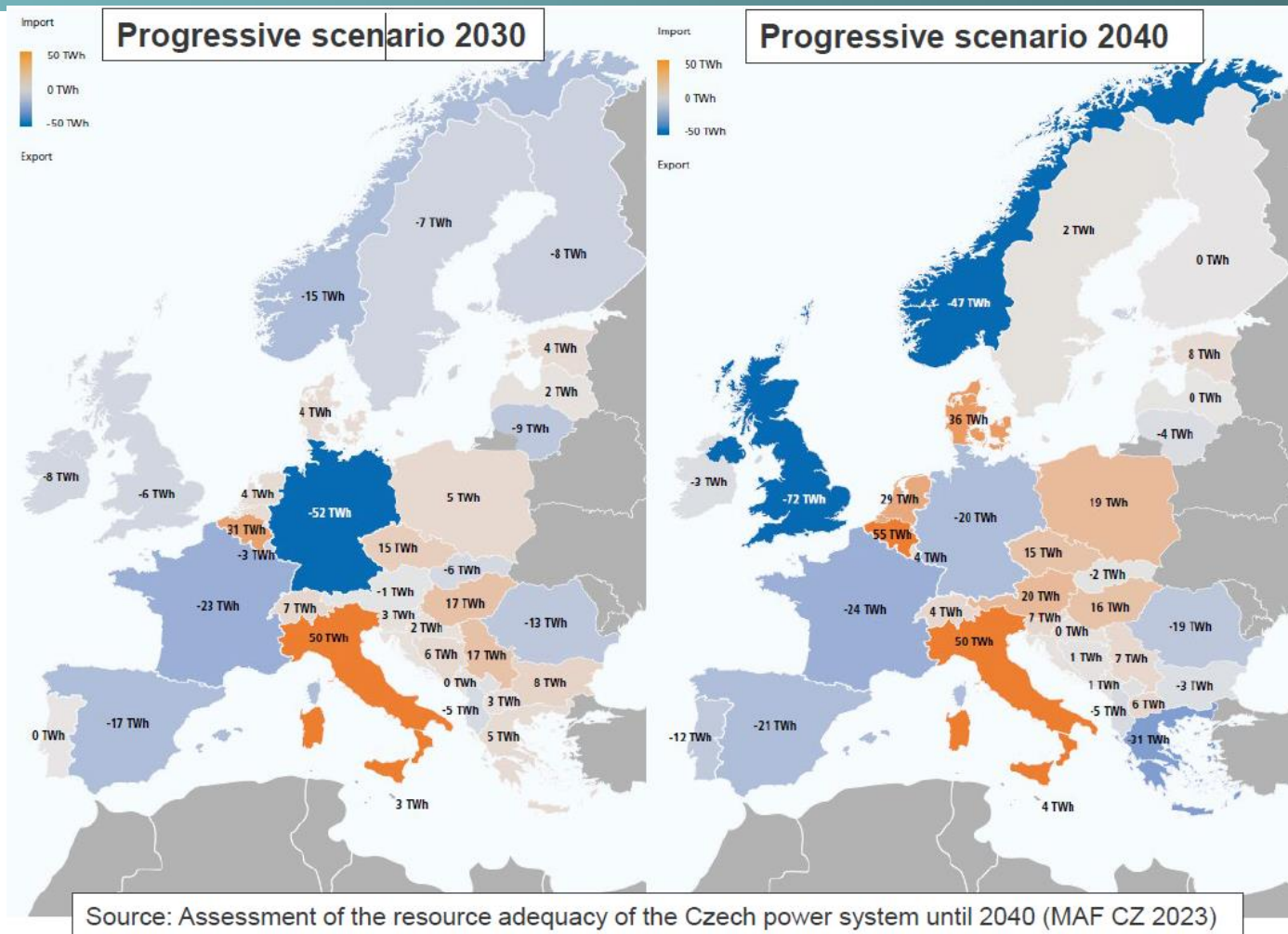
Fig. 4.1 a) Net installed capacity and b) Net electricity production in the EG of the Czech Republic in 2021, source: ERU





Predicted development

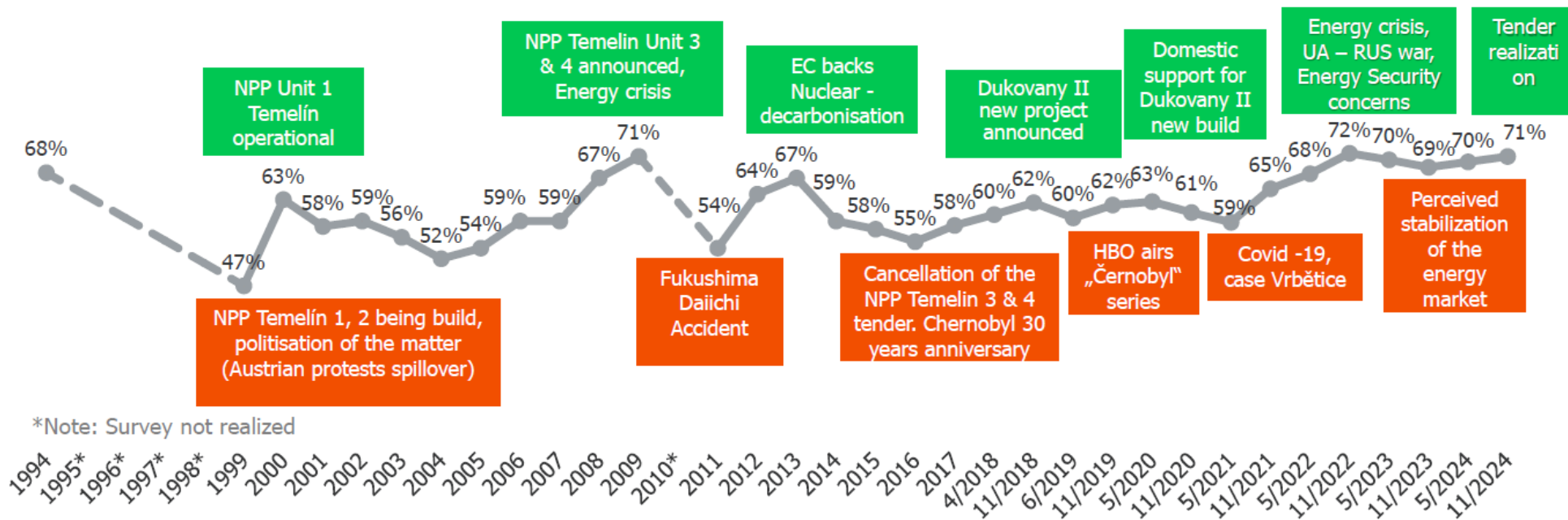
- The progressive scenario represents a faster transition of coal power to greater integration of renewable energy sources.
- The sensitivity analysis (CEPS, MAF 2023) shows the need for repowering as early as 2030, where for the Progressive Scenario it indicates a need for 3 GW or up to 4,1 GW.
- Probable baseline scenario 2+2 NPP at Dukovany and Temelin sites, SMR at Temelin site and other SMRs as a completion.





Public perception

Public support for nuclear is constantly one of the highest in the world





Adoption of the Energy Policy

- **State Energy Policy** still to be adopted
 - The last update was made in 2015
 - Goals and priorities in the energy sector to ensure sufficient energy (affordable prices, meeting climate targets)
 - The aim is to contribute to achieving climate neutrality at EU level by 2050. The basis for the energy transition is the significant development of renewable energy sources, a temporary moderate increase in the use of gas, a gradual decline in coal-fired production and a stable role for nuclear both in electricity generation and increasingly in heat generation
- **National Energy and Climate Plan** adopted in December 2024
- **National Action Plan for nuclear energy development** – following SEP adoption
- **Concept of radioactive waste and spent nuclear fuel management** - following SEP adoption



The future of the Czech Republic's energy mix

Projected production by generation sources according to the State Energy Concept for 2030 - 2040 – 2050
Gross electricity production in %

2030	10 %	7 %	45 %	37 %	1%
2040	0 %	1-5 %	47 - 65 %	37 - 47 %	1 - 2 %
2050	0 %	0 %	36 - 50 %	43 - 56 %	7 - 8 %
					
	Coal and natural gas		Nuclear	Renewable resources	Hydrogen and others

Source: The State Energy Conception Update (SEC)



Activities of Ministry of Industry and Trade

Czech SMR Roadmap – Applicability and Contribution to Economy (approved 2023)

- The Government tasks (Government Res. No. 808):
 - ✓ – use the Roadmap as **an input for the State Energy Policy**,
 - analyse **ownership, operation and financing models** for SMRs including state aid,
 - ✓ – negotiate and support the **involvement of the Czech companies** in the SMR supply chains,
 - ✓ – inform the Government on the possibilities of using **intergovernmental agreements for cooperation in the field of SMRs**,
 - ✓ – propose the **streamlining of licensing and permitting processes** for SMR technologies,
 - assess the need to define the sites listed in the SMR Roadmap in the **spatial planning documentation** of regions and municipalities,
 - negotiate with investors the **preparation of preferred sites and associated infrastructure**,
 - ✓ – recommend to the Governors and the Mayor of Prague to cooperate in the implementation of the SMR Roadmap.



SMRs – potential investors/operators

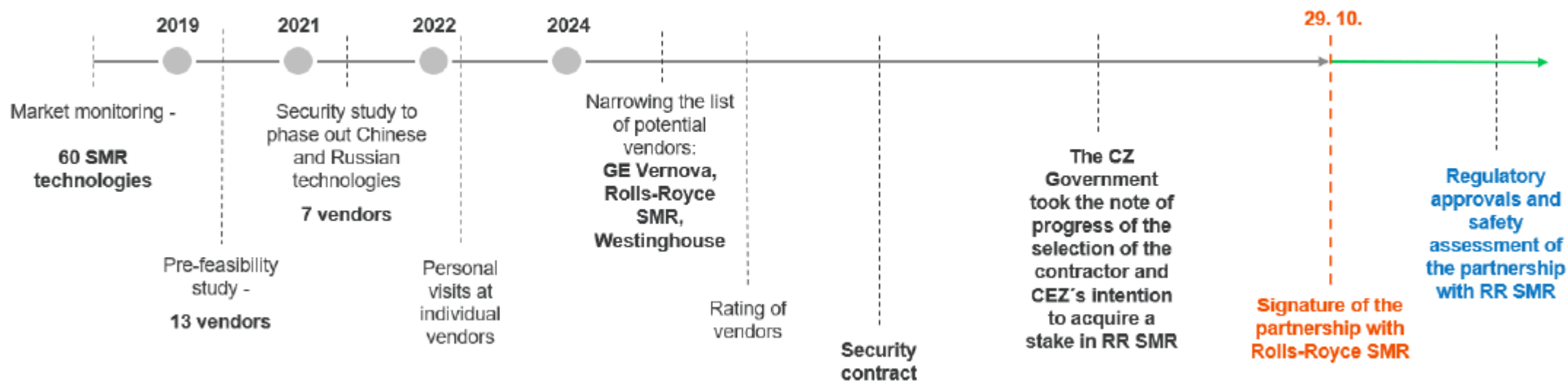
Potential investors/operators of SMR who have already started consultations with regulatory body:

- CEZ group
 - Nuclear operator
 - SMR design: RR SMS, GE Hitachi, Westinghouse
- ORLEN/Unipetrol
 - Non-nuclear operator (petrochemical industry)
 - SMR design: GE-Hitachi
- Sokolovska uhelna and SUAS GROUP
 - Non-nuclear operator (coal and oil energy company)
 - SMR design: not selected yet
- Other interested parties?



SMR program of the CEZ group

Timeline of key historical and future milestones related to the selection of a partner for the SMR Program (illustrative timeline):



Operation of SMR Temelin from **2032**

Operation of SMR units on other sites from **2035**



SMR program of the CEZ group



- Rolls-Royce SMR and CEZ group decided to partner to deploy SMR's in UK and in the Czech Republic
- Technology and strategic partnership was signed on 29th October 2024
- The plan is to deploy up to 3 GWe in the Czech Republic using RR SMR power plants
- CEZ will make an investment into RR SMR by acquiring a stake of approx. 20 %
- Successful closing of the partnership is subject to customary regulatory clearances and security assessments by Q1/Q2 2025

The strategic partnership between CEZ and Rolls-Royce SMR represents an opportunity to establish long-term collaboration between governments, research, and supply chain companies beyond SMR construction projects.

ČEZ takes Rolls-Royce SMR stake, plans to deploy 3GW fleet

Tuesday, 29 October 2024



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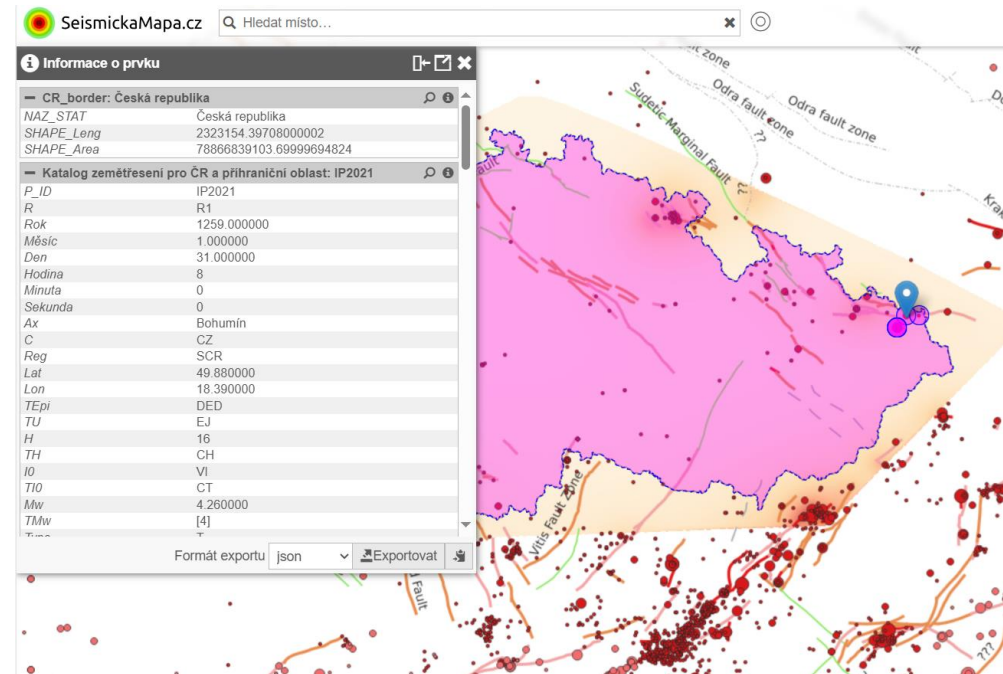
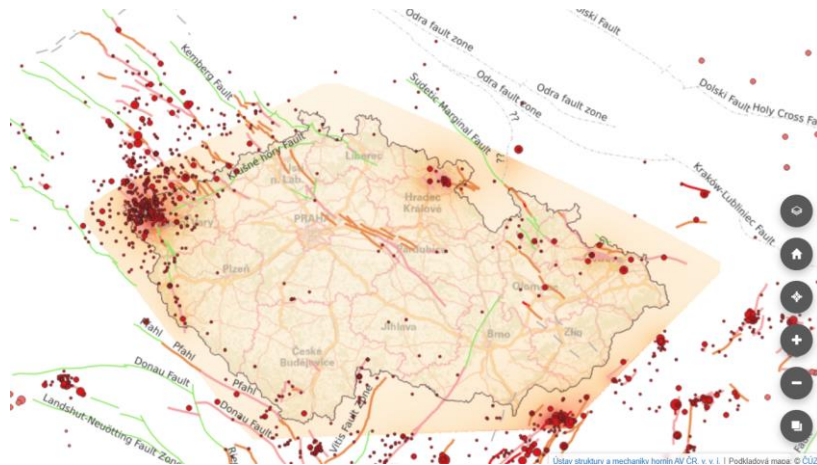


(Image: Rolls-Royce SMR)



Interactive seismic map of the Czech Republic

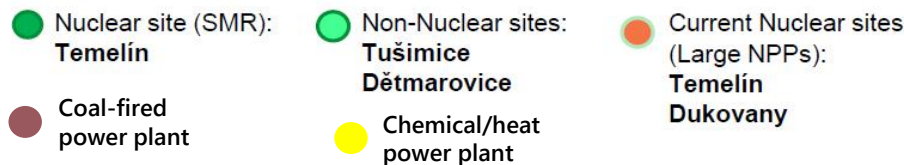
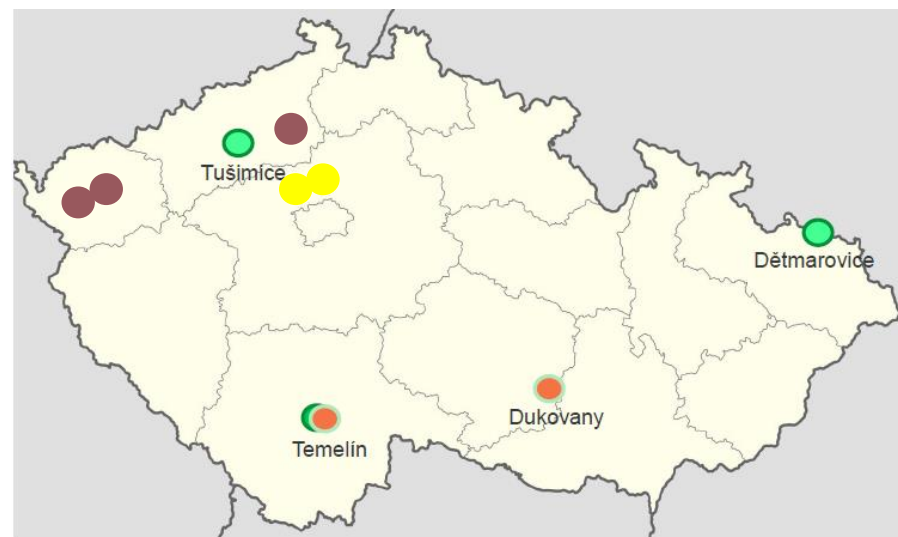
- R&D project, supported by The Czech Technology Agency (2020-2023)
- It provides seismic hazard parameters (seismic hazard probability curve, uniform spectrum, vs30) on the map of the Czech Republic.
- It serves as a basis for seismic safety assessment of nuclear installations.





SMRs – Potential Sites

- CEZ SMR Program
 - Temelin nuclear site
 - Tusimice coal-fired power plant site (*challenges due to hydrological conditions*)
 - Detmarovice site coal-fired power plant (*concerns include lower geological stability, high population density, and proximity to Poland (800 m), raising EPZ issues*)
- Other sites are also potentially suitable (brownfields - *former mining sites with lower geological stability*).
- Several parameters define the potential of given location. These are measured and analyzed thorough ongoing fieldwork on-site.





Temelin site

Site and internal infrastructure

- Preparation of connection points on Temelin site
- Site surveys
 - A draft geological model has been prepared for area of SMR; further geological surveys to follow in 2025
- Site monitoring
 - Four hydrogeological wells in the area of the SMR
 - Long-term monitoring of groundwater levels and quality, update of the groundwater flow mathematical model in progress

External Related Investments

- The scope will be determined after the issuance of the EIA statement
- Oversized and heavy components transportation

Permitting process

- EIA process
 - EIA Project Notification submitted to Ministry of Environment in 11/2024
 - Currently scoping process of the EIA is being assessed
 - Works on EIA documentation have started
- Sitting permit under Atomic Act
 - Preparation of ISAR, radiation monitoring program, management system documentation, physical protection, etc.

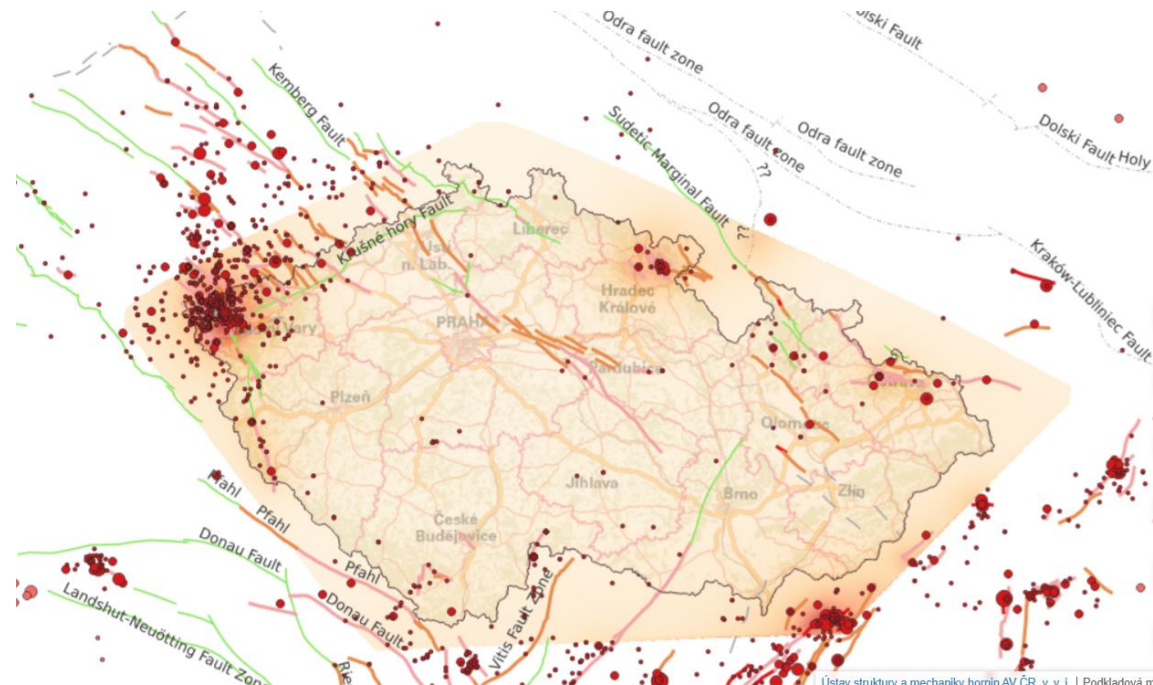


Application for siting in 2025, for construction in 2027 - general timeframe for deployment in **mid 30s+**



Tisova & Vresova sites

- **Sokolovska uhelna, SUAS GROUP**
- Tisova & Vresova: Former mining sites with lower geological stability
- **PROJECT PHOENIX (USA FIRTIS Program)** providing technical assistance to support the pursuit of the conversion of coal-fired power plants to SMR nuclear energy generation
 - assessing the suitability of the site in terms of nuclear reactor cooling, power output, geology and other technical aspects of operation
 - currently suspended





Conclusion

- Main objective of the SMR program is preparation and implementation of SMR program with installed capacity of 3GWe by 2050.
- SMRs are not replacing big reactors but serve as an addition to energy generation.
- SMRs are a promising clean and efficient alternative in the heating industry.
- The SMR program is a significant opportunity for developing the nuclear sector in the Czech Republic. It has the potential to significantly contribute to the country's economic development in a high-valued-added area.
- Opportunity of SMRs depends on the speed of acquiring Framework – legislature, investment capital, human resources.



QUESTIONS?



Prague