ÚJV Řež, a. s.
Division ENERGOPROJEKT PRAHA

Czech Experience and Plans with Utilization of Nuclear Power Plants and Applications for Central Heating

SMR and advanced world nuclear technology for industrial applications conference

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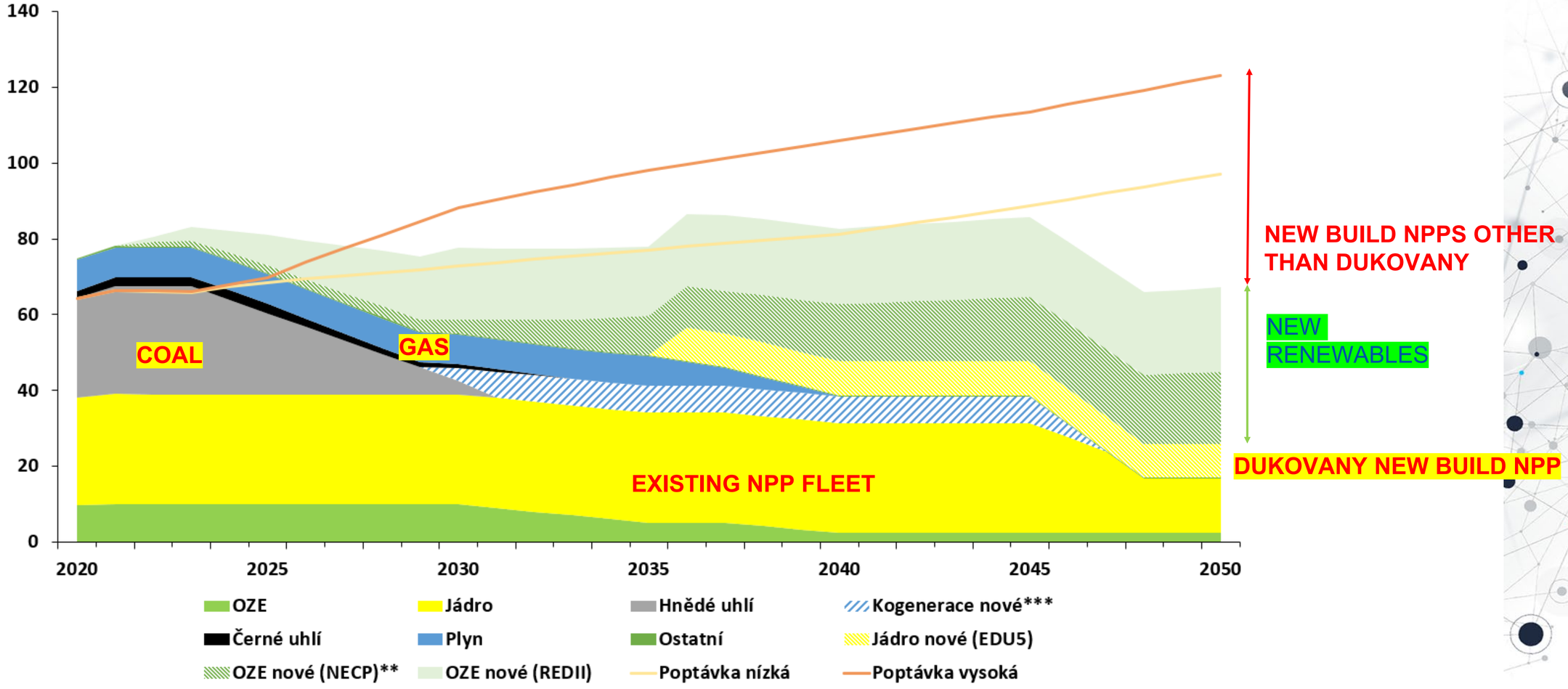
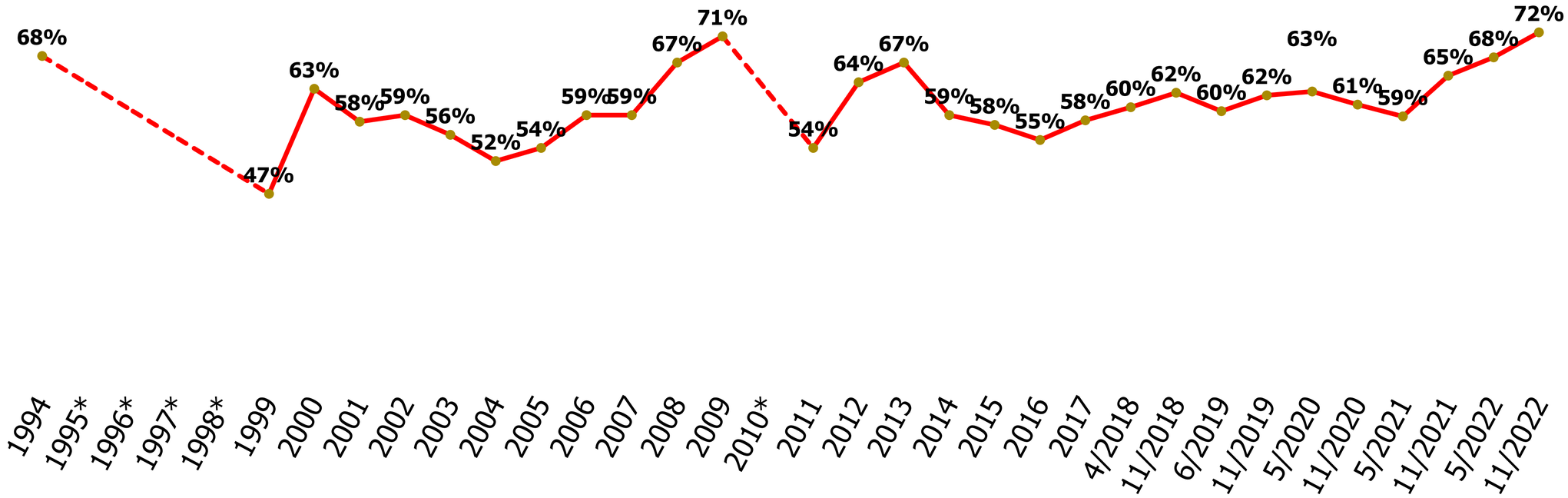
CONTENT OF THE PRESENTATION

- Energy situation and prospects in Czech Republic
- District Heating in Czechia
- Utilization of heat from existing Nuclear Power Plants

ELECTRICITY GENERATION IN CZECH REPUBLIC IN YEARS PER SOURCES



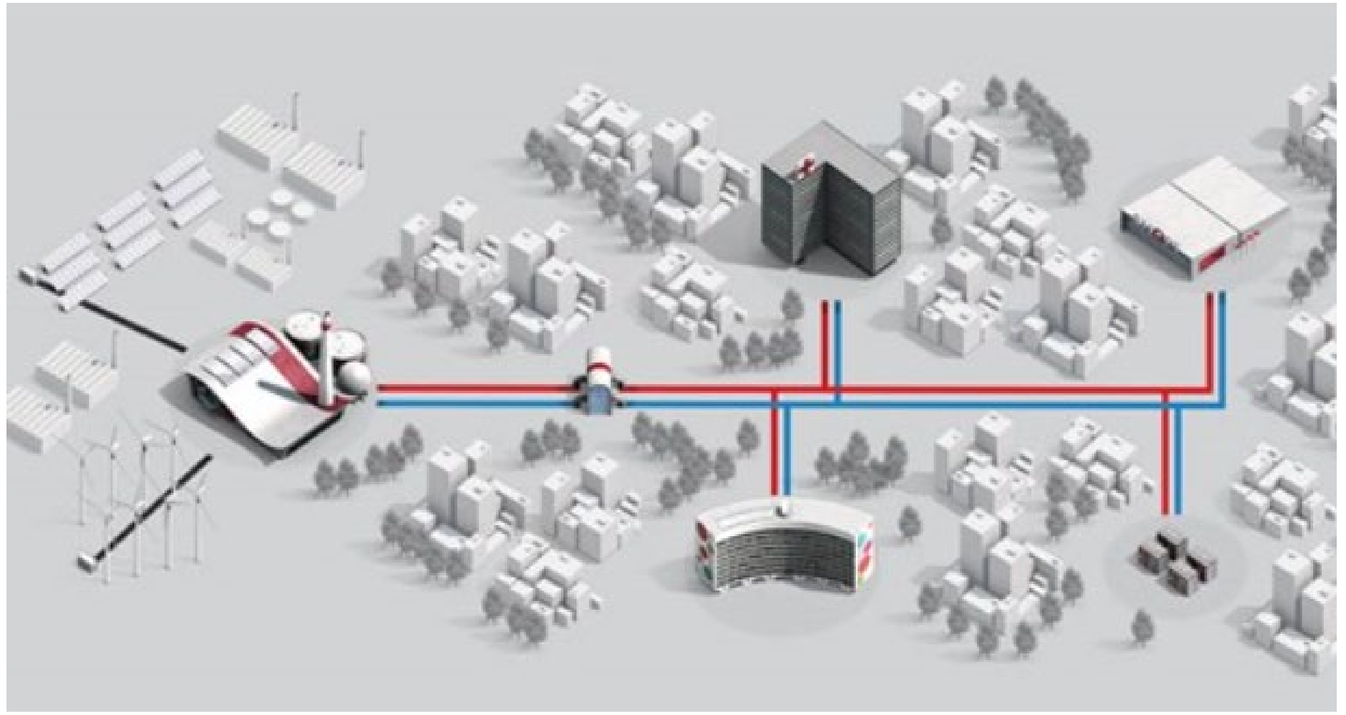
PUBLIC ACCEPTANCE OF NUCLEAR ENERGY IN CZECH REPUBLIC



DISTRICT HEATING IN CZECHIA

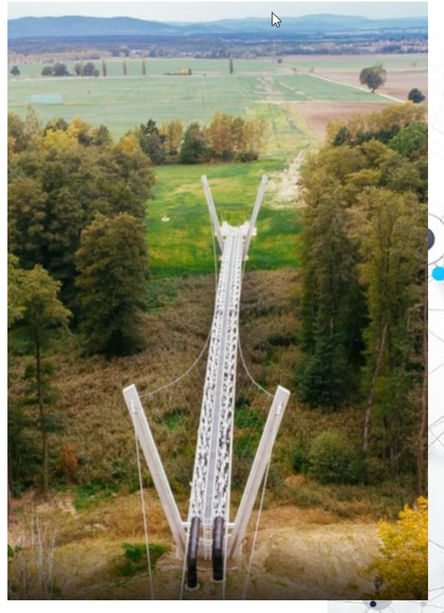
Current situation in 2020 Central Heating System:

- Thermal capacity of district heating in CZ : 40 000 MWt
- Installed thermal capacity of large heating plants in the CZ : 18 000 MWt
- Annual supply (data 2020]: 96 080 TJ
- Number of supplied household : 990 720



HEAT SUPPLY FROM TEMELIN NPP

- **Infrastructure:**
  - The heat is delivered through two 26-kilometer-long pipelines, buried at least 1.3 meters underground.



- **Construction Details:**
  - The construction took four and a half years and uses the latest technology. It includes two special pipelines, each 26 kilometers long, buried at least 1.3 meters underground.
  - The construction of the 26-kilometer-long heat pipeline cost 2.4 billion CZK, higher than the initially estimated 1.69 billion CZK.
  - The water supplied to the Budějovice heating plant was heated to 110°C on average, with peak winter temperatures reaching up to 140°C.

- **Heat Supply from Temelín:**
  - The Temelín Nuclear Power Plant supplied 50 terajoules (TJ) of heat to České Budějovice in the first month of operation.
  - Over the past year, the Temelín Nuclear Power Plant supplied 663,000 gigajoules (GJ) of heat to České Budějovice and 168,000 GJ to Týn nad Vltavou.

HEAT SUPPLY FROM TEMELIN NPP

- **Environmental Impact:**
  - The heat supply will reduce emissions by approximately one-third, saving over 80,000 tons of CO2 annually.
- **Efficiency:**
  - The combined production of electricity and heat is highly efficient, with minimal impact on the plant's electrical output.
- **Future Plans:**
  - The heat supply is expected to continue for at least 20 years, contributing to cleaner air and reduced reliance on coal. During this perios is also expected the heat pipeline is cover 30% of the heat demand in České Budějovice.

HEAT SUPPLY FROM DUKOVANY NPP TO BRNO

- **Infrastructure:**
  - The pipeline will be 42 kilometers long, buried deep underground to avoid disrupting the landscape, and will serve several municipalities along its route.

- **Construction Details:**
  - The pipeline is expected to start supplying heat by January 1, 2031, with trial operations beginning by the end of September 2030.
  - The total project cost is estimated at 19 billion CZK, with funding from both company investments and potential EU grants.
  - The pipeline will serve several municipalities, including Brno, Rosice, Neslovice, Zbýšov, Ivančice, Oslavany, Moravský Krumlov, and Dukovany.

- **Heat Supply from Dukovany:**
  - The hot water pipeline from the Dukovany Nuclear Power Plant to Brno represents a significant step towards sustainable and stable energy in the region.

HEAT SUPPLY FROM DUKOVANY NPP TO BRNO

- **Environmental and Economic Benefits:**
  - This project will provide efficient and eco-friendly heating solutions for Brno and the municipalities along the route, positively impacting the cost of heat.
  - The project aims to reduce Brno's dependence on gas and other fuels, stabilize heating costs, and decrease harmful emissions.
  - This project will provide efficient and eco-friendly heating solutions for Brno and the municipalities along the route, positively impacting the cost of heat.
  - Municipalities connected to the pipeline will experience substantial financial savings on heating costs, leading to direct economic benefits for the communities and their residents.

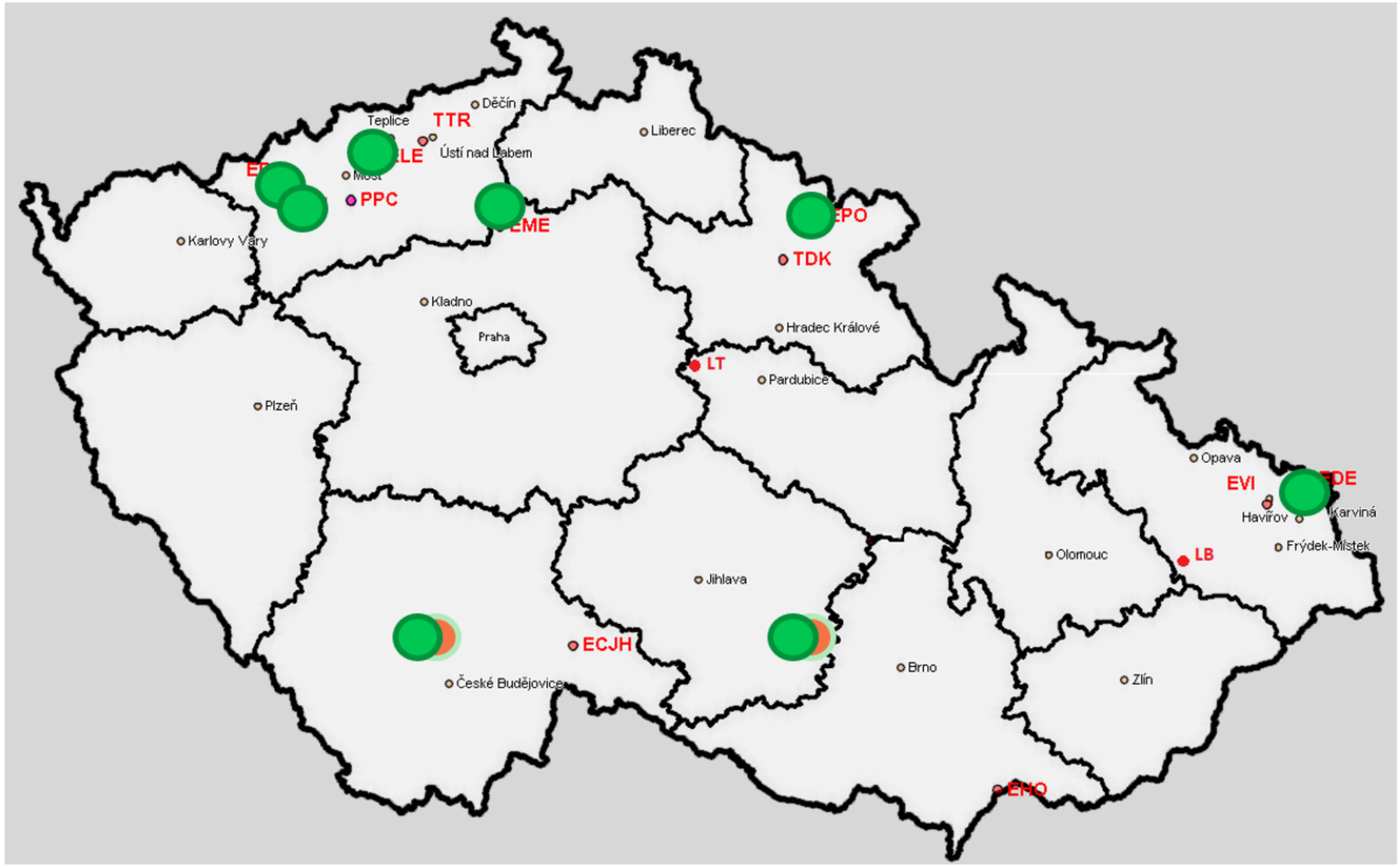
- **Approval of Memorandum:**
  - The Czech government has approved a memorandum involving regional authorities, the city of Brno, Brno Heating Plants, ČEZ, and relevant ministries to advance the construction of a hot water pipeline from the Dukovany Nuclear Power Plant to Brno.

HEAT SUPPLY FROM DUKOVANY NPP TO BRNO

- **Thermal feeder Dukovany**

  - Construction of a thermal feeder (approx. 42 km) and bypass of Brno with the aim of securing heat supply from the Dukovany Nuclear Power Plant (JEDU):
    - Capacity of the thermal feeder: 200 MWt
    - Heat supply: 2 0000 000 GJ/ year
    - Gas saving: 77,7 mil. m^3/ year
    - Reduction of CO^2 emissions: 135 00 tones CO^2/year
    - Almost full decarbonization of heat supply

CONSIDERED SITES FOR NUCLEAR AND SMRS NEW BUILDS



- Existing nuclear sites or
- Fossil plants sites
- District heating

SMR PROJECTS IN CZECH REPUBLIC THAT WERE IN CONSIDERATION

BWRX-300 (USA, 300/870 MWe/MWt), BWR
GE Hitachi

NuScale (USA 12 modules – 600 – 924 MWe), PWR
NuScale

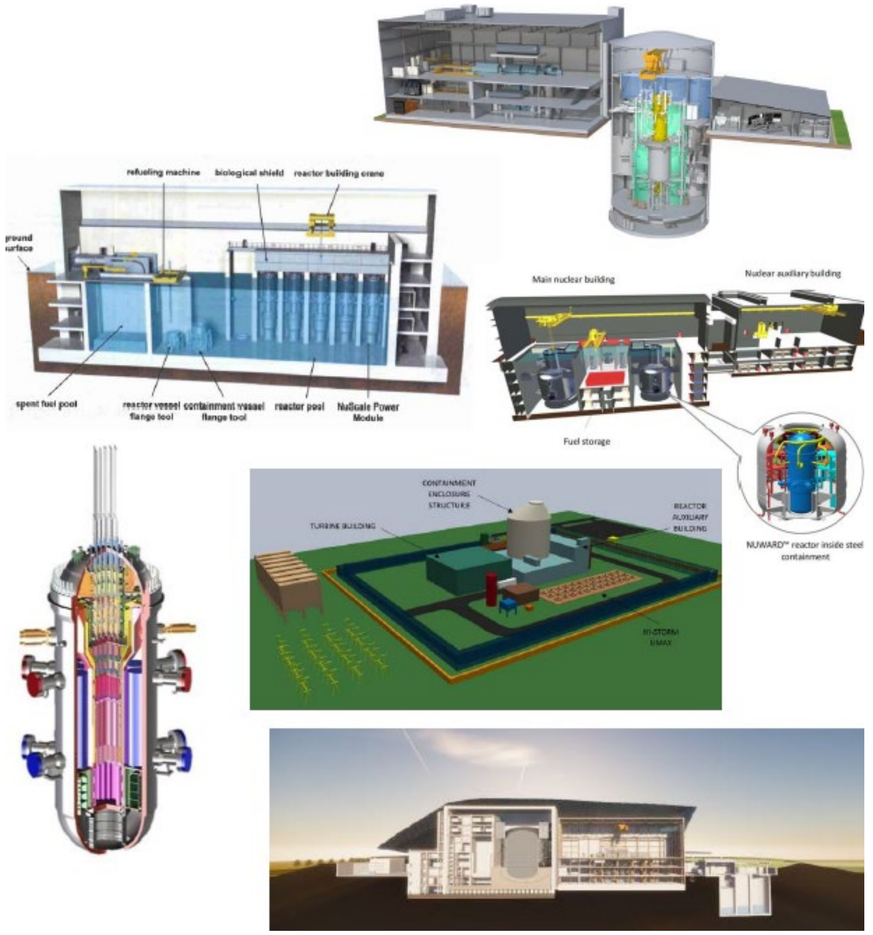
Nuward (2 x 170/ 2 x 540 MWe/MWt), PWR
EdF

SMART100 (Korea, 2x107/2x365 MWe/MWt), PWR
KHNP

SMR-160 (USA, 1x160/525 MWe/MWt), PWR
Holtec

UK SMR (UK, 470/1276 MWe/MWt), PWR
Rolls Royce

WEC SMR (USA, 1 x 300/900 MWe/MWt), PWR
Westinghouse



CZECH SPECIFIC CONDITIONS FOR NEW BUILD PROJECTS

- Czech Republic's nuclear regulatory framework is designed to LWR.
- The most operational and licensing experience are from PWRs (fleet of 6 units in operation)
- There is a nuclear qualified supply chain (RPVs and SGs supplied to over 16 units)
- Public acceptance of the nuclear energy - over 70%.
- Large units deployment – planned 4 units
- Coal sources to be shut down around 2033
- Up to 10 SMR units planned at fossil sites
- District heating sector in Czech Republic looking for new energy sources beyond coal – smaller SMR units under 100 MWt

Thank you for the attention

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