CZECH ENERGY STRATEGY AND NUCLEAR DEVELOPMENT

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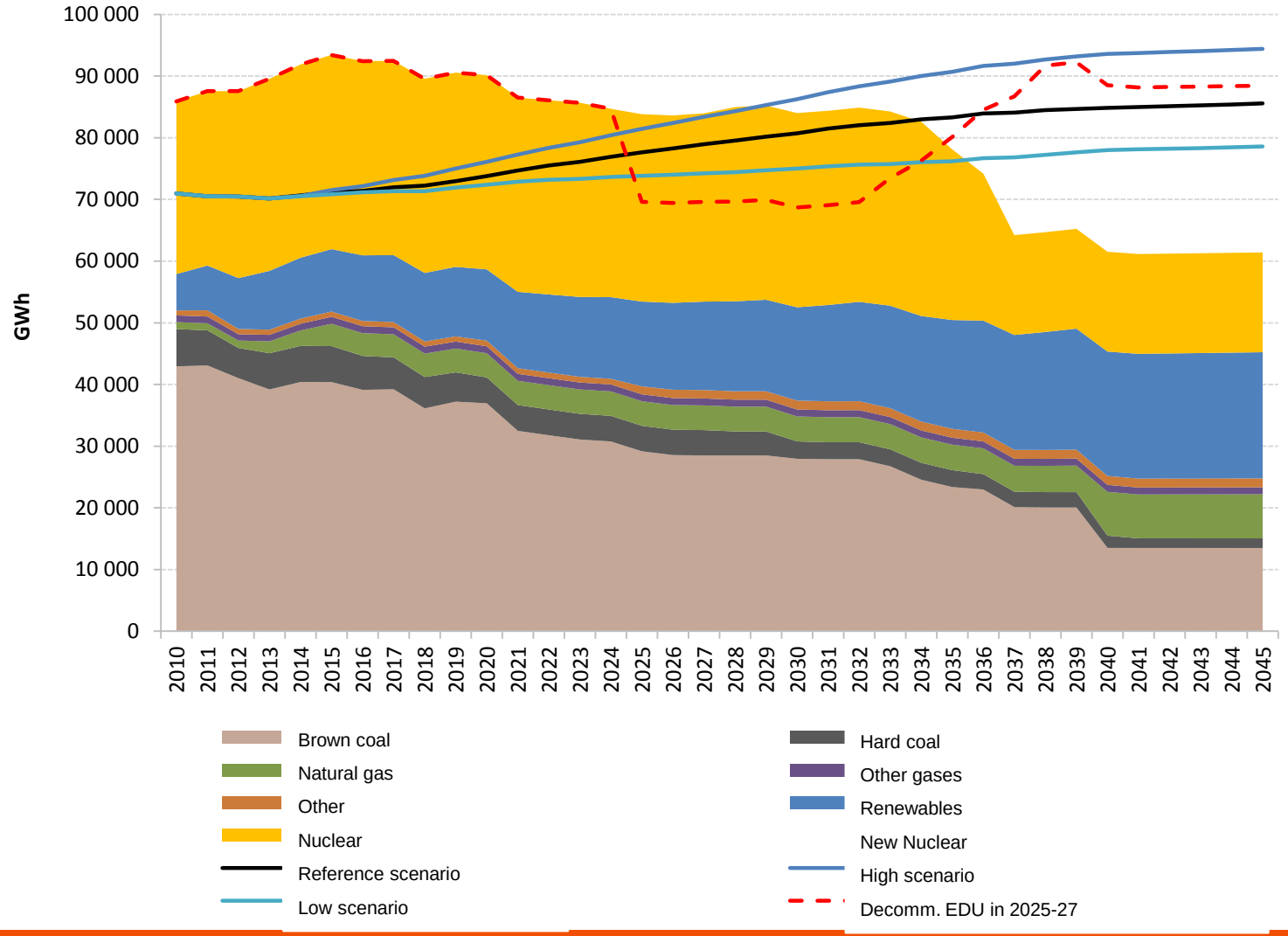
CONTENT

“A nation that can't control its energy sources can't control its future.”

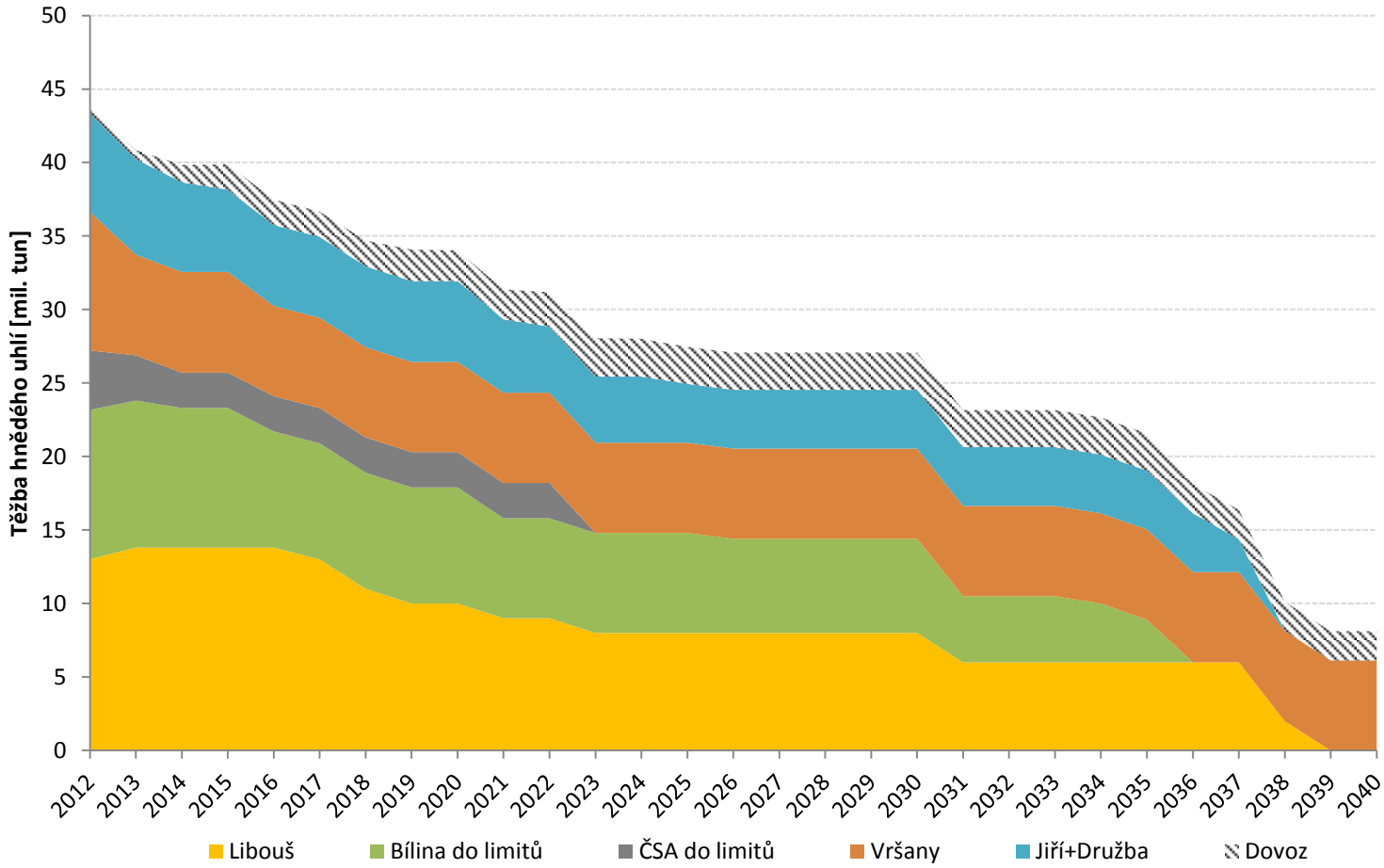
(Barack Obama)

There will occur significant energy deficit latest since 2035 (even with expectation of development of renewables)



** Optimised scenario of Czech energy strategy*

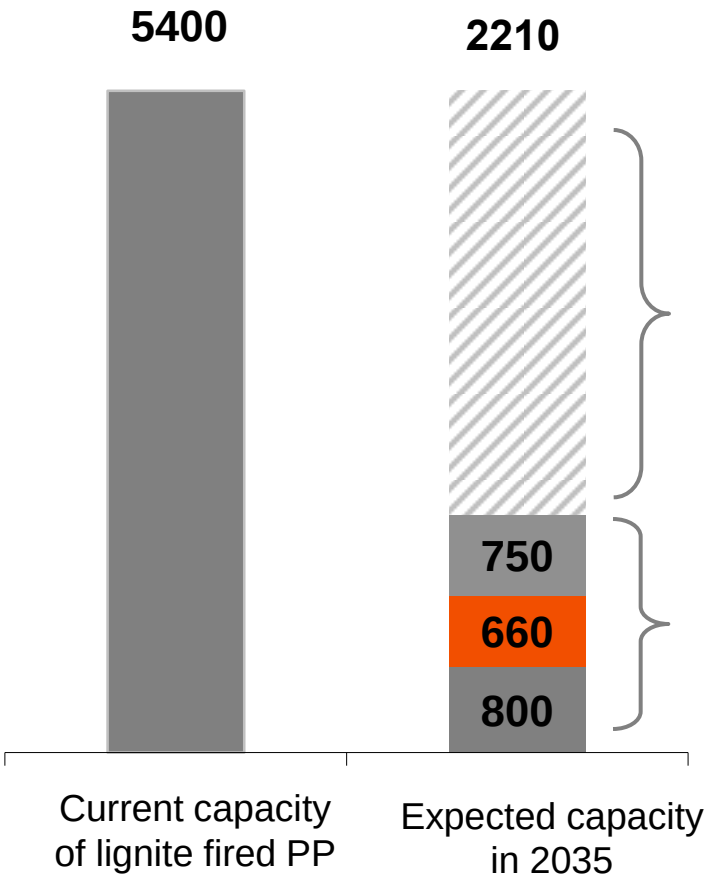
LIGNITE MINING WILL SIGNIFICANTLY DROP IN FOLLOWING DECADES



** Subject to existing territorial limits for lignite mining*

Majority of lignite capacity will be decommissioned in next two decades

Lignite (brown coal) capacity (MW)



3190 MW

To be decommissioned before 2035

Prunéřov (till 2040)

Ledvice (till 2055)

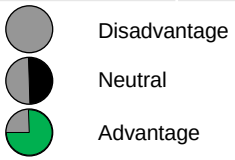
Tušimice (till 2037)

- Majority of coal fired power plants will disappeared from the electricity market till 2035
- Additional 1410 MW to be decommissioned till 2040
- Furthermore it is expected that NPP Dukovany 1-4 (2000 MW) will be decommissioned between 2035 - 37

Electricity production from power plants of approx. **7 GW** shall be replace by new build power plants

Czech Republic should respect energy policy of its neighbours however should keep the energy mix based on its geographical conditions

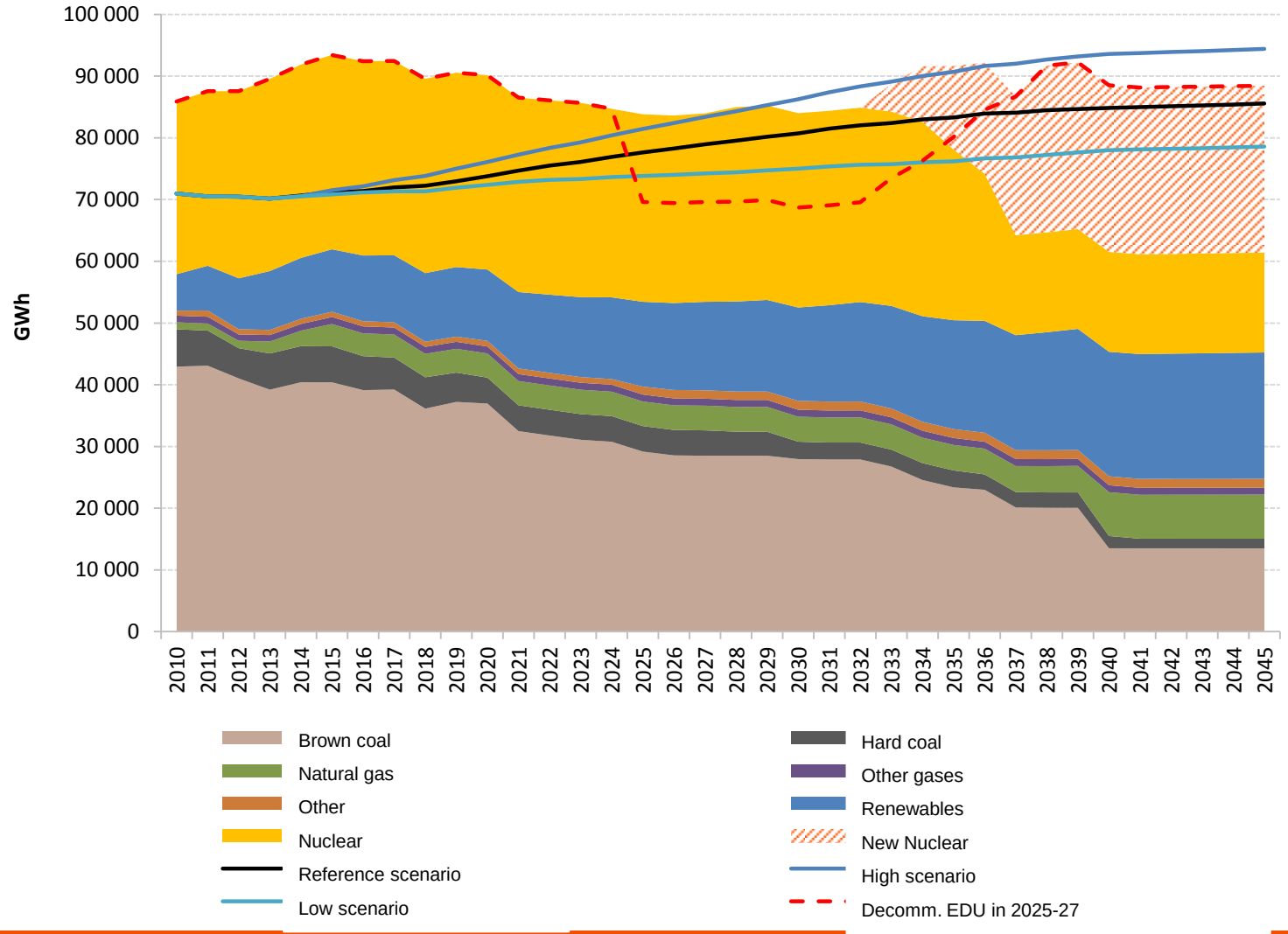
Technology	Competitiveness	Advantage
Natural gas	Weaker negotiation strength than Germany or Poland (with respect to lower volume of the gas contract)	
Hard (black) coal	Long transportation routes from sea ports, high costs for mining of the local coal	
Lignite (brown) coal	Existing coal mines with low mining costs. However limited resources not sufficient for Czech energy needs in coming decades	
Photovoltaic	Comparable conditions with Germany however much worse than in southern part of EU	
On shore wind	Wind conditions much worse than on sea shore (approx. Four times worse than in Germany)	
Off shore wind	No sea	
Biomass, WTE	Comparable conditions with neighbouring countries, limited volume	
Nuclear	Long term experiences, high level of public support, existing nuclear legislation, Czech industry capable to produce majority of the NPP components	



Czech energy strategy – goals for nuclear energy

- Nuclear energy will reach approx. 50% share of total production of electrical energy
- Construction of NPP up to 2500MW (20 TWh) till 2035
- Long term operation of existing NPP Dukovany (at least 50 years, it means till 2035-7, possibly 60 years)
- Construction of additional one unit in NPP Dukovany in order to replace existing NPP Dukovany
- Identification of the site for construction of further NPP

Nuclear energy will reach approx. 50 % of the total energy production in the Czech Republic



** Optimised scenario of Czech energy strategy*

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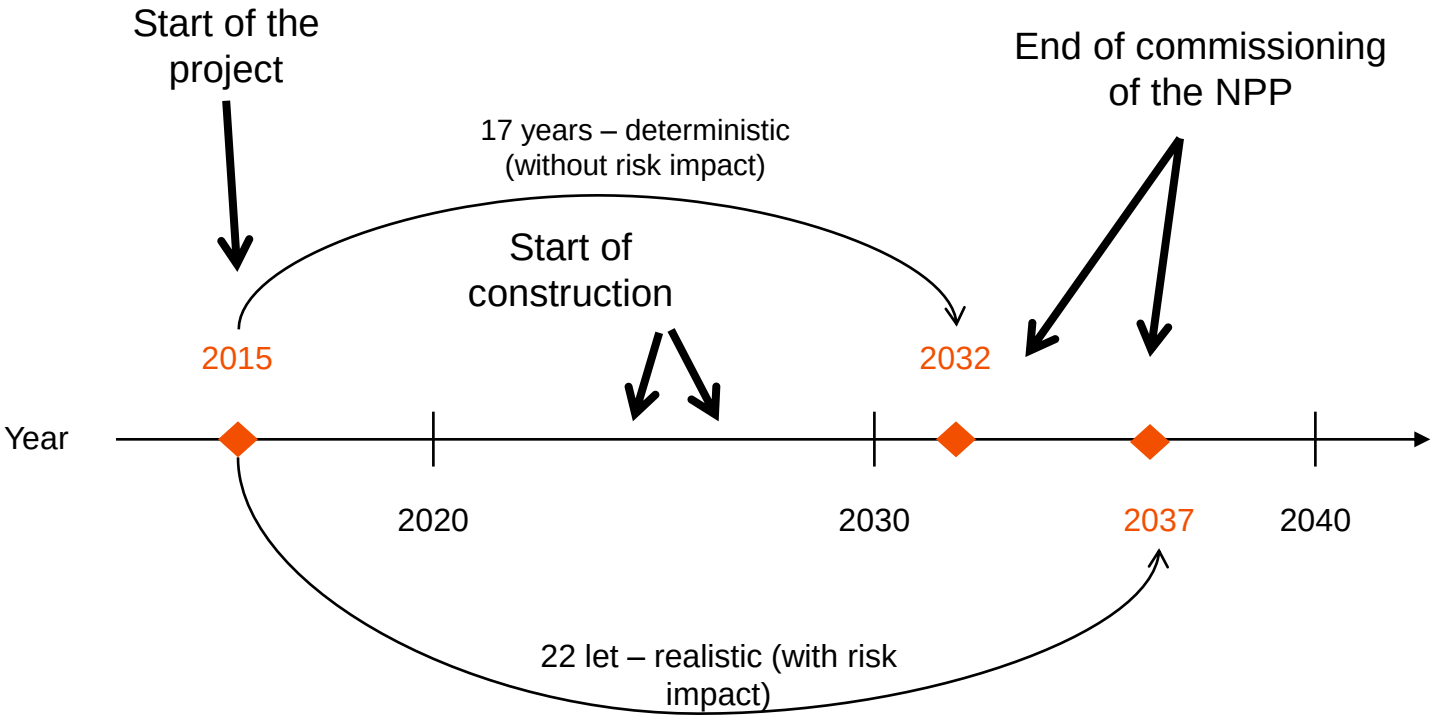
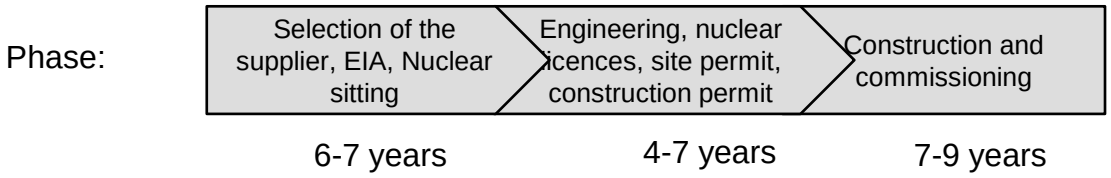
Preparation and construction of the NPP is a long process - it should start immediately





And therefore the National action plan defines following approach

- **Restart preparation works on NPP Temelín project and continue on NPP Dukovany project**
  - Preparation works to be done for 2 units on each site (land, permits, licenses)
  - Current expectation is to build 1 unit on each site only
  - However with possible extension to 2 units on respective site in case of need
- **Carve out both projects into project companies** to enable future entry of the state or strategic partner
- **Start the discussion with EU** (tender approach, allowable financing models, assurance of the project feasibility)
- **Decide and approve the final investment and delivery model** in order to assure feasibility of the project
- **Preparation of the Czech legislation modification** in order to enable acceleration of the preparation works

CURRENT STATUS - CZECH ENERGY STRATEGY AND NATIONAL ACTION PLAN ARE READY FOR GOVERNMENTAL APPROVAL

- **Czech energy strategy**
  - has been prepared and passed through strategic EIA
  - Its approval has been postponed till middle of 2015 due to continuous discussion about territorial limits for coal mining

- **National action plan for nuclear energy**
  - Is ready and discussed on governmental level
  - Its approval has been postponed after approval of the Czech energy strategy approval

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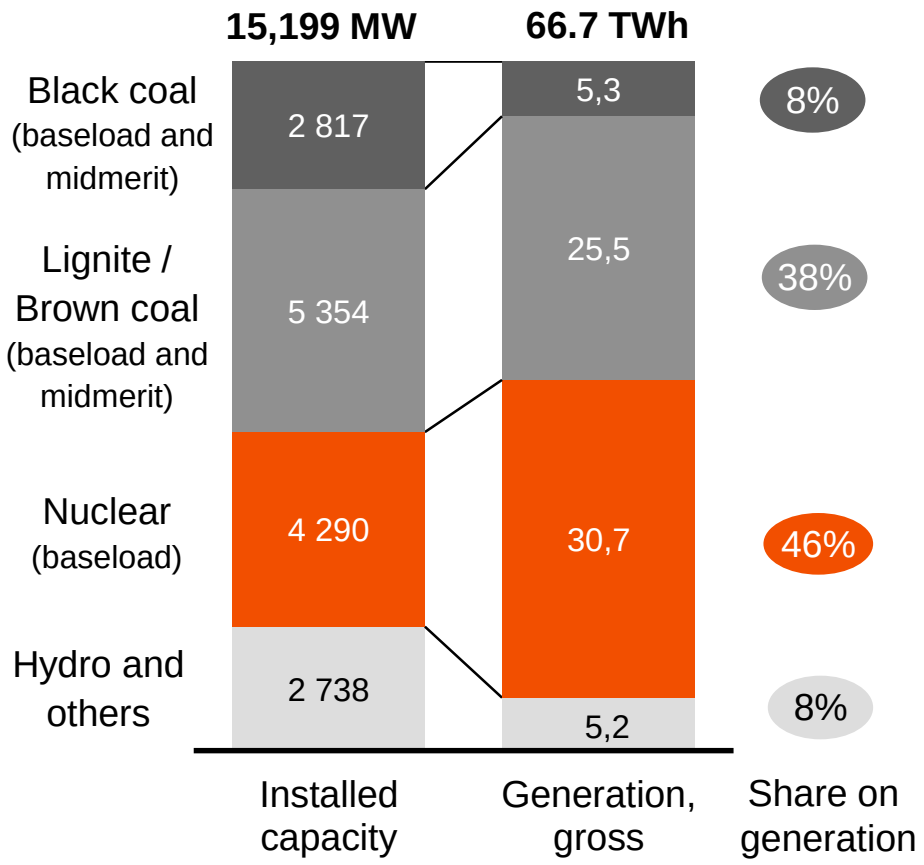
Even now nuclear energy represents nearly 50 % of ČEZ total production

Installed capacity and generation of ČEZ group within CZ (2013)



ČEZ IS OPERATING 6 NUCLEAR UNITS ON 2 SITES

DUKOVANY NPP 4 x 500 MWE

- In operation since 1985
- Type of reactor: VVER 440 type V 213
- Power uprating from 440 MW to 500 MW
- Dukovany NPP among top NPPs world-wide as per operational and safety performance indicators
- Safety long time operation program
- Total electricity production over 300 TWh

TEMELÍN NPP 2 x 1000 MWE

- First connection to the grid 2000
- Type of reactor: VVER 1000 type V320
- Installed capacity 2 x 1000 MW
- Temelín NPP is the largest energy source in CR
- Temelín NPP is built and designed at the highest level of safety
- Planned power uprating up to 1080 MW (till 2015)
- Total electricity production over 130 TWh

ČEZ GROUP – STRONG NUCLEAR COMPETENCIES IN CONSTRUCTION, OPERATION AND RESEARCH

- The **first research reactor** was put into operation in the Czechoslovakia **in 60**', making the country the 7th in the world in peaceful use of the Nuclear energy (reactor installed at NRI Řež).
- **ČEZ safely operates 6 nuclear units** (4×VVER440 at Dukovany NPP, 2 × VVER1000)
- **ČEZ prepares three new nuclear project** (Temelín 3&4, Dukovany 5, New unit at Jaslovske Bohunice NPP – Slovakia).
- Temelín NPP 1&2 are the latest Pressurized Water Reactors (PWR) successfully commissioned in Europe (in 2002) **it gives the ČEZ Group strong position in nuclear sector in EU**.
- **Škoda Praha** was the original general supplier of the technology for all nuclear units in Czechoslovakia including Temelín 1&2 NPP; Škoda Praha is also an EPC supplier of the heating plants (coal, gas).
- **Energoprojekt (currently a division of NRI Řež)** was the general designer of all nuclear units in Czechoslovakia including Temelín 1&2.
- **NRI Řež** is active not only in support of currently operating plant (especially research for life time extension) but also in generation IV. Research (for example Allegro) as well as partially in Small modular reactors.

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ČEZ's plans for NPP's builds

TEMELÍN - A FULLY OPERATIONAL EXISTING SITE…

KEY SITE CHARACTERISTICS

- Located c.100km south of Prague by the river
- Site initially designed to accommodate four units
- Extension of the existing site allows for synergies:
  - site authorisations and security management
  - existing access roads and network connections
  - interactions with local residents
  - fuel cycle management

TEMELIN ETE 1&2 – KEY DATA

Data	Unit 1	Unit 2
Type	PWR	PWR
Model	VVER V-320	VVER V-320
Vendor	Skoda Praha	Skoda Praha
Owner / Operator	CEZ / CEZ	CEZ / CEZ
Net / Gross capa.	963MW / 1,013MW	963MW / 1,013MW

WASTE MANAGEMENT

- CEZ in charge of storage and management of used fuel until hand over to the RAWRA (1)
- Storage pools in operation

HISTORICAL OVERVIEW

2014 Twelve years of nuclear exploitation

2002 Unit 2 - Commercial operation (start of trial operation)

2001 Unit 1 - Commercial operation (start of trial operation)

1993 Formal decision from Czech government to complete construction of units 1 and 2

1990 Construction of reactors 3 and 4 suspended following Velvet revolution of 1989 / Doubt raising on units 1 and 2

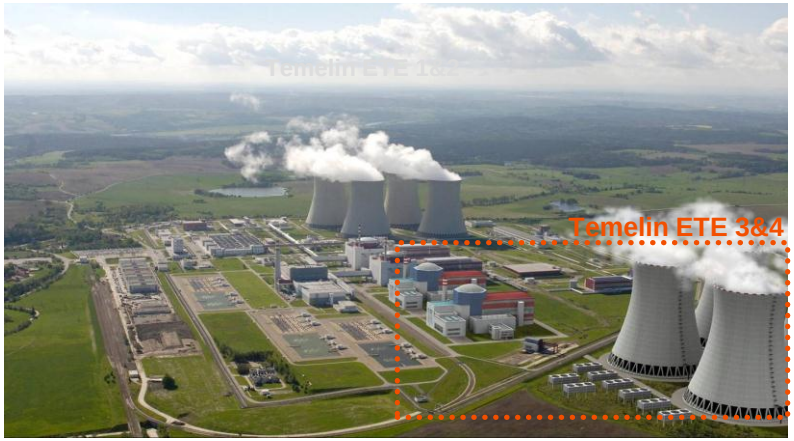
1987 Feb. 87 – Construction start
Jan. 87 – Construction start
Plan to build 4 units

Source: World Nuclear Association, CEZ
(1) Radioactive Waste Repository Authority (Správa úložišť radioaktivních odpadů, SÚRAO) established in June 1997 and responsible for the disposal of existing and future radioactive waste

… WITH AN AMBITIOUS EXTENSION PROJECT

INVESTMENT HIGHLIGHTS

- Project to add two reactors at Temelin site (ETE 3&4) reopened in 2005
- Supported by government to:
  - Ensure energy independence and security of supply
  - Retain and expand the country's nuclear know-how
- Conforms to EU's emission reduction goals
- Enables a transition towards low emission generation in the region
- Consented by the grid's operator (CEPS) and included in the grid development plan
- In line with CEZ strategy to become the leader on CEE market
- Environmental impact assessment issued in January 2013
- Nuclear licensing ongoing – Sitting licence issued in 10/2014



INDICATIVE TIMELINE

2015 – **2015–** Governmental plan for development of the nuclear energy to be issued – possible restart of tender process

2014 – **Oct. 2014 –** Licence for siting of the NPP issued

May, 2014– Cancelation of the EPC tender

2013 – **Jan., 2013 -** positive EIA statement issued

2012 – **July 2, 2012 –** Bid submission

2011 – **Oct. 2011** – Tender specification issued

2009 – **Aug. 2009 –** Initiation of EPC tender

TEMELIN ETE 3&4 – KEY DATA

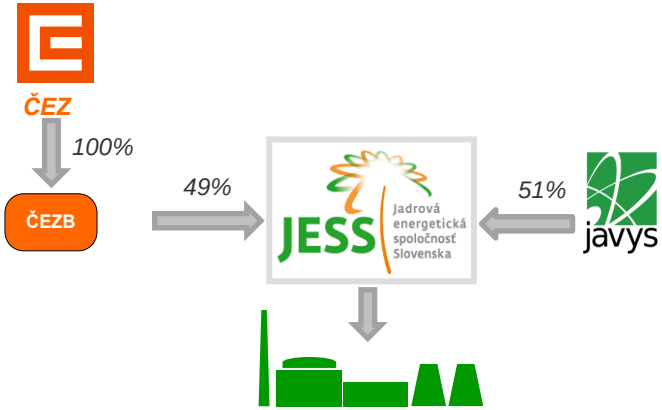
Data	3&4 Units to be built
Type	PWR of generation III or III+
Power output	Up to 3,400MW (>+1,000MW per unit)
Availability	>90%
Net thermal efficiency	37%
Life time	>60 years
Safety	Low risk of accidents with major damage of the core (below 10^{-5} / year)

CEZ GROUP NUCLEAR POWER PLANTS UNDER DEVELOPMENT (IN ADDITION TO TEMELÍN 3,4)

Dukovany NPP unit 5

- Preparation of the project started in 2010
- Feasibility study approved
- Complex water supply study
- EIA process started
- Grid study ready
- Preliminary transportation study
- Site investigation under progress
- Land acquisition under progress

Jaslovské Bohunice (Slovakia)



- JV company (JESS) established in 2009 with 49% of ČEZ share
- Joint Czech / Slovak team established
- Feasibility study approved
- EIA process started
- Grid study
- Transportation study
- Site investigation under progress
- Land acquisition under progress
- Preparation of the tender spec. under progress

THANK YOU FOR YOUR ATTENTION