CEZ GROUP:
THE LEADER IN POWER MARKETS OF CENTRAL AND SOUTHEASTERN EUROPE

CURRENT STATUS OF NPP PROJECTS
SUMMER SCHOOL 2016

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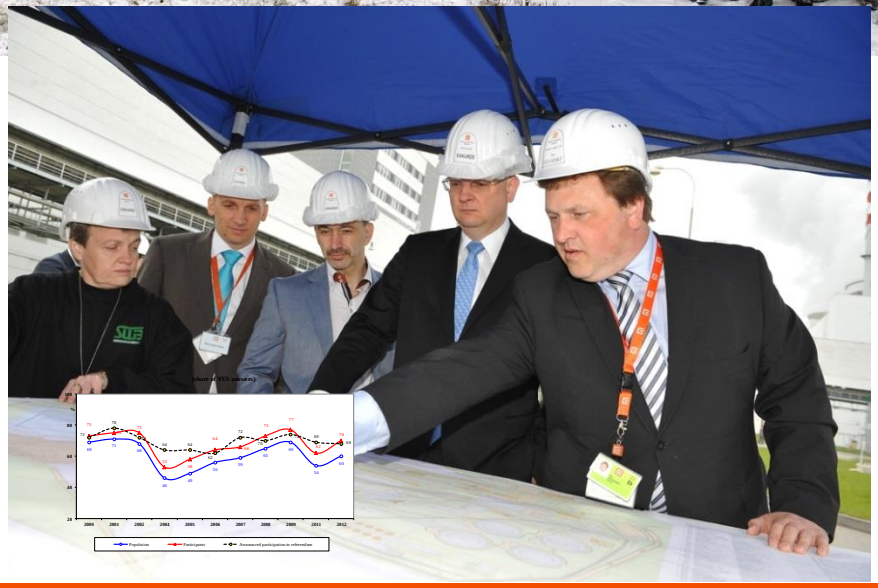
SUMMER SCHOOL – NEW NUCLEAR BUILD CONTENT

- **ČEZ Group**
- **Current situation and possibilities**
- **Nuclear in the world**
- **ČEZ - nuclear projects - status**

… KEY COMPONENTS TO BE ABLE TO BUILD A NUCLEAR POWER PLANT …



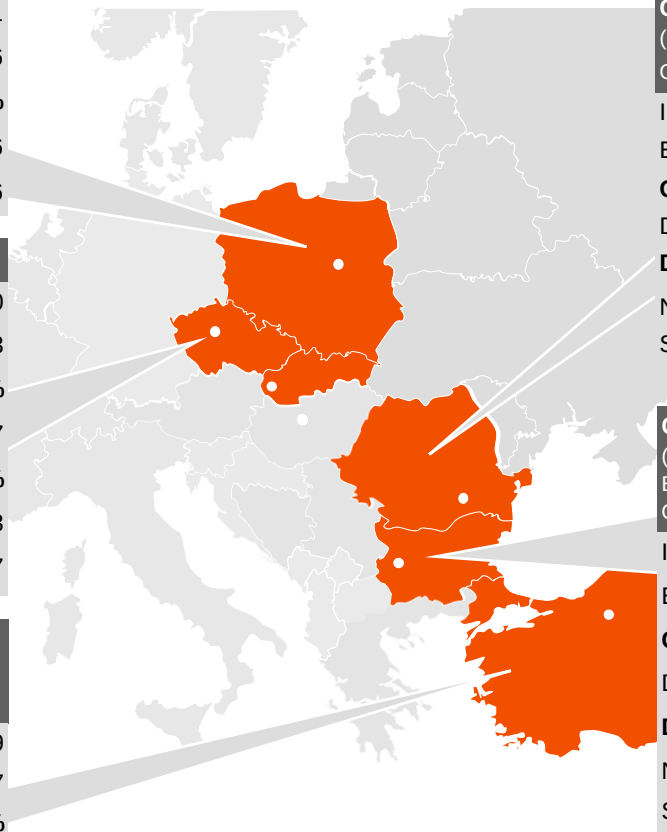
CEZ GROUP IS AN INTERNATIONAL UTILITY WITH A STRONG POSITION IN CEE

CEZ Group in Poland (100% stake in Skawina, 100% in Elcho)	
Installed capacity (MW)	681
Electricity generation, gross (TWh)	2.6
Generation market share	**1.8%**
Number of employees	396
Sales (EUR million)	156

CEZ Group in the Czech Republic	
Installed capacity (MW)	13,470
Electricity generation, gross (TWh)	58.3
Generation market share	**68%**
Distributed electricity (TWh)	32.7
Distribution market shre	**57%**
Number of employees	20,503
Sales (EUR million)	5,547

CEZ Group in Turkey (50% stake in SEDAS through AkCez, 37.36% stake in Akenerji)	
Installed capacity (MW)	1,289
Electricity generation, gross (TWh)	2.7
Generation market share	**1.1%**
Distributed electricity (TWh)	8.0
Distribution market share	**3%**

Energy Assets



CEZ Group in Romania (100% stakes in CEZ Distributie, CEZ Vanzare, Tomis Team, Ovidiu Development, TMK Hydroenergy Power)	
Installed capacity (MW)	622
Electricity generation, gross (TWh)	1.3
Generation market share	**2.1%**
Distributed electricity (TWh)	6.3
Distribution market share	**14%**
Number of employees	1,792
Sales (EUR million)	429

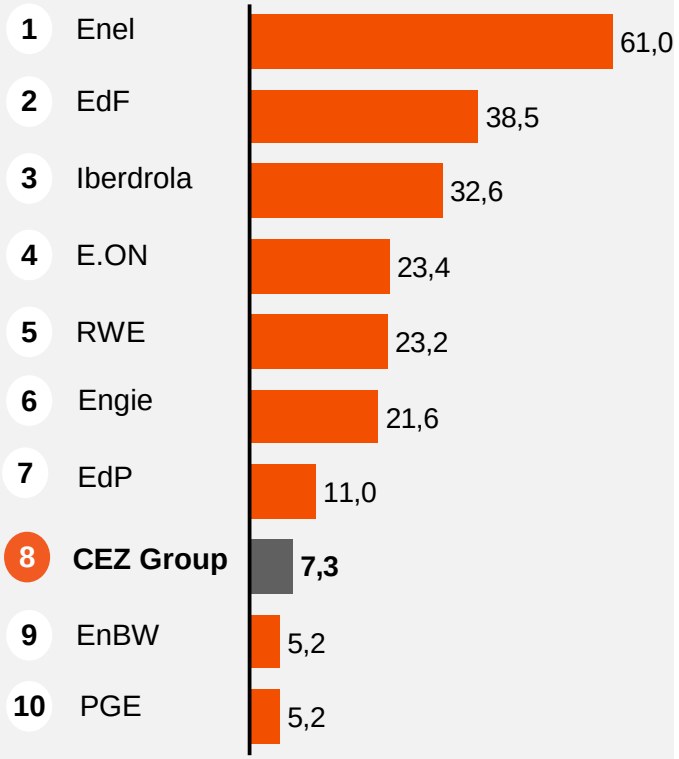
CEZ Group in Bulgaria (67% stake in CEZ Razpredelenie Bulgaria, CEZ Electro Bulgaria, 100% in TPP Varna, 100% in Free Energy Project Oreshets)	
Installed capacity (MW)	1,265*
Electricity generation, gross (TWh)	0.9
Generation market share	**2.3%**
Distributed electricity (TWh)	9.1
Distribution market share	**29%**
Number of employees	3,530
Sales (EUR million)	882

*Source: 2014 data, EUR/CZK=27.533, * 1260 MW of installed capacity is currently offline*

A TOP 10 EUROPEAN UTILITY

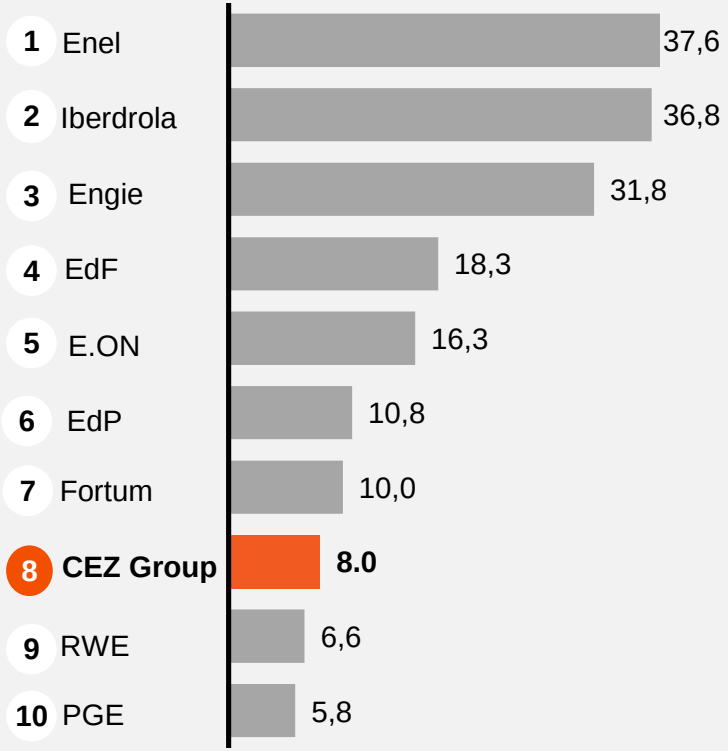
Top 10 European power utilities

Number of retail customers in 2014, in millions



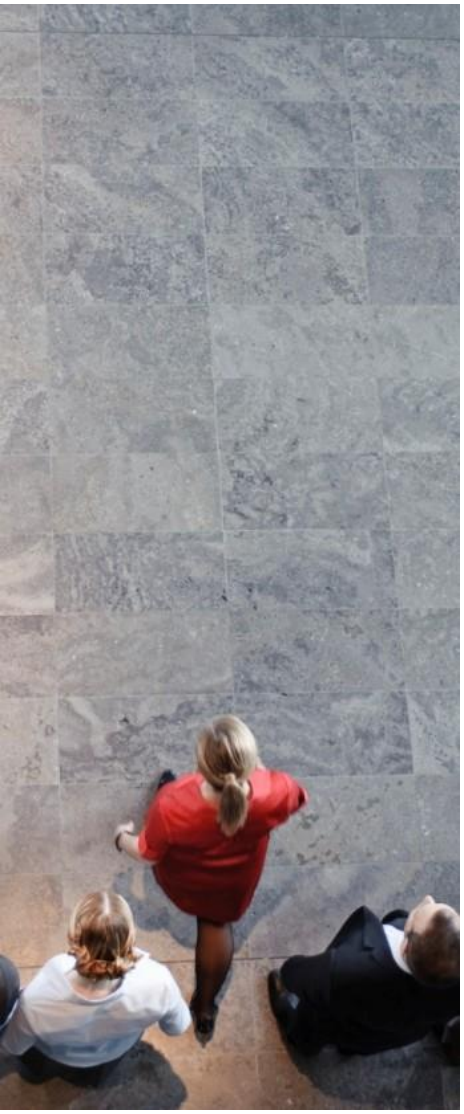
Top 10 European power utilities

Market capitalization in EUR bn, as of April 7, 2016

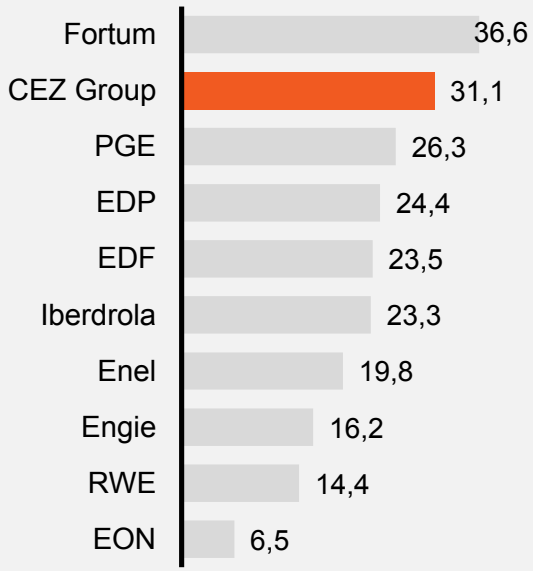


SOURCE: Bloomberg, Annual reports, companies' websites and presentations

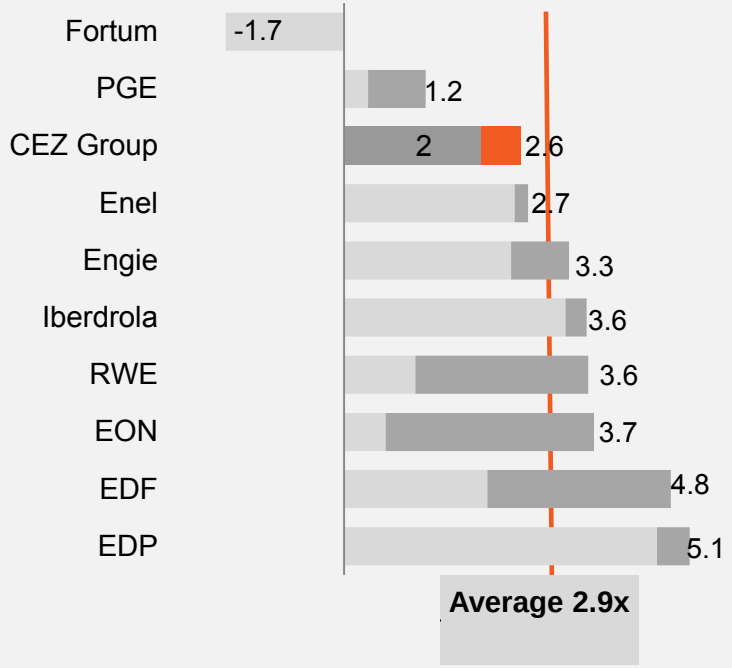
BETTER OFF FINANCIALLY THAN PEERS



EBITDA[1]
Percent, 2015



Net debt/ EBITDA[1]
Multiples, 2015



1 As reported by companies

2 Net economic debt = net financial net debt + liabilities from nuclear provisions & liabilities from employee pensions & reclamation provision

- *ČEZ group is one of the most profitable European utilities*
  - *Its leverage is low compared to industry standards*

CEZ IS A STRONG AND VERTICALLY INTEGRATED PLAYER IN THE CZECH ELECTRICITY MARKET

	Lignite mining	Generation	Transmission	Distribution	Supply
CEZ	**57%** 21.6 million tons 2014	**68%** 58.3TWh	**100%** 64.3 TWh	5 out of 8 distribution regions **61%** of customers	**37%** 21 TWh
Others	**43%** 16.6 million tons	**32%** 27.9 TWh		**39%** of customers	**63%** 36 TWh

- *CEZ fully owns the largest Czech mining company (SD) covering 71% of CEZ' s lignite needs*
- *Remaining 3 coal mining companies are privately owned*

- *Other competitors – individual IPPs*

- *The Czech transmission grid is owned and operated by CEPS, 100% owned by the Czech state*

- *Other competitors – E.ON, RWE/EnBW*

Source: CEZ, ERU, MPO, companies´ data; data for 2014 (distribution data for 2013)

CEZ GROUP'S STRATEGY IS BUILT ON THREE PILLARS

Vision: deliver innovative solutions to energy needs and contribute to a better quality of life.
Mission: guarantee safe, reliable and positive energy to our clients and the society as a whole.

I	II	III
Be among the best in the operation conventional electricity generation *and proactively respond to the challenges of the 21st century*	***Offer customers a wide range of products and services*** *addressing their energy needs*	***Strengthen and consolidate our position in Central Europe***
▪ *We want to **operate** power assets **as efficiently as possible** from the point of view of both shareholders and customers* ▪ *We want to **pro-actively react now to the future design of power sector** with a large proportion of decentralized and zero-emission production and diminishing differences between producers and consumers*	▪ *We want to offer our customers partnership, expertise, tools, and financing to **meet their energy needs** - our customers are much more active in the control of their electricity and gas consumption and use in general as well as in their own production* ▪ *We want to complement this with additional products that have **synergy with electricity and gas sales***	▪ *We want to **maintain our position among the top 10** energy companies in Europe* ▪ ***take advantage of major synergies** in the operation of our assets and when offering new products and servicing customers* ▪ *We focus our attention on **regions and countries** that are **close to** both CEZ and the **Czech Republic** in terms of energy markets, economy, politics and culture; however, undisputed profitability remains the key indicator*

Note: SME = small and medium-sized enterprises; ESCO = Energy service company

KEY STRATEGIC ACHIEVEMENTS OF 2015

I *Be among the best in the operation of conventional electricity generation and proactively respond to the challenges of the 21st century*

- *2014 dividend to our shareholders amounting to CZK 21.4 bn*
- *We saved CZK 2.9 bn in fixed costs compared to year 2014*
- *Mining limits have been extended for Bílina mine (possibility to extract additional 100 – 150 m tones of lignite)*
- *We completed checks of welds on Units I., II. and III. of Dukovany nuclear power plant and submitted an application for operating license extension for Unit I.*
- *We set up an SPV company for spinoff of projects of new plants in Temelín and Dukovany*

II *Offer a wide range of products and services to customers, which address their energy needs*

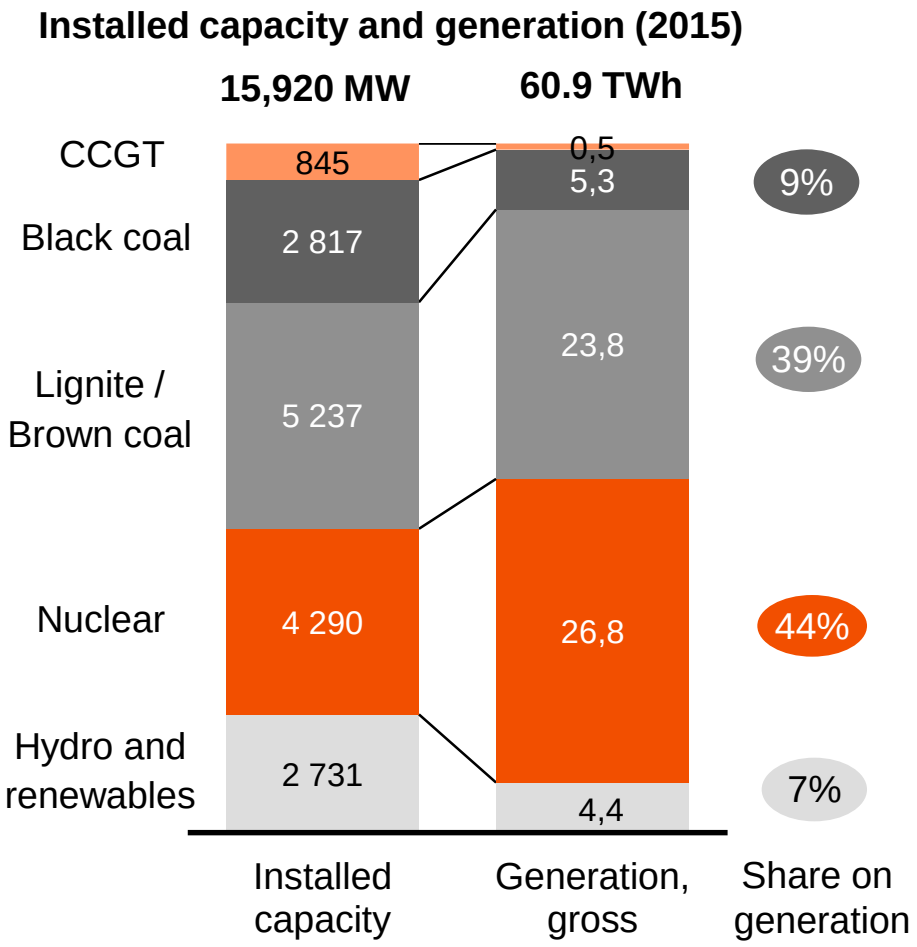
- *Stabilized portfolio of electricity customers, growing in gas (+36.9 th. connection points)*
- *Customer satisfaction grew (mainly with price and with product and service offering) – from 77% to 84 %*
- *We are offering roof top PV from CEZ – more than 100 signed contracts, thousands being negotiated*
- *We gained majority stake (75%) in ENESA a.s. focused on EPC projects*
- *3 extensive technological „smart grids“ projects are prepared in the Czech Rep.*

III *Strengthen and consolidate our position in the region of Central Europe*

- *We reduced financial exposure of CEZ, a. s. abroad by CZK 9.3 bn*
- *We completed two investments into German innovative companies Sonnenbatterie and SunFire (fuel cells)*
- *Allocation of green certificates restored for Fântânele Vest and Cogealac in Romania*
- *We signed a framework agreement for cooperation with German group Aquila Capital, offering investment opportunities to wind farms in Germany (up to 120 MW)*
- *On Feb 26, 2016 Standard & Poor's confirmed CEZ rating on the level of A- with stable outlook*

SPV - special purpose vehicle; EPC – Energy Performance Contracting

CEZ GROUP OPERATES LOW COST GENERATION FLEET, …



- **Coal power plants are using mostly lignite from CEZ's own mine** (67% of lignite needs sourced internally, remaining volume through long-term supply contracts)
- **Nuclear plants have very low operational costs**

CEZ has a long-term competitive advantage of low and relatively stable generation costs

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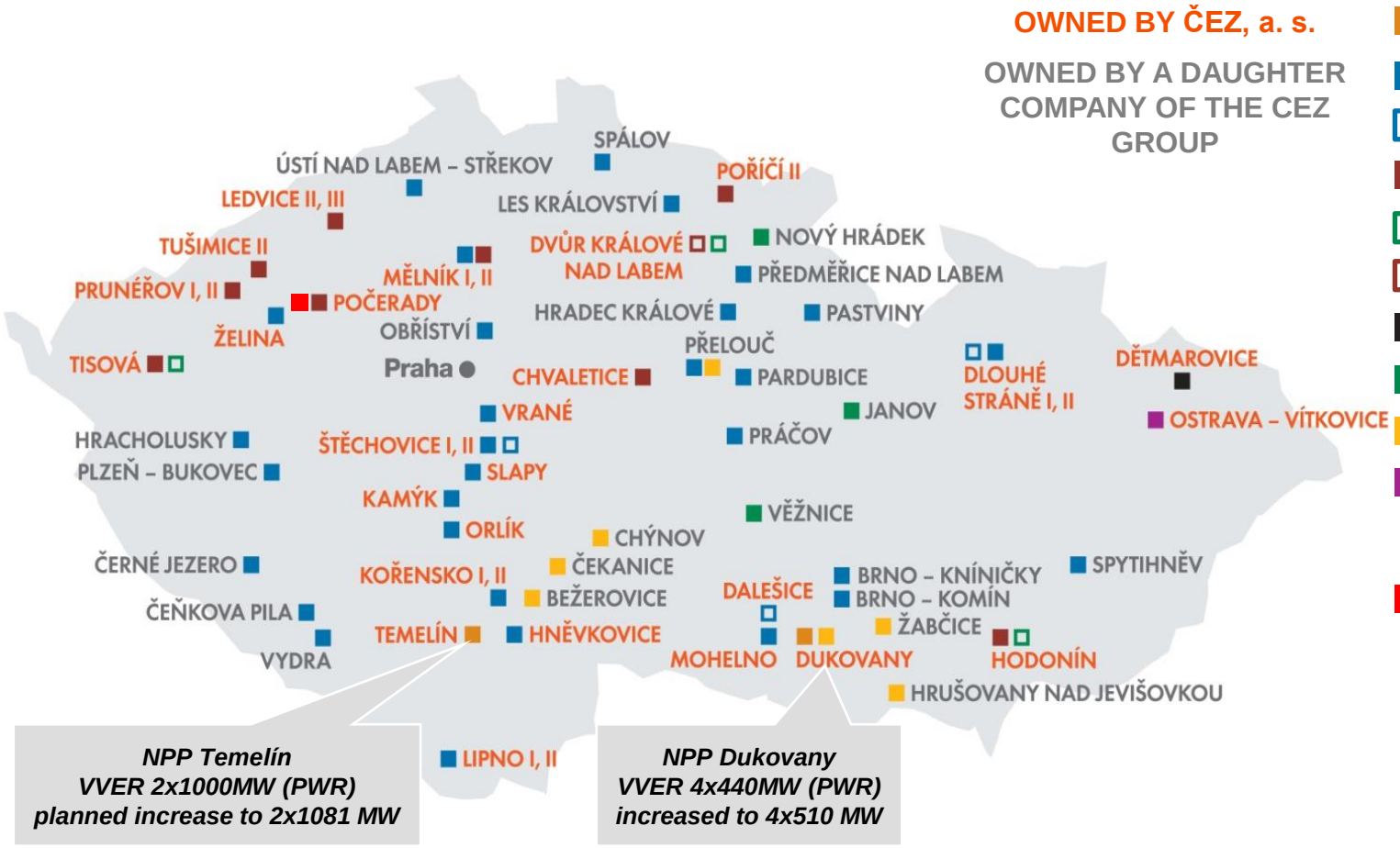
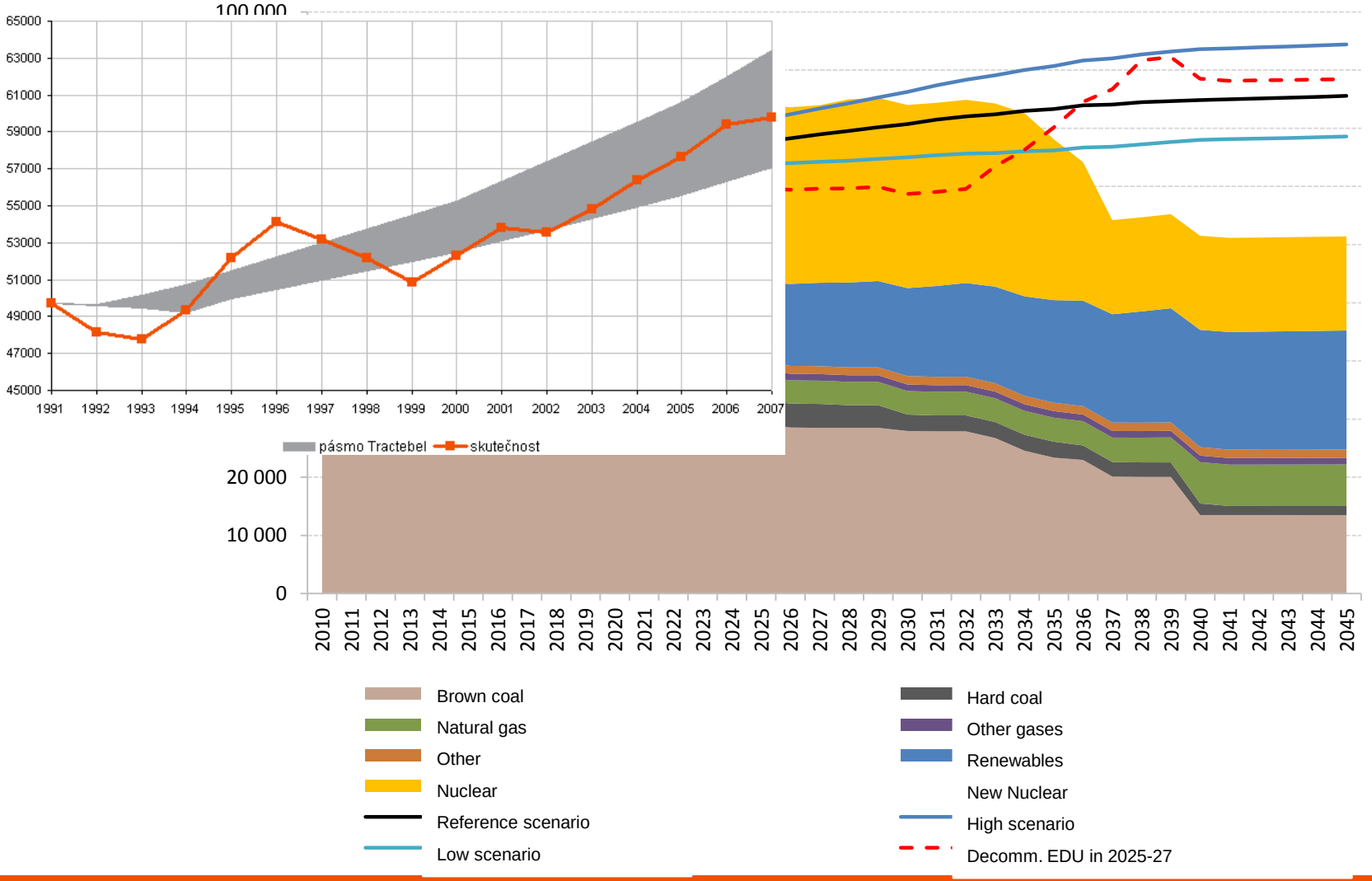
IN THE CZECH REPUBLIC, CEZ GROUP OWNS AND OPERATES A BROAD PORTFOLIO OF POWER PLANTS



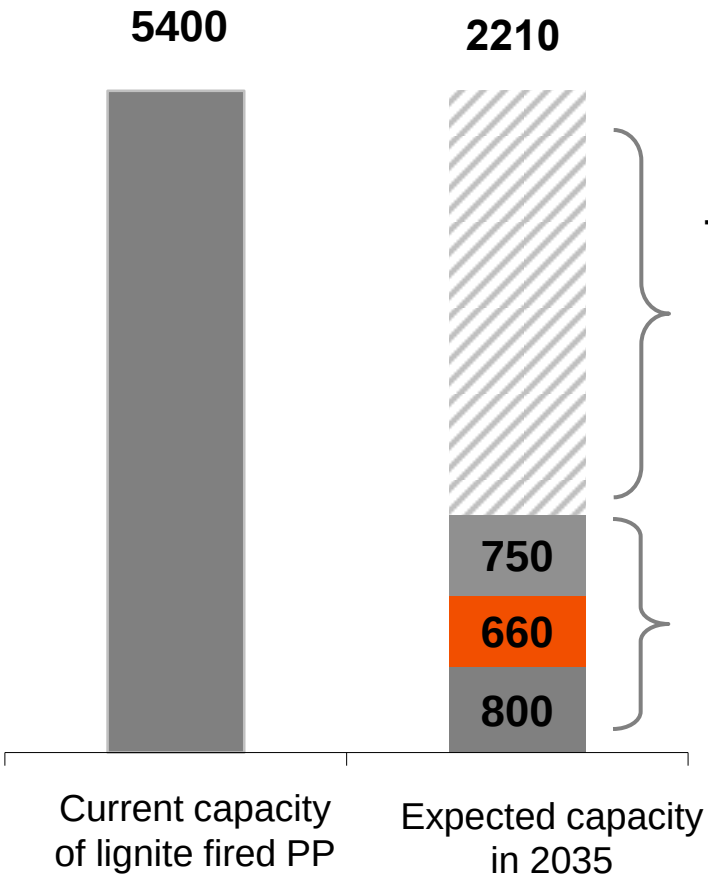
THERE WILL OCCUR SIGNIFICANT ENERGY DEFICIT LATEST IN 2035 (EVEN WITH EXPECTATION OF STRONG DEVELOPMENT OF RES)



** Optimised scenario of Czech energy strategy*

SIGNIFICANT PART OF LIGNITE CAPACITY WILL BE DECOMMISSIONED IN NEXT TWO DECADES

Lignite (brown coal) capacity (MW)



3190 MW

To be decommissioned before 2035

+ NPP Dukovany (50 years of operation) 2000 MW

Prunéřov (till 2040)

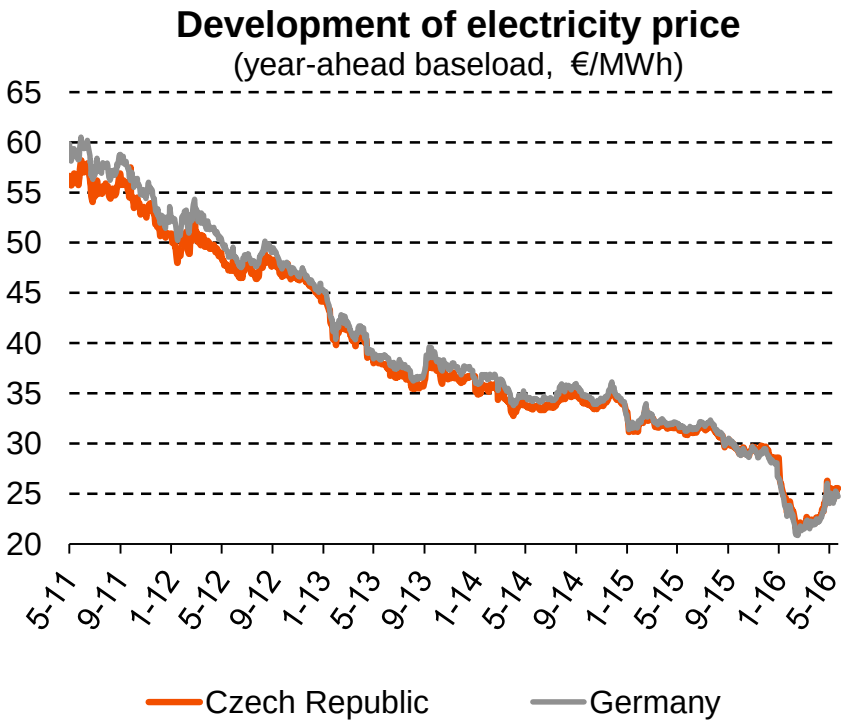
Ledvice (till 2055)

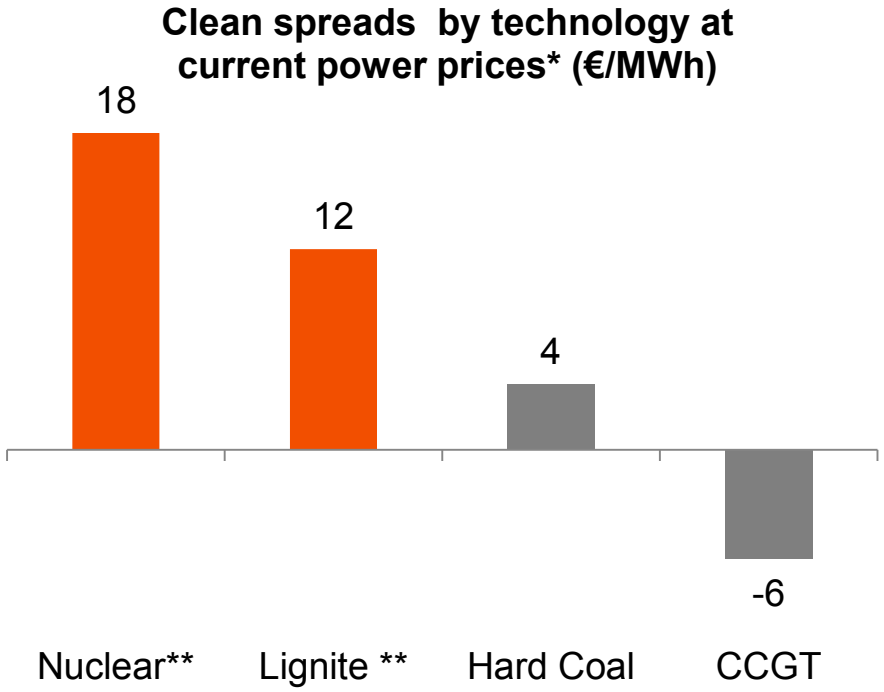
Tušimice (till 2037)

- Low cost of domestic lignite
- Thermal power plants next to mines – only costs of internal logistics
- Replacement of old units with more efficient new technology (20% lower CO_2 emissions, from 1t CO_2/MWh to 0.8 CO_2/MWh)
- Secured lignite supplies for the investment lifetime
- 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 replaced by new build power plants

,… WHICH IS A GREAT ADVANTAGE IN THE CURRENT LOW PRICE ENVIRONMENT





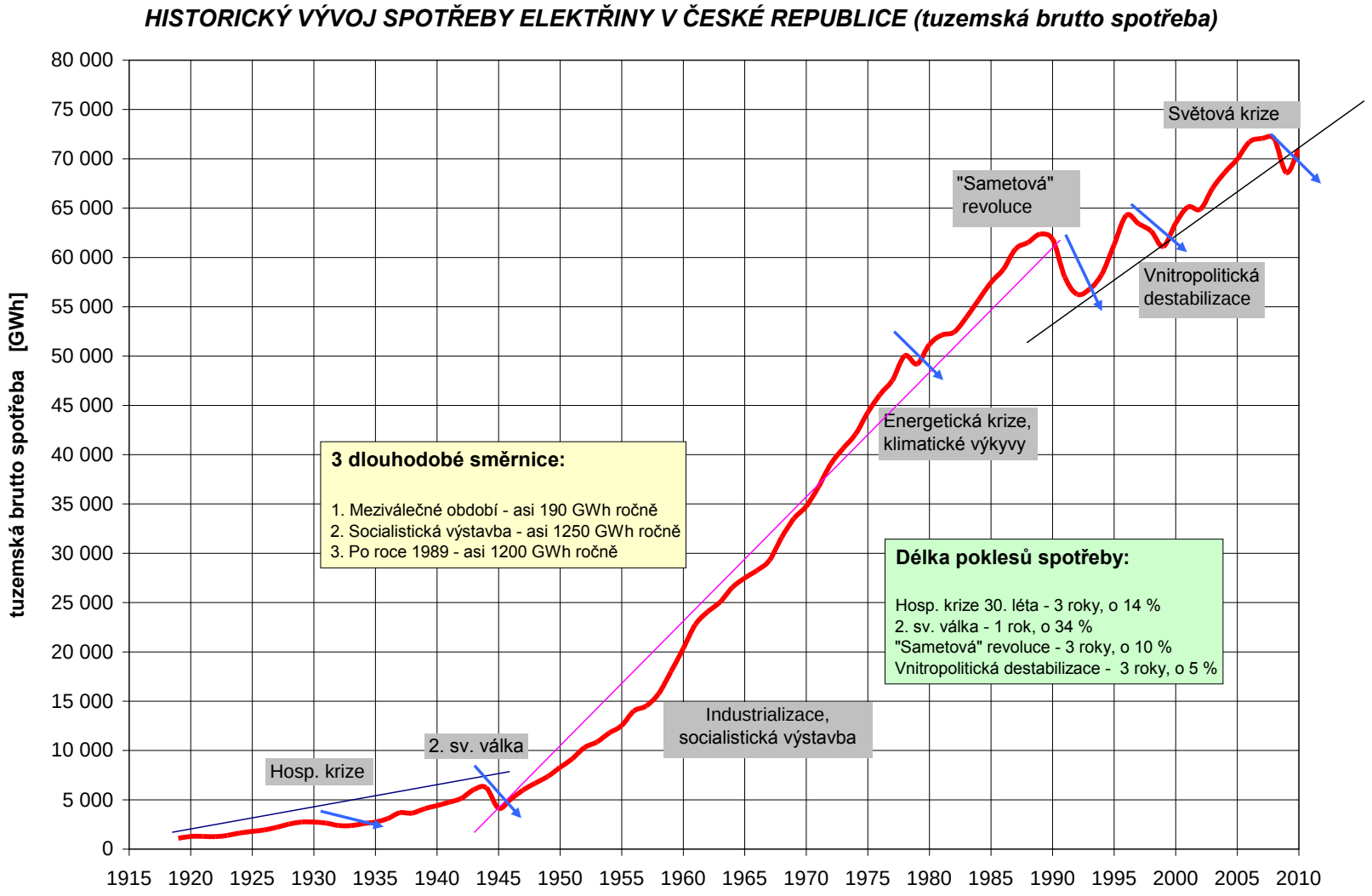
* Current power price of 25 €/MWh, 2016 production of CEZ hedged at €35/MWh, i.e. 10 €/MWh above current forwards

Drivers of electricity price

- Decline of **hard coal prices** due to shale gas discoveries in the US and declining Chinese imports
- Decline in **carbon prices** due to oversupply driven by economic slowdown
- **Growing** capacity of subsidized **renewables** at the time of stagnating/declining electricity demand

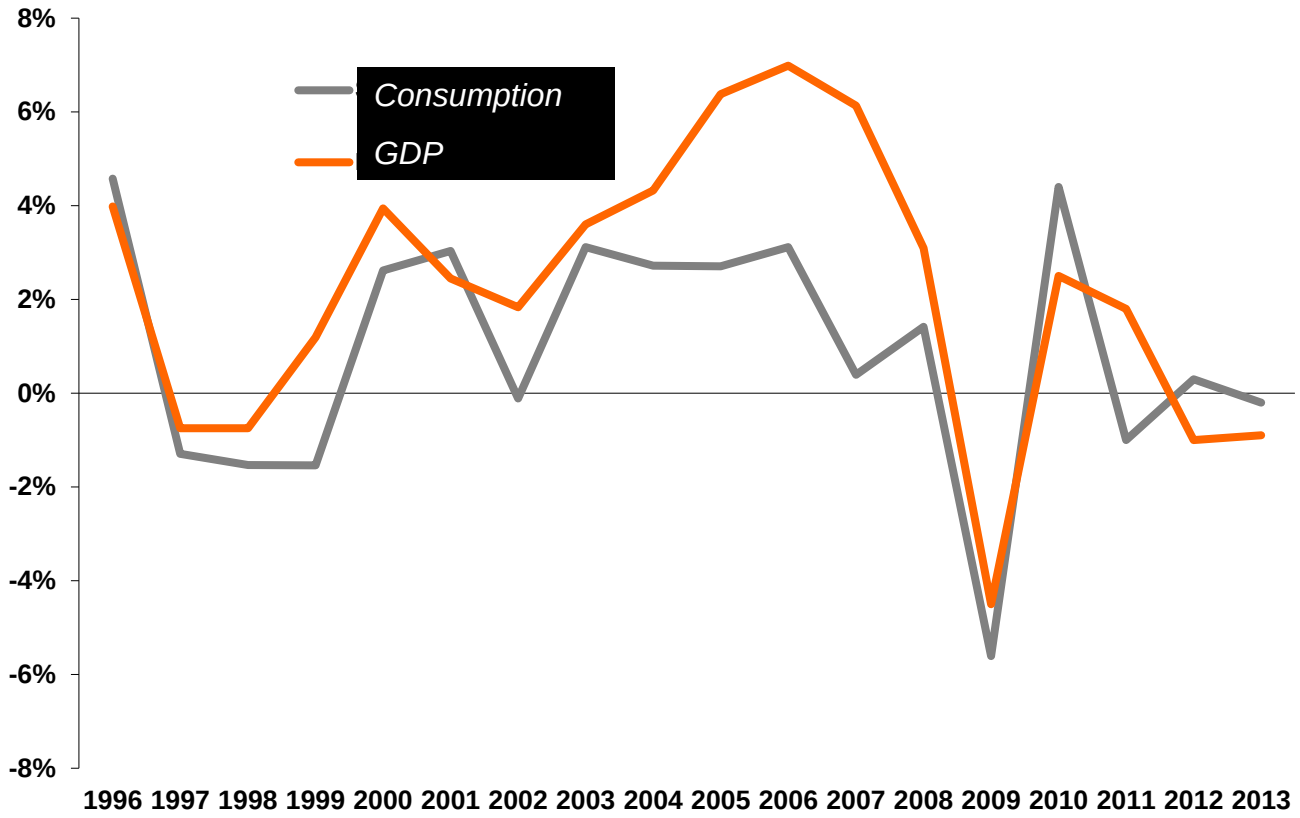
** Nuclear fuel costs and CZK50/MWh payment for fuel storage, cash cost of extracting own lignite, carbon costs are considered

LONG TERM CONSUMPTION IN THE CZECH REPUBLIC



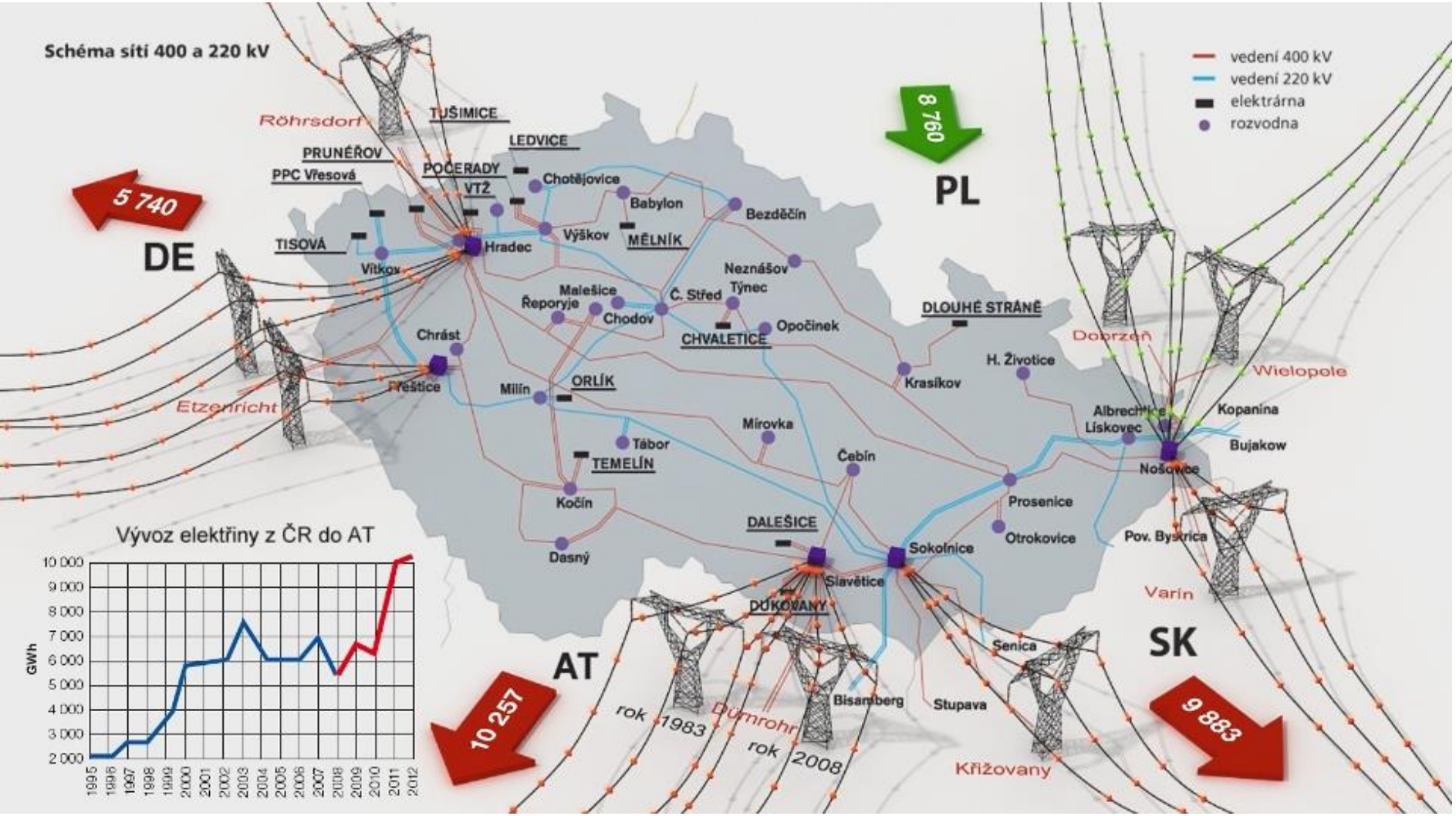
THERE IS A CLEAR CONNECTION BETWEEN ECONOMY SITUATION AND ELECTRICITY CONSUMPTION

Year to year indexes – GDP × electricity consumption



source: ČSÚ, ERÚ, ČEZ

GERMAN WIND POWER PLANTS ARE CAUSING PROBLEMS ALL AROUND CENTRAL EUROPE



WHAT CZECH REPUBLIC CAN DO ?

(EXCEPT OF UNREALISTIC IMPORT AND MASSIVE SAVINGS)

	+	−
	▪ Minimal CO_2 emissions ▪ Stability of fuel supply ▪ Low cost of electricity	▪ Long construction period ▪ High investment ▪ Politically sensitive issue
	▪ The only fuel that is available in our region in sufficient amount ▪ Existing international market with black coal, import possible	▪ High CO_2 emissions ▪ CCS still not commercially available ▪ CO_2 price of allowances
	▪ High efficiency (CCGT) ▪ Flexible source ▪ Relatively short construction period and low investment cost	▪ High gas prices ▪ Gas prices are unstable and difficult to predict in long term ▪ Total dependence on import
	▪ No CO_2 emissions ▪ Environmentally friendly ▪ Political support	▪ Limited possibilities, strongly dependant on local conditions ▪ Risk for grid stability ▪ Expensive (depending on subsidies)

WE ARE CURRENTLY UNDERTAKING SEVERAL MAJOR INVESTMENTS INTO THE GENERATION FLEET IN THE CZECH REPUBLIC AND ABROAD

Tusimice *(4 x 200 MW)*

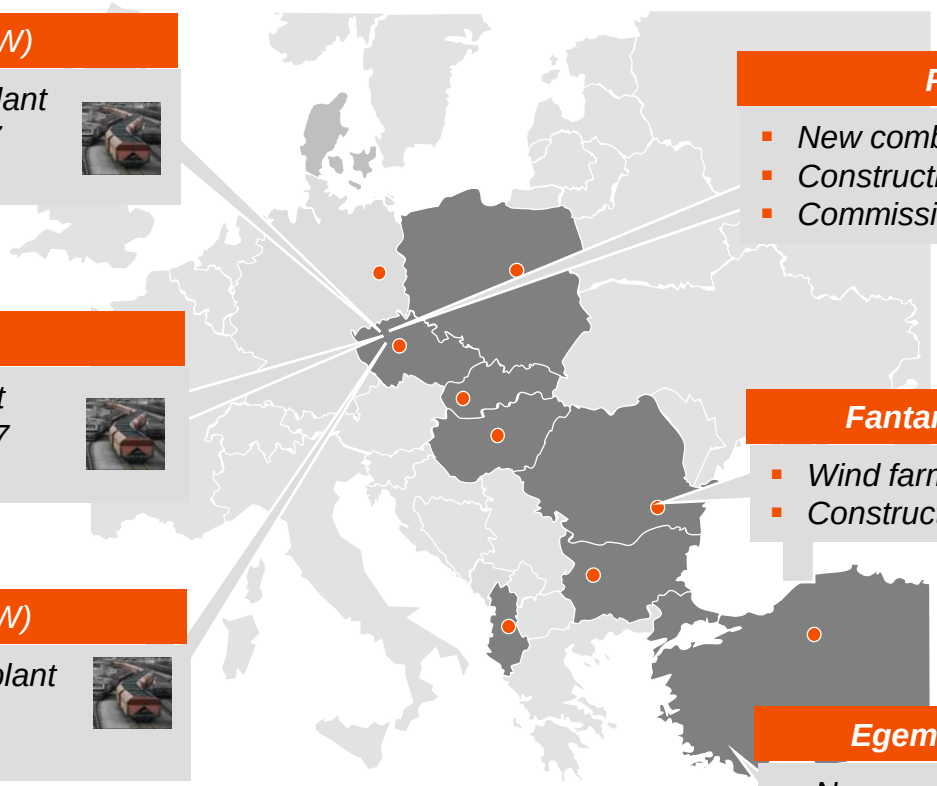
- *Upgrade of lignite existing plant*
- *Construction started in 2007*
- *Commissioning in 2012*

Ledvice *(660 MW)*

- *New supercritical lignite unit*
- *Construction started in 2007*
- *Commissioning in 2015*

Prunerov *(3×250 MW)*

- *Upgrade of existing lignite plant*
- *In permitting stage*
- *Commissioning in 2015*



Pocerady *(840 MW)*

- *New combined cycle gas plant*
- *Construction started in 2011*
- *Commissioning in 2013*

Fantanele + Cogealac *(600 MW)*

- *Wind farm*
- *Construction started in 2007*

Egemer *(872 MW, in JV Akenerji)*

- *New combined cycle gas plant*
- *Construction started in 2011*
- *Commissioning in 2014*

Assets of the CEZ Group *Branch offices*

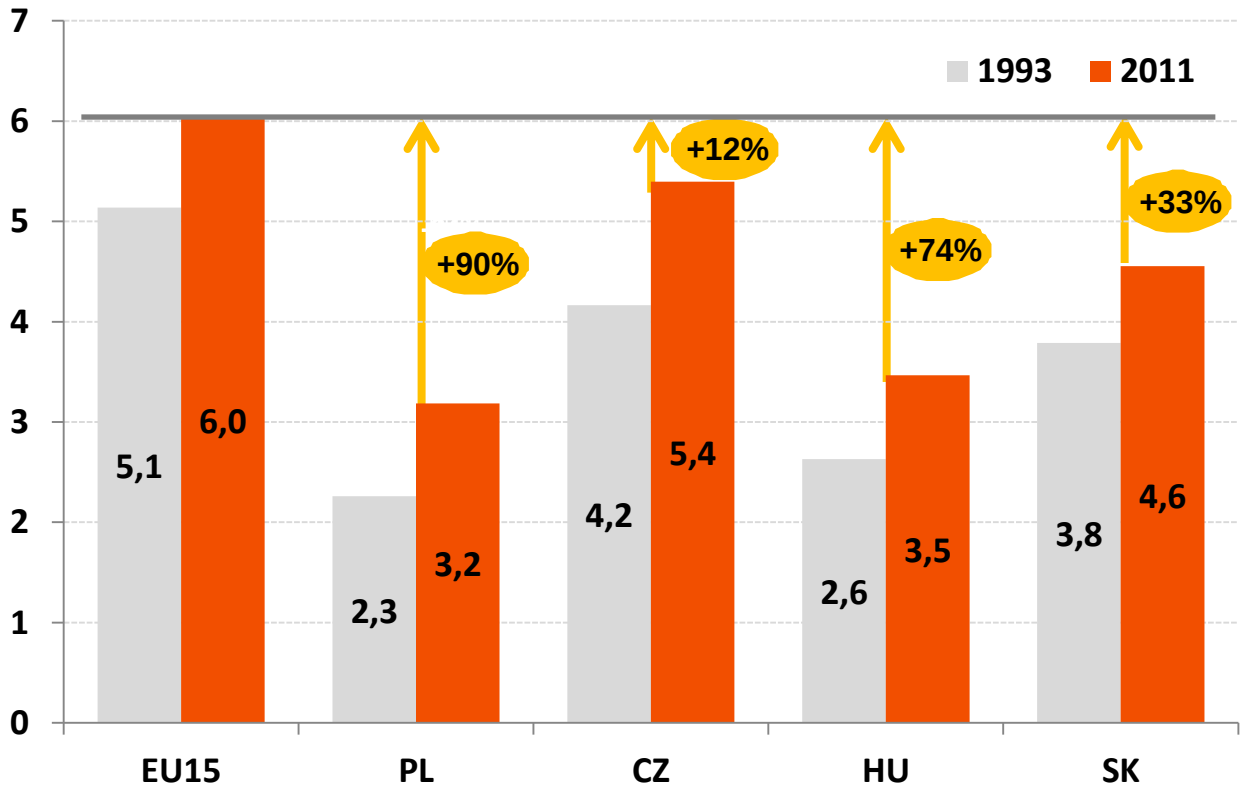
LONG TERM FORWARD PRICES DON'T INDICATE THE RECOVERY OF THE INVESTMENT ENVIRONMENT

- In 2008 the market sent the motivation signal for investment - before the crises. The CO2 price was at the level that promoting low-carbon sources.
- Intermediate oversupply and drop in coal and gas prices decreased the power price.
- Unpredictable support of renewables threatens the European power and CO2 market that should motivate investment into the power sources.

Note: 2014 …2020 - baseload forwards (CAL14 – CAL19 EEX)

THE DEMAND FOR ENERGY IS LIKELY TO GROW

Final consumption of electricity per capita
MWh/cap

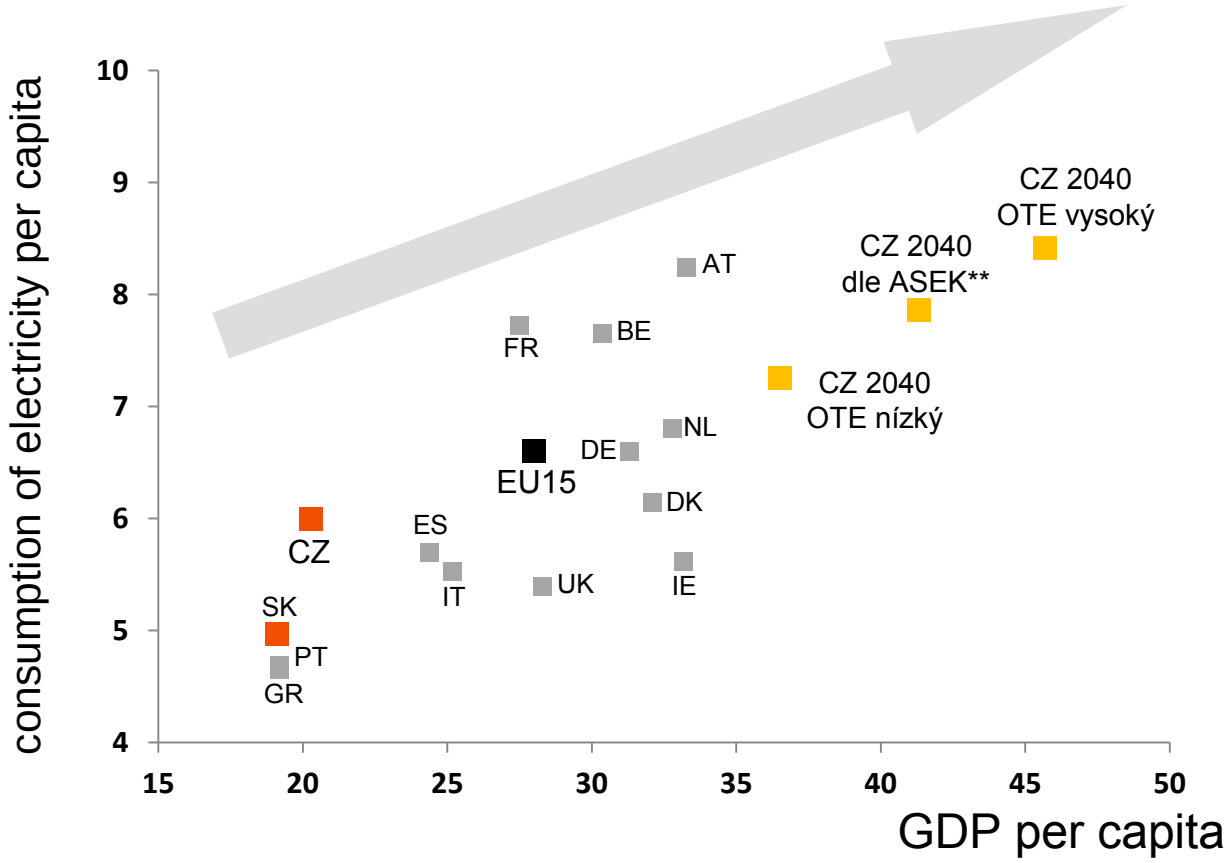


- Further economic convergence in the V4 countries towards the European core can be expected
- Differences in consumption between comparable countries are given by the structural differences in the GDP

Source: Eurostat, 2012

V ČR NELZE V PŘÍPADĚ EKONOMICKÉ KONVERGENCE OČEKÁVAT ABSOLUTNÍ POKLES SPOTŘEBY

Spotřeba elektřiny* na osobu [MWh/os] vs.
HDP na osobu [tisíce PPS/os], 2012



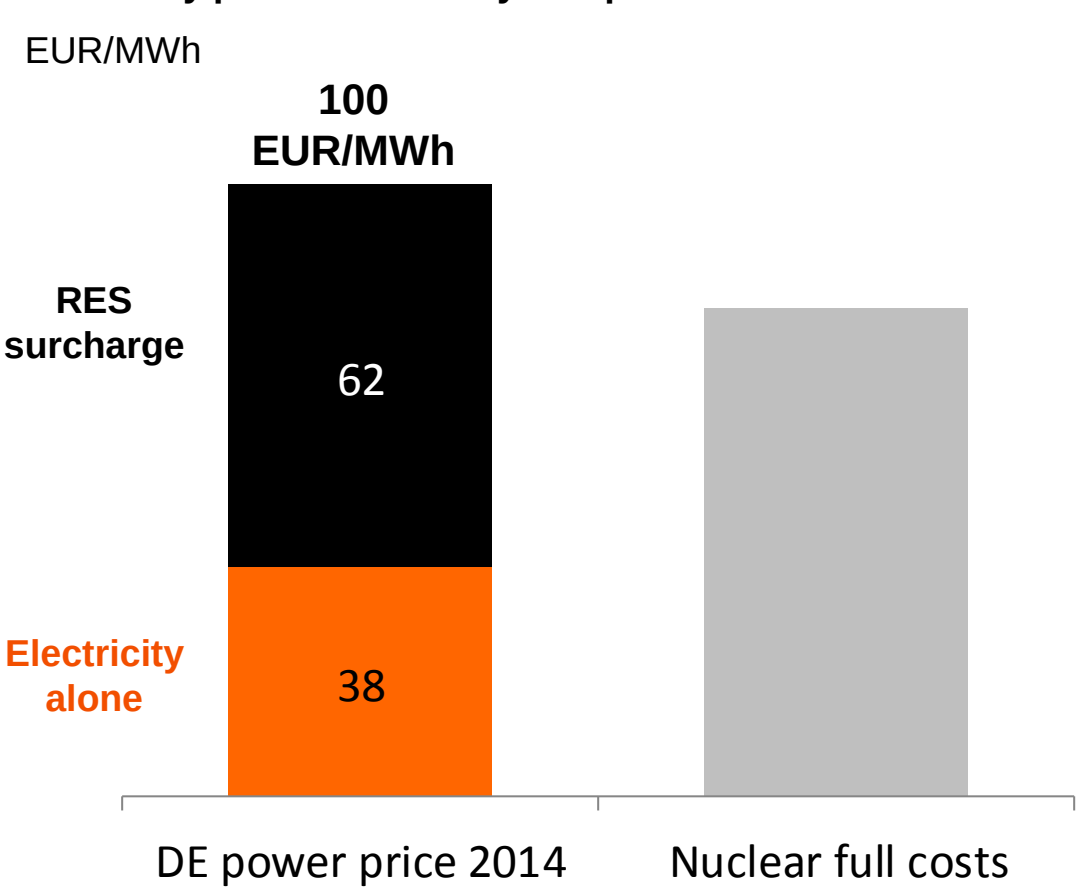
- Existuje silná korelace mezi úrovní ekonomiky a spotřebou elektřiny na obyvatele
- I přes ekonomiku orientovanou na průmysl má ČR nižší spotřebu elektřiny na osobu než jiné vyspělé západoevropské země
- Spotřeba elektřiny ve skandinávských zemích (FI, SE) je na úrovni dvojnásobku průměru EU. Např. Norsko vykazuje 24,5 MWh/osobu

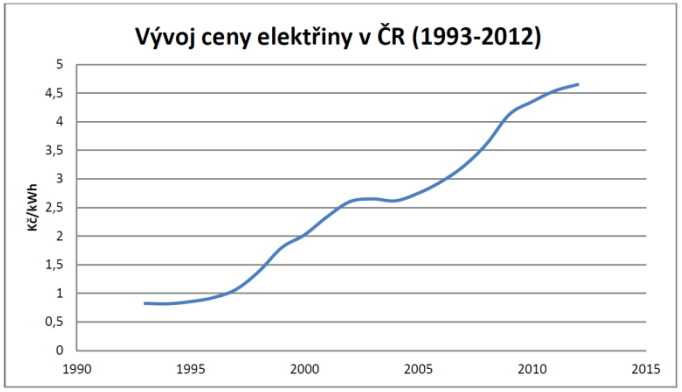
* Konečná spotřeba včetně ztrát v síti a elektromobility
**Růst HDP ve stejné výši jako OTE (2,4% ročně), ASEK vychází z OTE

Zdroj: Eurostat, ENTSO-E

NUCLEAR OFFERS A LOW – EMISSION, LOW COST SOLUTION FOR COUNTRIES STILL WORKING ON ECONOMIC CONVERGENCE TO EU CORE

Electricity price in Germany compared with nuke full cost





STUDY FOR THE EUROPEAN COMMISSION, DG ENERGY

Table 7.5: **Electricity unit supply costs in EUR/MWh for considered scenarios with varying shares of renewables and varying installed capacities of nuclear power**

Installed capacities of nuclear power plants/share of renewables	(EUR/MWh)		
	0 GW	20.7 GW	41.4 GW
15%	95	84	71
35%	120	109	101
50%	132	122	119
80%	174	171	174[a]

a) Variation RES-80%_NUCL-41(21LE) with one half of the nuclear power plant portfolio being entirely depreciated but retrofitted: EUR 169/kWh.

Synthesis on the Economics of Nuclear Energy

William D. D'haeseleer

Professor at the University of Leuven (KU Leuven), Belgium

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SOME FIGURES – NPPs IN THE WORLD

	2006	2010	2011	„Today“*
Units in commercial operation	**435**	**442**	**434**	**445****
Installed power GWe	**368**	**376**	**370**	**389**
Ratio of nuclear power in overall production	**16%**	**14%**	**13,8%**	**11,5%**
Under construction	**28**	**63**	**61**	**61**
On order or planed	**64**	**156**	**156**	**170**
Proposed	**158**	**322**	**343**	**339**

Operable = Connected to the grid;
Under Construction = first concrete for reactor poured, or major refurbishment under way;
Planned = Approvals, funding or major commitment in place, mostly expected in operation within 8-10 years;
Proposed = Specific program or site proposals, expected operation mostly within 15 years.

** Source: WNA 1.8.2016 ** Including Japan (43)*

COUNTRY	REACTORS		REACTORS		REACTORS		REACTORS	
Country Profile)	No.	MWe net	No.	MWe gross	No.	MWe gross	No.	MWe gross
WORLD**	**445**	**388,777**	**61**	64,589	**170**	**177,685**	**339**	**381,6**
China	34	30597	**20**	22596	42	47930	136	156000
Russia	35	26053	**8**	7104	25	27755	23	22800
India	21	5302	**6**	4300	22	20700	38	44000
UAE	0	0	**4**	5600	0	0	10	14400
USA	100	100013	**4**	5000	18	8312	24	26000
Japan	43	40480	**3**	3036	9	12947	3	4145
Korea RO	25	23017	**3**	4200	8	11600	0	0
Pakistan	3	725	**3**	1841	1	1161	0	0
Belarus	0	0	**2**	2388	0	0	2	2400
Slovakia	4	1816	**2**	942	0	0	1	1200
Argentina	3	1627	**1**	27	2	1950	2	1300
Brazil	2	1901	**1**	1405	0	0	4	4000
Finland	4	2741	**1**	1700	1	1200	1	1500
France	58	63130	**1**	1750	0	0	1	1750
Poland	0	0	**0**	0	6	6000	0	0
Turkey	0	0	**0**	0	4	4800	4	4500
United Kingdom	15	8883	**0**	0	4	6100	9	11800
Vietnam	0	0	**0**	0	4	4800	6	6700
Canada	19	13553	**0**	0	2	1500	3	3800
Iran	1	915	**0**	0	2	2000	7	6300
Egypt	0	0	**0**	0	2	2400	2	2400
Czech Republic	6	3904	**0**	0	2	2400	1	1200
Bangladesh	0	0	**0**	0	2	2400	0	0
Hungary	4	1889	**0**	0	2	2400	0	0
Ukraine	15	13107	**0**	0	2	1900	11	12000
Jordan	0	0	**0**	0	2	2000		
Kazakhstan	0	0	**0**	0	2	600	2	600
Romania	2	1310	**0**	0	2	1440	1	655
Armenia	1	376	**0**	0	1	1060		
Bulgaria	2	1926	**0**	0	1	950	0	0
Indonesia	0	0	**0**	0	1	30	4	4000
Lithuania	0	0	**0**	0	1	1350	0	0

UAE First "Newcomer" In 27 Years To Start Nuclear Power Plant Construction

The United Arab Emirates is the first country to start the construction of its first nuclear power plant in 27 years, since construction was started on China's first plant in 1985.

As of **30 August 2012**, the Barakah-Unit 1 is reported in the IAEA Power Reactor Information System (PRIS) as "under construction".

The Emirates Nuclear Energy Corporation (ENEC) poured the first nuclear safety-related concrete on 18 July 2012, after receiving a construction license from the Federal Authority of Nuclear Regulation. The first unit of the APR1400 technology supplied by a Korean consortium led by KEPCO is scheduled to be in operation in 2017 and three additional units are planned to be operational by 2020.

The UAE has started its nuclear power program to meet increasing demand for electricity.

Other potential "newcomers":
Saudi Arabia, Bangladesh, Indonesia, Jordan, Thailand,Vietnam, …..

CHINA

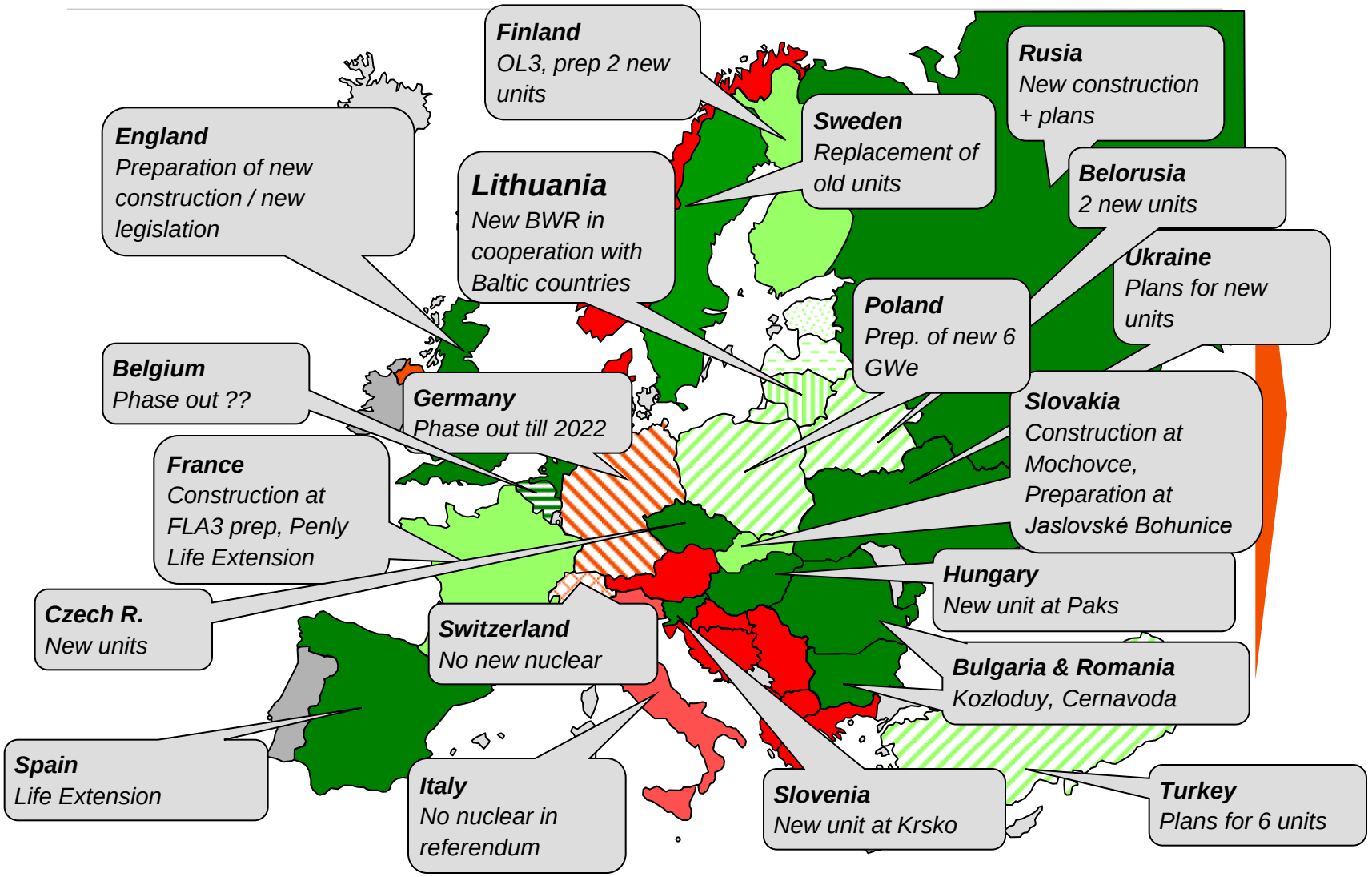
- 1st NPP in operations since 1994
- Currently 34 units in operation (except of 2 Candu 6, all are PWR (300, 600 &1000 MWe); 20 units under construction: 23 MWe; 42 planned: 48 MWe (PWR …. AP1000, EPR, VVER-1000, CPR1000, HL1000, BN-800…)

USA .... NUCLEAR REGULATORY COMMISSION APPROVES CONSTRUCTION OF FIRST NUCLEAR UNITS IN 30 YEARS

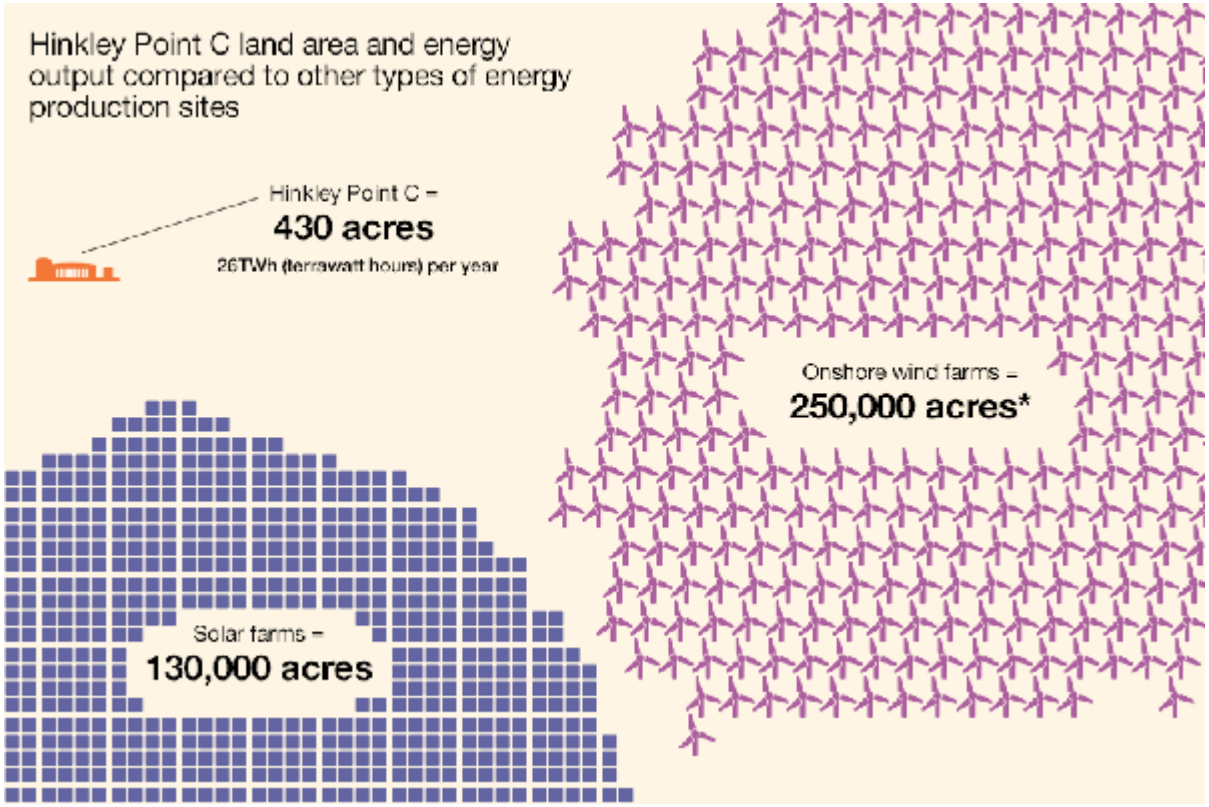
- The USA is the world's largest producer of nuclear power, accounting for more than 30% of worldwide nuclear generation of electricity.
- The country's 100 nuclear reactors produced 798 billion kWh in 2015, aprox. 20% of total electrical output.
- Following a 30-year period in which few new reactors were built, it is expected that 4 new units may come on line by 2020, the first of those resulting from 16 licenses applications made since mid-2007 to build 24 new nuclear reactors.
- However, lower gas prices since 2009 have put the economic viability of some of these projects in doubt.
- Government policy changes since the late 1990‘s have helped pave the way for significant growth in nuclear capacity. Government and industry are working closely on expedited approval for construction and new plant designs.

Vogtle, GA	AP1000 x 2	2400	Southern Nuclear Operating Company	24/7/08, **COL Feb 2012**	loan guarantee; 11/2016, 11/2017
V. C. Summer, SC	AP1000 x 2	2400	South Carolina Electric & Gas	31/3/08, **COL Mar 2012**	loan guarantee; 2017, '18

EUROPE


Finland
OL3, prep 2 new units
Rusia
New construction + plans
Sweden
Replacement of old units
England
Preparation of new construction / new legislation
Lithuania
New BWR in cooperation with Baltic countries
Belorusia
2 new units
Ukraine
Plans for new units
Poland
Prep. of new 6 GWe
Belgium
Phase out ??
Germany
Phase out till 2022
Slovakia
Construction at Mochovce, Preparation at Jaslovské Bohunice
France
Construction at FLA3 prep, Penly Life Extension
Hungary
New unit at Paks
Czech R.
New units
Switzerland
No new nuclear
Bulgaria & Romania
Kozloduy, Cernavoda
Spain
Life Extension
Italy
No nuclear in referendum
Slovenia
New unit at Krsko
Turkey
Plans for 6 units

LAND USE NUCLEAR VS WIND AND SOLAR



Hinkley Point C:

- *430 acres, **174 ha,***
- *26 TWh/year (3200 MW, 93% up time), about 7% of the total UK demand.*

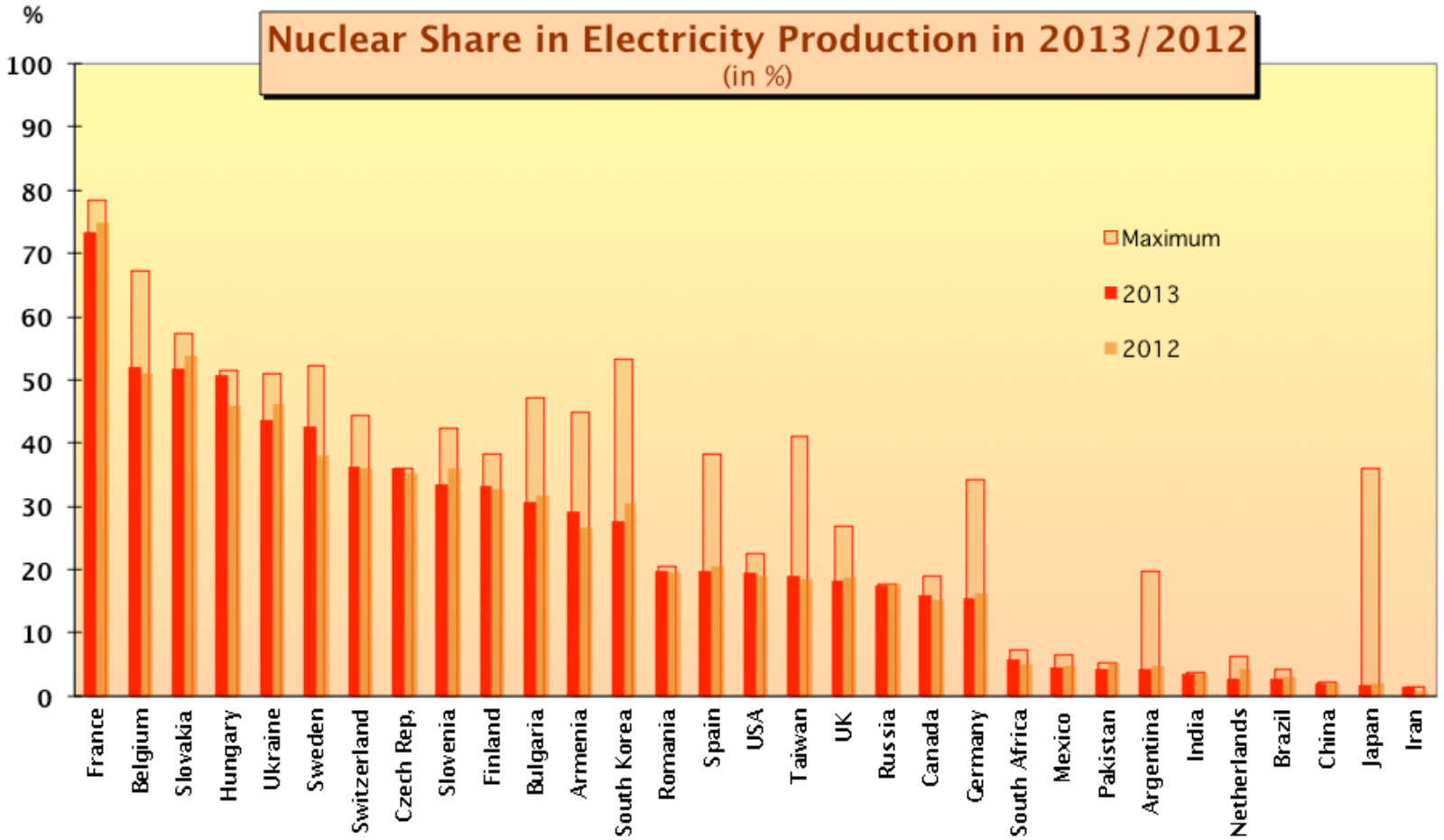
Solar:

- *- 130 000 acres, **52 609 ha***

Wind onshore:

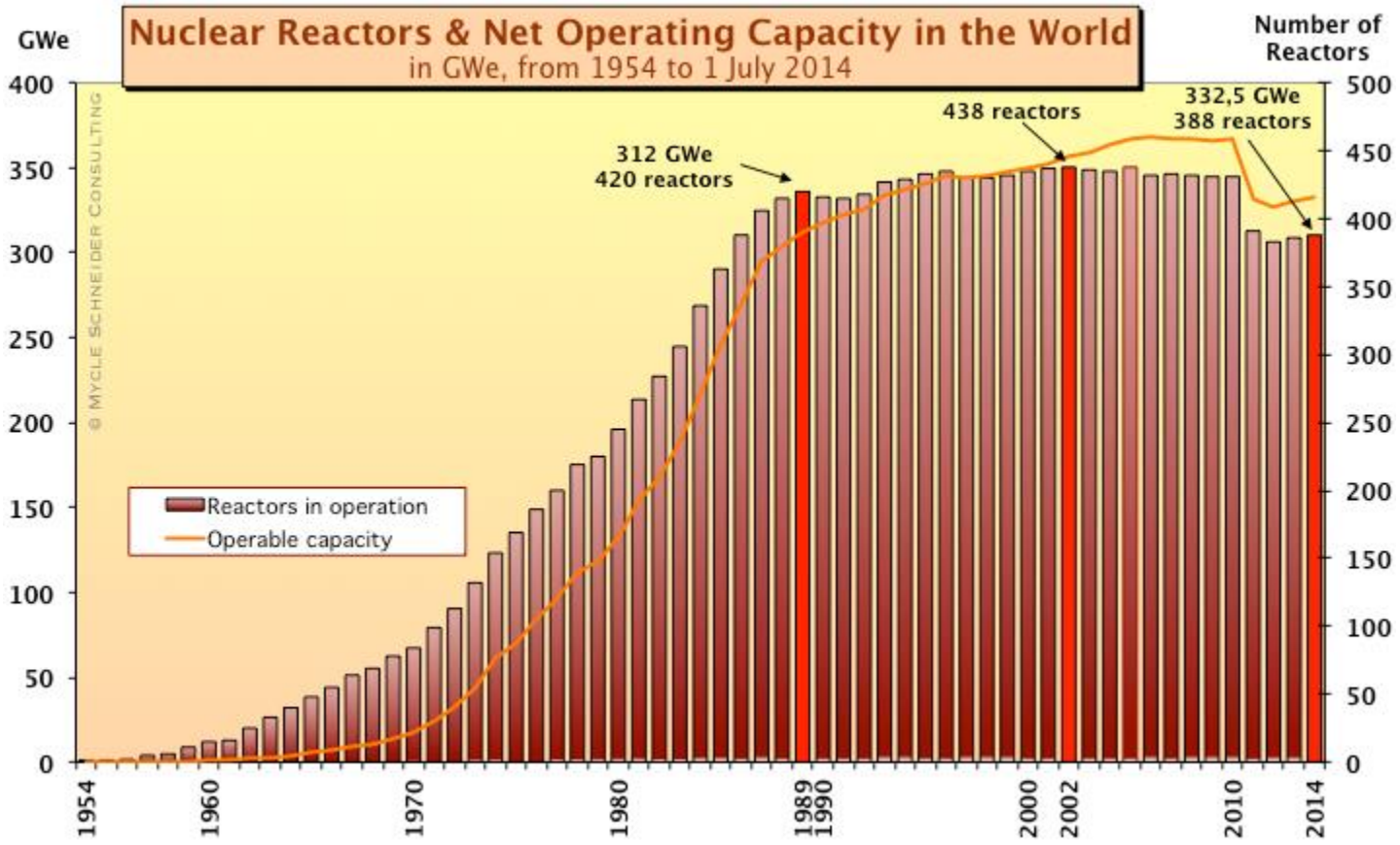
- *- 250 000 acres, **101 171 ha***

ANNUAL NUCLEAR SHARE IN ELECTRICITY MIX BY COUNTRY AND HISTORIC MAXIMUM



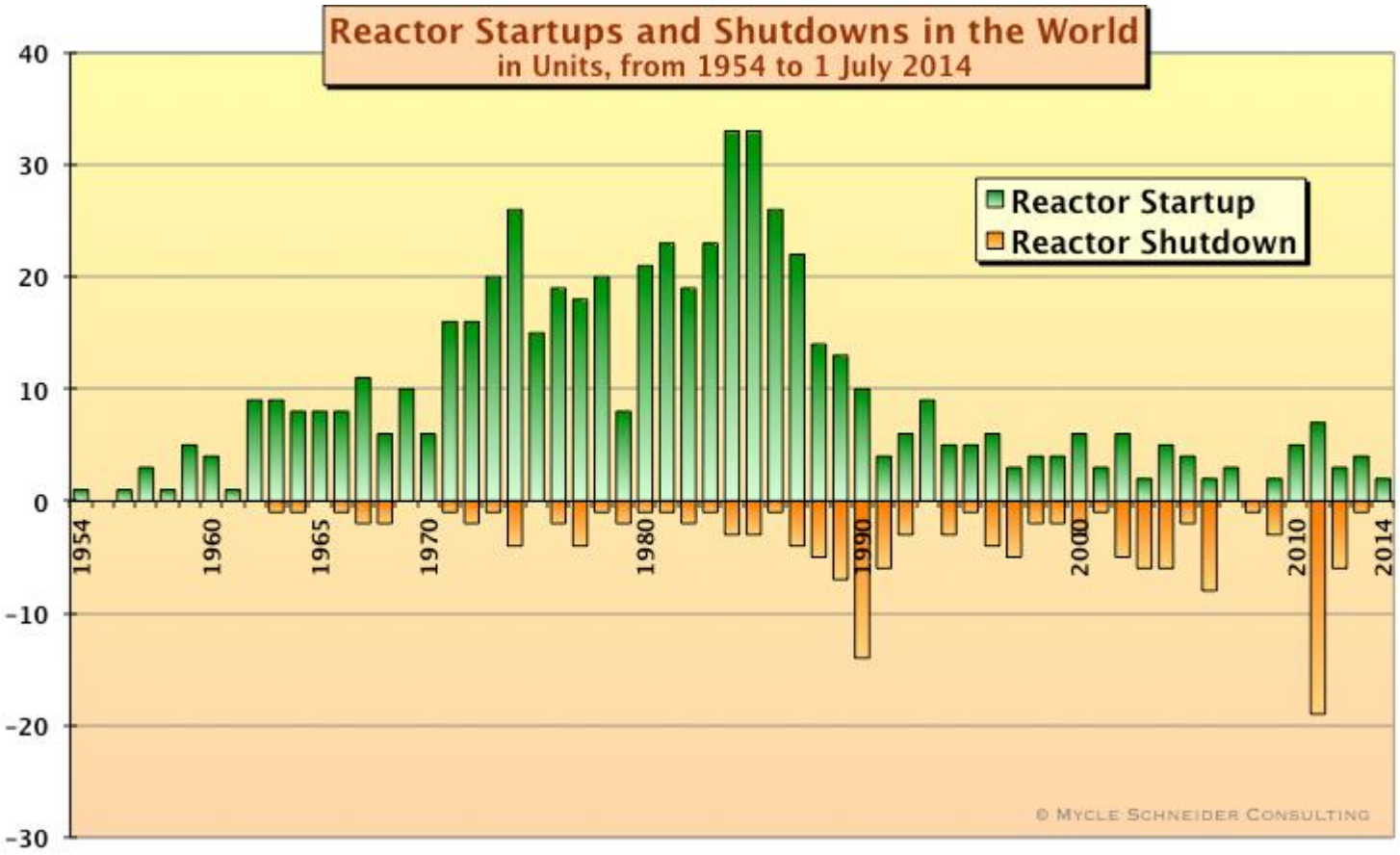
Source: The World Nuclear Industry Status Report 2014

WORLD NUCLEAR REACTOR FLEET, 1954–2014



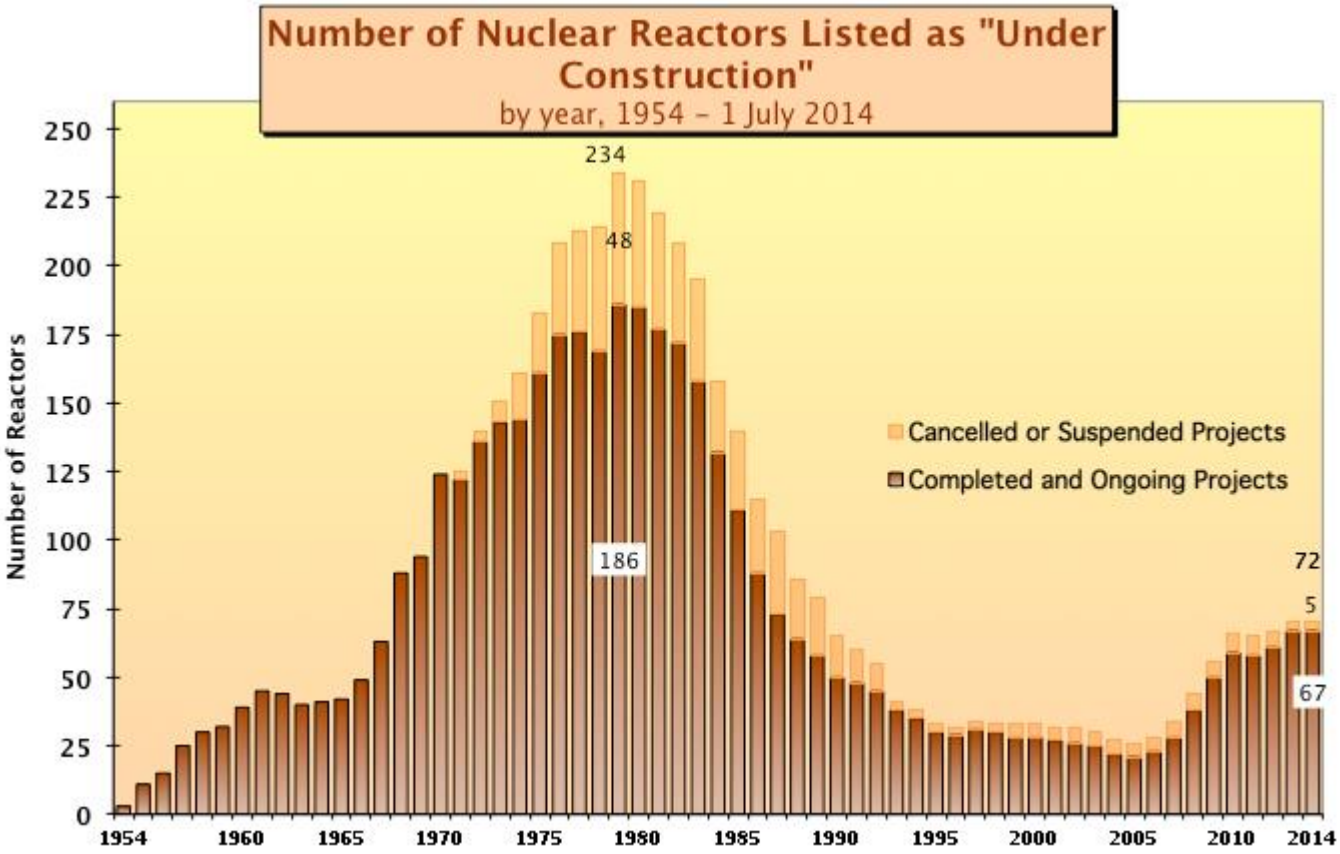
Source: The World Nuclear Industry Status Report 2014

NUCLEAR POWER REACTOR GRID CONNECTIONS AND SHUTDOWNS, 1954–2014



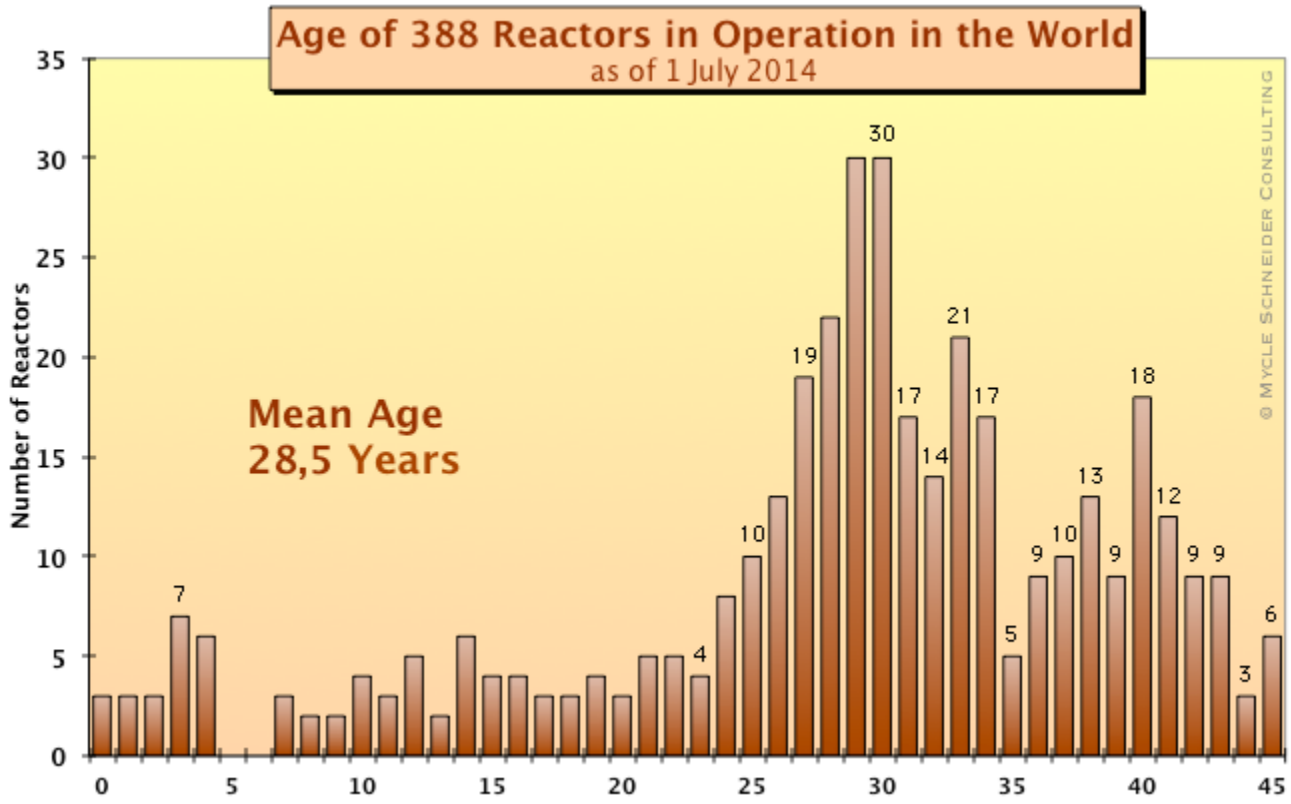
Source: The World Nuclear Industry Status Report 2014

NUMBER OF NUCLEAR REACTORS UNDER CONSTRUCTION



Source: The World Nuclear Industry Status Report 2014

AGE DISTRIBUTION OF OPERATING NUCLEAR REACTORS



Source: The World Nuclear Industry Status Report 2014

SUMMER SCHOOL – NEW NUCLEAR BUILD CONTENT

- **ČEZ Group**
- **Current situation and possibilities**
- **Nuclear in the world**
- **ČEZ - nuclear projects - status**

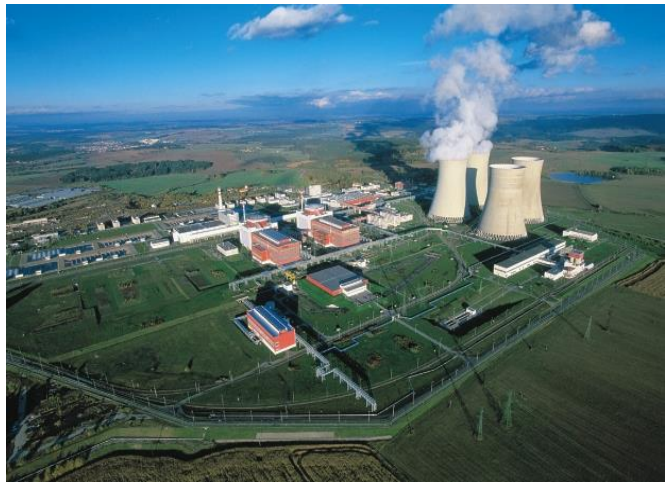
ČEZ IS OPERATING 6 NUCLEAR UNITS ON 2 SITES

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 150 TWh*



ČEZ'S GROUP NUCLEAR COMPETENCIES

- 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&6, New unit at Jaslovske Bohunice NPP – Slovakia).
- 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.

ČEZ's PLANS FOR NEW NPP's BUILDS

THE BUILDING OF NEW REACTOR UNITS IS A PRIORITY FOR BOTH ČEZ AND THE CZECH REPUBLIC

State energy concept

Guarantee energy supplies which will be

- *Reliable*
- *Safe (safe production resources)*
- *Friendly to the environment – almost zero emissions*
- *For an acceptable price*
- *Supplying continuously even in crisis situations*

ČEZ's attitude

- *Nuclear energy has always been for ČEZ profitable*
- *The new nuclear reactors will help ČEZ to increase the proportion of emission-free generation facilities*
- *By building new units, ČEZ would replace decommissioned existing coal power plants*

Targets

- *Building 2 new units in Dukovany and/or Temelín*
  - *Installed capacity 2,000 - 3,300 MWe*
  - *PWR Generation III+ reactors*
  - *Minimum life 60 years*

- *Other project in preparation*
  - *Jaslovské Bohunice power plant (JV with JAVYS)*

EPC TENDER ACC. TO PUBLIC TENDERING – THE WORLD UNIQUE PROCESS HAS BEEN CLOSE TO SELECTION OF EPC SUPPLIER …

Competitive open process

- Tender procedure compliant with European Union and Czech public tendering
- Balanced technical and commercial criteria for offer evaluation
- Specifications selected to favour the standard design option with minimum modification
- Technical requirements adapted from European Utility Requirements (EUR) as a starting point, modified mainly for:
  - Site conditions
  - Legislation requirements and licensing process in the Czech Republic
  - CEZ operational experience from Dukovany and Temelin (6 units all together)
  - Technical advisor recommendation
  - Emphasis on safety and security following Fukushima incident
- Selection of EPC contractor independent from partnership process

Three nuclear technology leaders retained as bidders

AP1000™ The Nuclear Renaissance Starts Here.™

Westinghouse Electric Company LLC
Westinghouse Electric Czech Republic s.r.o

EPR™ by AREVA

Areva NP SAS

Modernized International Reactor MIR

SKODA JS a.s
ZAO Atomstroyexport
OAO OKB Gidropress

SUMMARY OF PASSED MILESTONES AND NEXT STEPS REGARDING EPC TENDER

Initiation of EPC tender — ***Aug 2009***

Qualification finished — ***Feb 2010***

Consultation

First round of tender

Initiation of external

Consultatio

Decision about tender changes — ***19th-25th May 2011***

Documen reac for secon of exte assess — ***15th June***

Bid submission — ***2nd July 2012***

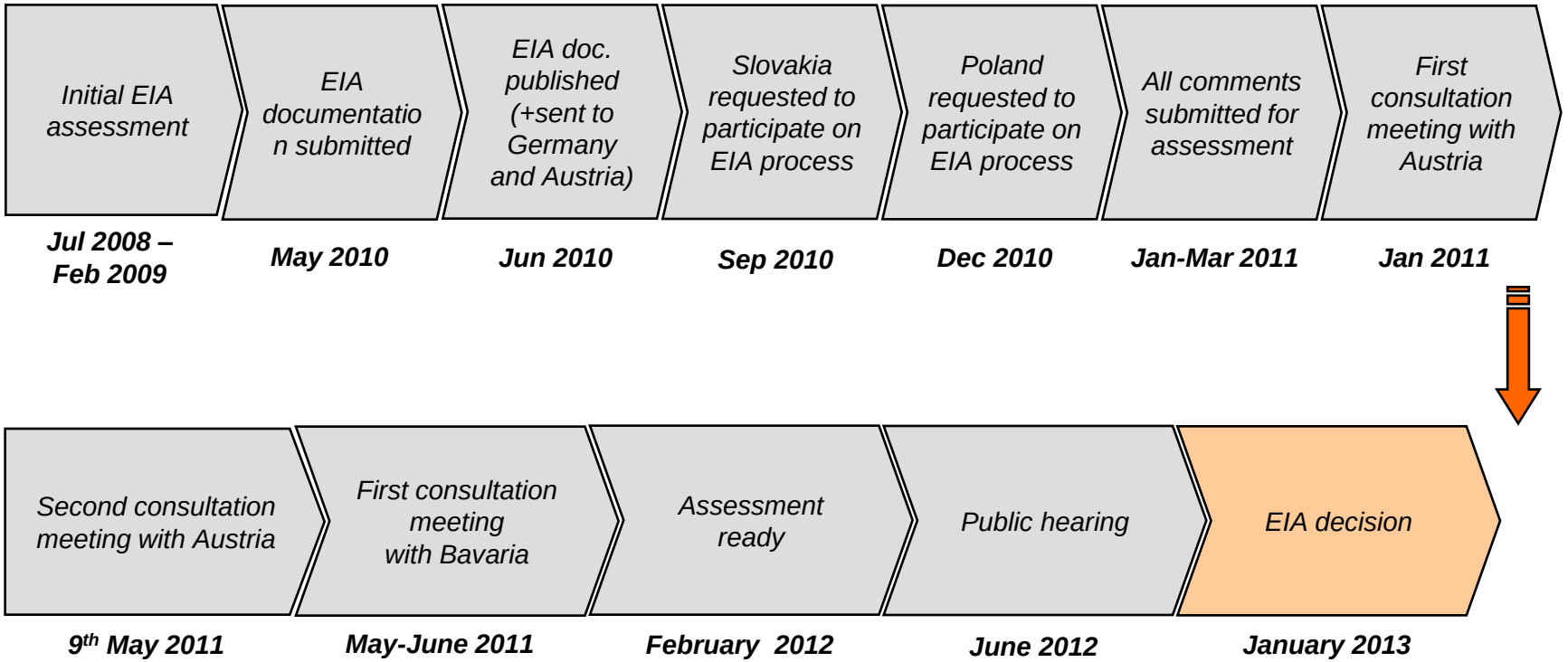
Finalisation of the evaluation and negotiations — ***April 2014 Tender canceled***

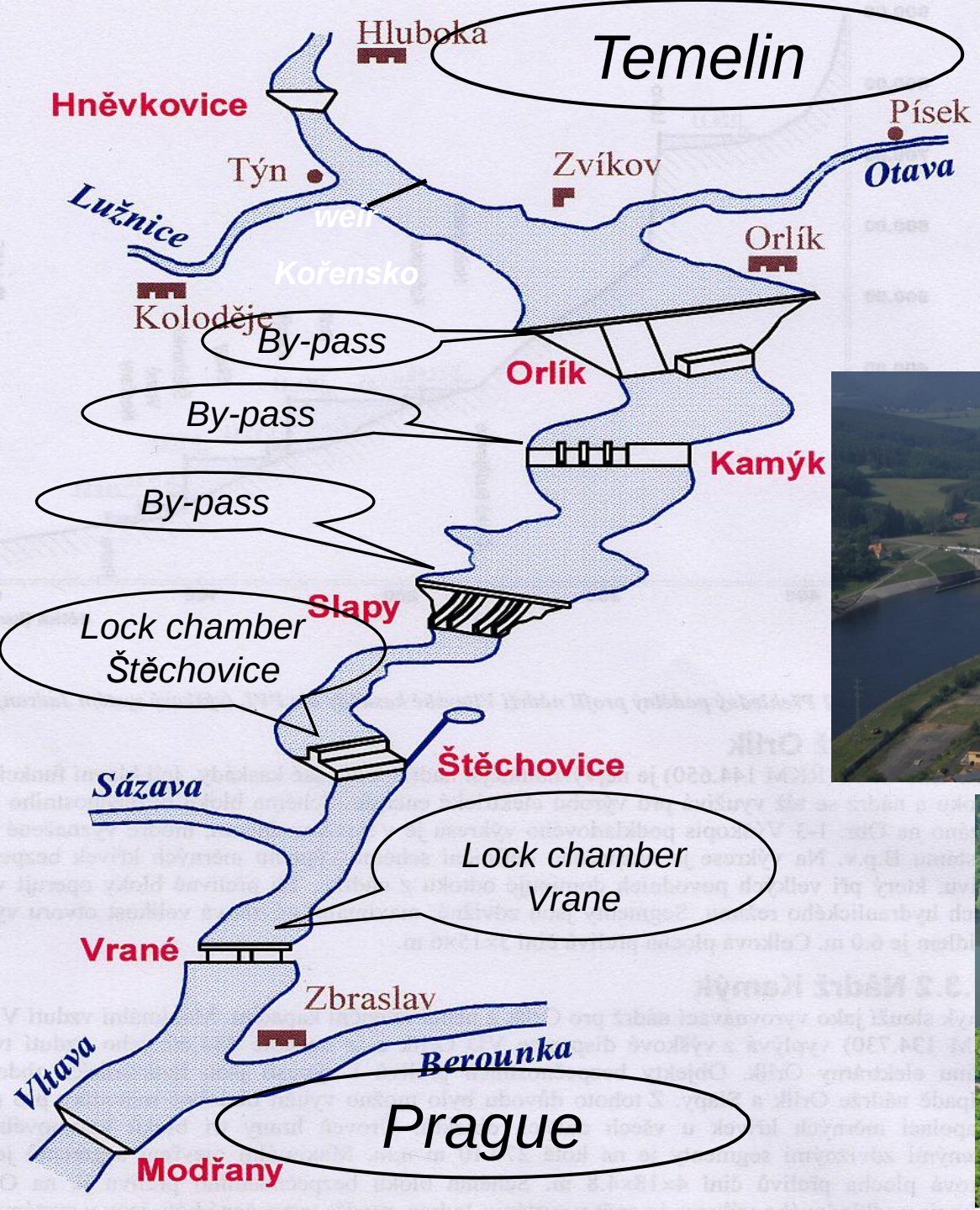
Approval by MB and SB of ČEZ

Signature of the EPC contract

Final notice to proceed – start of construction

SUMMARY OF PASSED MILESTONES REGARDING EIA PROCESS



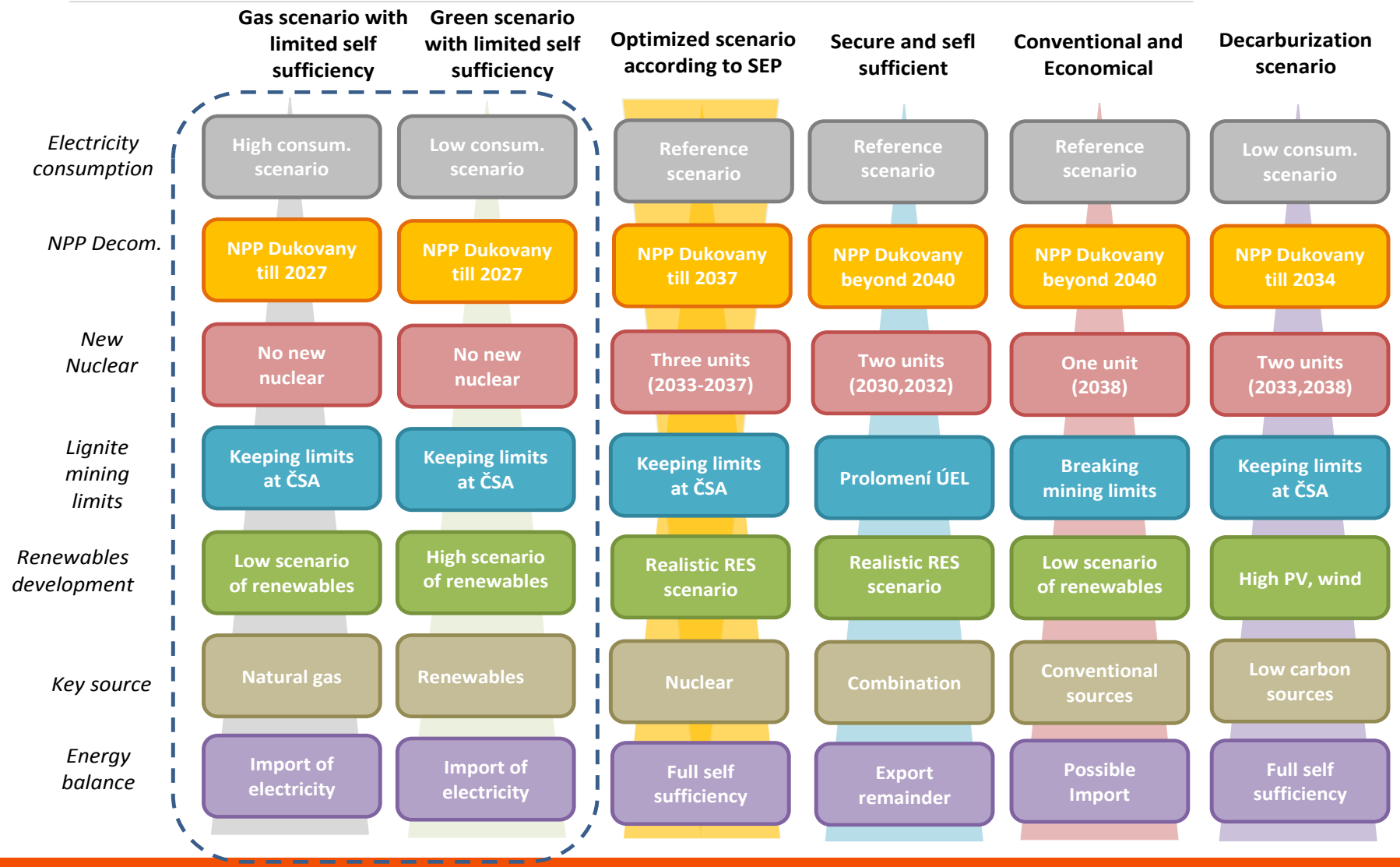

Temelin
Hluboká
Hněvkovice
Písek
Otava
Týn
Zvíkov
Lužnice
weir
Kořensko
Orlík
Koloděje
By-pass
Orlík
By-pass
Kamýk
By-pass
Slapy
Lock chamber
Štěchovice
Štěchovice
Sázava
Lock chamber
Vrane
Vrané
Zbraslav
Vltava
Berounka
Prague
Modřany

Orlik

Kamýk

Slapy

STATE ENERGY POLICY HAS BEEN APPROVED IN 2015



LONG TERM ROLE OF NUCLEAR ENERGY SECTOR

- **The transition to a low/zero carbon energy sector** in 2050 in the context of meeting the Czech international obligations.
  - *Communication of EU: 2050 – 80% - 95% emissions of GHG compare to 2005 (zero emission energy sector).*

- **Ensuring energy security** (ability of long-term electricity supply even in the absence of external supply sources).
  - *Creating reserves of uranium fuel for 4 or more years.*

- **Industrial production and export potential.**
  - *Nuclear energy industry and infrastructure – 15 000 people, 2 % GDP, potential to double this share.*

- **The knowledge base of the economy** (the leader of hi- tech industrial production, organizational and structural skills).
  - *High value added, with significant multiplication to other (material R&D, engineering etc.).*

CZECH STATE ENERGY POLICY
SUMMARY OF GOALS FOR NUCLEAR ENERGY

- **Strengthening the role of the nuclear energy in the energy mix of the Czech Republic,** compensation for decreasing production from thermal (coal) power plants => up to 50% share on gross electricity generation.
- **Promote and accelerate the process of negotiation, preparation and execution** of new nuclear units at existing locations **with a total capacity to 2,500 MW**, respectively, annual production of around 20 TWh in the period of 2030-2035.
- **Aim the start of operation around possible shutdown of Dukovany NPP**, it means after 2035.
- Creating the conditions for extending the **operational period of Dukovany NPP up to 50 (or 60) years.**
- **Ensuring the conditions for the establishment and operation of a secure and long-term repository of radioactive waste;** decide on nuclear repository location until 2025.
- **Identification and securing territorial protection for other suitable locations for potential NPPs.**

NATIONAL ACTION PLAN FOR NUCLEAR ENERGY RECOMENDED STEPS

- **Immediate continuation of preparatory works for NPP Temelín project and on NPP Dukovany project**
  - Preparatory 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 if needed
- **Carve out both projects into project companies** to enable future entry of the state or strategic partner
- **Start discussion with strategic partners**
- **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
- **Keep know-how and teams**

ČEZ NUCLEAR NEW BUILD PROJECTS

New NPP Temelín

- *SPV (Special Purpose Vehicle) established*
- *Fulfilment of conditions from permission and licenses issued (EIA, Initial Safety Report/nuclear siting, …)*
- *Related investments (at site, in the region)*
- *Other preparatory works (ČEPS, …)*

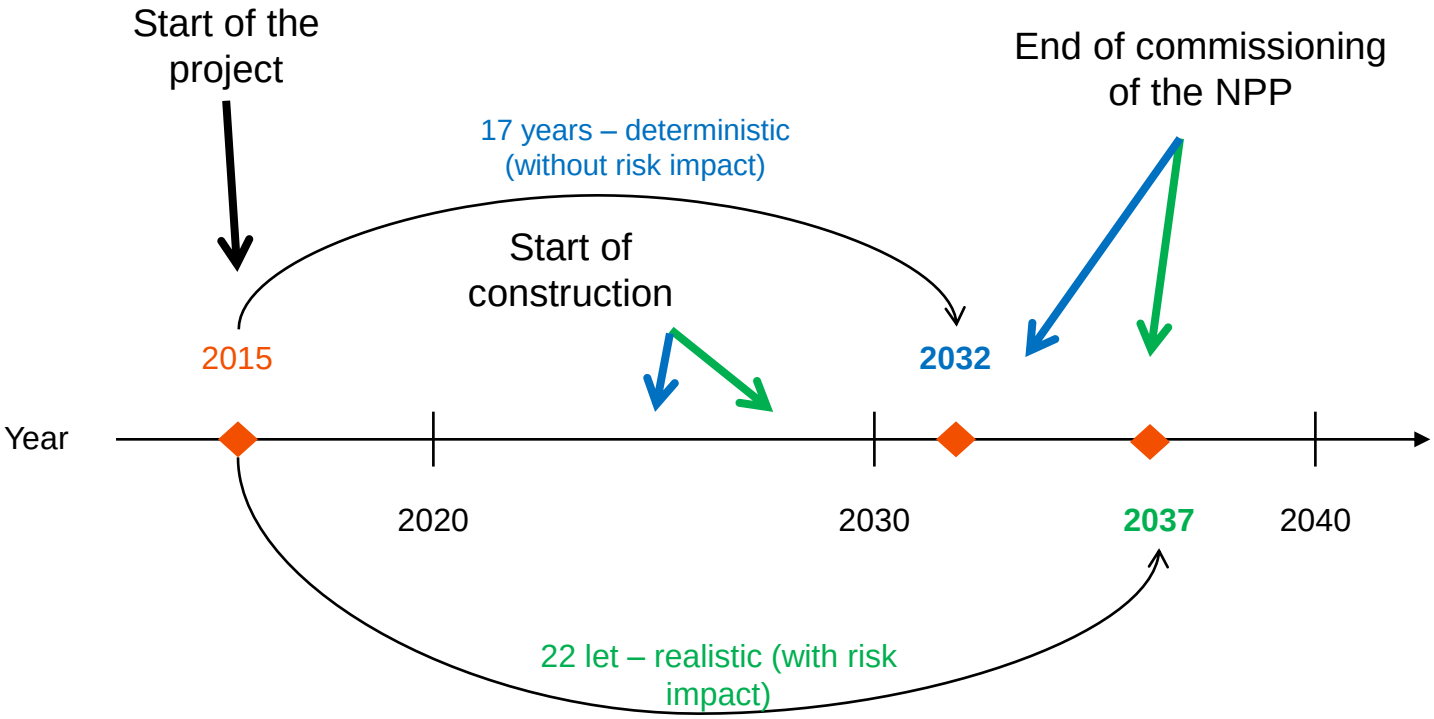
New NPP Dukovany

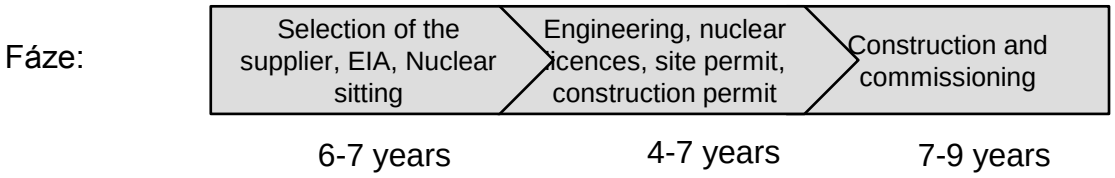
- *Preparation of the project started in 2010*
- *Feasibility study approved*
- *Complex water supply study*
- *EIA process stated*
- *Site investigation under progress*

New NPP Jaslovské Bohunice (SK)

- *JV company (JESS) established in 2009*
- *Joint Czech / Slovak team established*
- *Feasibility study approved*
- *EIA process stated*
- *Site investigation under progress*

PREPARATION AND CONSTRUCTION OF THE NPP IS LONG JOURNEY AND THEREFORE SHOULD START IMMEDIATELY





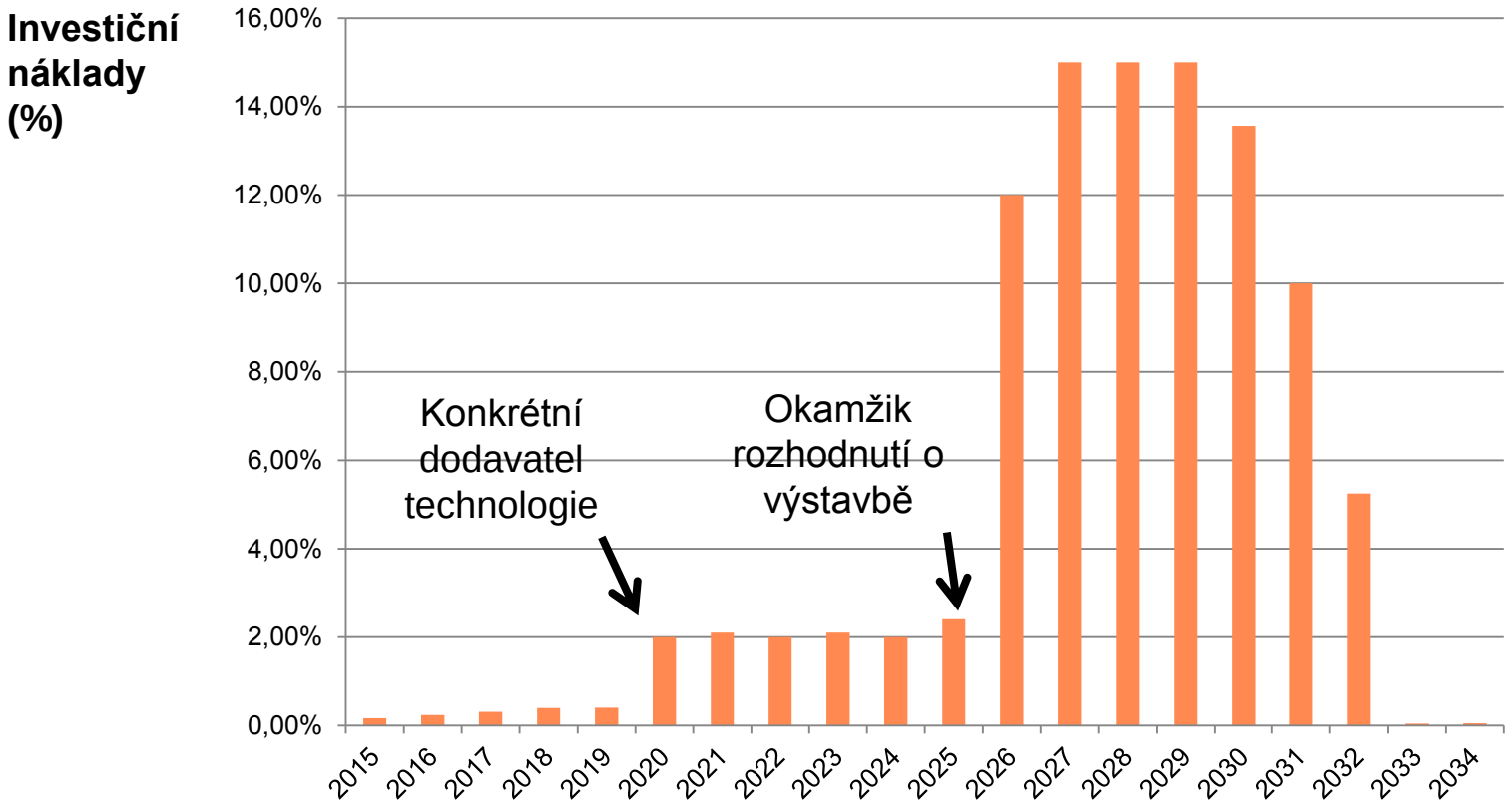
NPP DEVELOPMENT AND CONSTRUCTIONS IS A LONG PROCESS CONTAINING NUMBER OF RISKS

Milestone	Years from T0 (risk free)	Risk and its impact	Delay (in years)	Delay on critical path	Years from T0 (incl. risk)
EIA process resulting in positive EIA statement	4	**Prolongation of the process** - complicated process including international hearing and discussions **Complaint or legal proceeding** – strong opposition of NGO , number of obstructions and complaints	1	0	5
Site permit (nuclear regulator)	5,5	**Longer preparation of the documentation** (need to prepare more information than originally expected) **Suspension of the process** – request for provision of additional information **Law suit** based on third party claim	1	0	6,5
EPC tender acc. to public proc. law	5,5	**Complaint or legal proceeding** initiated by rejected of non-successful bidder **Prolongation of the notification process** in EC **Prolongation of negotiation** and / or of internal approval process	1	1	6,5
Site permit (ministry of local development)	7,5	**Prolongation of assessment** on ministry due to scope and complexity of the project **Suspension of the process** - request for provision of additional information **Law suit** based on third party claim	0,8	1,8	9,3
Construction permit (nuclear regulator)	9,5	**Longer preparation of the documentation** (need to prepare more information than originally expected) **Suspension of the process** – request for provision of additional information	0,5	2,3	11,8
Construction permit (ministry of trade and industry)	10,5	**Prolongation of assessment** on ministry due to scope and complexity of the project **Suspension of the process** - request for provision of additional information **Law suit** based on third party claim	0,5	2,8	13,3
Take over of first unit	17,5	Delay due to poor performance of Supplier Delay resulting from change in law	2	4,8	22,3

Rozhodnutí o přípravě jaderných projektů je dnes

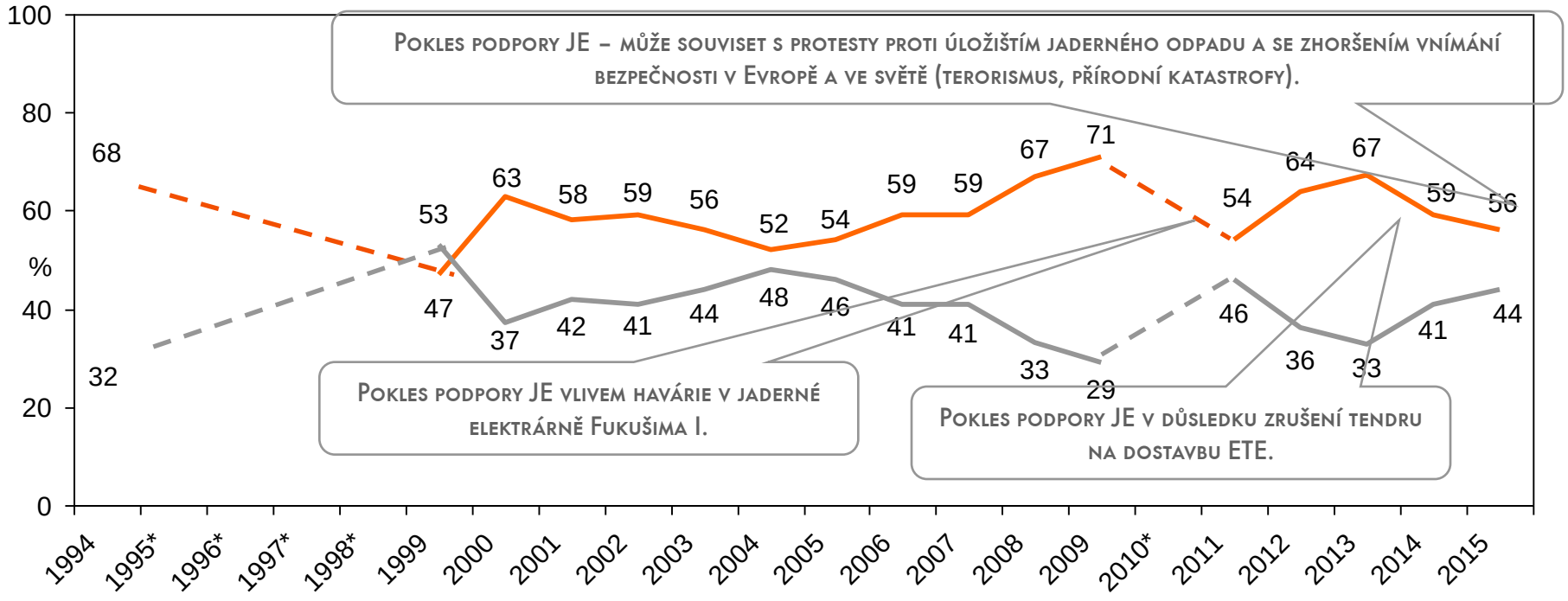
rozhodnutím o budování příležitosti, nikoliv o výstavbě

Ilustrativní příklad



PODPORA ROZVOJE JADERNÉ ENERGETIKY V ČR – ČASOVÉ SROVNÁNÍ

Od podzimu 2014 zaznamenán mírný pokles podpory rozvoje jaderné energetiky v ČR.



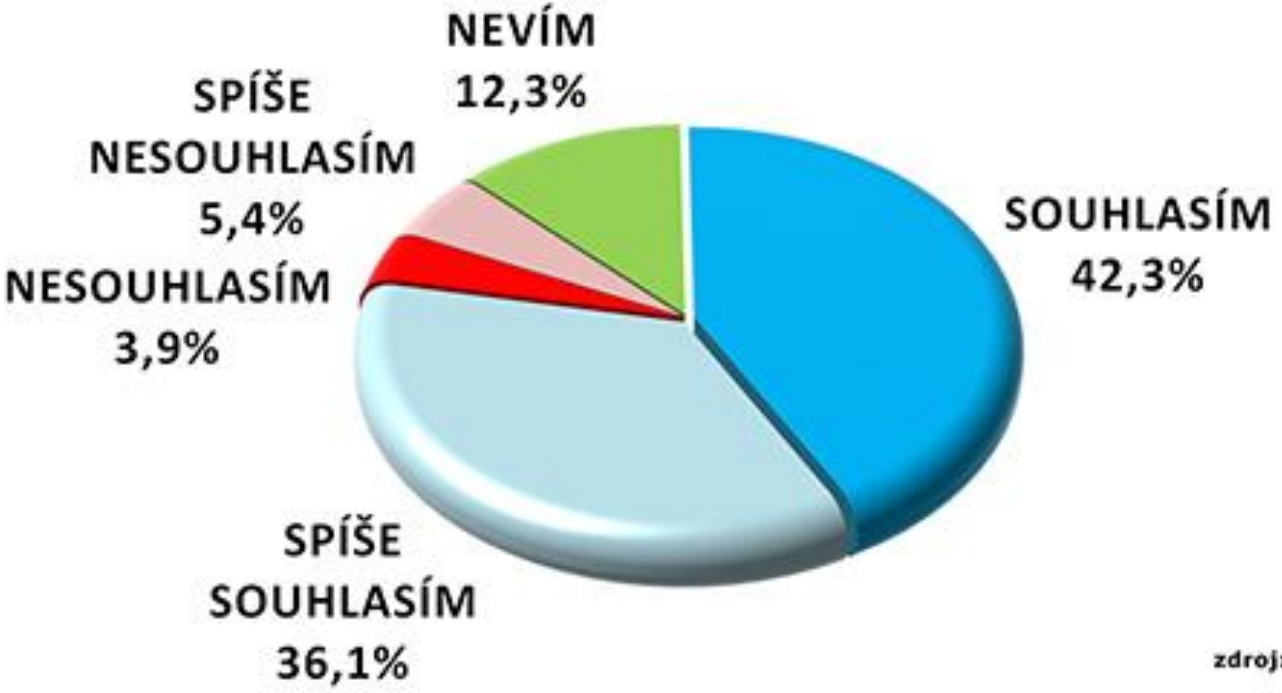
(stat. chyba: max. 3,7%)

ZDROJ DO 2012: STEM

*Pozn.: V letech 1995-1998 a 2010 nerealizováno

Q4) Jste Vy osobně pro rozvoj jaderné energetiky v naší republice? (odpovídají všichni respondenti N=500)

V rámci energetické nezávislosti a bezpečnosti se rovněž hovoří o nutnosti dostavby nových bloků v jaderných elektrárnách Temelín a Dukovany. S dostavbou nových bloků tuzemských jaderných elektráren:



zdroj: SANEP.cz

CZECH POWER INDUSTRY ALLIANCE

- **ŠKODA PRAHA initiative for export of conventional island of the NPPs and subsequently generally for energy sectors**
- **Initiative substantial also for preparation nuclear projects in ČR (Temelín, Dukovany)**
- **Initiative is also in line with tasks given by the government – Czech government has approved National Action Plan for Nuclear Energy on 3rd June, 2015. In the chapter 5.3., there is stated the following; Organization of the supply chain:**
  - Although they are private companies owned by various owners, their common interest is to carry out business in the sector under the powerful control of the state. Knowledge and the maintenance or development thereof and the involvement of suppliers are important for the development of the sector as a whole.
  - **It is recommended to initiate the establishment of an organisation which would associate the industrial undertakings participating in supplies for the nuclear energy sector. Such an organisation would be a partner of the Committee** (with the representative of the organisation as a member thereof) and could provide for the transfer of knowledge between the government and the industry, participate in the assessment of the NAP NE and submit proposals aimed at the Committee and coordination of members thereof.

- **ŠKODA PRAHA brings traditional trademark and takes the lead of the Alliance**

CZECH POWER INDUSTRY ALLIANCE

EXPORT COORDINATOR OF CZECH DELIVERIES FOR NUCLEAR POWER PLANTS

CPIA Board:

- ***Mr. Bodnár*** *– Chairman – Škoda Praha*
- ***Mr. Perlík*** *– Vice-Chairman – Škoda JS*
- ***Mr. Světlík*** *– Member – Vítkovice*
- ***Mr. Koníček*** *– Member – I.B.C. Praha*

1. ***ŠKODA PRAHA a.s.***
2. ***ŠKODA JS a.s.***
3. ***VÍTKOVICE HOLDING, a.s.***
4. ***Doosan Škoda Power s.r.o.***
5. ***SIGMA GROUP a.s.***
6. ***MSA, a.s.***
7. ***I.B.C. Praha spol. s r.o.***

1. ***ALTA, a.s.***
2. ***ZAT a.s.***
3. ***ZVVZ GROUP, a.s.***
4. ***OSC, a.s.***
5. ***KRÁLOVOPOLSKÁ RIA, a.s.***
6. ***Elektro Kroměříž a.s.***

Potential newcomers:

1. *CHEMCOMEX Praha, a.s.*
2. *FANS, a.s.*
3. *NOEN, a.s.*
4. *ETD Transformátory, a.s.*
5. *ZK – TERMOCHEM s.r.o.*
6. *JSP, s.r.o.*
7. *….*

Czech Power Industry Alliance

DO WE HAVE RESPONSES TO THE FOLLOWING QUESTIONS?

- What are the alternatives we have, compared to nuclear. How real are they in the Czech Republic conditions?
- Which criteria we are taking into the account (is the current spot price the only criterion we should take into the account)?
- What is the social price of the security of supply?
- Will we be able to buy electricity at competitive price, if there are no new sources in the Czech Republic?
- How the Czech energy sector will look like in 2035 without the investment into new sources?
- What is the cost of a black-out in the Czech Republic? How real is the risk?
- What is socially acceptable price for electricity and what is current price?
- Will not lead postponement of decision on build - up / unsupported build - up new sources to problems, which will be heavy, or impossible manageable in the future?

TEMELÍN NOW

TEMELÍN NOW & FUTURE

THANK YOU FOR YOUR ATTENTION