CEZ INVESTMENT IN CLEANER ELECTRICITY PRODUCTION FROM BROWN COAL

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INTRODUCTION

The Czech Republic is the last country in the CEE Region with an existing generation surplus.

The country has roughly 17,000 MW of installed capacity, of which CEZ counts for some 12,000 MW (6,500 MW from brown coal-fired plants).

Czech energy group CEZ is among TOP 10 European power utilities.

Generation 62.0 TWh represents 73.5 % of the Czech electricity market.

CEZ is a strong and vertically integrated player.

CEZ fully owns the largest Czech mining company SD – Severoceske doly, covering 60 % of CEZ´s brown coal needs.

SD Company :

brown coal production 22.8 million tons/year
market share 45.9 %

Remaining two Czech brown coal mining companies (total 26 million tons/year) are privately owned.

In the Czech Republic coal accounts for about 56 percent of electricity production and about 47 % of primary energy supply.

CEZ GROUP HAS DEVELOPED A STRONG ASSET BASE IN CEE THROUGH ACQUISITIONS

- Asset positions
- Target markets
- Trading office

CEZ Group in Poland
(75% share in Skawina, 89% in Elcho)

– Electricity sales netto (TWh)	3.9
– **Market share**	**2.4%**
– Installed capacity (MW)	830
– **Market share**	**2.3%**
– Number of employees	751
– Sales (EUR million)	185

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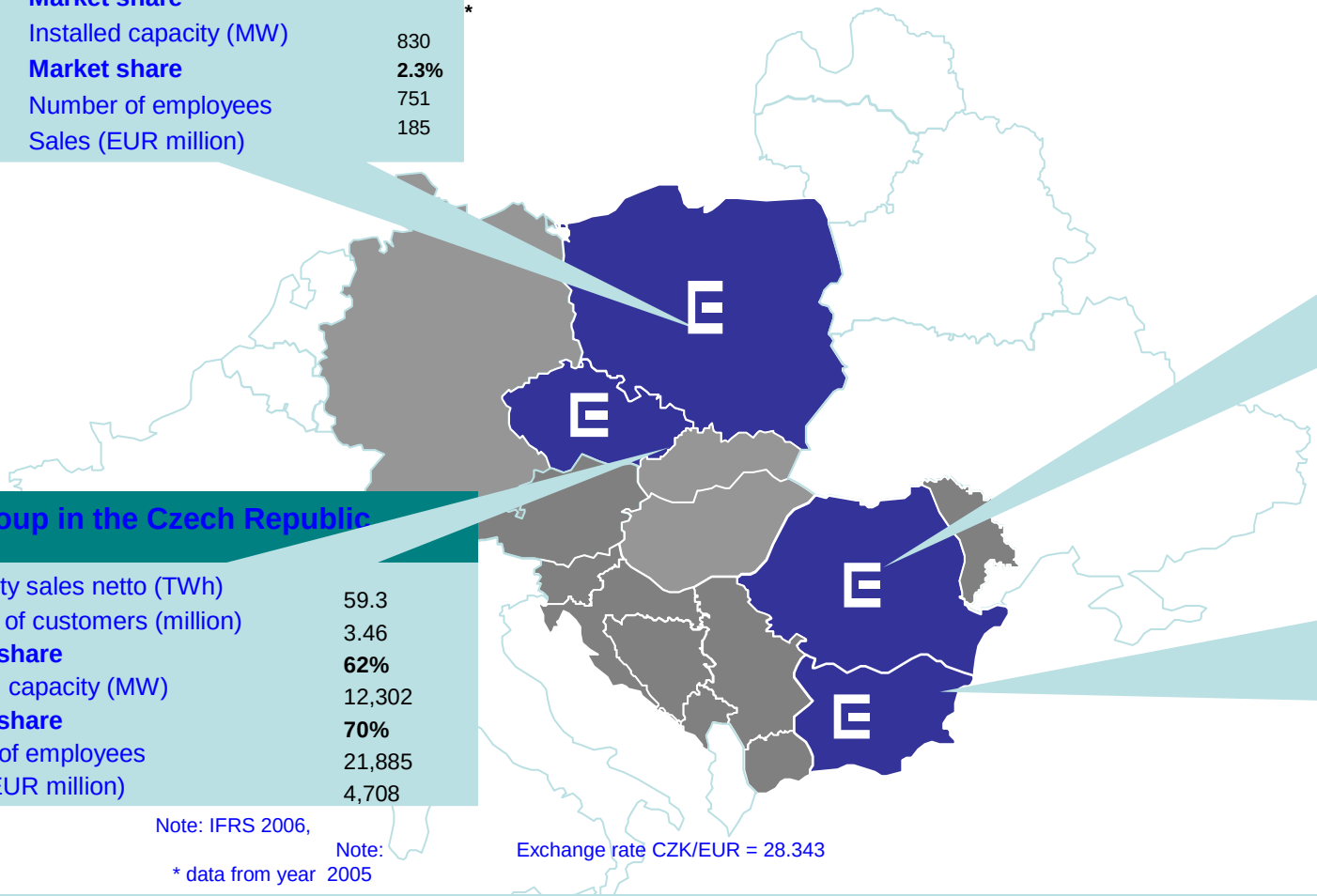


CEZ Group in Romania
(51% share in EDC Oltenia)

- Electricity sales netto (TWh)
- Number of customers (million)
- **Market share**
- Number of employees
- Sales (EUR million)

CEZ Group in the Czech Republic

▪ Electricity sales netto (TWh)	59.3
▪ Number of customers (million)	3.46
▪ **Market share**	**62%**
▪ Installed capacity (MW)	12,302
▪ **Market share**	**70%**
▪Number of employees	21,885
▪ Sales (EUR million)	4,708

CEZ Group in Bulgaria
(67% shares in 3 EDCs, 100% in TPP Varna)

- Electricity sales netto (TWh)
- Number of customers (million)
- **Market share**
- Installed capacity (MW)
- **Market share**
- Number of employees
- Sales (EUR million)

Note: IFRS 2006,

Note:
* data from year 2005

Exchange rate CZK/EUR = 28.343

Source: CEZ

BROWN COAL PP AS THE IMPORTANT PART OF CEZ PLANT FLEET IN THE CZECH REPUBLIC

- **Low cost of domestic brown coal (large share ~ 60 % of supplies from own opencast mines SD - Severoceske doly Company)**
- **Acceptable environmental impact of mining and use of brown coal if progressive technologies adopted**
- **Low and relatively stable generation cost**
- **Increased efficiency after PP fleet renewal and maintenance cost reduction**

But

- **Limited availability of domestic brown coal (mining limits in the North Bohemian Brown Coal Basin)**
- **CO_2 regulation/price**

TERRITORIAL MINING LIMITS

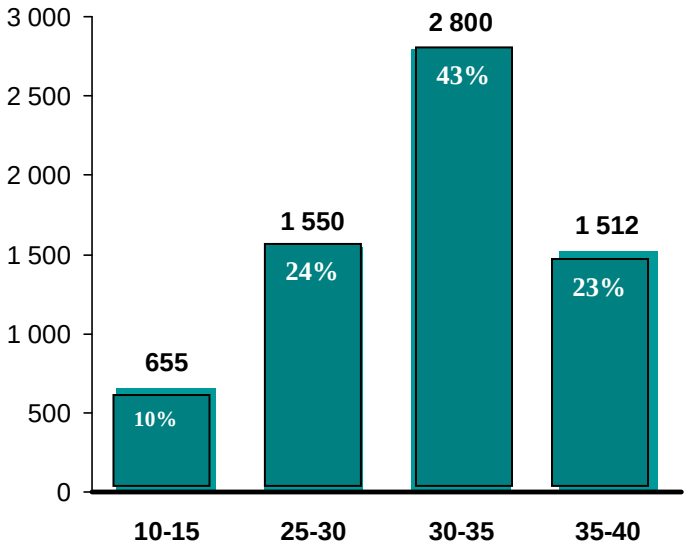
- The issue of territorial mining limits (imposed by the government order of 1991) will influence investment into new power capacity.
- The limit change decision to be made by the respective communities and by the government.
- The decision may take into account the responsibility for the energy security and independence of the state, as well as for the social and economic impact on the whole brown coal mining region and on the citizens of the Czech Republic.
- The reserves of 100 million tons of brown coal in the area of SD - Severoceske doly Company are currently restricted by mining limits.

AGE STRUCTURE OF CEZ BROWN COAL-FIRED UNITS IN THE CZECH REPUBLIC

- **The fleet of brown coal power plants must be renewed by new plants construction and by refurbishment of existing units.**
- **CEZ invested EUR 1.5 billion into desulphurization of its plants between 1993 – 1999. Desulphurization equipment reaches end of its lifetime in 2015 – 2020.**
- **CEZ Group emission change 2006/1993 represents -92 % SO_2, -95 % fly ash, -77 % CO and -50 % NOx. Consequently, the CEZ Group was the first clean generator in CEE.**
- **Portion of CEZ coal power plants approaches end of its lifetime in 2010 – 2020.**
- **The emission limits on SOx , NOx will get again much stricter starting 2016.**
- **Age structure of installed capacity:**
- **35-40 years old : 1,512 MW**
- **30-35 years old : 2,800 MW**
- **25-30 years old : 1,550 MW**
- **10-15 years old : 655 MW**

PORTION OF CEZ POWER PLANTS IS NEARING THE END OF ITS LIFETIME

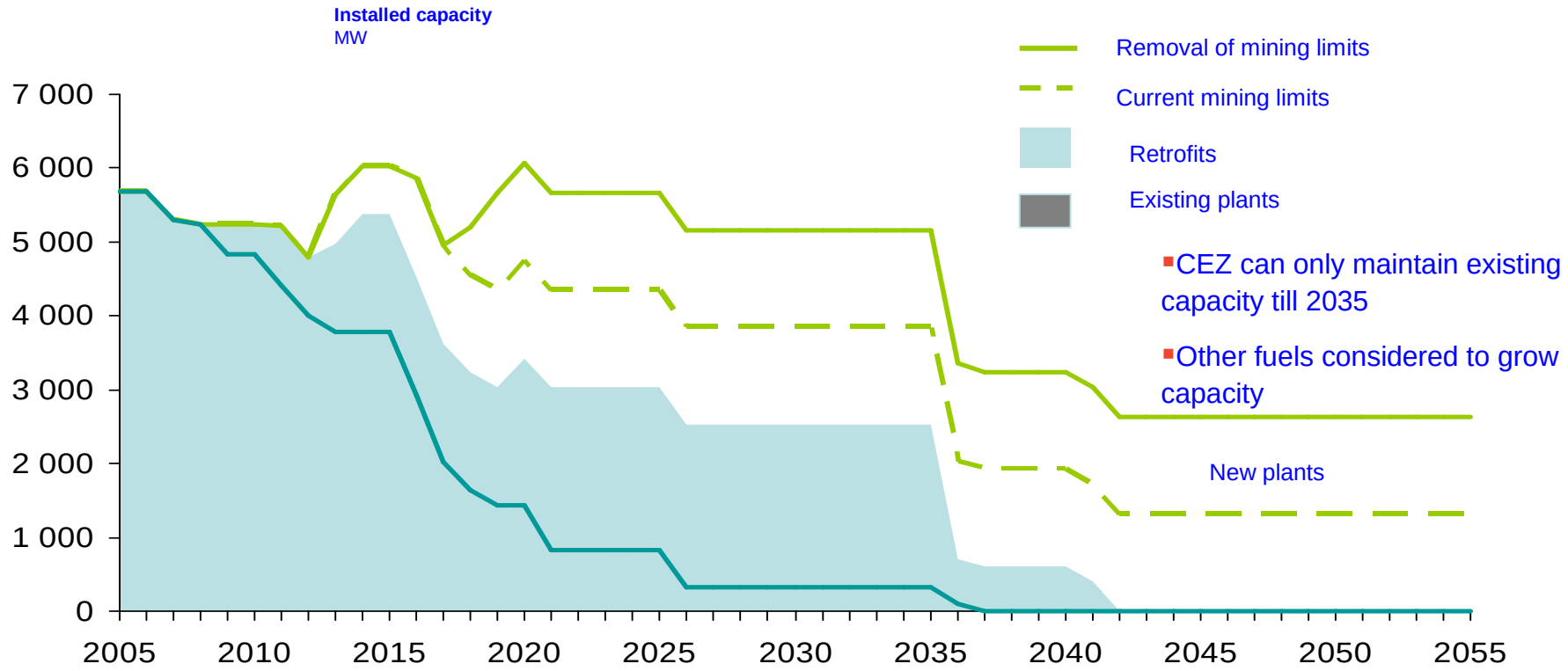
Age structure of ČEZ thermal blocks MW



Thermal capacities must be renewed by new plants additions on refurbishment of existing equipment

Source: CEZ

EXPECTED DEVELOPMENT OF CEZ´S BROWN COAL INSTALLED CAPACITIES

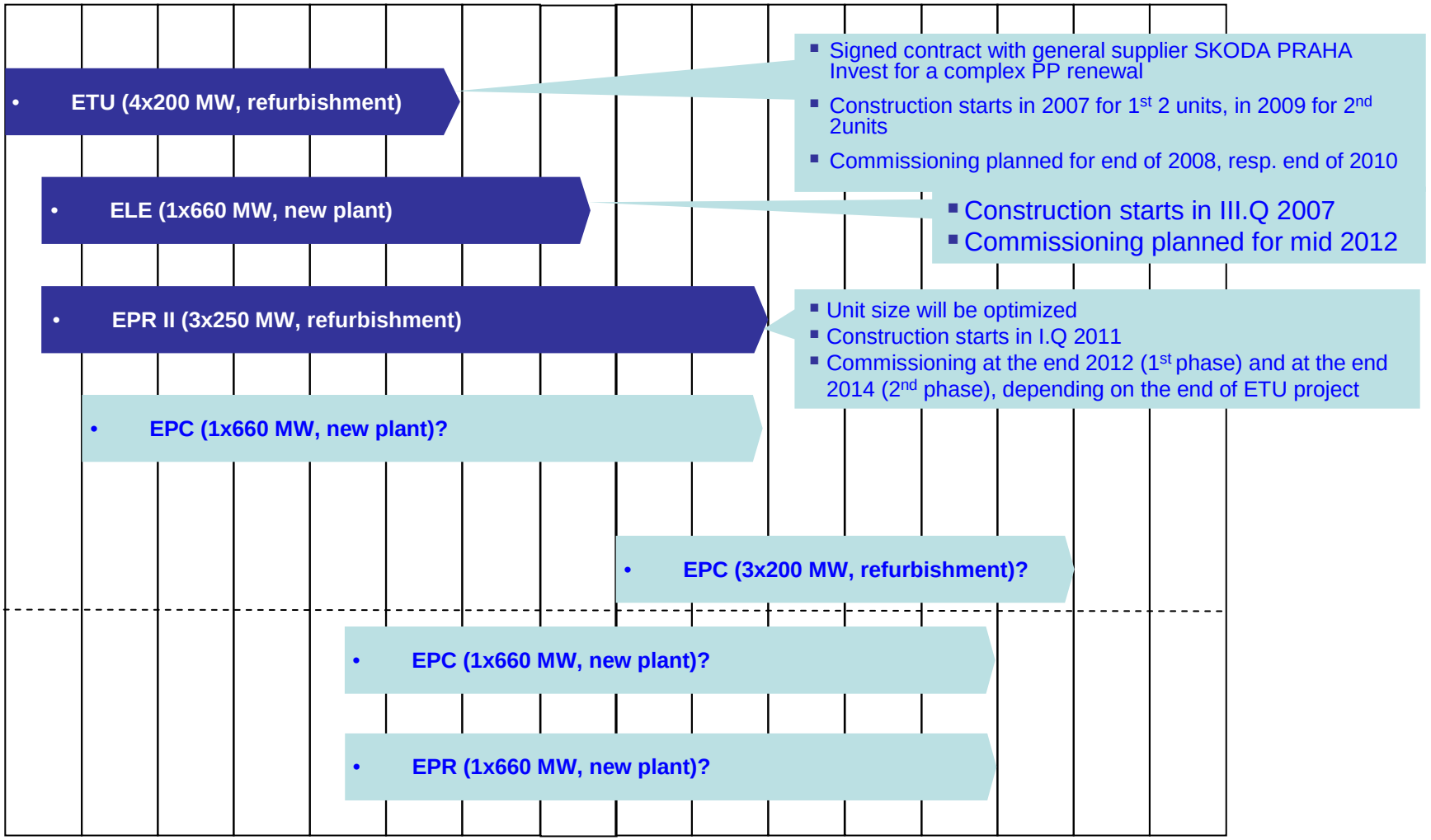


Source: CEZ

CEZ ACTION PLAN FOR GHG EMISSION REDUCTION

- **Renewable energy sources (three times more energy production from renewables in 2020 than in 2005)**
- **Reduction of GHG emission levels of coal-fired plants (-15 % by 2020, with the total emission factor decreasing from 0.55 t/MWh (2005) to 0.47 t/MWh)**
- **Energy savings (contribution to the fulfilment of the national goal to reduce energy intensity by 23 TWh/year through education aimed at changes in consumers behaviour)**
- **Foreign projects to reduce emissions (investments into emission control projects in the CEE Region – „Carbon Financing“ including Joint Implementation and Clean Development Mechanism)**

CEZ ALREADY LAUNCHED FIRST GENERATION RENEWAL PROJECTS



Source: CEZ

SHORT-TERM AND MIDDLE-TERM CEZ BROWN COAL PP RENEWAL PROJECTS

- USING THE BEST AVAILABLE TECHNOLOGIES INCLUDING CCT
- IMPROVING THE EFFICIENCY

LONG-TERM PLANNED PROJECTS

- INVESTMENTS INTO THE DEVELOPMENT OF CCS, NEAR -ZERO EMISSION PP PILOT PROJECT, FULL COMMERCIAL USE EXPECTED AFTER 2020

ACCELERATING INVESTMENTS

- **CEZ finds the existing incentives and signals of the upcoming „Carbon-Constrained Economy“ as an important input into decision-making about investments, where the emission trading scheme in particular can be a fundamental element in accelerating investments or choosing more modern and economic technologies.**

- **However, the scope of PP renewal can be largely influenced by the availability of fuel (brown coal) from domestic sources.**

- **The CEZ Group has joined strategic initiatives and international technological platforms – particularly the European long-term technological platform ZEP (Zero Emission Fossil Fuel Power Plants), GeOCapacity (Sixth and Seventh Framework Programme for Research and Technical Development), IEA.**

FIRST RENEWAL PROJECTS of CEZ

- **Tusimice Power Plant (4x200 MW, refurbishment)**
  - 2005 signed contract with general supplier SKODA PRAHA Invest for
  - a complex PP renewal
  - 2007 construction started for first two unints, in 2009 for second two units
  - 2008 and/or 2010 commissioning planed
- **Ledvice Power Plant (1x660 MW, new unit)**
  - 2007 construction started in III. Q
  - 2012 commissioning planned
- **Prunerov II Power Plant (3x250 MW, refurbishment, optimisation of unit size)**
  - 2011 construction starts
  - 2014 commisioning planned

TOTAL INVESTMENT : 100 billion CZK (€ 4 billion or $ 5 billion) till 2016 – absolutely most massive investment volume in the Czech Republic.

Improving of generation efficiency is top priority

From present 33 % to close to 38 % in renewed units. Efficiency approaching 43 % envisaged for new units.

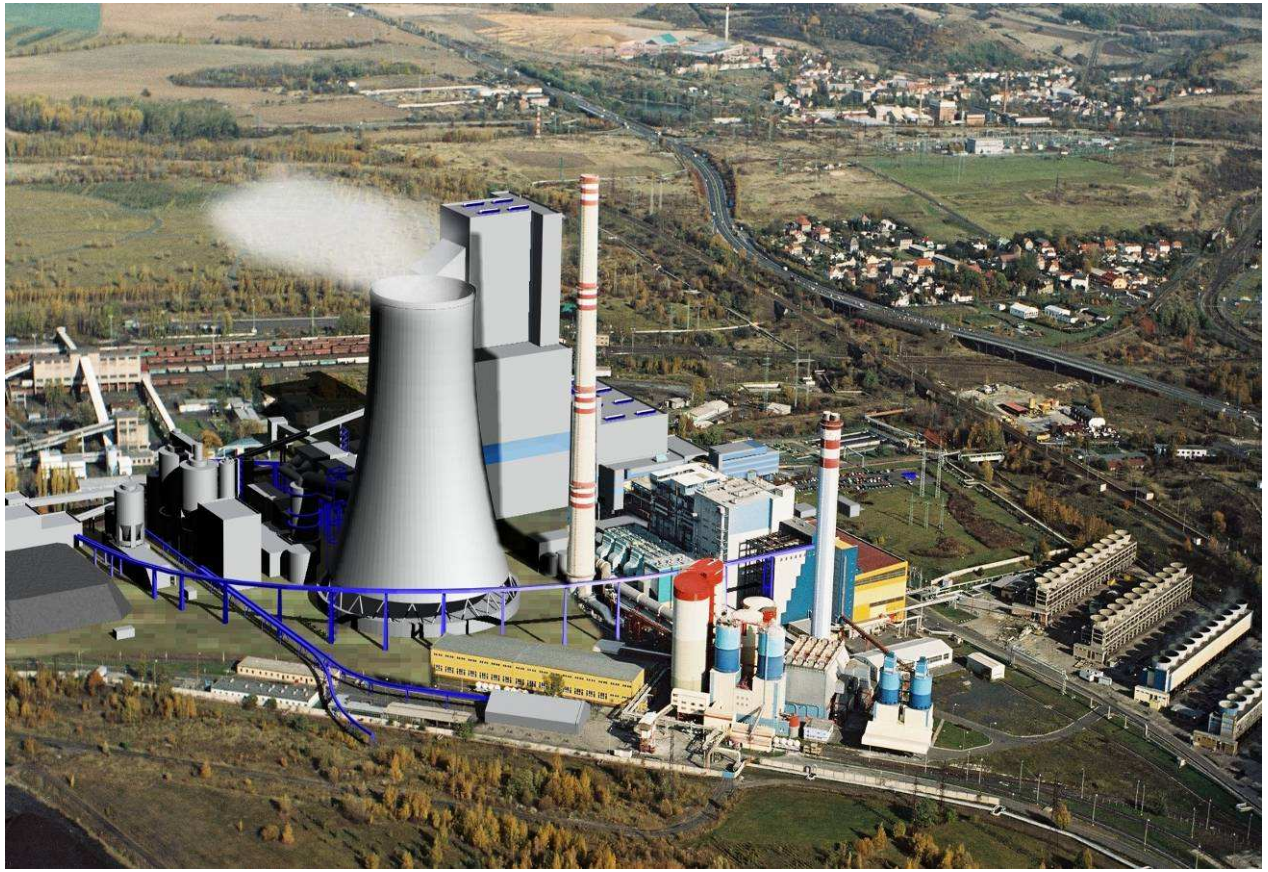
Existing units: l kWh produced from 1.1 kg of coal
New units: l kWh produced from 0.6 kg of coal

The new 660 MW unit at Ledvice PP compared with existing units 2 and 3

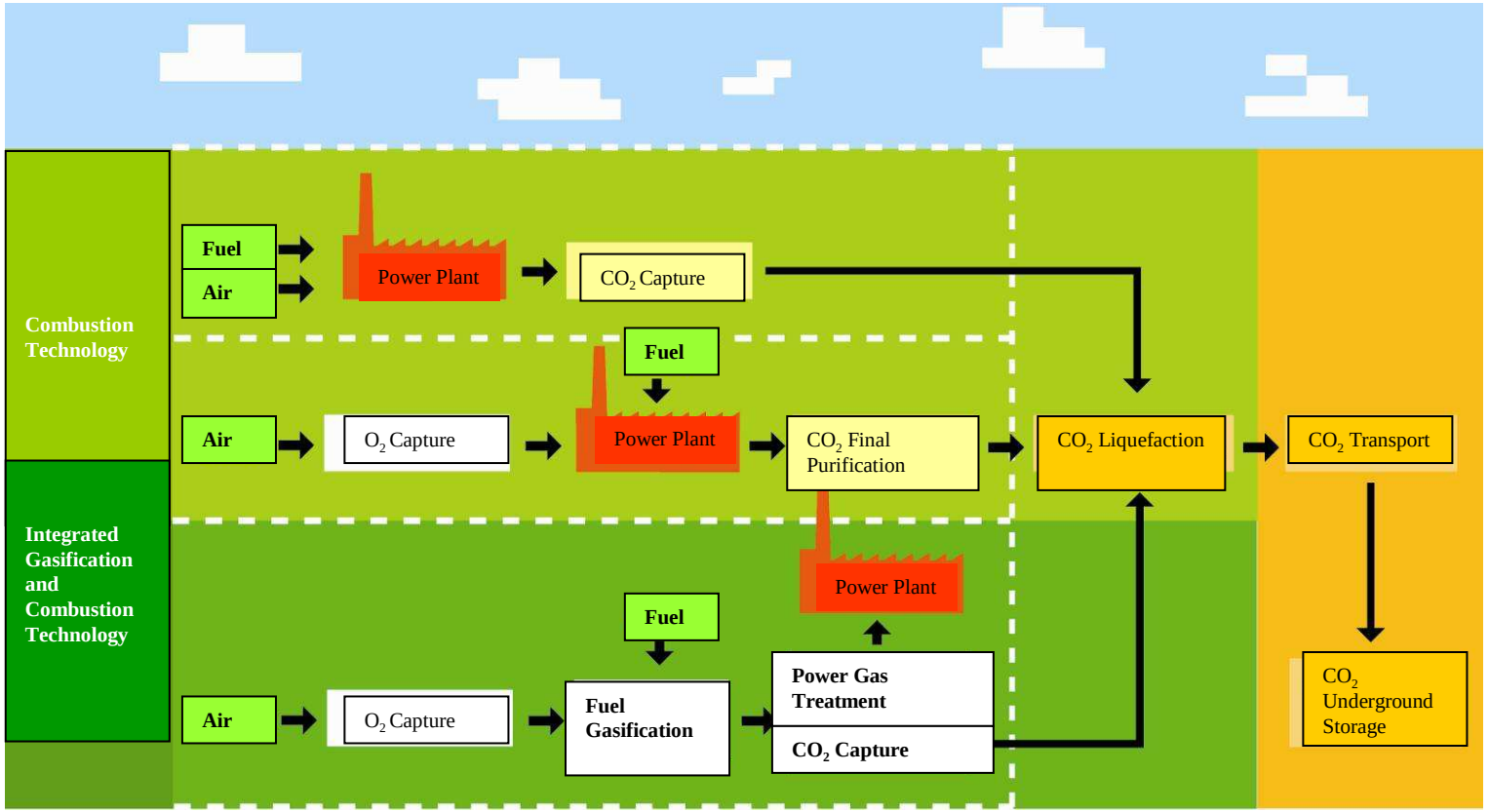
	New unit (max. parameters)	**Existing units** (2006 parameters)
Brown coal consumption	656 kg/MWh	1,130 kg/MWh
CO_2 emissions	735 kg/MWh	1,356 kg/MWh
NO_x emissions	0.55 kg/MWh	2.11 kg/MWh
SO_2 emissions	0.41 kg/MWh	5.01 kg/MWh

LEDVICE PP ACTUAL SITUATION

LEDVICE PP NEW UNIT VISUALISATION

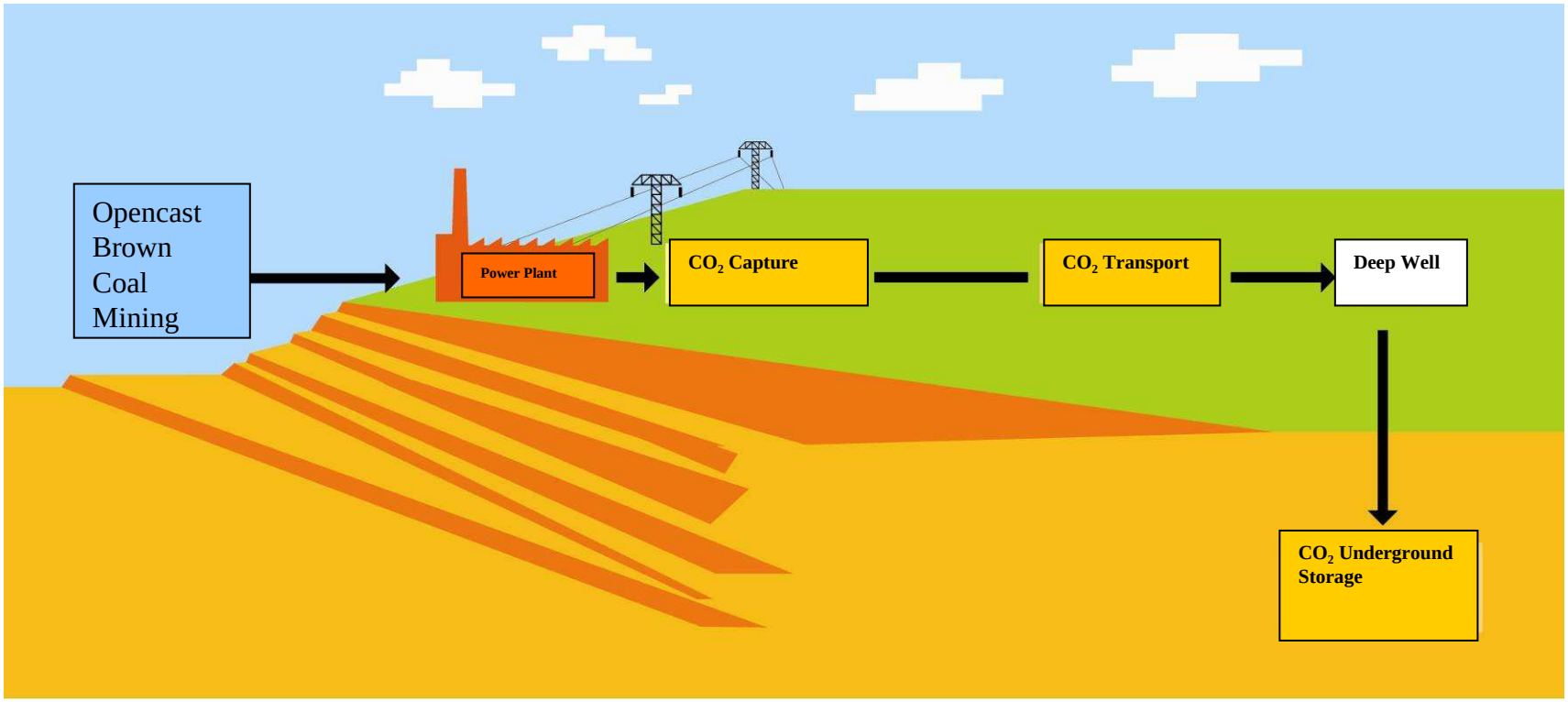


CCS TECHNOLOGIES FOR NORTH BOHEMIA CLEAN COAL PROJECT



Source: CEZ

POTENCIAL USAGE OF BROWN COAL IN CLEANER ELECTRICITY PRODUCTION WITH CCS



Source: CEZ

GEOLOGICAL SEQUESTRATION

- **The future sequestration reservoirs must be developed if CCS technology is to be effectively deployed.**
- **CEZ investigate the feasibility of North Bohemia Clean Coal Project based on an optimum combination of „clean brown coal“ and CCS technology with geological sequestration as a safe method of permanently storing CO2.**
- **CEZ will use its mineral exploration activities (i.e., core drilling) as a mechanism for collecting and analyzing information that will be useful in characterizing subsurface geology for potential usage in carbon sequestration.**
- **The issue of public confidence in geological sequestration will be crucial one. CEZ can play an important role during this formative period for public opinion – to raise the general level of knowledge of the technology and its potencial.**

CONCLUSIONS

- **The improvements already made in coal technologies (reduction in atmospheric pollution due to SO_2, NOx and particulate emissions, increase in energy efficiency) show that significant technological progress is possible by future applying of CCS.**
- **Continued development of these technologies and demonstrating their commercial viability is required for large-scale use.**
- **Legislative framework, financial assistance and support of EU and local government will be needed to address the higher costs associated with CCS.**
- **Close cooperation between the energy sector and the public authorities is very important. Further communication will be needed to address the question of public acceptance.**
- **The CEZ Group and Czech brown coal industry have an ambition to participate in demonstration of a CCS Project.**

THANK YOU !

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