

# ASSESSING EMISSIONS AND EFFICIENCY OF POWER PLANTS

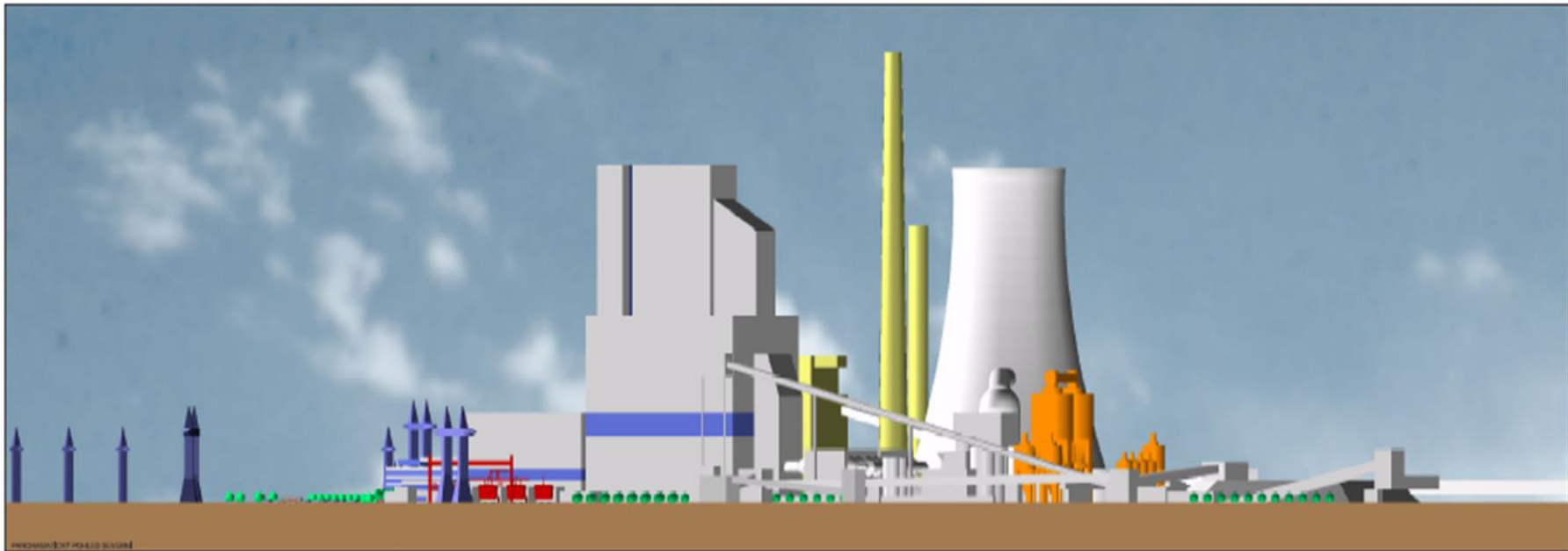
Vladimir Budinsky  
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UNITED NATIONS  
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# CZECH MOST EFFICIENT POWER PLANT LEDVICE – 660MWe





# LEDVICE – OLD POWERPLANT

## LOW EFFICIENCY in 2006

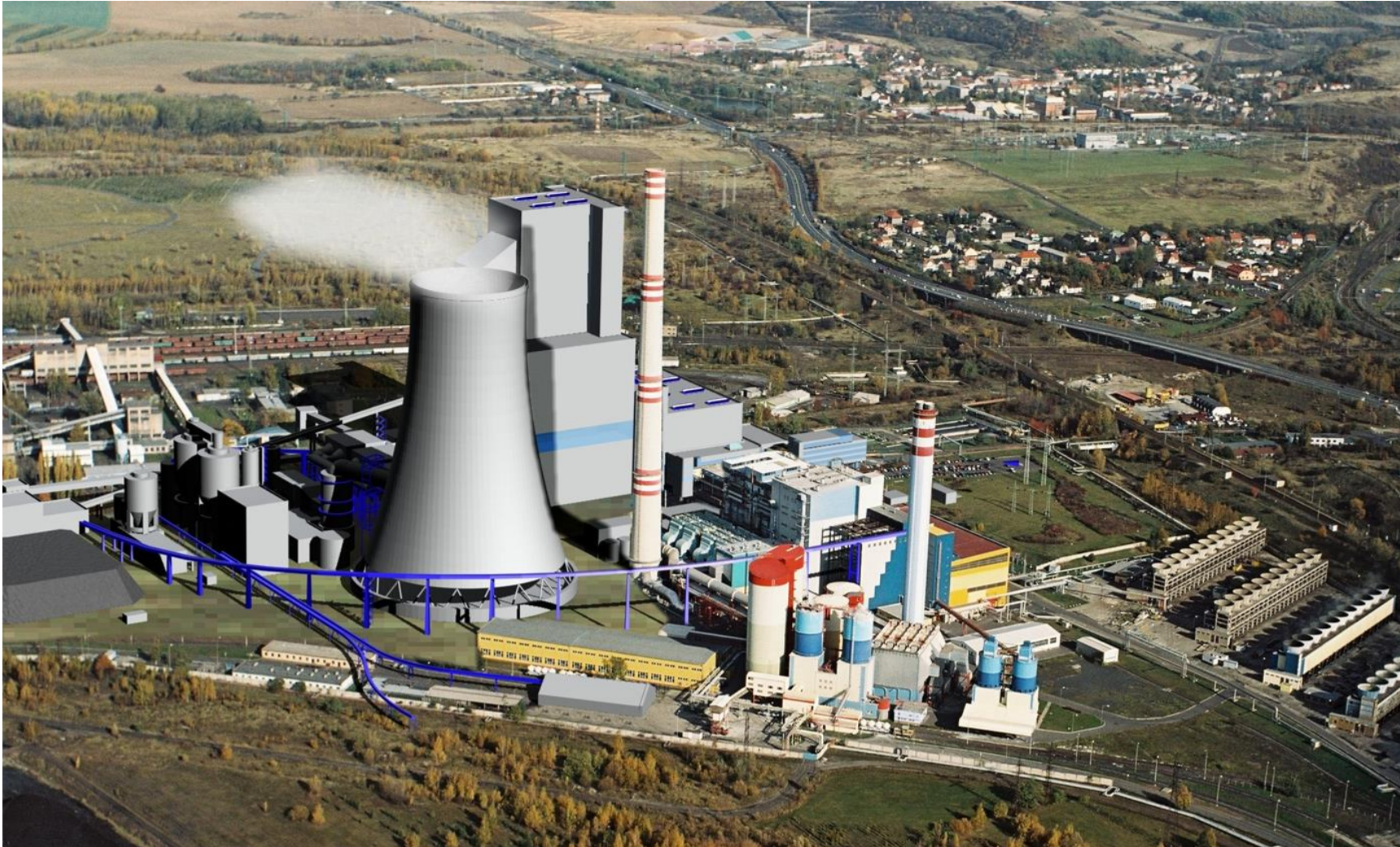


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# NEW LEDVICE – Operation from 2015

## EFFICIENCY INCREASE +25%



# NEW UNIT 660MW IN LEDVICE

- „Brownfield“ development on the existing mine
- First and unique 660 MWe brown coal fired unit in Czech Republic
- First supercritical unit in Czech Republic
- Specification calls for the Best Available Technology
- Unit will meet EU all ecological criteria valid after year 2012
- SKODA PRAHA Invest s.r.o. selected as a General Contractor in September 2006
- Work on the site started 2007 (preparation of construction area for new unit)
- Operation from 2015
- Intended as Capture Ready after CCS is mature

# KEY PROJECT MILESTONES

Investor's Purchase Order	June, 2006
EPC Contract Signature	September, 2006
Construction commencement (1 <sup>st</sup> stage)	July, 2007
Construction Permit for New Unit	July, 2008
Start of Civil Work on Main Unit	January, 2009
Start of Boiler House Construction	March, 2009
Preliminary Acceptance	December, 2014
Test operation	2015
Final Acceptance	December, 2016
Planned working life 40 years	2015 - 2055



# KEY TECHNICAL PARAMETERS

Rated Unit Capacity	660 MW
Net Efficiency	47 %
Steam pressure	28 MPa / 5 MPa
Steam temperature	600°C / 610°C
Live Steam Flow	1684 t/hr
NOx concentration recalcd. to NO2	max.200 mg/Nm <sup>3</sup>
CO	max.200 mg/Nm <sup>3</sup>
SOx concentration recalcd. to SO2	max.150 mg/Nm <sup>3</sup>
Solid Particles concentration	max. 20 mg/Nm <sup>3</sup>

# EMISSIONS PER YEAR

Yearly emissions with expected 7000 operating hours per year.

Type of emission	emission concentration		absolute quantity	
	Unit	Emission limit	unit	Emission per year
dust	mg.Nm <sup>-3</sup>	20	tons/year	270
SO <sub>2</sub>	mg.Nm <sup>-3</sup>	150	tons/year	2 025
NO <sub>x</sub>	mg.Nm <sup>-3</sup>	200	tons/year	2 700
CO	mg.Nm <sup>-3</sup>	200	tons/year	2 700
CO <sub>2</sub>	mg.Nm <sup>-3</sup>	-	tons/year	3 480 000

Power-plant with standard average efficiency would emit 4,6 Mt CO<sub>2</sub> emissions

**25% efficiency increase will reduce emissions by 1,1 Mt CO<sub>2</sub> p/y**



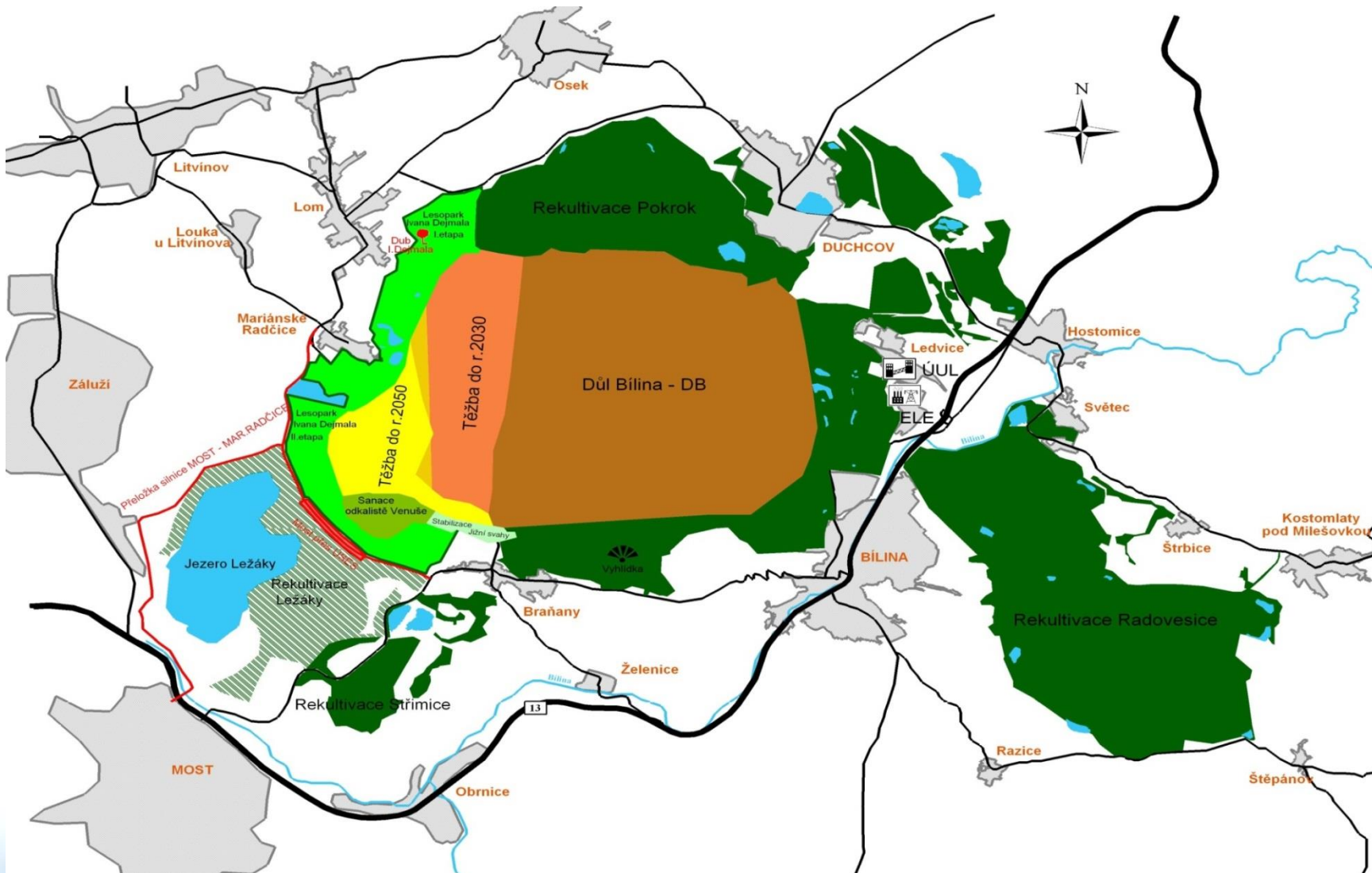
# BROWN COAL PARAMETERS

Brown coal consumption - (660 MW, 15.5 MJ/kg):

**442 t/hour - 3.1million t/year - 125million t/40y lifecycle**

Parameter Parametr	Units of measurement Jednotky	Lower level Dolní mez	Average guarantee-related fuel Průměrné garanční palivo	Upper level Horní mez
$Q_l^r$	MJ/kg	10,5	11,5	13,0
$W_{tr}$	% hm.	23	26	28
$A^d$	% hm.	31	40	46
$S^d$	% hm.	1,1	1,3	max. 1,8
Elemental composition of the combustible material / Elementární složení hořlaviny				
$C^{daf}$	% hm.		67,9	
$H^{daf}$	% hm.		6,0	

# BILINA MINING AREA – valid Mining permit - Reserves are 155Mt + Accessible 100 Mt, if existing mining limits finally corrected



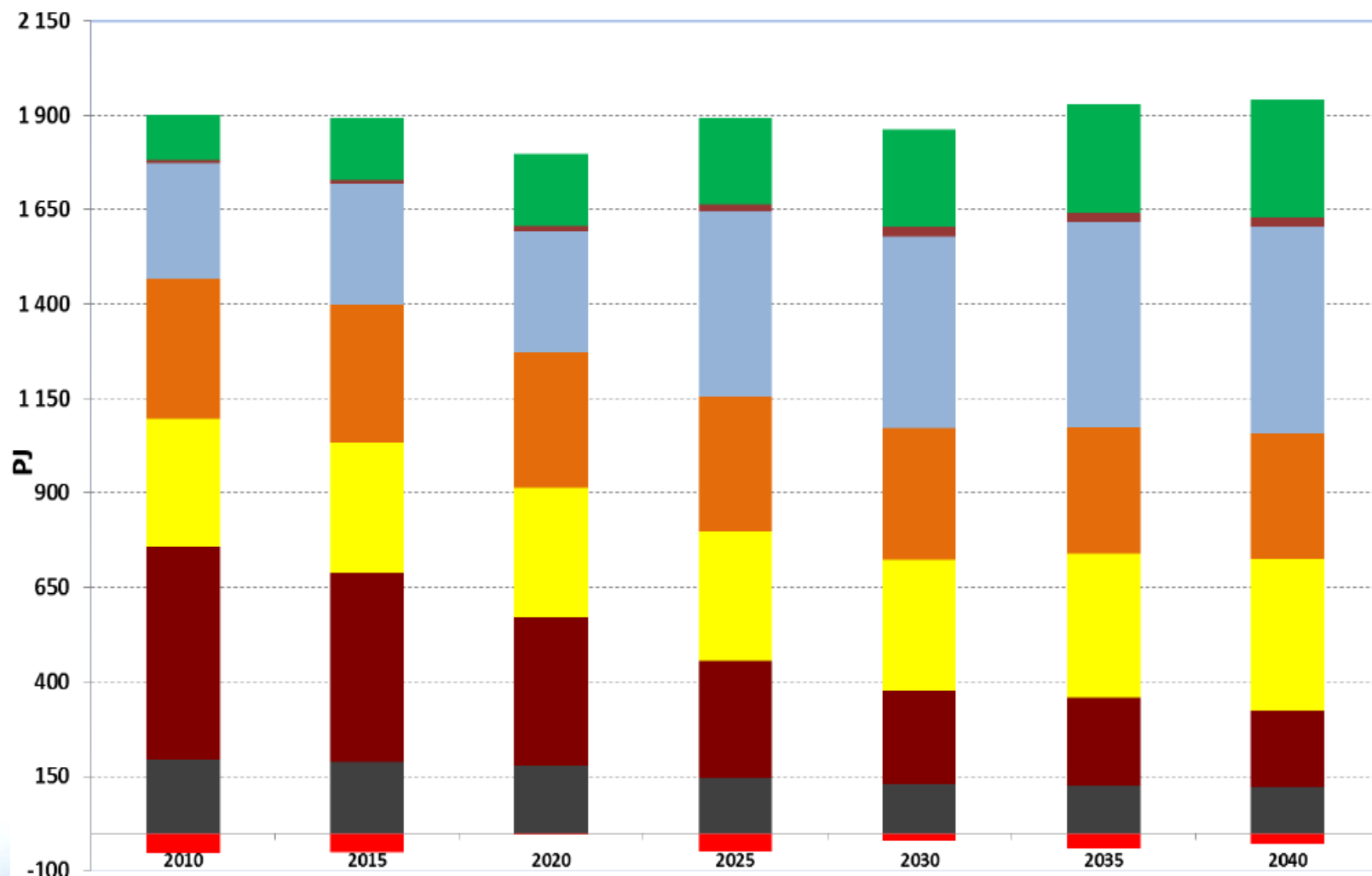
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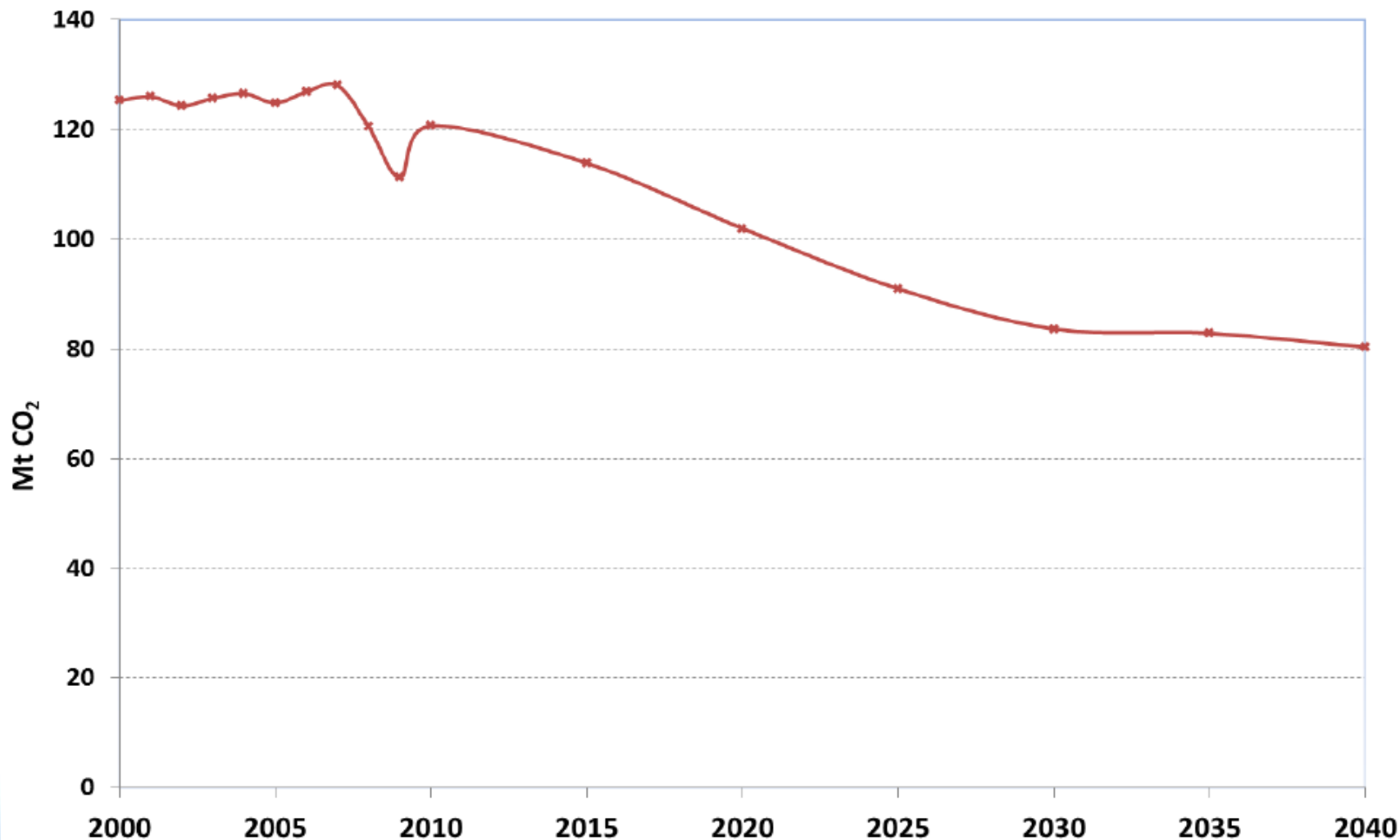
# COAL CONSUMPTION DROP IN CZ

Source – New Czech Energy Concept September 2014



# CO2 EMISSIONS DROP IN CZ

Source – New Czech Energy Concept September 2014



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