THE EUROPEAN LIGNITE TRIANGLE.
SCENARIOS FOR A SECURE, COST-EFFECTIVE AND SUSTAINABLE ENERGY SECTOR TRANSFORMATION

www.forum-energii.eu
Background
Coal production and imports in Europe in 2019

Source: Forum Energii based on EURACOAL
**Background**

- **Coal gap in Czech Republic**
  - need for new, low-carbon capacities.

- **CO₂ emissions reduction**
  - old/new EU targets for 2030 and 2050; lignite as the most emissive fuel.

- **Regional strategy**
  - Germany, Poland and the Czech Republic are the main EU lignite producers. Interactions need to be analysed.

- **Lack of profitability of new coal projects**
  - rising CO₂-prices in the ETS.

- **The transformation has already started**
  - no proper decisions to address the challenge.
Objective of the analysis

Impact assessment of parallel lignite phase-out in Poland, Czech Republic and Germany.

- security of supply
- electricity trade balance and electricity flows
- reduction of CO₂ emissions
- wholesale electricity prices and overall costs
Approach

Elaborating reference scenario – current energy plans of the Czech Republic, Poland and Germany.

Two scenarios of lignite phase-out by: 2032, 2035

Analysis of technological and economic conditions in the Triangle countries.

Modelling – hourly simulations of connected power systems; cost optimisation.
Key results
In the reference scenario, at least half of Czech coal-fired power plants will be decommissioned by 2030.

Until 2035, more than three quarters of the coal plants will go offline.

Source: Aurora Energy Research.
If the reference scenario, the decrease in coal is likely to be replaced by a mixture of renewables, natural gas and electricity imports.

New nuclear power plants to be built by 2040 are neither a timely nor economically option.

Source: Aurora Energy Research.

1) Hydro includes run-of-river, hydro storage and pump storage.
Compared with wind and solar, nuclear is not a cost-competitive option

Source: Aurora Energy Research.
1) WACC of 9% assumed for all technologies. 2) Nuclear assumptions: CAPEX of 6.3 mEUR/MW, FOM of 84 kEUR/MW, VOM of 10 EUR/MWh
The Czech Republic has huge untapped potentials of wind and solar

RES capacities and potentials in the Czech Republic

GW
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 225

SOLAR

6 5 11

WIND ONSHORE

5 2 8

76

20 96

223

REFERENCE 2035 PHASE-OUT 2032 PHASE-OUT JRC LOW JRC HIGH

JRC for solar assumes 170W/m² with 3% of available, non-artificial land used. Light grey refers to the reference scenario with current legal requirements in place. Dark grey depicts the low restrictions scenario. The data for onshore refers to locations with capacity factors > 20%.
Coal phase-out benefits
An earlier phase-out from lignite results in a significant decrease in CO$_2$-emissions

- Phasing out lignite by 2032 will close the gap to reach the 2030 NECP target (2018: 50 Mio. t CO$_2$ eq) by a third (17 Mio. t CO$_2$ eq)

Total power sector emissions in the Czech Republic across scenarios up to 2040

Cumulative savings reference vs. 2032 phase-out: ~95 MtCO$_2$

Source: Aurora Energy Research.
An earlier phase-out from lignite results in lower wholesale power prices for consumers.

Average annual baseload electricity price in Czech Republic up to 2040

Source: Aurora Energy Research.
An earlier phase-out from lignite results in lower system costs in the long term.
Even if lignite plants are phased-out by 2032, the Czech power system can still be operated safely.
CO₂ emissions reduction in power sector between 2020 and 2030

The faster the phase-out (2032 scenario), the faster emissions drop between 2020 and 2030

Lignite phase-out brings significant CO₂ reductions in the EU

-47% PL
-51% DE
-44% CZ
Thank you for attention
The European lignite triangle.
Scenarios for a secure, cost-effective and sustainable energy sector transformation

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Register on www.agora-energiewende.de