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**: need for new, low-carbon capacities.
- **CO$_2$ 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 CO$_2$-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 CO$_2$ 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.
Starting point – reference scenario

**PL** → “Poland's Energy Policy 2040", 2018 version; no nuclear power; cost-based decisions for both conventional and RES capacities.


**CZ** → National Energy and Climate Plan and capacity planning by ČEZ; more ambitious development of RES, no new nuclear power.
Key results
Germany
Electricity generation

Source: Aurora Energy Research.
1) Hydro includes run-of-river, hydro storage and pump storage
Power sector CO$_2$ emissions – all scenarios

Cumulative savings reference vs. 2032 phase-out: ~410 MtCO$_2$

Source: Aurora Energy Research
Electricity trade balance

![Graph showing electricity trade balance from 2020 to 2040 with labels: 2020, 2025, 2030, 2035, 2040. Categories include EXPORT and IMPORTS with values such as -24, -30, -35, -46, -63, -70 in TWh. Graph also includes lines for REFERENCE SCENARIO, 2035 PHASE-OUT, and 2032 PHASE-OUT. Source: Aurora Energy Research]
Wholesale electricity prices – all scenarios

Source: Aurora Energy Research
System costs

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<th>Wholesale Cost</th>
<th>Payment for RES Support</th>
<th>Subsidy CHP</th>
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</table>

Source: Aurora Energy Research, Netztransparenz.de.
Note: The payment for RES support is the difference between set level of RES support and achieved market revenue.
Poland
1) Hydro includes run-of-river, hydro storage and pump storage
Power sector CO\textsubscript{2} emissions – all scenarios

Cumulative savings reference vs. 2032 phase-out: ~158 MtCO\textsubscript{2}

Source: Aurora Energy Research
Electricity trade balance

Source: Aurora Energy Research
Wholesale electricity prices – all scenarios

Source: Aurora Energy Research
System costs

Source: Aurora Energy Research
Czech Republic
Electricity generation

Source: Aurora Energy Research.

1) Hydro includes run-of-river, hydro storage and pump storage.
Power sector CO\textsubscript{2} emissions – all scenarios

Cumulative savings reference vs. 2032 phase-out: \textasciitilde95 MtCO\textsubscript{2}

Source: Aurora Energy Research.
Electricity trade balance

Source: Aurora Energy Research.
Wholesale electricity prices – all scenarios

Source: Aurora Energy Research.
System costs

REFERENCE SCENARIO

2035 PHASE-OUT

2032 PHASE-OUT

Source: Aurora Energy Research.
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

-47% PL

-51% DE

-44% CZ

Lignite phase-out brings significant CO₂ reductions in the EU

-33% in lignite triangle

-50% in the EU-27

-24% in the EU-27
Summary

- The decline of lignite is inevitable. Key decisions and coordinated regional action are needed.
- Security of supply in the region can be ensured even if we speed up the phase-out of lignite, but such a transformation requires a plan.
- A move away from lignite can significantly reduce CO$_2$ emissions in the region and in the EU.
- Leaving lignite faster will not cost more.
- Accelerated withdrawal from lignite reduces electricity imports.
- Date of lignite exit: 2032 is realistic.
- To phase out lignite successfully, an alignment of strategy is necessary. This includes the future role of gas in the system.
Thank you for attention