AURORA ENERGY RESEARCH

Agora Energiewende

Forum Energii
Analizy i dialog

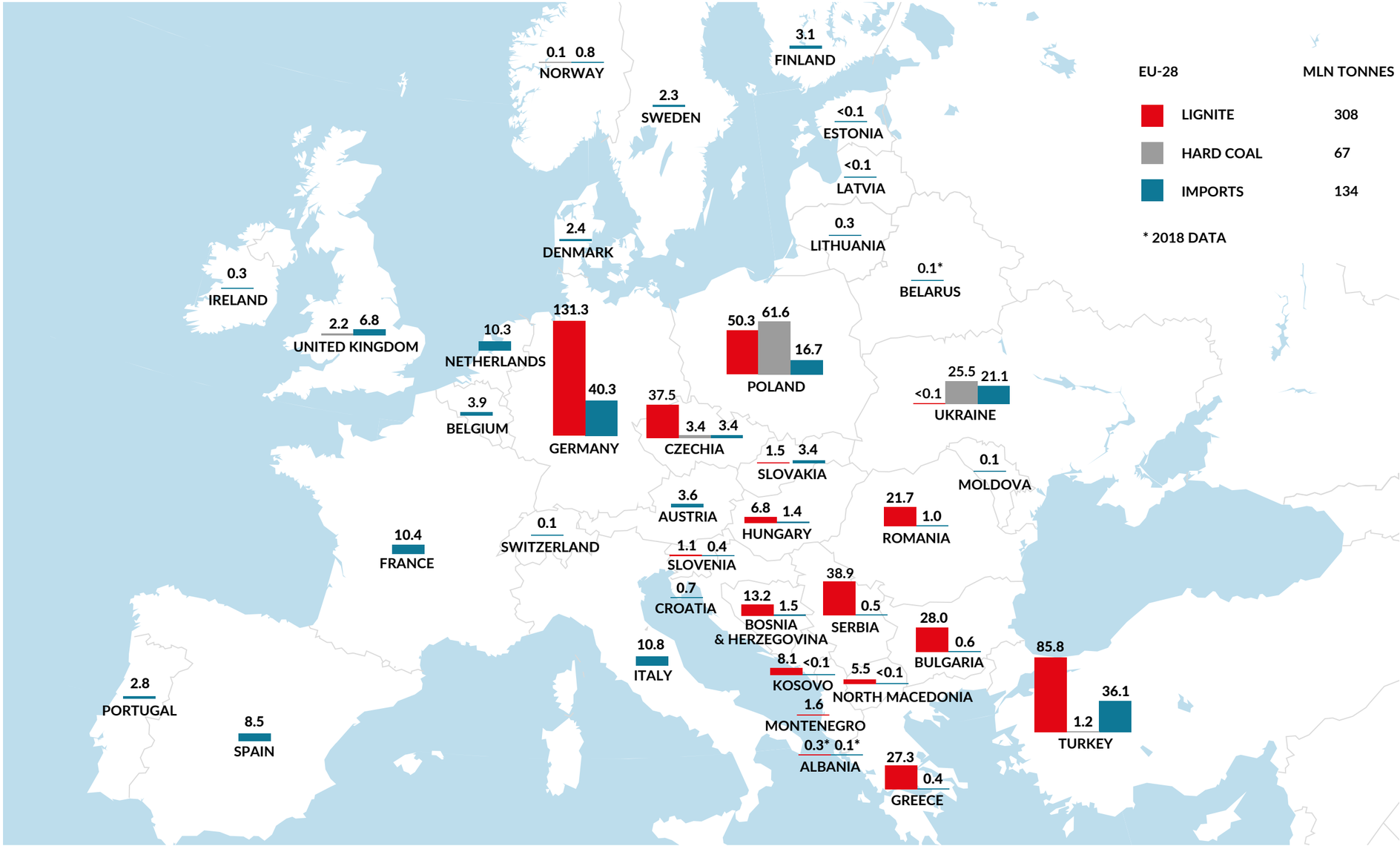
THE EUROPEAN LIGNITE TRIANGLE.

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.
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 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 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.

↓

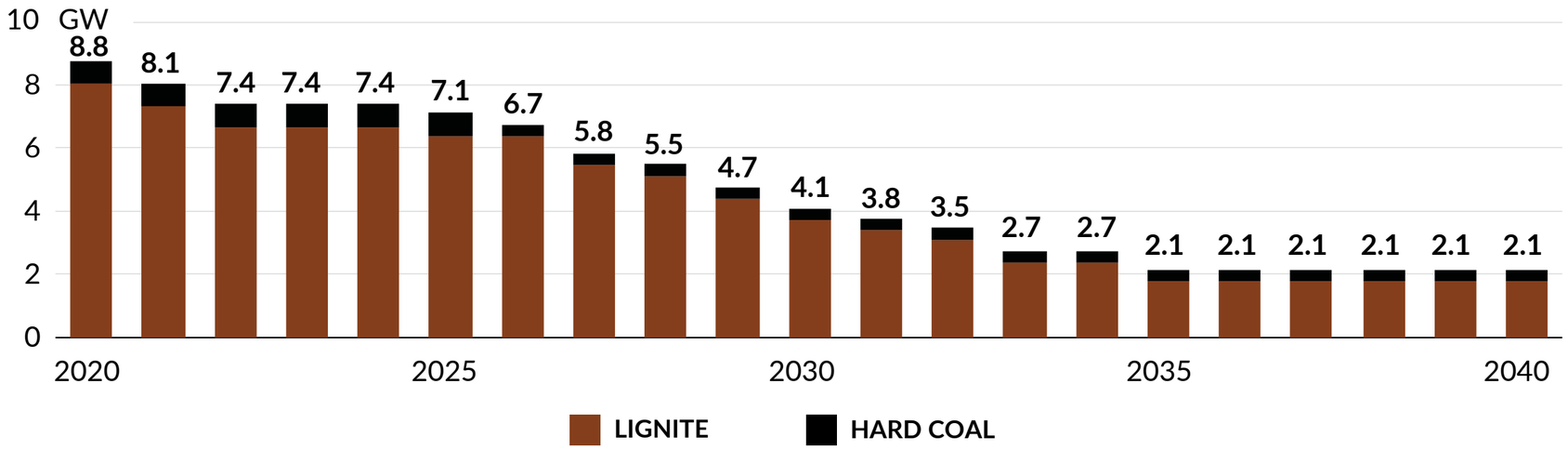
Modelling – hourly simulations of connected power systems;
cost optimisation.

Key results

Challenge

- **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.**

Installed capacity of coal-fired power plants in the Czech Republic for 2020–2040 in the reference scenario

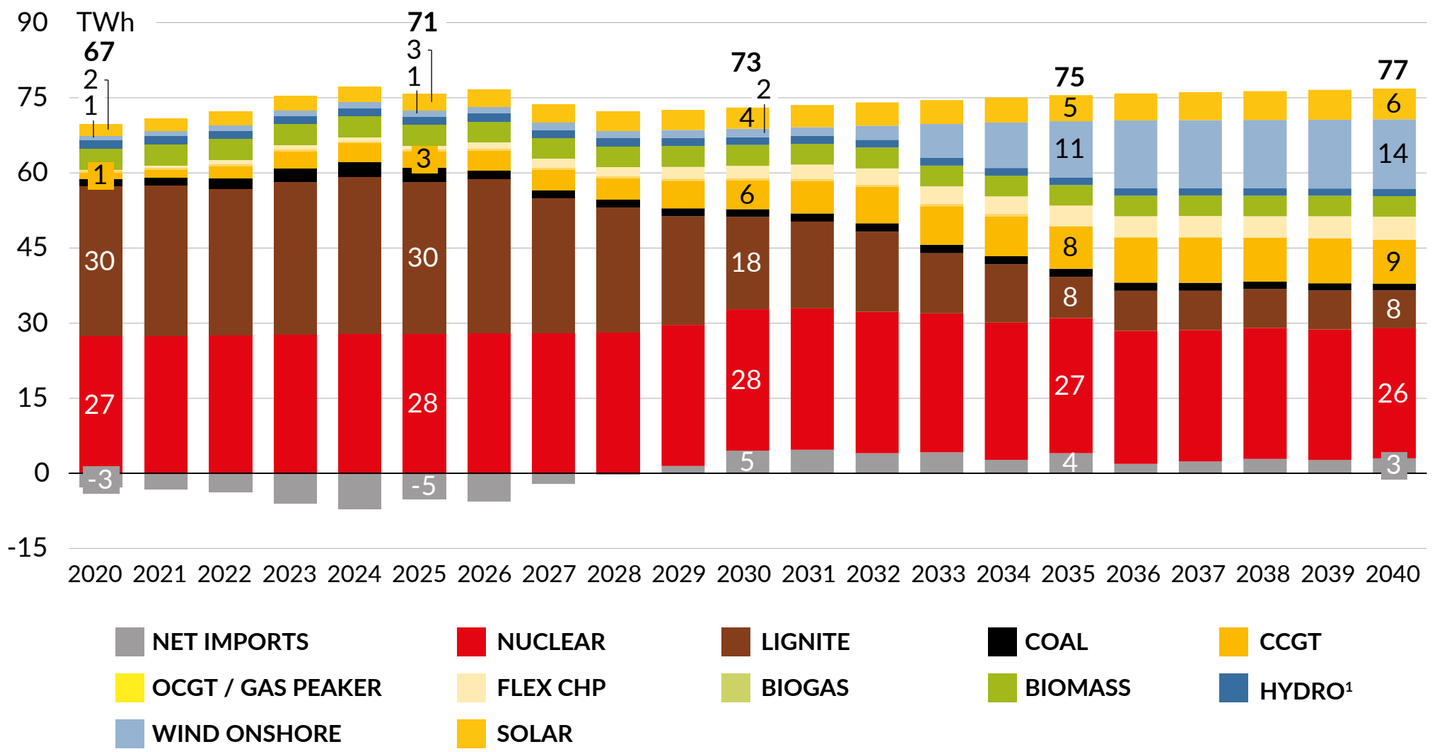


Source: Aurora Energy Research.

New energy mix

- **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.**

Total net generation in the Czech Republic up to 2040

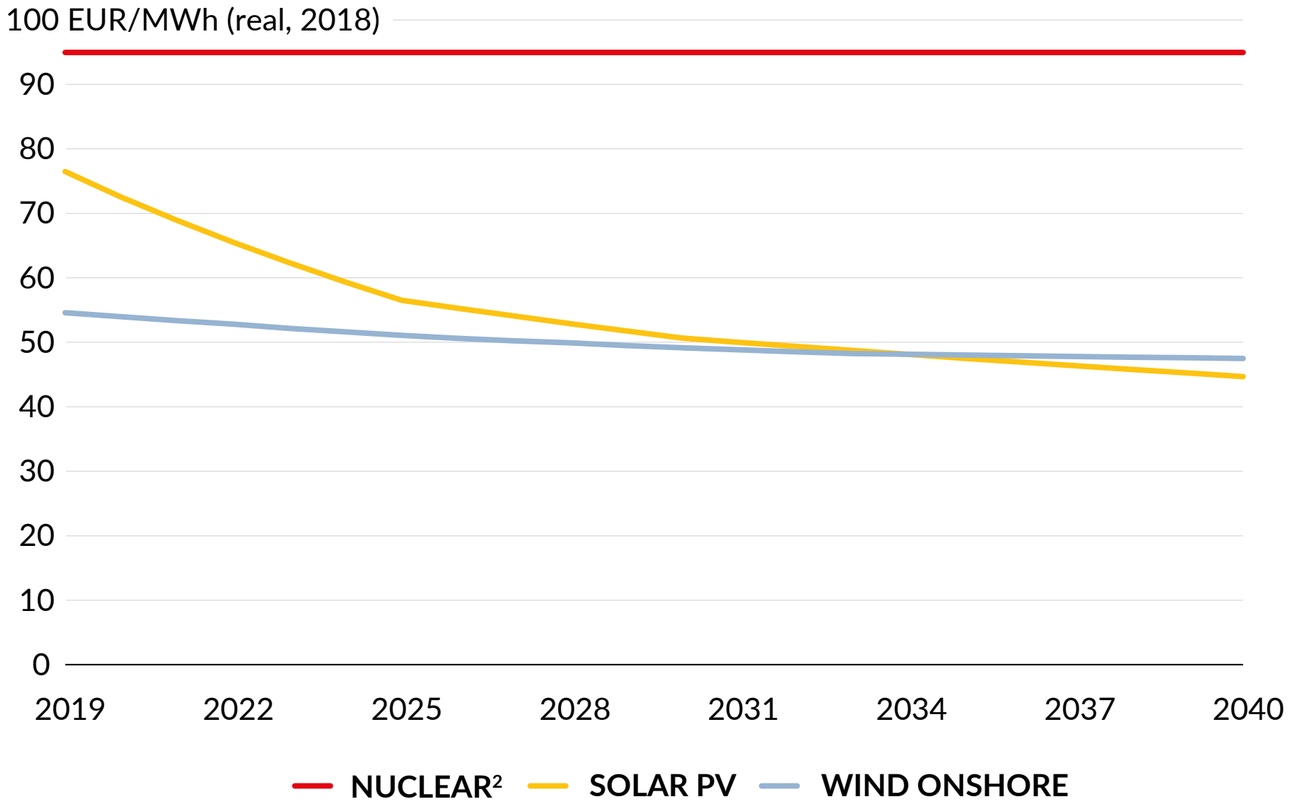


Source: Aurora Energy Research.

1) Hydro includes run-of-river, hydro storage and pump storage.

Compared with wind and solar, nuclear is not a cost-competitive option

LCOE of new-build nuclear and RES technologies in Czech Republic



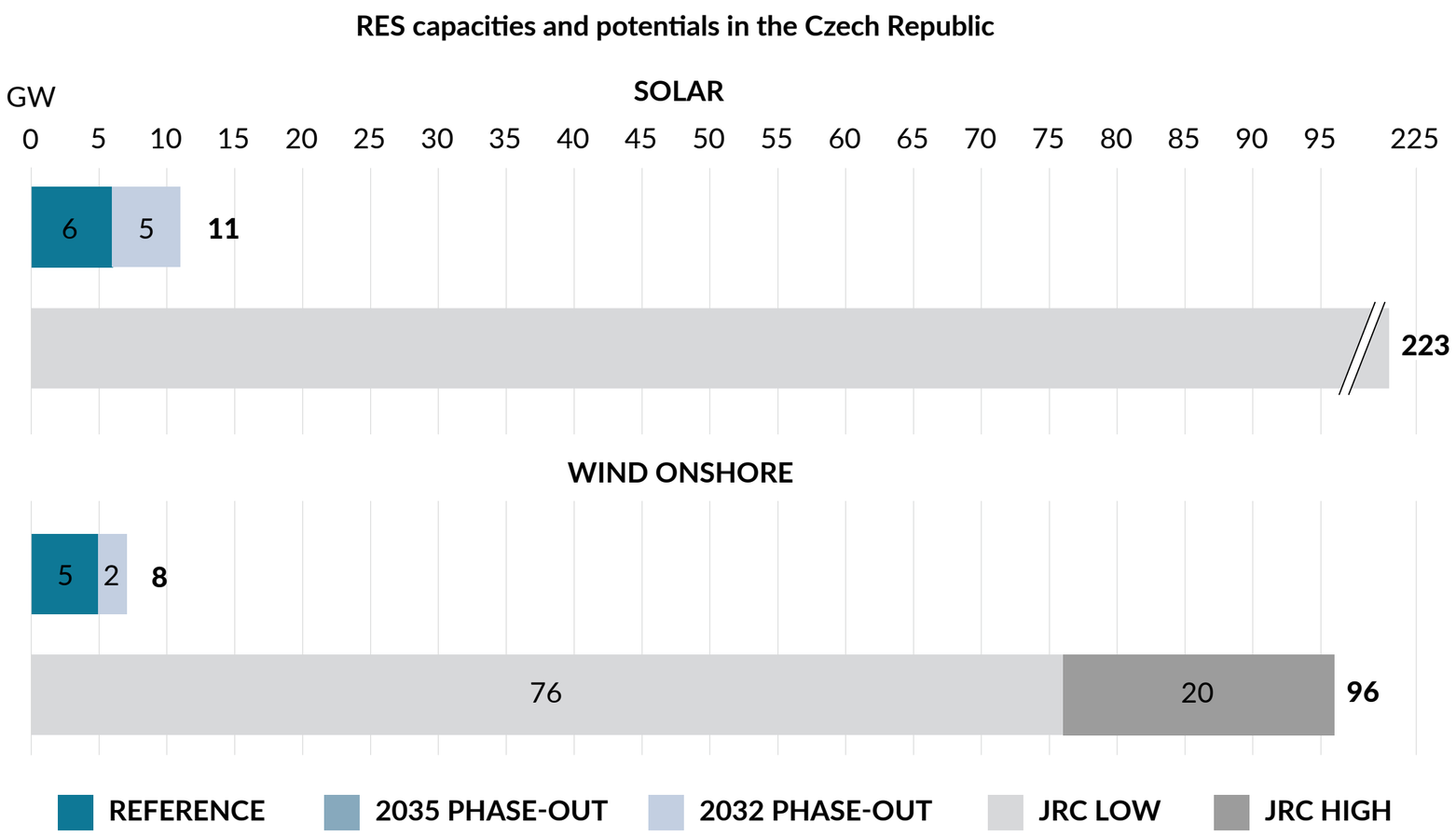
Nuclear-RES LCOE delta:

2020	
Solar PV	**24%**
Onshore	**74%**
2030	
Solar PV	**87%**
Onshore	**93%**
2040	
Solar PV	**124%**
Onshore	**99%**

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

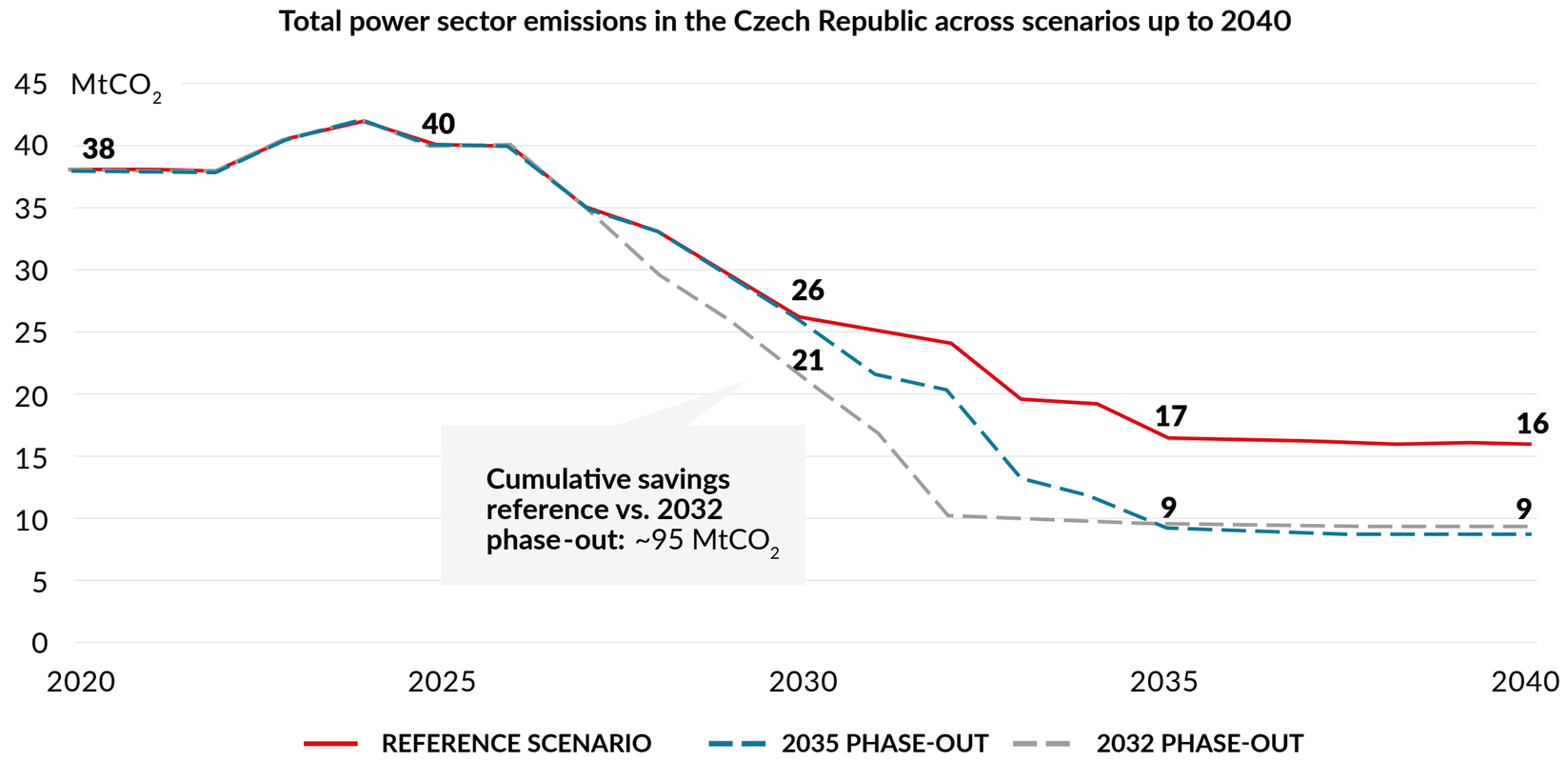


Source: Aurora Energy Research, European Commission & Joint Research Centre (2019).
JRC for solar assumes 170W/m2 with 3% of available, non-artificial land used. Light grey refers to the reference scenario with current legal requirements in place. Dark grey depicts the low restrictions scenario. The data for onshore refers to locations with capacity factors > 20%.

Coal phase-out benefits

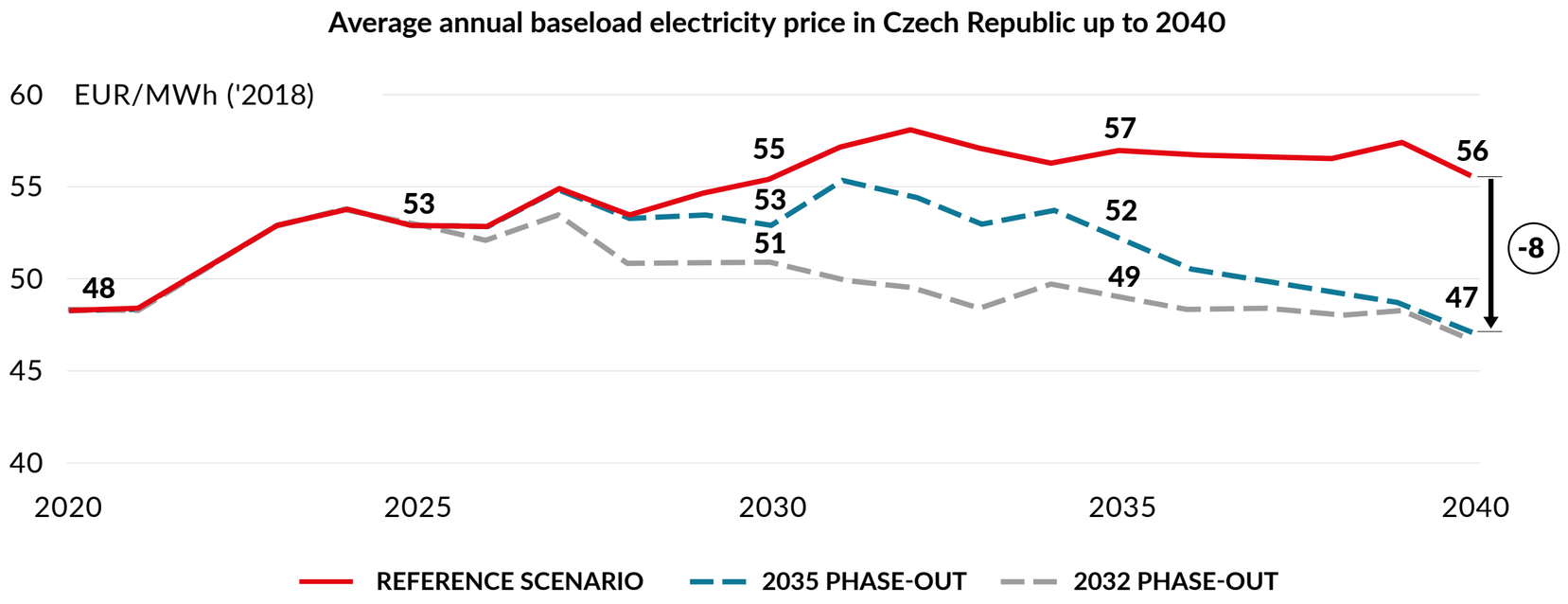
An earlier phase-out from lignite results in a significant decrease in CO_2-emissions

- **Phasing out lignite by 2032 will close the gap to reach the 2030 NECP target (2018: 50 Mio. t CO_2eq) by a third (17 Mio. t CO_2eq)**



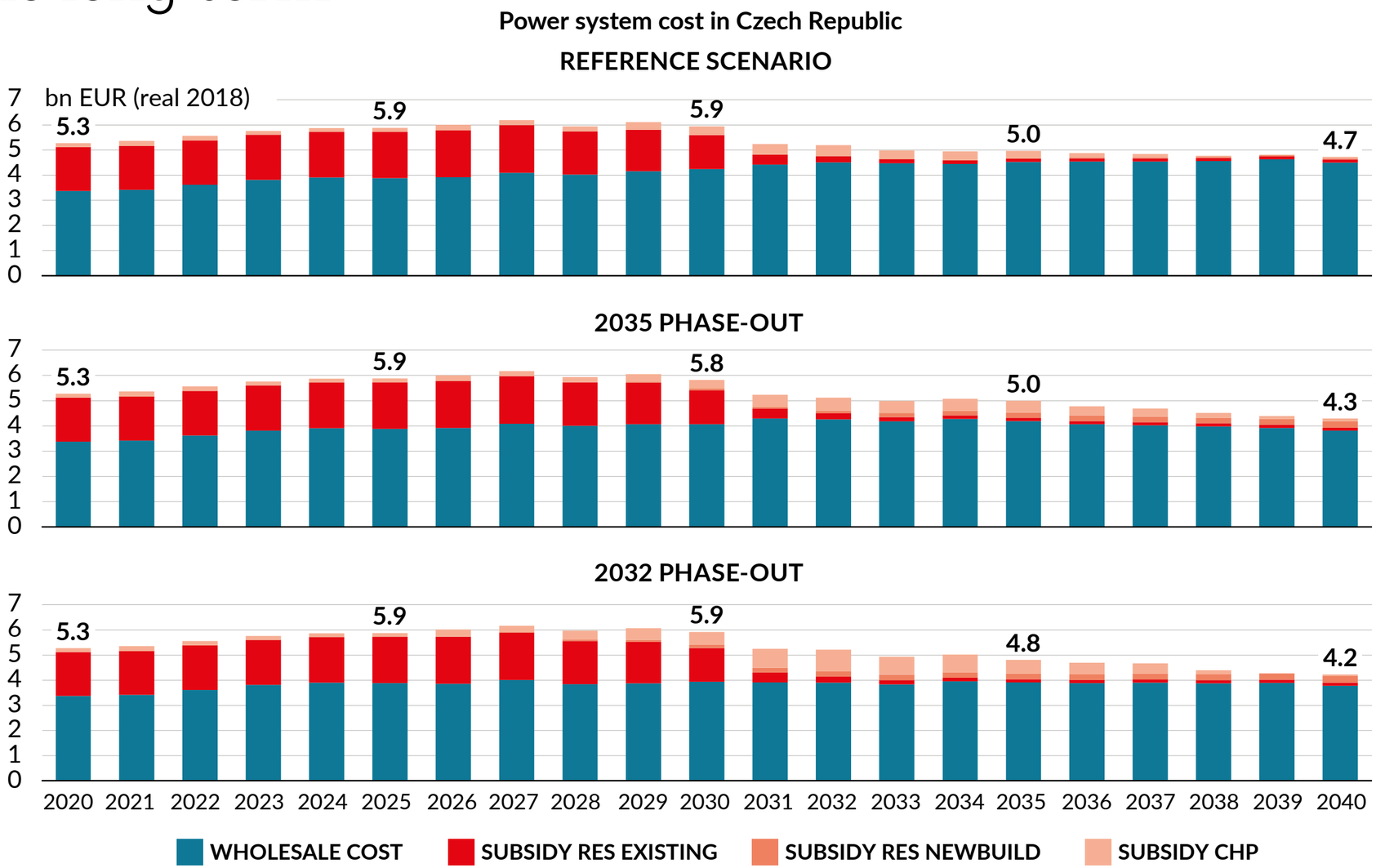
Source: Aurora Energy Research.

An earlier phase-out from lignite results in lower wholesale power prices for consumers



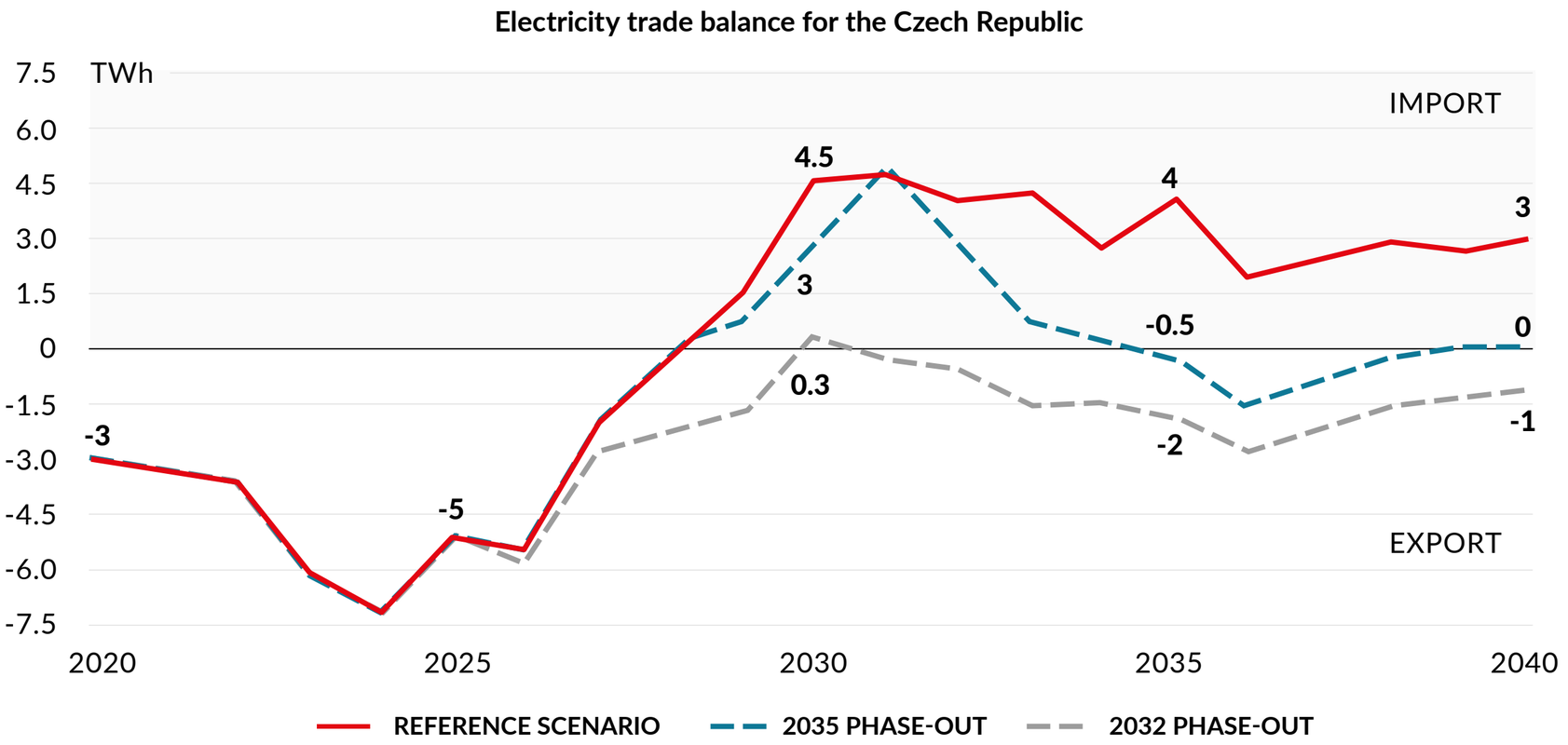
Source: Aurora Energy Research.

An earlier phase-out from lignite results in lower system costs in the long term



Source: Aurora Energy Research.

Even if lignite plants are phased-out by 2032, the Czech power system can still be operated safely



Source: Aurora Energy Research.

CO_2 emissions reduction in power sector between 2020 and 2030

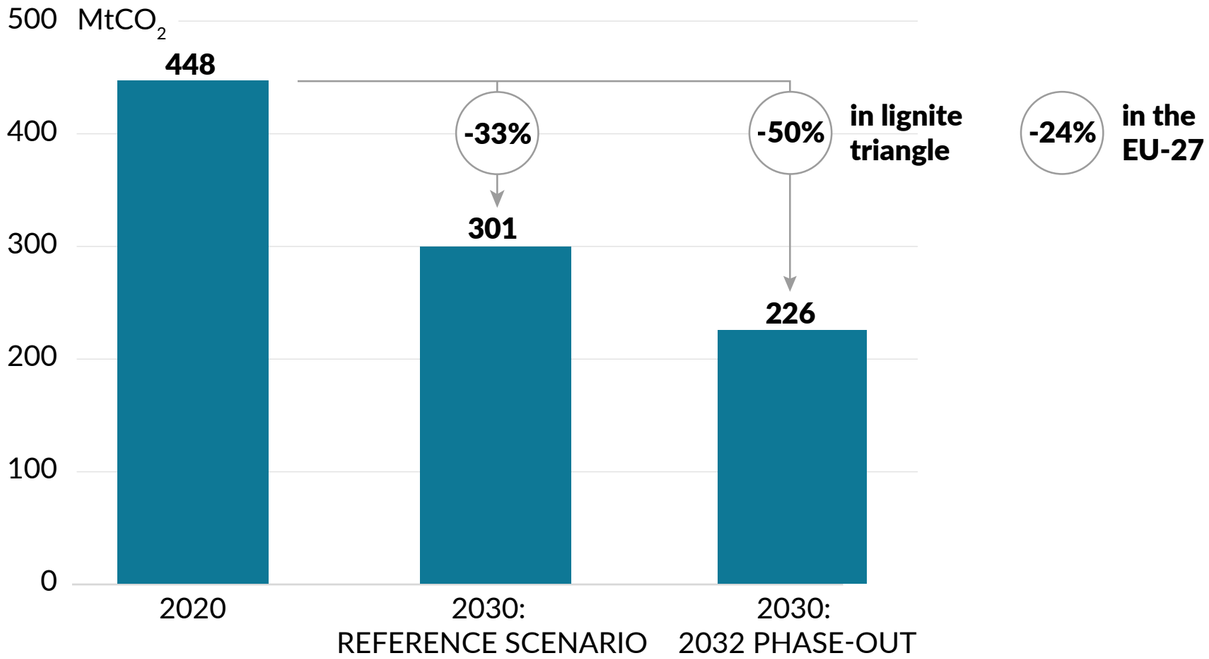
Lignite phase-out brings significant CO_2 reductions in the EU

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

-47% PL

-51% DE

-44% CZ



Thank you for attention

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Next webinar

The European lignite triangle.

Scenarios for a secure, cost-effective and sustainable energy sector transformation

15 September (Tuesday) 2020

Register on www.agora-energiewende.de