

# Building Consensus on Phasing Out Coal in Germany

*Strategies and Lessons Learned*

Dr. Patrick Graichen

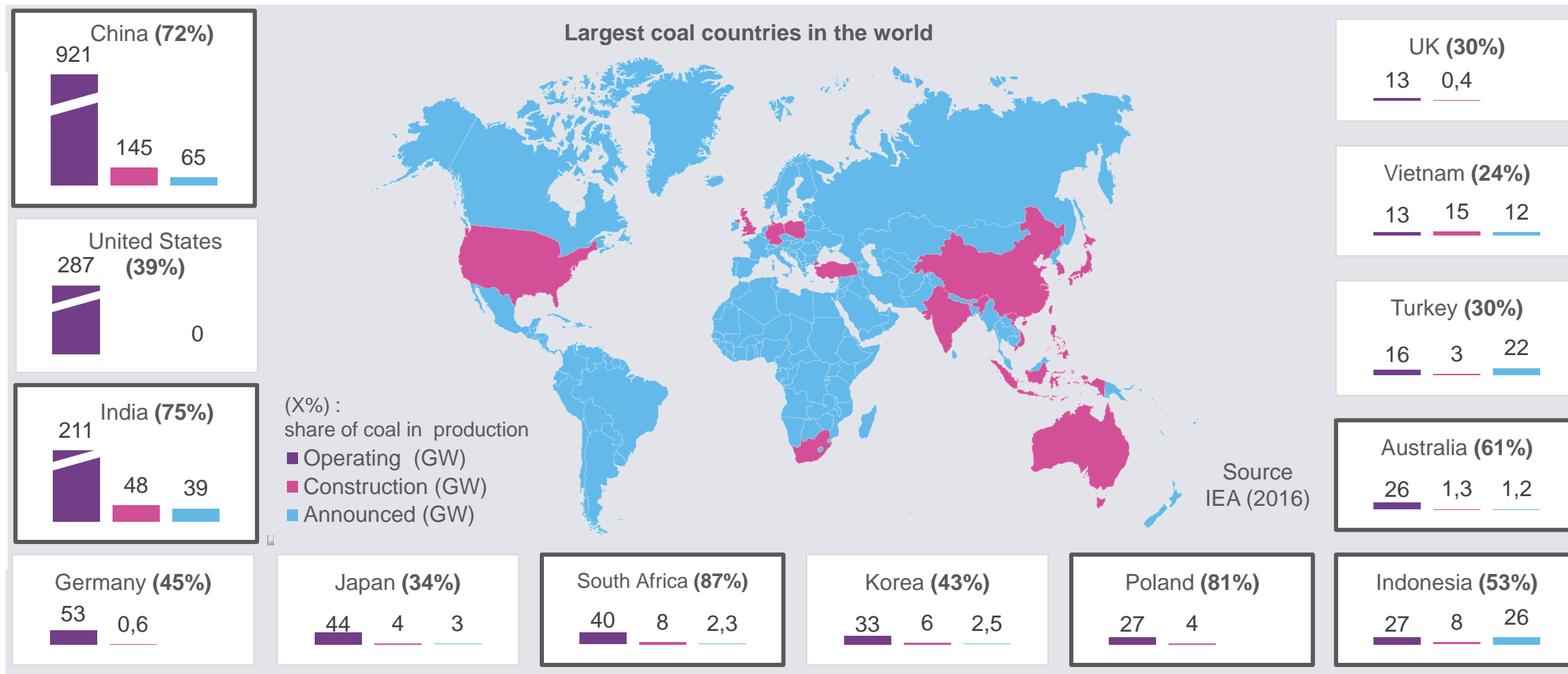
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# The future of coal in global power systems

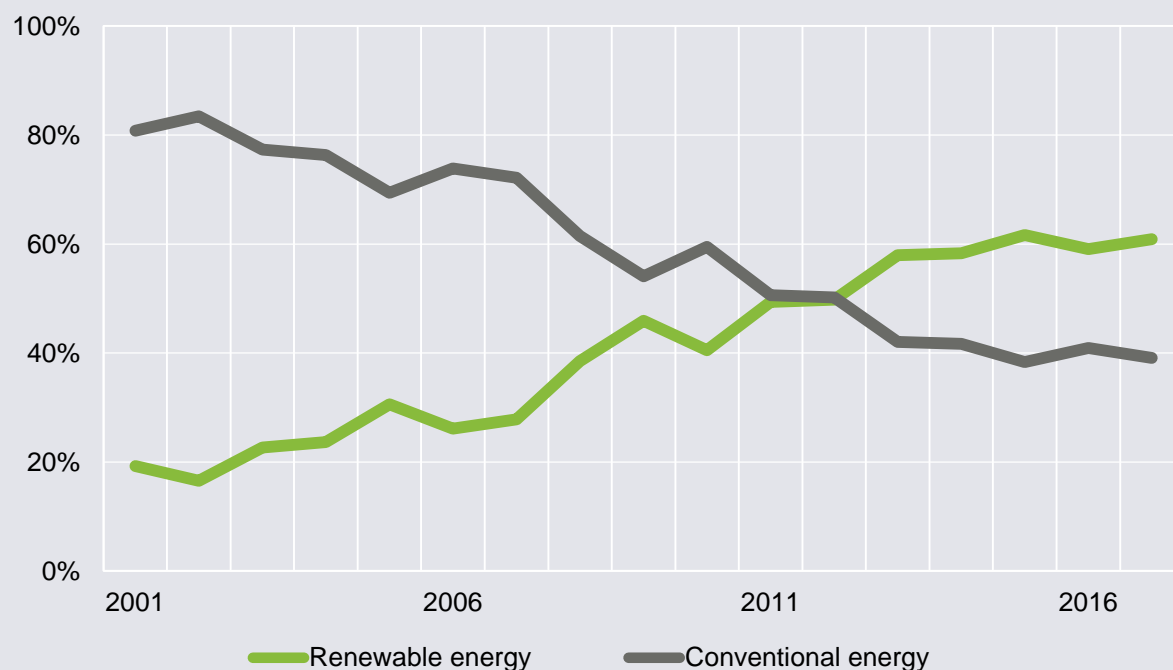


# Construction and planning of new coal power plants globally is shrinking dramatically...



**...as new investments are going mostly into renewables power plants, especially wind and solar.**

Share in new power capacities (without large hydro power plants) 2001 - 2017



IRENA, FS UNEP

- In the past 10 years, the global power plant investment market indicates a trend away from fossil fuels and towards RES.
- RES capacities represent 60% of newly installed capacity worldwide – other technologies (coal, gas, nuclear and oil) add up to 40%.
- Wind and solar have the biggest shares in RES capacities.

# The reason:

## Wind and solar are now cheap technologies, in many places of the world they are the lowest-cost option for power production

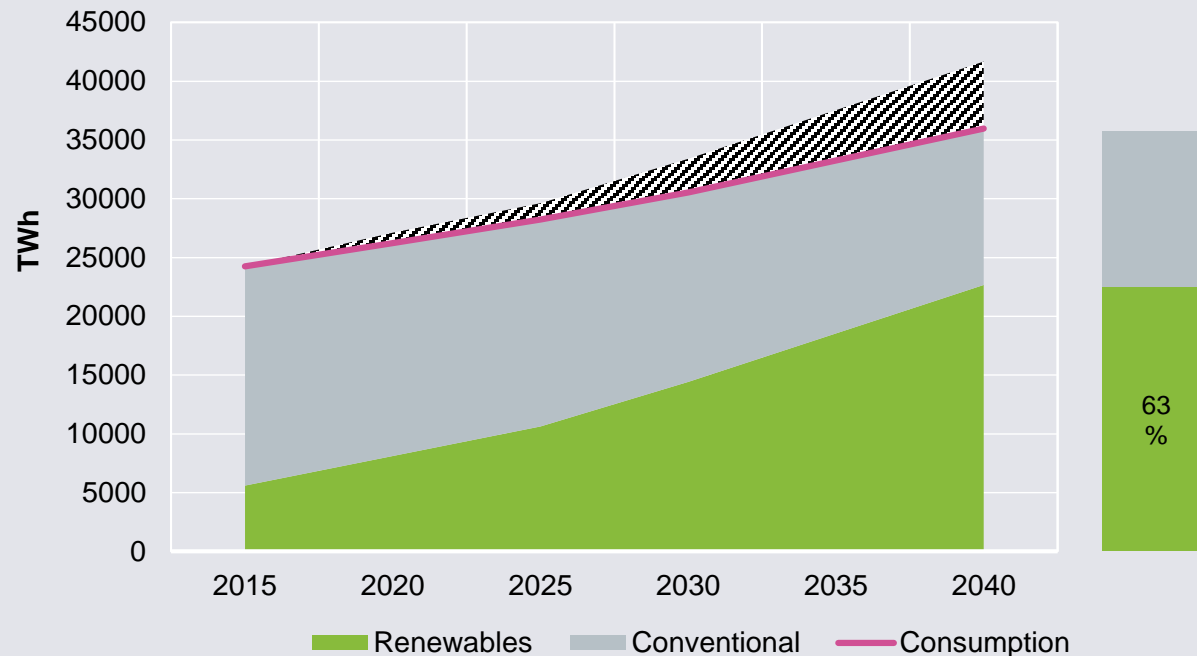


- In places with good wind and or solar conditions, power production costs are now at 2-3 ct/kWh
- Even where there is not much sun (like in Germany or Denmark), new solar is now cheaper than new coal/gas
- Key requirement: Low capital costs, as cost structure of wind and solar has low share of operating costs but high share of investment costs
- Challenge: Almost everywhere regulations were designed for the old power systems (coal, gas) and are now often blocking progress



# Even with increasing global power demand, the market for conventional power generation is set to decline in the next decade...

IEA global scenario of the market for conventional power generation

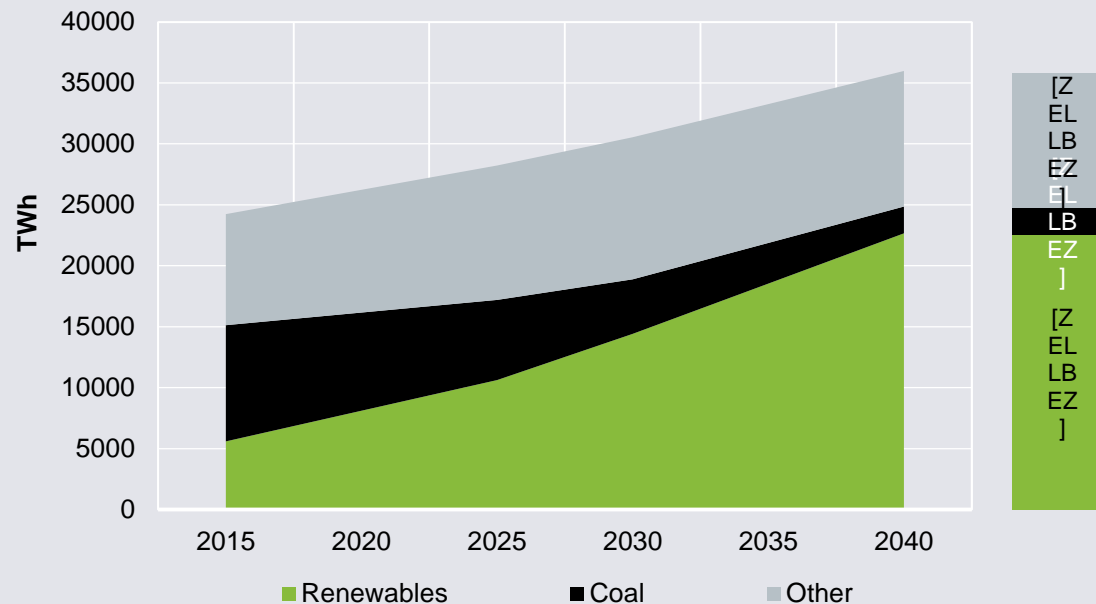


IEA World Energy Outlook 2017 (Sustainable Development Scenario)

- Efficiency gains may limit growth in electricity consumption even in emerging economies.
- Its further cost reduction is continuing to strengthen RES technology's competitive position relative to conventional technologies.
- Demand side flexibility will shift the demand towards times with high RES availability.
- Conventional technologies will serve as back-up technologies for the increasing RES shares.
- The development is driven by economic reasons, because in the near future, the full cost of wind and solar will be lower than the variable costs of conventional power.
- The market for conventional power generation will very likely shrink, despite growing demand.

## ...and Coal will go down to 6% in global power production by 2040, according to the IEA sustainable development scenario

IEA global scenario of the market for conventional power generation

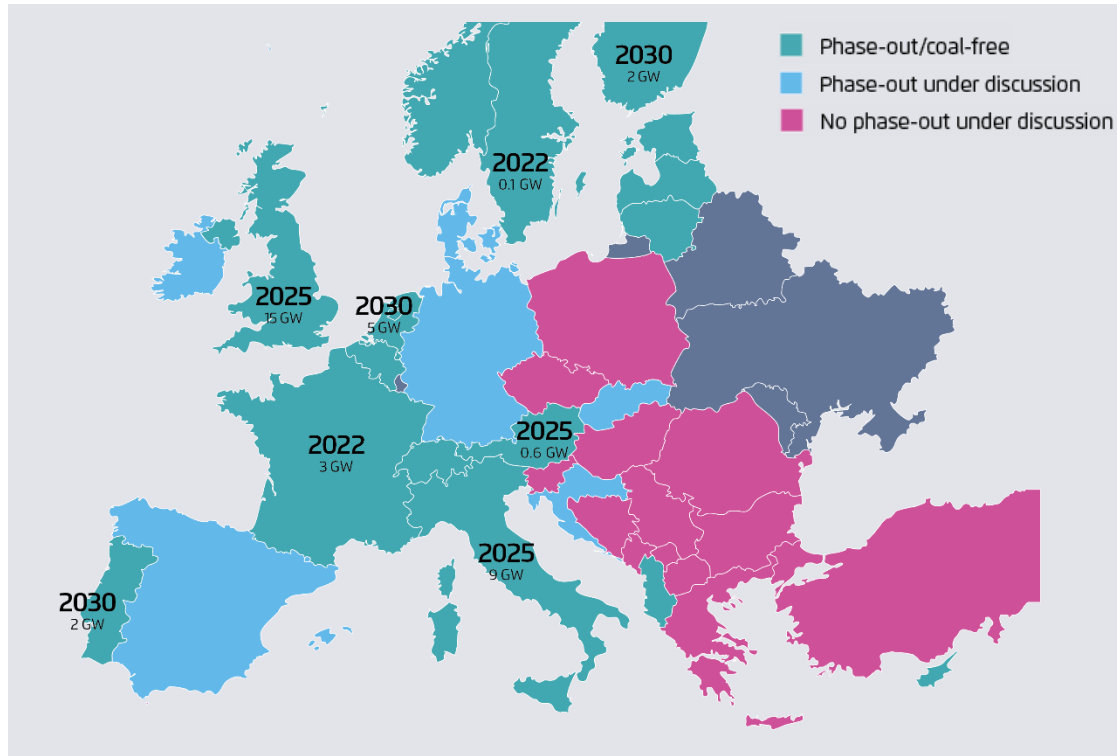


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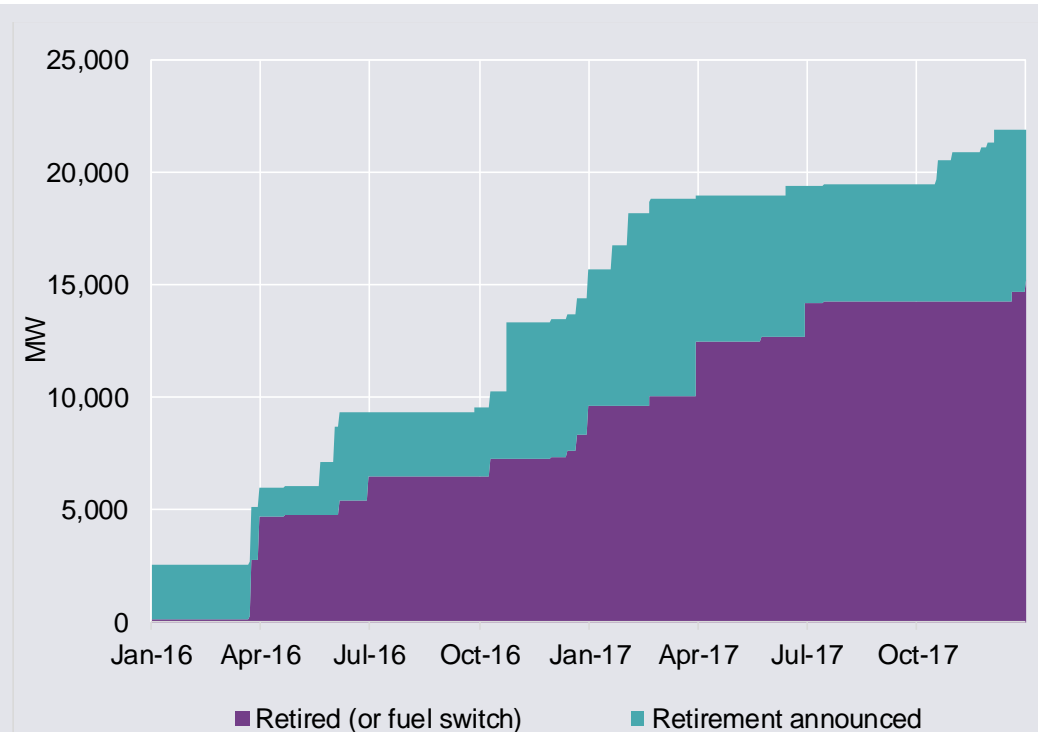
# Numerous countries in Europe have issued a coal phase out by 2030, Germany will most likely have a decision by the end of 2018

Coal phase-out years and operational capacity



Beyond Coal campaign 2018

Coal plants retired or announced to retire



Beyond Coal campaign 2018

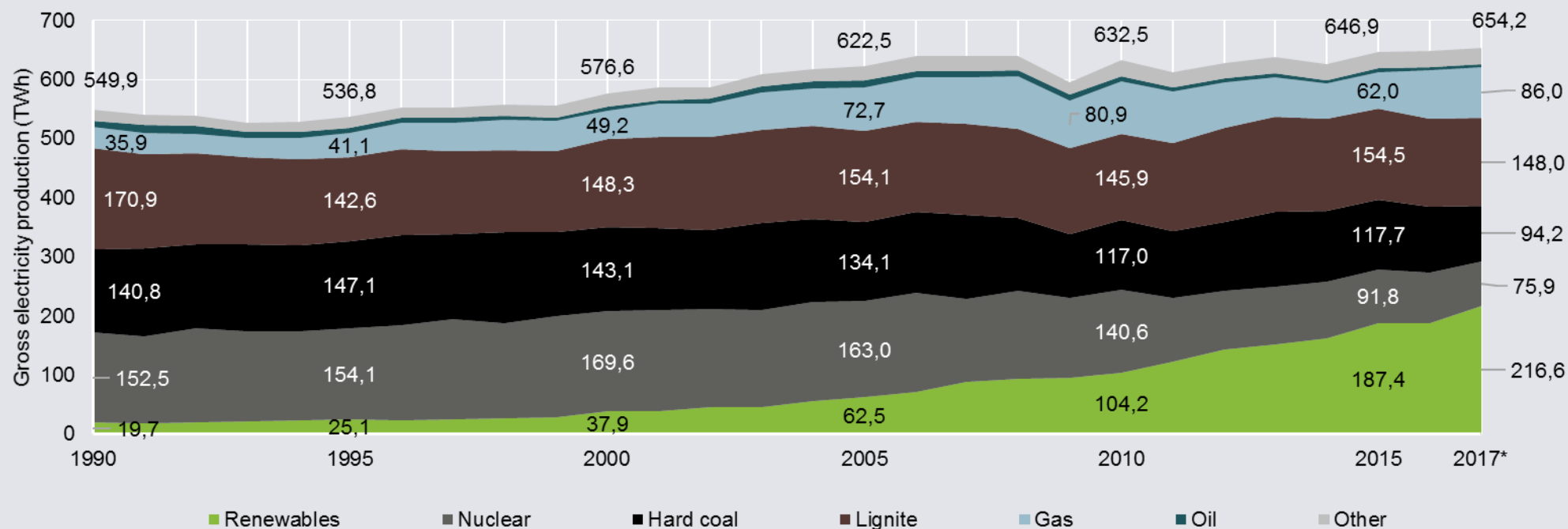


# The situation in Germany



## In 2017, hard coal and lignite account for 37% of Germany's power production – down from 57% in 1990 and 50% in 2000

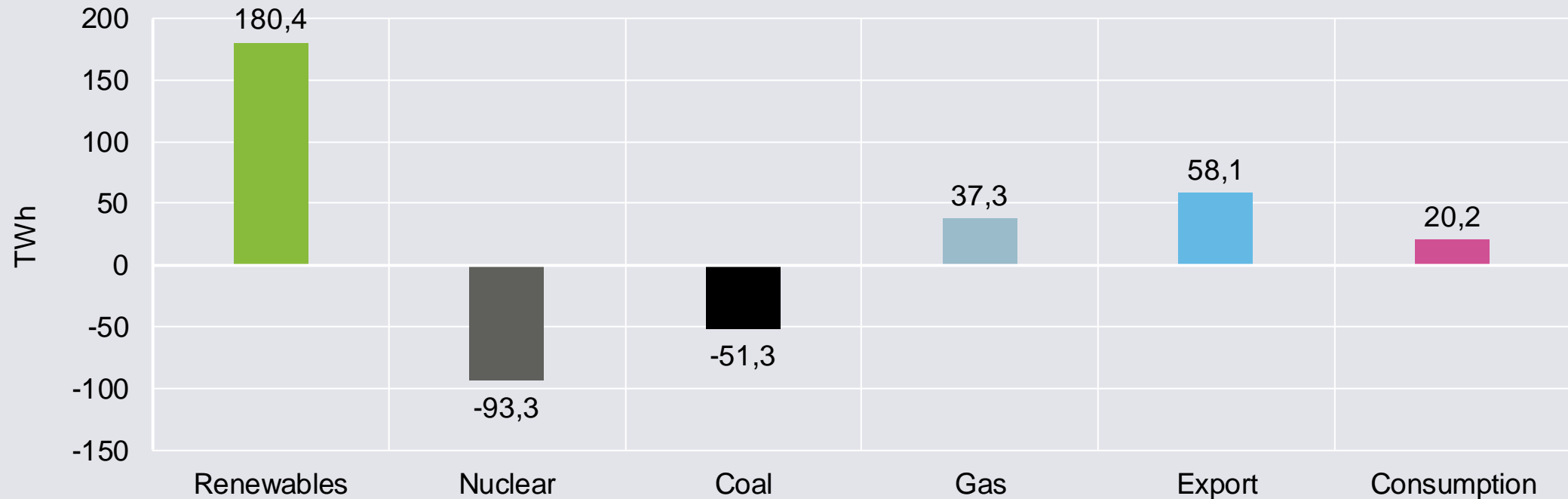
Gross power production, 1990–2017



AG Energiebilanzen 2017a; \*preliminary data

**However, Germany's coal power generation could have dropped a lot more since the year 2000 – given the enormous increase in renewables**

Changes in power generation 2000 - 2017



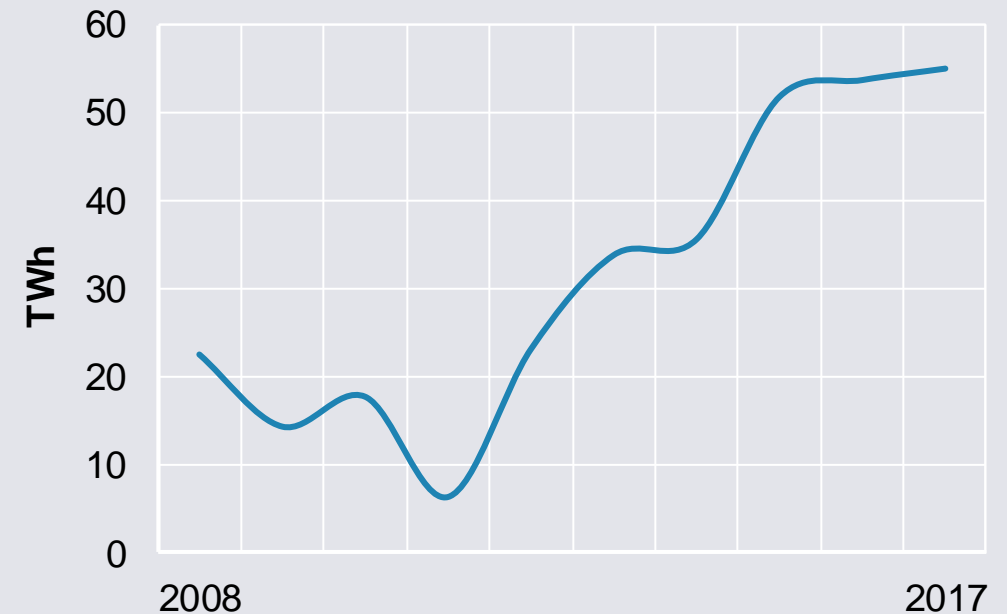
**One key reason: Coal power was rather exported than reduced, due to consistently low CO<sub>2</sub> prices in the European emission trading scheme and Germany's position in the European market**

CO<sub>2</sub>-Prices 2008 – 2017 in European Emissions Trading



EEEX (depicted are 1-Year-Futures)

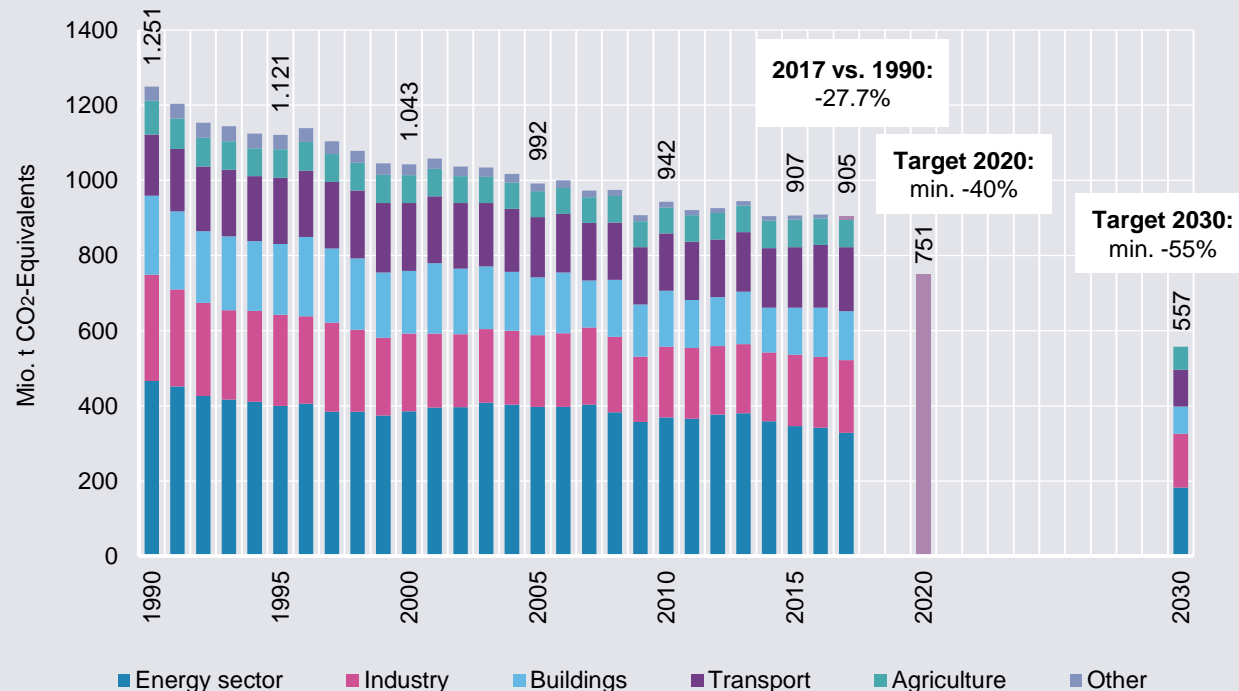
Annual Germany's power export surplus 2008 - 2017



AG Energiebilanzen

# As a consequence, emissions in Germany are only reducing slowly, putting Germany's 2020 and 2030 climate targets at risk

Greenhouse gas emissions by sectors 1990 – 2017



Umweltbundesamt, own calculations

- Since 1990, Germany has reduced its GHG emissions by around 27 percent. Until 2020, Germany aims for reducing its greenhouse gas emissions by 40 percent towards 1990 levels.
- Current projections show, that this target is basically out of reach.
- Despite insufficient performance of other sectors (especially transport), one of the key reasons for Germany not meeting its targets is the continuing high power and heat generation based coal.

# In June 2018, the German government announced the appointment of the Commission „Growth, Structural Change and Employment“

German ministers announcing the appointment of the Commission in June 2018



BMWi

## Main tasks of the Commission

- Create a perspective for new employment in by coal phase out affected regions.
- Develop a mix of instruments bringing growth, structural change, social combability, social cohesion and climate mitigation together, including investment in by coal phase out affected regions and a fonds for structural change.
- Measures to reduce the expected gap to the 2020 climate target, measures to fulfil 2030 sectoral climate target for the energy sector and a masterplan to stepwise reduce and end coal-based power production.



**As members of the commission, the government nominated both stakeholders, scientific experts as well as political representatives**

Chairs of the Commission „Growth, Structural Change and Employment“

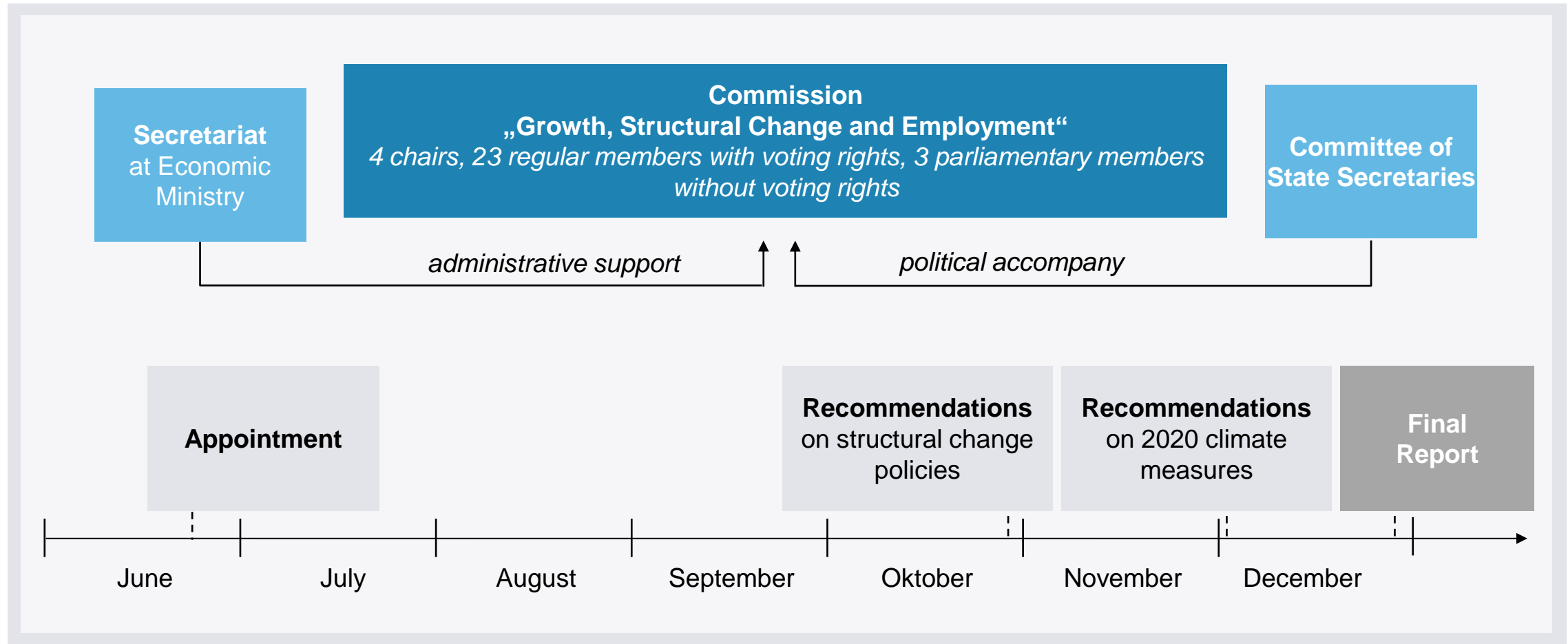


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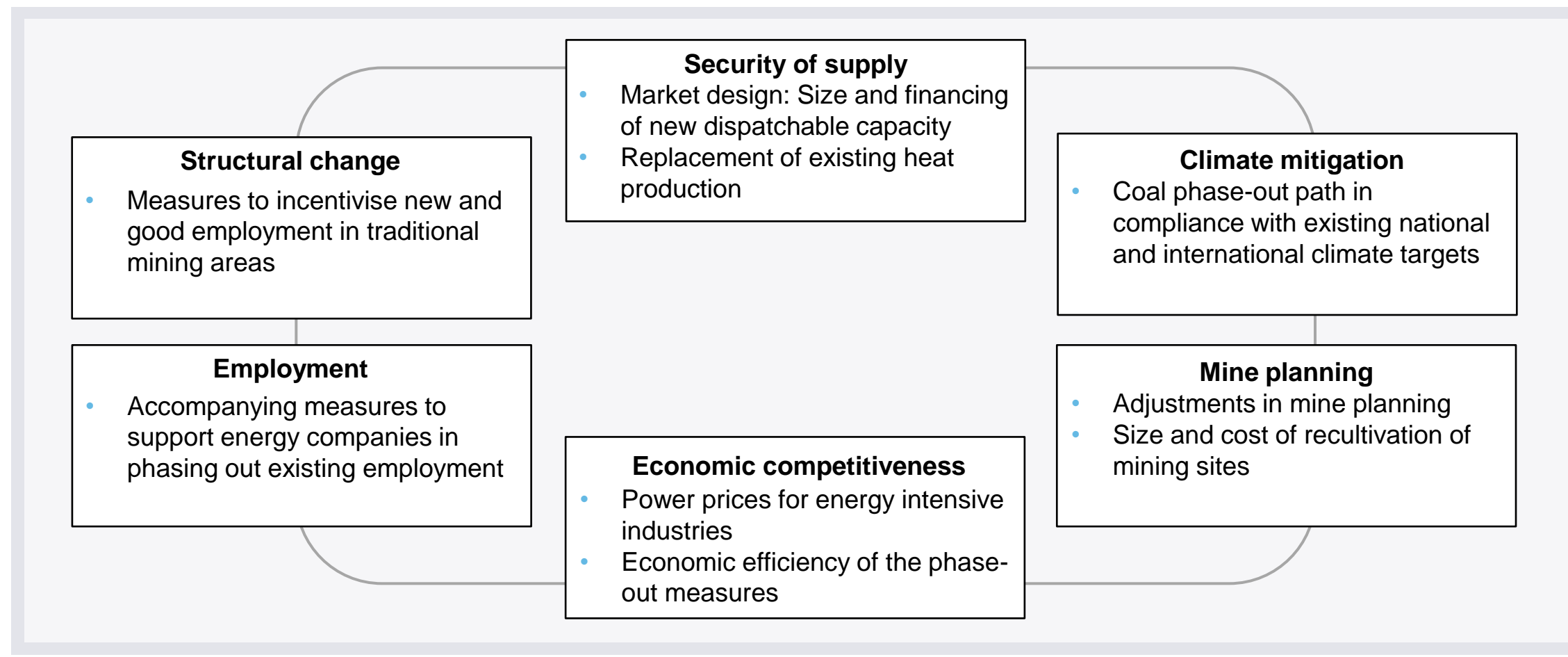
**Members of the Commission include:**

- 4 Chairs, representing the regions, politics and science
- 23 regular members, including
  - a. Representatives from environmental associations, trade unions, mining affected regions, industry associations
  - b. Scientists with expertise on climate change, energy policy, structural change policy, employment policy
- 3 Representatives from the governing parties of the German Parliament (without voting rights)

## The time schedule of the commission to deliver final results until the end of 2018 is ambitious

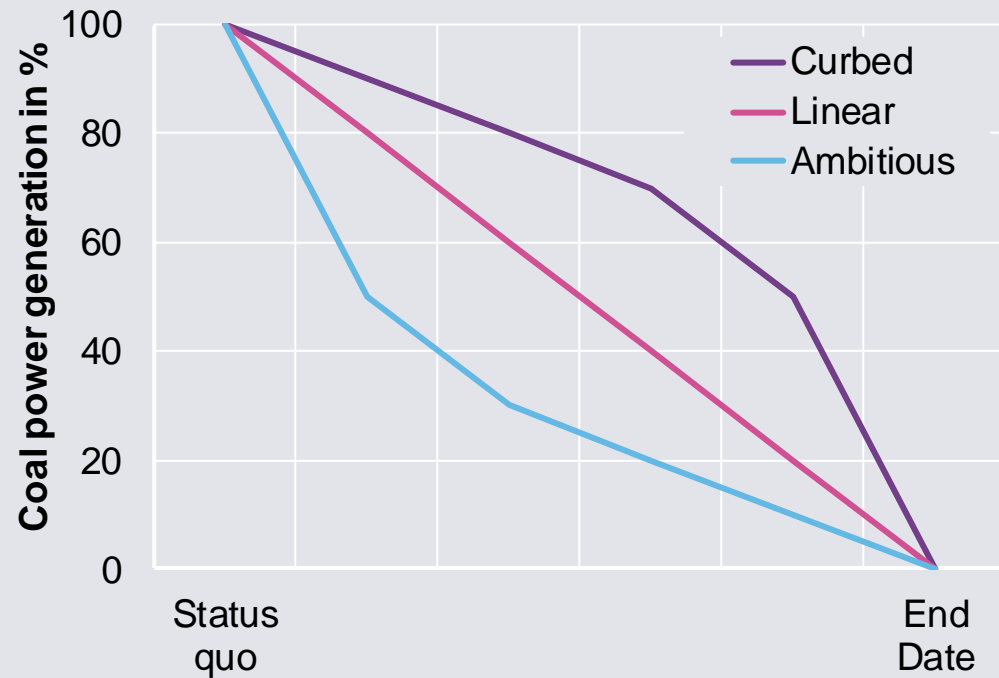


## Key issues to address in the Coal Commission



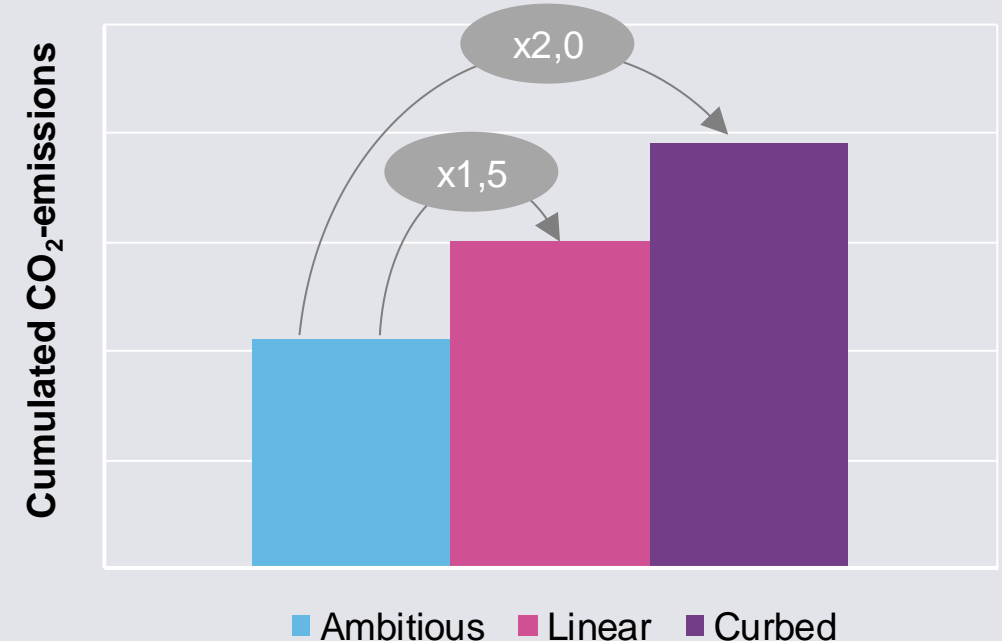
# Climate effects are determined by the sum of the CO<sub>2</sub>-emissions over time – that's why the course of the phase-out path plays a significant role

Illustrative course of different phase-out paths



own presentation

Cumulated CO<sub>2</sub>-emissions of different phase-out paths



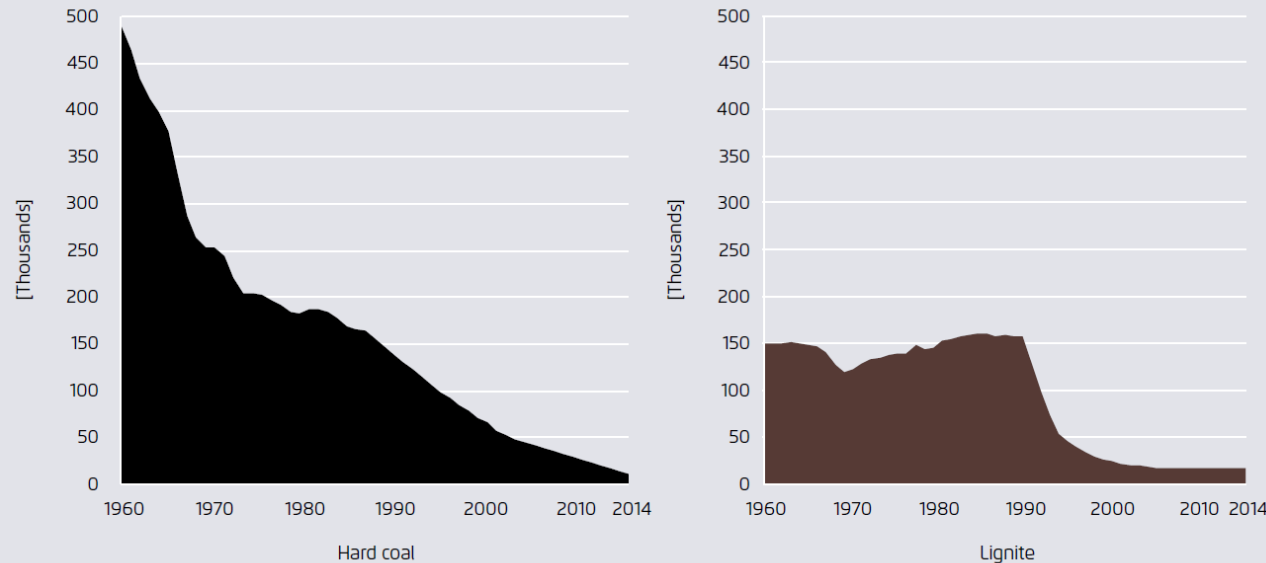
own presentation

# **Anticipating change – a coal consensus in light of energy transitions**



# The coal industry in Germany has already experienced a huge drop since the 1960s – we are now talking about the regional transition challenge in two lignite mining regions

Employees in German hard coal and lignite mining, 1960–2014



Agora Energiewende (2016)

- The characteristic of coal industry investment with its high capital intensity and long investment cycles has an inherent risk of stranded investments.
- Integrated mining and coal power generation industries have different economics than power generation from imported coal.
- Coal mining is still a labor-intensive industry with high regional concentration and ownership by the workers.
- Coal industries have huge upstream and downstream links to other industries that might be affected by changes of the coal sector.
- Coal mining is causing long term requirements for “aftercare” that has to be financially secured.



# Agora Energiewende has developed 11 principles on how to address the economic and social aspects of the coal phase-out

A

## The Foundation

- 1 Convening a 'Round Table for a National Consensus on Coal'
- 2 Incremental, legally binding phase-out of coal power by 2040

B

## The Coal Phase-Out in Germany's Power Plant Fleet

- 3 No new construction of coal-fired power plants
- 4 Determine a cost-efficient decommissioning plan for existing coal power plants based on remaining plant lifespans, including flexibility options in lignite mining regions
- 5 No additional national climate policy regulations for coal-fired power plants beyond the phase-out plan

C

## The Coal Phase-Out in Lignite Mining Regions

- 6 No additional lignite mines and no further relocation processes of affected communities
- 7 The follow-up costs of lignite mining should be financed with a special levy on lignite
- 8 Creation of 'Structural Change Fund' to ensure a sound financial basis for structural change in affected regions

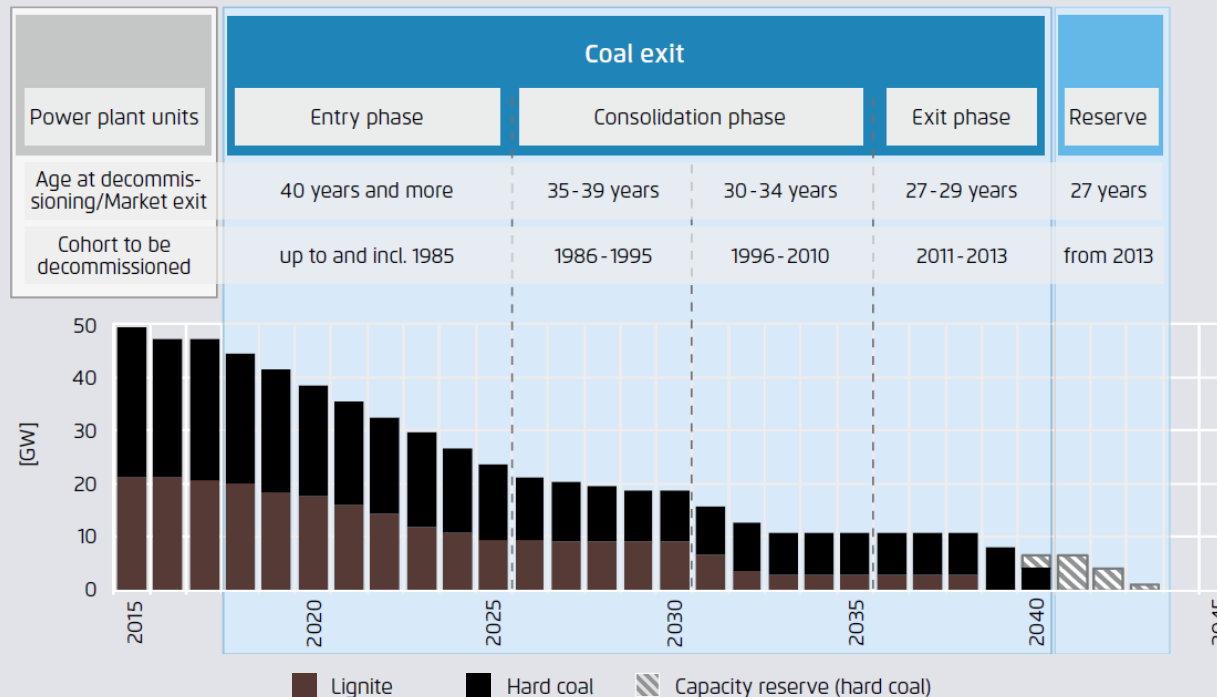
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## Economic and Social Aspects of the Coal Phase-Out

- 9 Ensuring security of supply over the entire transformation period
- 10 Strengthening EU Emissions Trading and the prompt retirement of CO<sub>2</sub> certificates set free by the coal phase-out
- 11 Ensuring the economic competitiveness of energy-intensive companies and the Germany economy as a whole during the transformation process

## Three main phases of the coal phase-out: Entry, consolidation and exit – each phase has its own characteristic focus

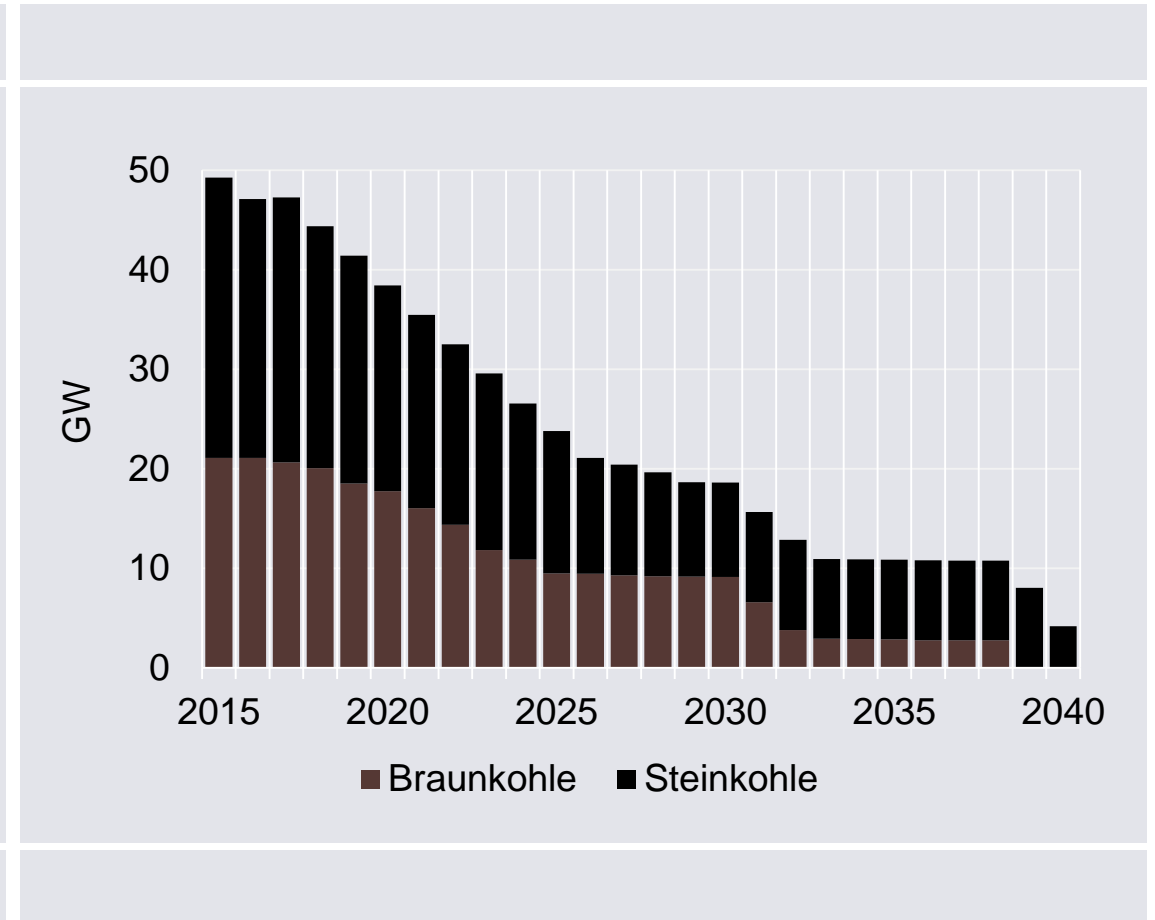
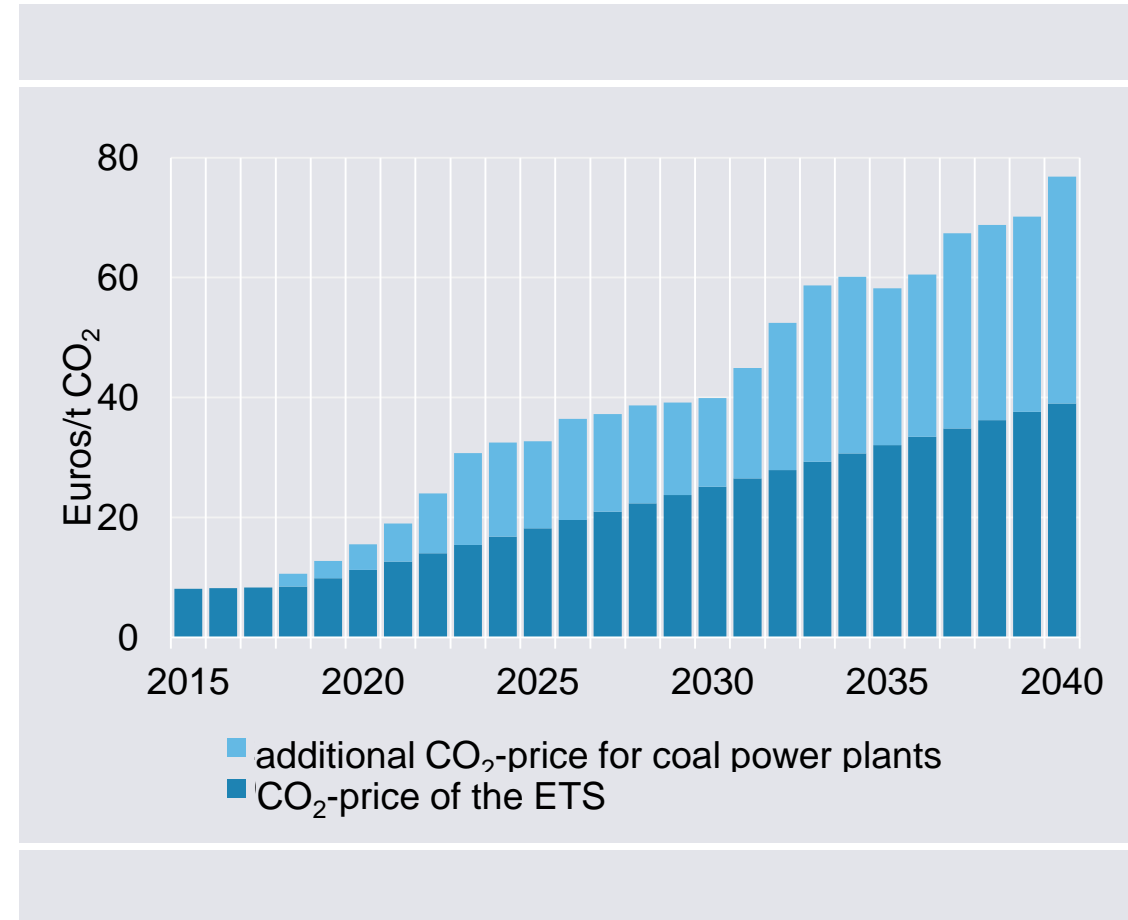
Installed capacity in the proposed Coal Consensus Path 2040



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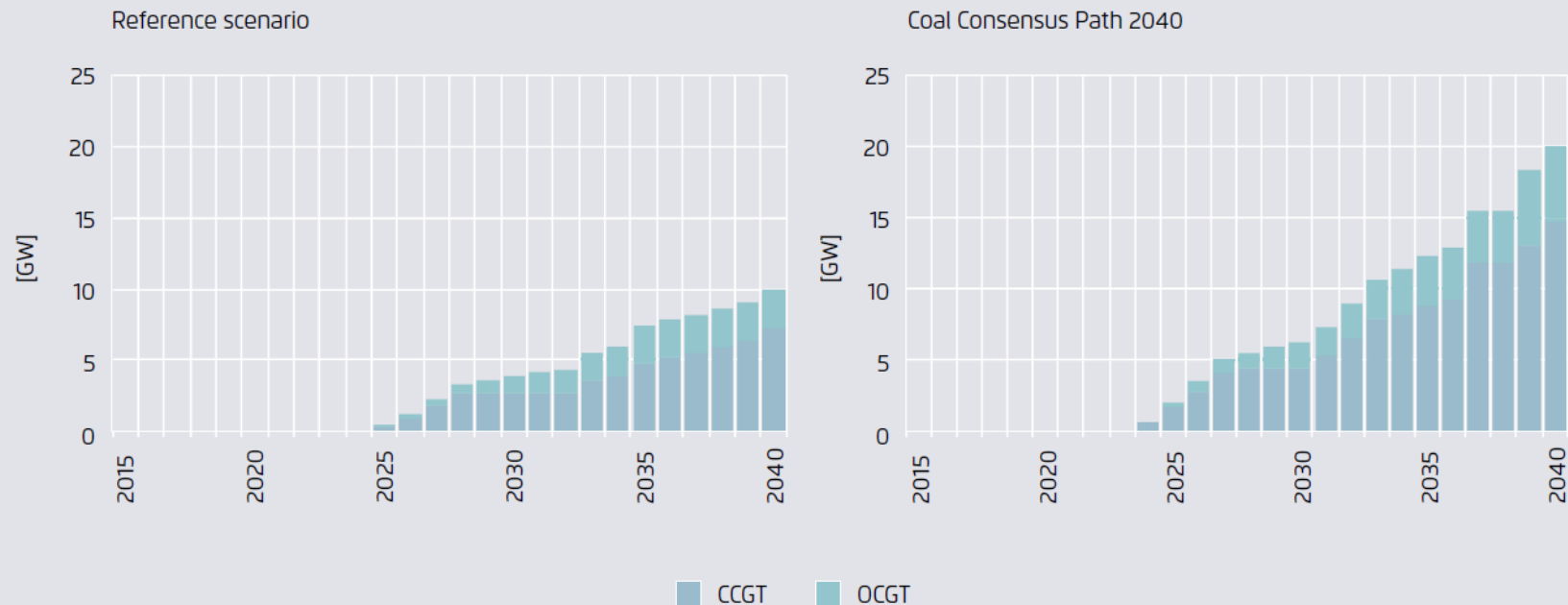
- *Entry phase*: shutting down the oldest, most inefficient plants, mainly reducing overcapacities, socially acceptable staff reduction, start dismantling of power plants, prepare the regions for a life without coal (R&D)
- *Consolidation phase*: start to invest in new back-up to secure the power supply, start to invest in the regions new business opportunities, start further education for those workers that are not reaching retirement age before the end of coal, start the aftercare-activity for the first closing lignite mines
- *Exit phase*: finalizing the investments for security of supply in power sector, shut down of all lignite mines, ramping up of aftercare-activity for the lignite mines, secure the regions new business opportunities

## Two instrument options to achieve a coal phase out: Introduce a carbon price or regulate it



# To ensure security of supply in times of no sun nor wind, new gas power capacity additions are necessary – but they will have low operating hours!

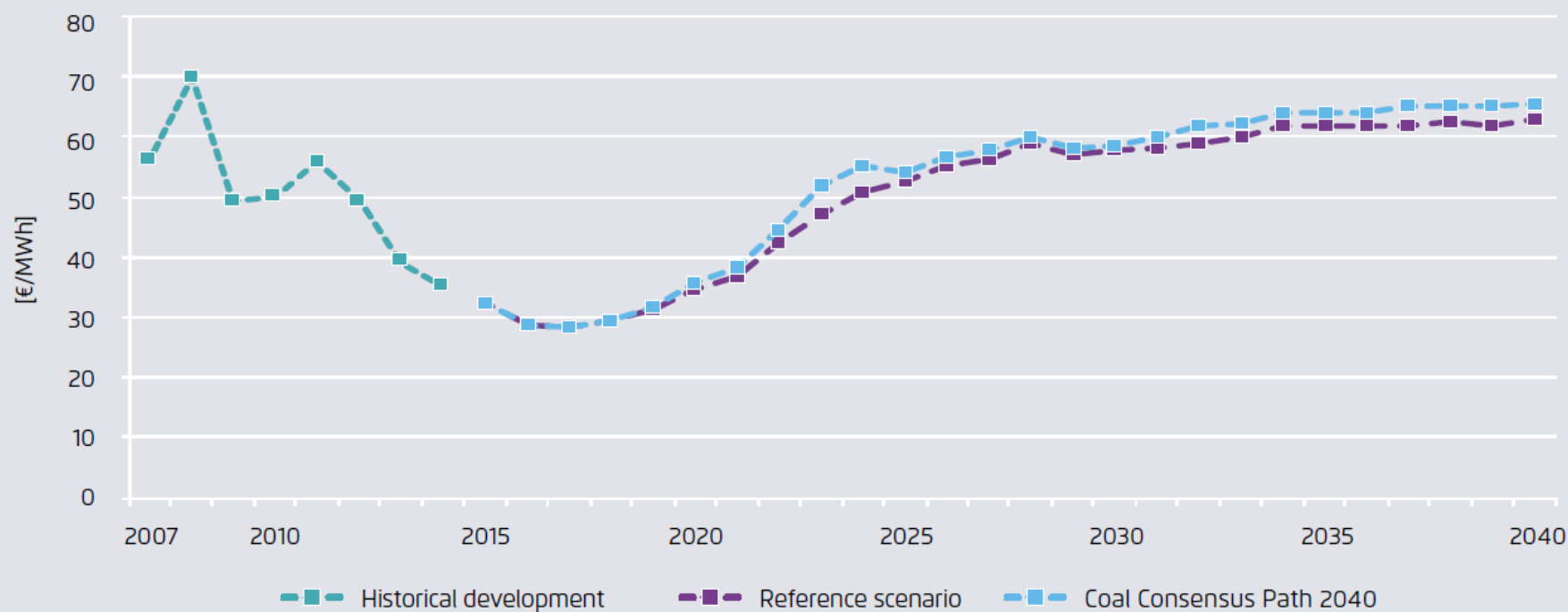
Model-based capacity additions of the new natural gas-fired plants required on the reference scenario and on the proposed Coal Consensus Path 2040



Agora Energiewende (2016)

## If managed properly, power price effects are not substantial

Wholesale electricity price (base) in the reference scenario and the proposed Coal Consensus Path 2040



Agora Energiewende (2016)

**Summing up:**

**Since CCS is nowhere near to market readiness, the days of coal are gone**

- Coal use needs to be halved by 2030 globally in order to achieve a 2 degrees world
- Many countries are aiming for a coal phase out by 2030
- Social and economic issues need to be addressed, but this is manageable
- Germany and Chile share the same basic facts, so should work together



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# Thank you for your attention!

Questions or Comments? Feel free to contact me:  
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Agora Energiewende is a joint initiative of the Mercator  
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