Managing the coal phase out in Germany

Insights into environmental, economic and social challenges

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1. The historical role of coal in Germany
Germany’s reconstruction after the second world war is strongly interlinked to its direct access to coal – and the hard working miner is a symbol for its success.
Since the 1960/70s, the relevance of lignite and hard coal for the energy system is steadily declining – first due to the raise of oil, then due to the raise of gas, nuclear and renewables.

AG Energiebilanzen

Employees in lignite and hard coal mining 1960 - 2016

Statistik der Kohlenwirtschaft
“Coal Culture” is still a relevant part of the German identity.
2. Coal in Germany’s energy system today
In 2017, lignite and hard coal accounted for less than a quarter of Germany’s primary energy consumption

To meet its energy demand, Germany produced around 13,500 PJ of primary energy last year.

Around 80 percent of primary energy consumption is covered by fossil fuels: Around 35% by oil, 24% by fossil gas and 11% each by hard coal and lignite.

Nuclear energy accounts for 6% and renewable energies reach 12%.
While lignite is mined in Germany, hard coal is nowadays almost completely imported, especially from Russia, the USA, Colombia and Australia.

Almost 100% of the lignite used in Germany is mined in one of the national pits in North-Rhine Westfalia, Lusatia and Central Germany.

When it comes to hard coal, only around 7% are still mined in Germany. And until 2019, even this share will be reduced to zero, since the last hard coal mines in west Germany are about to close at the end of 2018.

Most of the hard coal is in contrast imported, mainly from Russia (30%), the United States (15%), Colombia (18%) and Australia (11%).
Lignite and hard coal is mainly used for power (and some heat) production – material use only plays a role for hard coal, especially in the steal industry.

Usage of lignite and hard coal by sector 2016

- **Lignite**
  - Power and Heat; 90%
  - Mining; 9%
  - Industry; 1%

- **Hard Coal**
  - Power and Heat; 65%
  - Industry; 34%
  - Others; 1%

**Lignite**

- Lignite is almost completely (90%) used for power and heat generation (esp. district or industrial process heating).
- Around 9% of the lignite is used for manufactured heating goods like Brickets.
- Only around 1% of the lignite is needed for material use in the industry sector.

**Hard Coal**

- Also hard coal is mainly used for electricity and heat generation (65%).
- Nevertheless, around 35% of the hard coal is needed in the industry sector for material use (i.e. steal industry).
Power and heat production from lignite and hard coal is still responsible for more than a third of Germany’s greenhouse gas emissions

Up to 2016, Germany has reduced its GHG emissions towards 1990 levels by around 27 percent.

More than a third of these emissions (35 percent) go back to power and heat production from lignite and hard coal.

Oil and gas combustion in the power, heating and transport sector account together for around 40 percent.

The rest (20 percent) are mainly methane emissions from the agriculture sector and process emissions from the industry.
In 2017, the German lignite and hard coal industry had ~33,000 direct employees

Two thirds of the employees work in the lignite sector, the other third in the hard coal sector.

Same share accounts for power plants and mining: One third is employed in power plants, the other two thirds work in the mining sector.

Roughly 600 people are working in the (lignite) recultivation sector.

On every lignite mining job, one can add roughly 1 – 2 indirect employees (suppliers, subcontractors).
The average age of an employee in the coal mining industry is 46 years.
For the overall economy, the coal mining industry today only plays a marginal role – but is still rather important in some regions.
3. Why the phase out of coal is unavoidable
Reason 1: The coal power plant fleet is aging, and some developed mining capacities reach their limits

Some parts of the German coal capacities are pretty old already today: half of the fleet has been build before the 1990s. That means, even without any additional measures, more and more coal capacities will be decommissioned. In the reference scenario, we expect coal capacities to drop to ~55% by 2030 and to ~25% by 2050.
Reason 2: The economics of lignite and hard coal plants have changed for the worse – and they will probably not change for the better again.
Reason 3: European and national climate targets demand an accelerated phase out from coal in the medium to long term

- Reducing GHG by 80 to 95% by 2050 (against 1990), all sectors need to lower their emissions significantly.
- The potential for reduction in industrial processes and the agricultural sector are expected to be rather limited (max. -60%).
- Consequently, the power, heating and transport sectors need to contribute more than proportionately to GHG reductions (≥ -90%).
- Such a reduction is not feasible without a coal phase-out, especially since the use of electricity in the heating and transport sectors will increase.
- Neither CCS, material use, nor exports are realistic options to prevent the phase out.
4. Key elements to manage the phase out from coal successfully
A reliable, consensus oriented framework sets the scene for long term planning and just transition

Status quo of the political framework for the coal phase out in Germany

- **Climate targets**: defines emission budget
- **Commission**: agrees on climate and structural change measures
- **Climate law**: makes agreement reliable

⇒ To allow for prompt but long-term oriented planning, a reliable, consensus oriented framework is needed.
⇒ In Germany, currently there is a broad consensus among the climate targets itself, but not yet so much the way to meet these targets and what this means for single technologies or industries.
⇒ To bring the debate a step forward, based on the Climate Action Plan 2050 from 2017 and confirmed by the new coalition treaty, Germany plans on setting up a commission, discussing the future role of coal and structural change.
⇒ The climate targets themselves and the major decisions from this commission on coal should be recorded in a separate climate law.
Element 2: A decommissioning plan creates planning security both for regions and workers as well as investors and utilities.

One of the key questions regarding the coal phase out will be, which instrument should be applied.

Technically speaking, there are three options: capacity management, CO$_2$-pricing, production caps.

To allow for the highest rate of planning security for all affected stakeholders, capacity management (i.e. with a phase out plan) would be the best option.
Element 3: A sufficient financial framework allows for new, self-determined investment and helps generating new economic growth and employment.

Agora’s proposal for the size of a structural change fund

- **Lost added value (2015 – 2040):**
  - ~17.6 Bln. Euros
  - or
  - ~700 Mio. Euros/a

- **Public funding rate for structural support:**
  - ~35 percent

- **Total public structural funding (2015 – 2040):**
  - ~250 Mio. Euro/a

Agora’s proposal for the structure of one of the funds

- **Rhineland:**
  - ~50 percent

- **Central Germany/ Lusatia:**
  - ~50 percent

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*Dr. Patrick Graichen | Berlin, 24 February 2016*
Thank you for your attention!

Questions or Comments? Feel free to contact me:
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