

Black Diamond or Black Death: The United Kingdom's, Germany's and Poland's diverging transition pathways towards a future without coal consumption.

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Overview

Coal is the biggest single source of global climate change, contributing to 46 percent of global CO₂ emissions although it “only” provided 29 percent of the world’s total primary energy supply in 2013 (IEA, 2015). Even without any new-build power plants, the greenhouse gas (GHG) emissions of coal-fired power generation in 2030 would exceed emissions levels consistent with the 2°C target by 150 percent (Breevoort et al. 2015). Emissions of coal-fired power plants represented 28% of the European Union’s total CO₂ emissions in 2015 (Olivier et al. (2016, p.5)). To fulfil the commitment made by ratifying the Paris Agreement all EU countries will have to phase-out electricity and heat generation by coal long before 2050. Nevertheless, most countries have not yet agreed upon a phase-out plan. In fact, some countries have even planned further expansions in coal generation capacity.

The transition towards a sustainable energy system with a (roughly) fixed end-date for coal is a political project that has arisen due to increasing awareness of dramatic consequences of a changing climate. Markets are unable to autonomously change and to incorporate external costs due to e.g. biodiversity loss, environmental and health damages. Countries have chosen different pathways to adjust their markets to reflect those new challenges (e.g. capacity mechanisms, carbon price floors, etc.). The main climate policy instrument created by the EU is the EU Emission Trading System (EU-ETS). Despite several reforms the current low price signals, however, are not sufficient to significantly reduce coal consumption. This paper aims to contribute to identifying on a country-specific level main policy measures to adjust the domestic energy markets to the imperative of a coal-phase out. It contributes to the literature by investigating the current state and strategies regarding coal consumption of three representative EU states, namely the United Kingdom, Germany and Poland. The UK, Germany and Poland are representatives of the three different strands of strategies, namely a coal phase-out by 2025, a business-as-usual approach, and continuous expansion of coal. Apart from being crucial countries in absolute numbers of coal consumption, tackling a coal phase-out in these countries can be seen as blueprints for other (EU) countries.

In recent years attention has shifted from renewables (REN) and niche-innovations support, to the analysis of how the incumbent fossil fuel regimes can be destabilised and eventually replaced. This paper aims to contribute to this strand of literature by analysing the reasons why some major European countries are capable of exiting the coal business, while others, despite looming climate change impacts, asset devaluations, and increased losses, further invest in coal. Lessons will be derived on how the coal regimes in this second group of countries can be weakened. Successful policies will have a strong impact on the profitability of thermal power generation and utility business models. A coal phase-out constitutes of a deep systemic transformation, with profound consequences not only for the corporations involved in the coal sector, but also local and state governments, workers, civilians, the environment and the climate. The political challenge is hence, to develop a strategy that enables countries to quickly phase-out coal consumption, avoiding additional stranded assets, whilst also providing a buffer for social impacts and guarantee a stable energy supply. E.g., Poland’s (mostly state-owned) loss making hard coal sector, requires bailouts of corporations and yearly subsidies amounting to 8% of GDP (IMF 2015). Simply put, economics alone is not enough to explain the crucial role coal plays in Poland’s and other EU member state’s economies and energy systems. The analysis is therefore performed with a multidisciplinary framework including economics whilst also taking into account the importance of social, political, environmental and technical aspects.

Methods

The paper gives first an overview of the status quo and current trajectories for the future demand of coal in the three case study countries. The next section conducts a **stakeholder analysis** of the coal regimes. The combination with the **Triple Embeddedness Framework** (TEF) based on the work of Geels (2014) enables the identification of the most important factors leading to the status quo and most important levers to change it. The TEF is a framework to analyse the role of incumbent firms-in-industries, especially during a phase of societal challenges and transformations, and is therefore appropriate to analyse the coal phase-out particularities of the UK, Germany and Poland. It is broadly based on a Schumpeterian (1942) belief of creative destruction and the relevance of social institutions for economic behaviour. It can be used to analyse the strength and interactions of external pressures on

the industry, the strategic responses of firms and also the strength of regime lock-in mechanisms. The enabling and constraining factors include e.g. energy security considerations, competitiveness of domestic firms, affordability of electricity for households and industry or air pollution impacts. The **country-comparative** analysis enables to identify impacts of private vs. public ownership structures, domestic resources or import dependencies. It is possible to identify which stakeholders have been able to impede a transition away from coal and the most important interests of potentially influential stakeholders. Based on the analysis policy recommendations are being derived on how to achieve a coal phase-out, increasing the prospect of being politically feasible by addressing the relevant interests of stakeholders and at the same time taking into consideration regional dependencies and distributional effects.

Results

Some preliminary, and not comprehensive, results from the analysis are represented in the following table:

	United Kingdom	Germany	Poland
Techno-economic pressures	<ul style="list-style-type: none"> • Carbon price floor • Expensive domestic mining • Dash for gas 	<ul style="list-style-type: none"> • Strong RENs support • Devaluation of coal assets • End hard coal subsidies 2018 • Low wholesale elec. prices, high natural gas prices 	<ul style="list-style-type: none"> • Domestic coal more expensive than world market prices • 80% of mines unprofitable • Dwindling resources
Socio-political pressures	<ul style="list-style-type: none"> • Coal phase-out • Climate Leadership aspirations • 2025Miners' strikes 	<ul style="list-style-type: none"> • Lignite as domestic resource (import dependence) • (Inter-)national climate commitments • Nuclear phase-out • Strong civil society participation 	<ul style="list-style-type: none"> • Fear of import dependence on Russia • Strong political power miners • Failed attempts of fracking and nuclear energy • Opposition due to air-pollution
Firm-level responses	<ul style="list-style-type: none"> • Closure of deep-pit mines • Closure of most coal plants • Switch to biomass-co-firing • Fuelling the "keep the lights on" debate 	<ul style="list-style-type: none"> • Company splits (e.g. RWE) • Lobbying against climate levy, enforcing capacity payments • Framing of coal as partner of RENs 	<ul style="list-style-type: none"> • State enforced acquisitions of insolvent mining corporations • Mounting coal stockpiles • Lobby against RENs to avoid competition and losses

Conclusions

If and only if strong, consistent, and credible policy measures are being taken, a transition away from coal in time to prevent catastrophic levels of climate change will be possible. To achieve the decarbonisation of the energy sector further stranded assets in coal have to be prevented by stringent energy and climate policies on domestic and EU-wide level in addition to the reform of the EU-ETS. Policies concerning the energy sector, but also targeting regional development and the labour market have to be implemented quickly, to remain in the window of opportunity where a transition instead of a crash of the electricity sector and relating entire economies is still possible. The transition away from coal started in the 1980s in the UK, and is still not finished. The transformation in Germany and Poland has to happen at a much faster rate. Blunt policy measures have to be taken which also address specific stakeholder interests to achieve acceptance by the private sector and civil society.

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