

Lessons learned from the German coal phase-out process since the 1950s

Webinar on Germany's long goodbye from coal; 09.06.2020



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German Institute for Economic Research (DIW Berlin)

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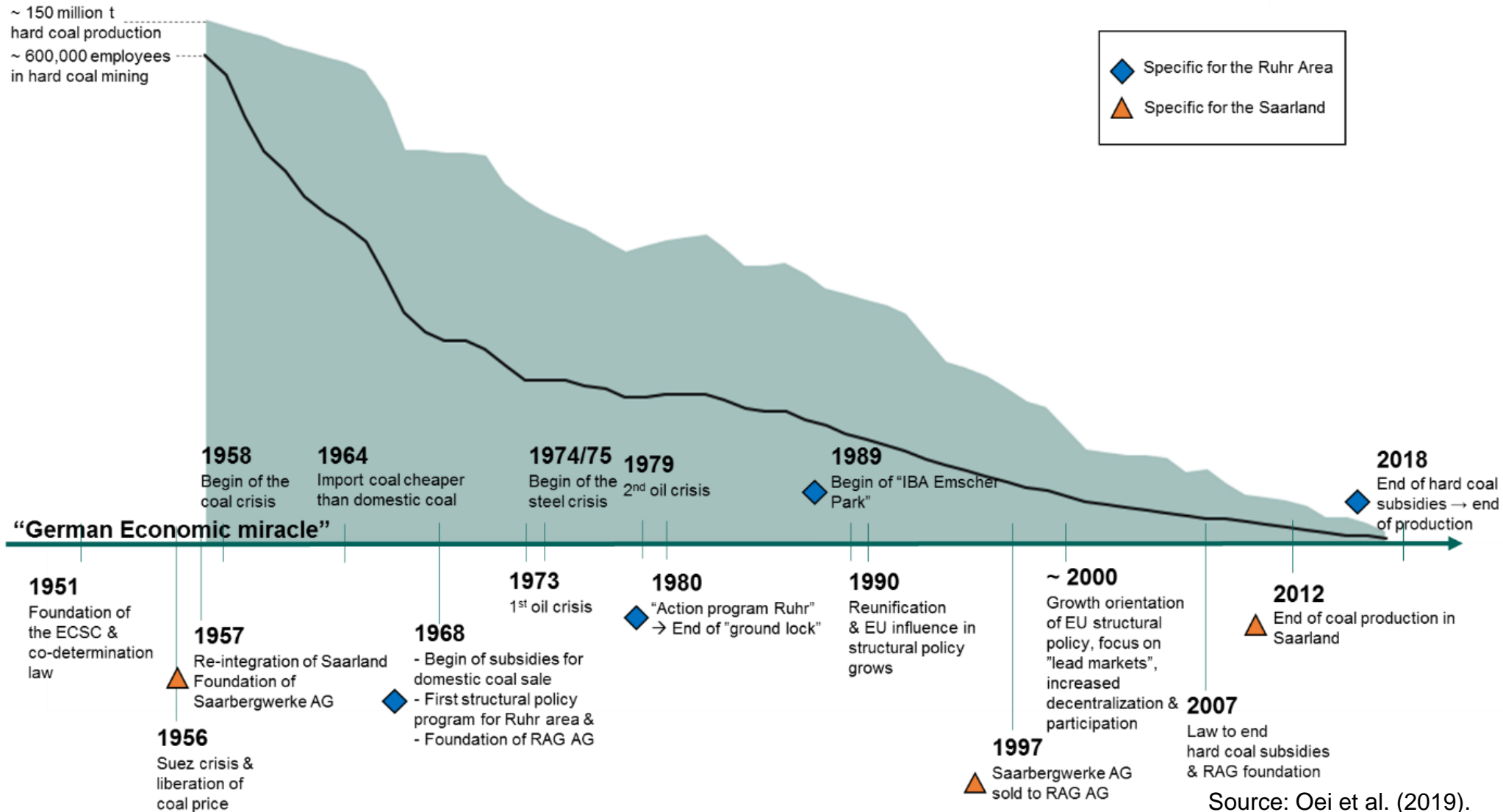
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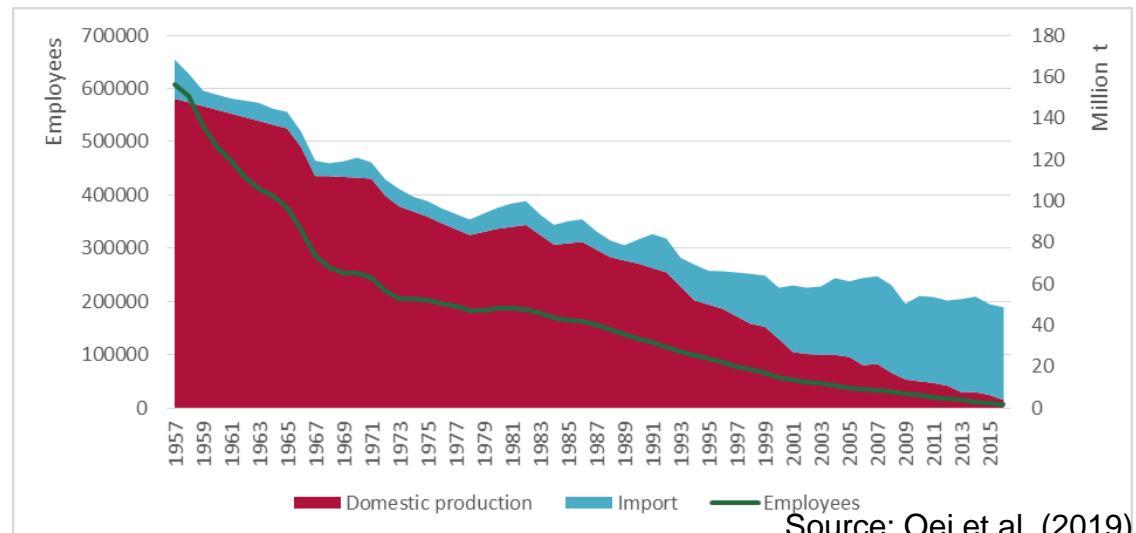
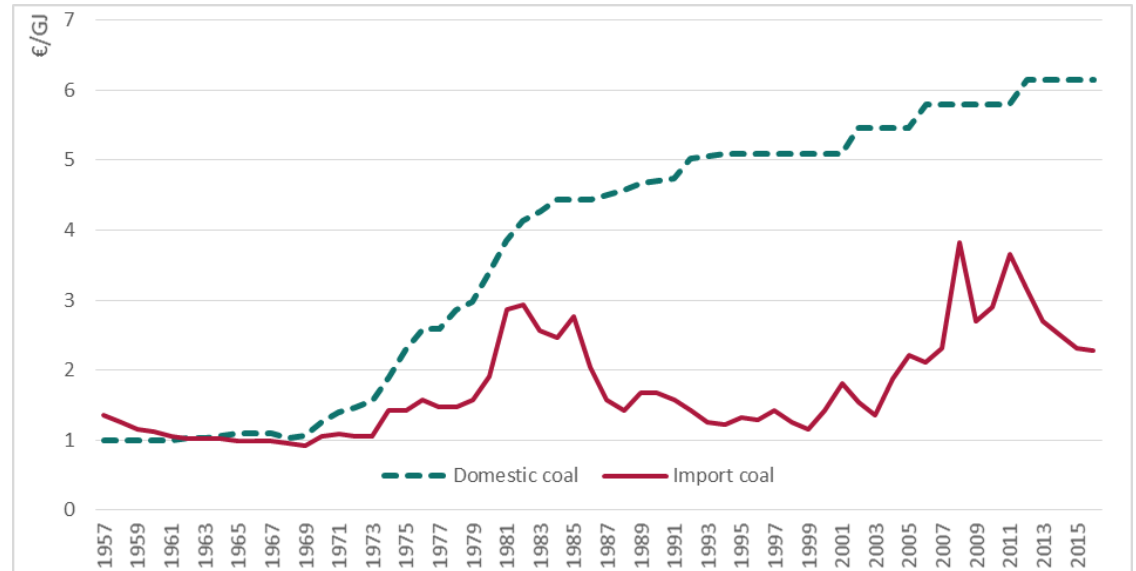
Germany: Long history starting with the European Coal and Steel Community in 1951 and coming to an end in 2018



Source: Oei et al. (2019).

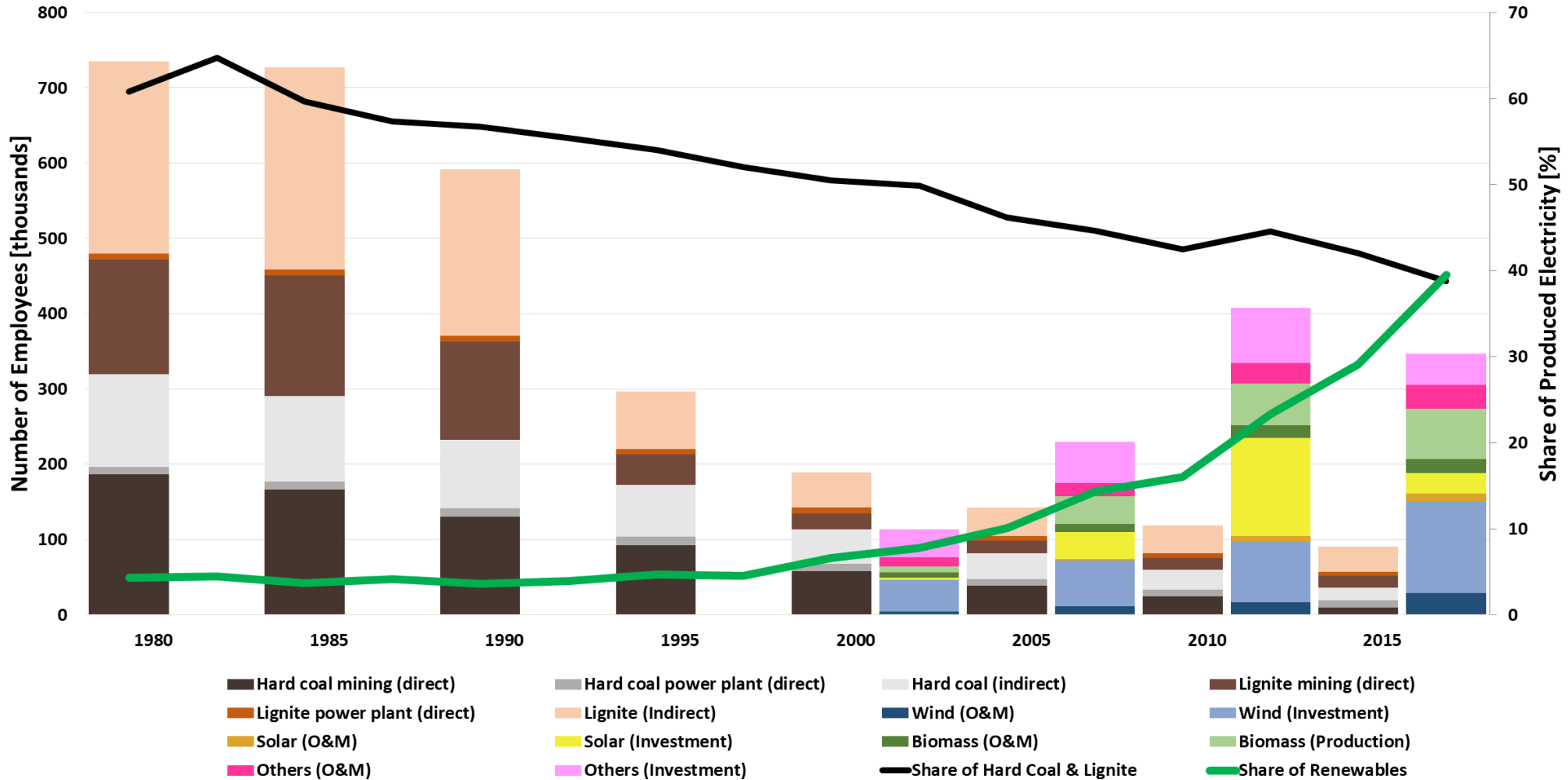
Germany: Hard coal phase-out was economically driven and replaced by cheaper imported hard coal

- Domestic hard-coal was up to four times more expensive compared to imported coal
- Substitutional processes in households and industry
- Production and employment in Germany peaked in 1957
- Germany spent at least €330 billion on direct and indirect hard coal subsidies



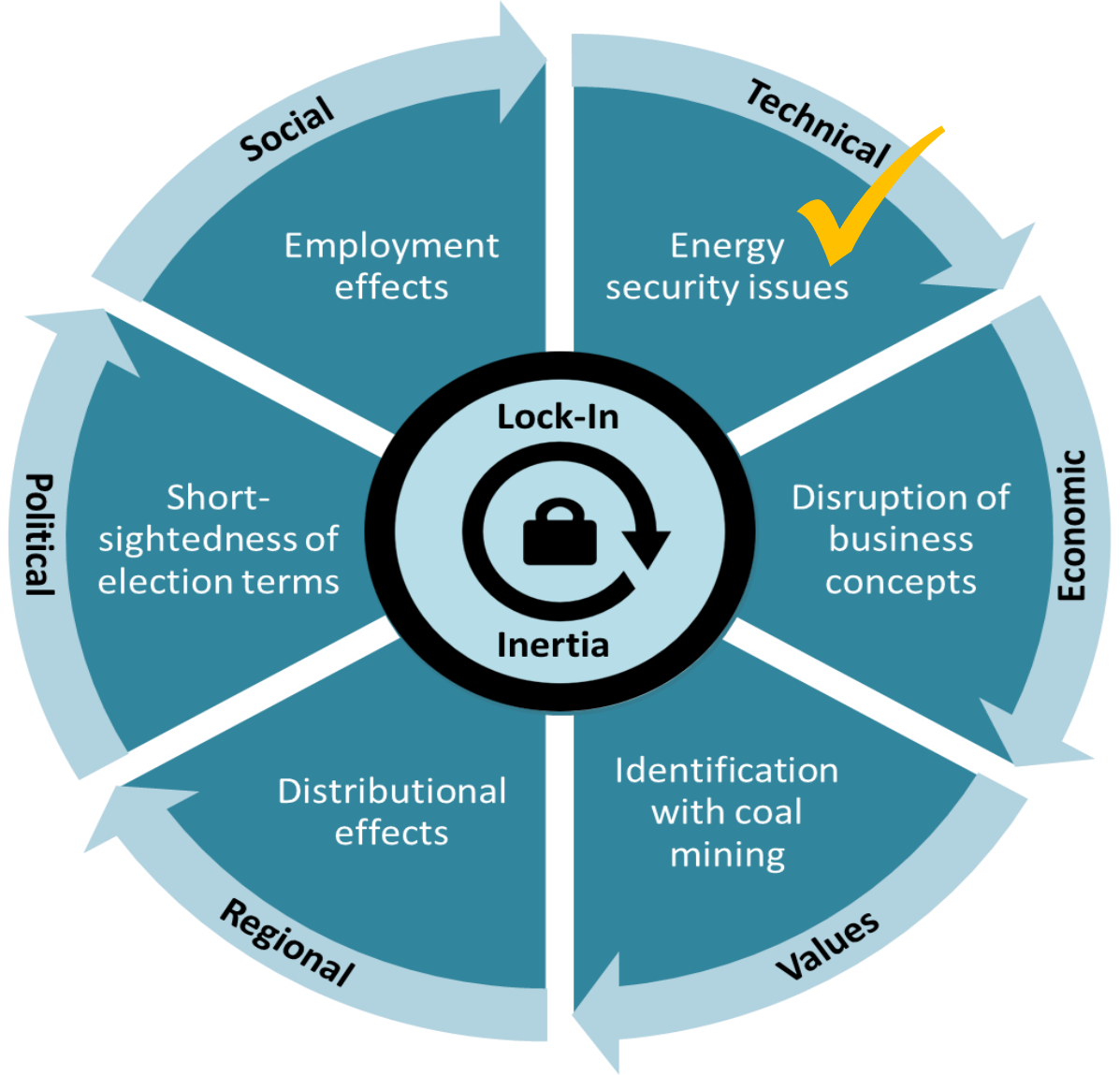
Source: Oei et al. (2019).

Coal and Renewables in Germany since 1980



Source: Oei et al. (2020).

The carbon lock-in of coal regions and actors originates from various sources



Source: Oei et al. (2019).

List of selected References – all open-access

Lessons from Germany's hard coal mining phase-out: policies and transition from 1950 to 2018

ABSTRACT

German hard coal production ended in 2018, following the termination of subsidies. This paper looks at 60 years of continuous decline of an industry that employed more than 600,000 people, through a case study comparing Germany's two largest hard coal mining areas (Ruhr area and Saarland). Although predominantly economic drivers underlay the transitions, both provide valuable lessons for upcoming coal phase-outs induced by stricter climate policies, including beyond Germany.

The analysis identifies the main qualitative and quantitative characteristics of the two regions. It then discusses policy instruments implemented to guide the transition, including measures for the conservation of coal production, regional economic reorientation, and the easing of the transition's social impacts. The success of these policies is evaluated using economic, social, and geographical indicators that were developed within three interdisciplinary research projects running from 2016 to 2019.

A key lesson from the examined case studies is the importance of combining not only policies addressing unemployment and the attraction of new energy corporations and investments, but also measures improving infrastructure, education, research facilities and soft location factors. Protecting a declining industry for decades caused increased transition costs compared to an earlier phase-out. Economic reorientation and changing regional identities have proven most difficult in the past. However, the German example illustrates that the complexity of the challenges of a transition can be mastered if city, regional, and national governments and institutions cooperate in a polycentric approach.

Key policy insights

- A faster and more pro-active hard coal mining phase-out in Germany would have been much less expensive and paved the way for new industries
- A just and in-time transition needs to:
 - be jointly managed in a polycentric approach by city, regional, national, and international governments and institutions.
 - combine climate, energy, social, and structural policies, whilst recognizing both local specifics and global connections.
 - consider how climate affects external institutional settings apart from the incumbent

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Coal phase-out in Germany – Implications and policies for affected regions

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Coal phase-out in Germany – Implications and policies for affected regions

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ABSTRACT

The present study examines the consequences of the planned coal phase-out in Germany according to various phase-out pathways that differ in the ordering of power plant closures. Combining an energy system model with an input-output model and a regional macroeconomic model, it studies the socio-economic effects of the phase-out in the lignite regions, as well as in the rest of Germany. The combination of these models results in the advantage of expanding the phase-out from different power generation technologies and the resulting effects on the regional economy. The results show that the phase-out regions will experience losses in output, income, and population, but a faster phase-out would lead to a quicker recovery. Migration to other areas in Germany and demographic changes will partially compensate for the resulting employment, but support from federal policy is also necessary to support structural change in these regions.

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1. Coal in the context of the Energiewende in Germany

To achieve internationally agreed upon climate targets, all countries must achieve rapid decarbonization of all sectors by the middle of the century [1]. Research on this topic has mostly focused on the energy sector due to its high remaining emissions, but comparatively cheap abatement potential [2,3]. Germany's Energiewende (energy transition) is sometimes referred to as a positive example in this context [4,5]. It originates from bottom-up initiatives by people and a diversity of community and industry

owned companies promoting renewable energy sources (RES) [6,7]. The sharp increase of RES from 20 to 30% of electricity in 2018 came alongside new business concepts and the creation of around 100,000 new jobs, spread relatively evenly across the entire country (cf. Fig. 1). At the same time, employment within the coal sector decreased continuously [8,9]. The deployment of photovoltaic (PV) around 2011 was especially remarkable. As a consequence, several countries are taking Germany as a benchmark [10–12], hoping to use their own photovoltaic potential [13–15]. Germany, however, cannot rely on pure performance in the context of more recent European energy-transition targets [16]

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Abstract: This paper recalls the development of the German lignite regions Rhineland and Lusatia since 1945 to allow for a better understanding of their situation in 2019. We analyze their economic resilience, defined as adaptive capacity, using Holling's adaptive cycle model. We find that the Rhineland is currently in the conservation phase, while Lusatia experiences a reorganization phase following the economic shock of the German reunification. Key policy recommendations for the upcoming coal phase-out are to foster innovation within the Rhineland's infrastructures to avoid overconnection, and to expand digital and transportation infrastructure in Lusatia so that the structurally weak region can enter the exploitation phase. Future policy-making should take into consideration the differences between the two regions in order to enable a just and timely transition during which lasting adaptive capacity can be built.

Keywords: coal phase-out; energy transition; coal transition; sustainability transition; Energiewende; just transition; structural change; regional economic resilience; adaptive cycle model; Germany

1. Introduction

A global decline of the use of fossil fuels is crucial for reaching the 1.5 °C goal of the Paris climate agreement. At the same time, history has shown that past coal transitions have often had severe negative socioeconomic consequences on the affected regions due to poor management [1]. Consequently, literature has put an increasing focus on the just transition towards sustainable social-ecological systems [2–5].

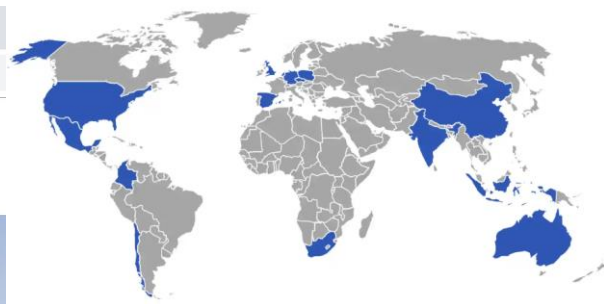
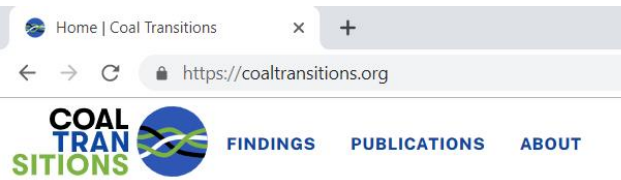
In this context, the concept of resilience, especially the evolutionary perspective using the adaptive cycle model (AC) [6], has inspired useful insights on how regional economies withstand major disturbances [7,8]. We use this concept to address the situation of the two major German lignite mining regions that are currently undergoing sustainability transitions: the Rhineland in the western German state of North-Rhine-Westphalia (NRW), and Lusatia in eastern Germany in the former German

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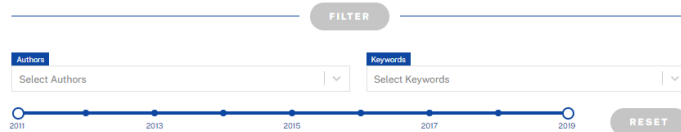
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Main Finding

A just and timely coal transition is possible but needs political support

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