



Original research article

Regime destabilization in energy transitions: The German debate on the future of coal

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ABSTRACT

Greenhouse gas emissions are stagnating in Germany despite increasing deployment of renewable energy. This makes the government's *Energiewende* appear inconsistent and has triggered a discussion on phasing-out coal. The focus has thus turned from niche technology development to the destabilization of the existing high-carbon regime. In this paper we investigate stakeholders' framings and their perceptions of different policy options to advance the understanding of regime destabilization processes and theory-building in the context of the multi-level perspective (MLP) on socio-technical transitions.

We find that actors still form coalitions with traditional allies and cling to established lines of reasoning, although there are indications for a beginning disintegration of the status quo-defending coalition. In their framings, core actors emphasize risks and threats. This confirms that regime destabilization is particularly conflictual and shows that for actors pushing regime change it is more difficult to offer a positive story. Linking policies for phasing-out incumbent technologies to accompanying measures for managing structural change in affected regions may facilitate compromise. The results moreover point to a tension between national and supra-national action as a core issue in destabilization debates. Our insights are relevant for countries in similar transition phases and may inform future comparative research.

1. Introduction

Germany's *Energiewende* (energy transition) has come a long way. Within a quarter of a century, the share of renewable energy in electricity consumption has increased from around 3% in 1990 to over 30% in 2015 [1]. The introduction of support policies for renewables – at a time when this was not regarded as a serious challenge by the conventional industry [2] – built constituencies that promoted further progress [3]. Renewable energy companies became relevant players with considerable lobbying power [4], and German federal states were motivated to pursue ambitious plans for renewables development with the expectation of local co-benefits such as jobs and tax revenues [5]. Policies introduced during historic windows of opportunity thus created self-reinforcing effects, which in conjunction with external events enabled major policy and energy system changes (e.g. [6,7,2]).

In parallel, the discourses on the future of the energy supply in Germany, which initially were deeply polarized, converged over time. The “story of rise” [8] told by energy transition proponents, which promised not only the solution to environmental problems but also a

modernization of the industrial system, job creation, and an enhanced position on world markets for renewable technologies, became the mainstream narrative motivating energy transition [107]. Today, none of the established parties of the political system or the major stakeholders involved publicly questioned the project,¹ and the transition to an energy system based mainly on renewable energy is an official government strategy [9].

The German energy transition has served as an example to advance theories of socio-technical transitions (e.g. [10,11]). A widespread expectation is that Germany's energy system is on a “substitution pathway”, where renewable technologies, initially developed in niches protected from market pressures, become competitive and eventually replace the incumbent technologies fueled by nuclear and fossil resources [10,12]. Indeed, nuclear power is to be phased out by 2022, conventional power plant operators have experienced decreases in profitability due in part to the expansion of renewable energy [13,14], and the resilience of the fossil-nuclear system overall appears to be declining [15].

However, the replacement of fossil by renewable technologies

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¹ This is not true for the new Eurosceptic and climate-sceptic party AfD (*Alternative für Deutschland*) that made its way into Federal Parliament in September 2017.

cannot be taken for granted. While renewable technologies have gained momentum, it is unclear whether current dynamics will lead to substitution and thus to a completion of the energy transition process. The use of coal for electricity production has decreased only slowly in recent years, and carbon dioxide emissions from electricity production even increased between 2011 and 2013 [16]. This “coal conundrum” [17] constitutes a major inconsistency within Germany’s energy transition endeavor.

This situation has given rise to an intense debate on the future of coal, which reflects the growing perception that empowering renewable technologies may not suffice, and that existing high-carbon infrastructures will need to be actively removed (see Section 2.2). This represents a new phase in the German energy transition process. The literature on sustainability transitions, traditionally focusing on the role of niche innovations in triggering systemic changes, increasingly acknowledges the relevance of this “flipside of energy transitions” [18] which requires the weakening or phasing out of existing systems [11]. However, the specific characteristics of this phase of transitions are less well understood.

In this paper we analyze the German coal phase-out debate as a case study for a socio-technical transition that has left behind the initial phase of niche technology development and is now faced with the challenge of destabilization and replacement of the incumbent regime. Our research contributes to understanding destabilization processes by addressing three research questions. 1) What discourses on German energy transition have emerged after the focus shifted from the expansion of renewable energies toward the phasing-out of incumbent technologies? 2) What strategies do actors pursue in their discursive positioning in this phase of transition? And 3) what can we infer from our analysis on promising ways forward?

To this end we analyze how actors frame problems and possible solutions, and we map actors with respect to their position in the debate. By comparing our results to previous analyses of the German energy transition discourse we aim to identify specific characteristics of framings and actor strategies in destabilization debates. To address the third question, we characterize the solution space as seen by opponent actor groups in the future-of-coal debate and identify areas with a high potential for compromise.

Our case study analysis is of relevance also for a comparison with other countries where measures to reduce or phase-out coal from energy supply are being discussed or implemented. For instance, the UK government aims to close all unabated coal power stations by 2025 at the latest. A stakeholder consultation process on options to achieve this took place in 2016 and 2017 [19,20]. In Australia, where coal-fired power generation currently still accounts for more than three quarters of electricity supply, plans for energy transition and mechanisms for the retirement of coal-fired power stations are being discussed [21,22]. Also, the Chinese government is making efforts to reduce coal use and to push for cleaner energy [23]. While a comparison with the processes in other countries is beyond the scope of this paper, we hope that our case study can inform future comparative research.

The following section presents the theoretical framework (2.1), background on the case study and a summary of the debate during the period under investigation (2.2), and the methodological approach and empirical material upon which the research is based (2.3). The results are presented and discussed in Section 3. Section 4 provides a summary of the main conclusions.

2. Research design

2.1. Theoretical framework

Our research framework conceptualizes the more recent history of German energy policy as a socio-technical transition, building on the multi-level perspective (MLP) and related work.² We draw on the discourse and framing literature for the empirical analysis.

The MLP explains sustainability transitions at the level of socio-technical regimes as driven by influences from two other levels: niche innovations and an overarching socio-technical landscape [24–26]. The socio-technical regime is formed by the dominant technologies, the institutions, the infrastructures and practices surrounding their use, and by the associated actor groups with shared perceptions and norms. A number of processes work to stabilize the existing regime and to put innovations at a disadvantage, which may lead to a lock-in of unsustainable technologies [27,28].

Niches are located below the regime level. They provide a protected space where innovations can be developed and nurtured by small actor networks, possibly to become competitive with established technologies ([27], p. 1025). Niche-innovations can break through and contribute to a regime shift if support comes from the sociotechnical landscape, which is “an exogenous environment beyond the direct influence of niche and regime actors” ([26], p. 400). Changing societal values or political coalitions represent developments at the landscape level that influence the chances of niche technologies. Climate change and the discourses that mediate its perception in society [29] are also landscape-level processes, because they pressure the energy sectors and trigger policy changes. Investigating a national case study, we explicitly consider conditions, regulations and processes at higher political levels (European, global) to be landscape factors. If a regime transition happens as a result of the interplay between the three MLP levels, the new regime configuration may also cause changes at landscape level [24].

The MLP literature traditionally focuses on processes surrounding the development of niche innovations and conditions that support their breaking through at the regime level. While MLP scholarship increasingly acknowledges the relevance of phasing out existing systems to accelerate “transitions by creating space for niche innovations and removing barriers to their diffusion” ([11], p. 1243), the MLP model itself does not provide detailed explanations of the processes that follow the entry of new technologies into the system, when the new technologies can no longer be classified as niches and are seriously challenging – but have not replaced – the existing regime ([11], p. 1244).

Research on regime destabilization however provides insights into the dynamics of this phase of transitions. It has been shown that policy mixes for sustainability transitions do include policies for regime destabilization, although the full range of options – e.g. pricing instruments, cutting subsidies for fossil energies, changing of regime rules and changes in social networks – is hardly fully exploited [30]. It is obvious that the destabilization of the old regime is likely to meet severe resistance from established actors [31,32]. However, it is important to note that destabilization of the regime is not equivalent to “overthrowing” or suppressing incumbent actors. Incumbents may themselves contribute to innovations and become part of the new regime, and the notion that new entrants enter a regime and disrupt established industries may be overly simplistic [33]. The commitment of incumbent industry actors to the existing regime has been shown to weaken as external pressures accumulate and their performance problems aggravate ([34], p. 1753). However, Turnheim and Geels also point out that mindsets and perceptions of mission and identity may exhibit a high degree of lock-in, slowing down responses to external pressures.

Sustainability transitions require the contributions of multiple actors, and politics play a core role [109] which warrants a focus on actors and discourses in the analysis of transition processes [38]. We conceptualize discursive practices both as strategic resources employed by actors and as indicators of changes in their interests and perceptions. Niche actors use framing and narrative tools to empower niche technologies [35,27]. Incumbent actors use discursive in combination with other forms of power to enact resistance against low-carbon transitions [31]. A repositioning in incumbents’ discourses may indicate increasing

² A list of acronyms and abbreviations can be found in Appendix A.

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