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What role for sustainability in post-fossil regional transition processes? Exploring governance conditions, actors, and transition projects in a German coal phase-out region

Konrad Gürtler* and David Löw Beer*

Regional Sustainability Transformations, Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS), Potsdam, Germany

ABSTRACT

While the coal phase-out is progressing in many countries, formerly fossil-dependent regions receive transition funding for substitute economic activities. This can steer these regions into a sustainable future, yet it is not clear from the outset whether governance conditions and actors' preferences are conducive to a genuinely sustainable transition. The present study examines to what extent sustainability goals shape the transition process following the coal phase-out in a German coal region (Lusatia), and the guiding logics observed therein. Three key aspects for regional transition processes are considered: enabling conditions for sustainability governance (policy coherence, participation, reflexivity, intergenerational equity); key actors and their sustainability conceptions; and the role of sustainability in selecting and funding transition projects. Based on expert interviews, policy documents, project lists, and sustainability declarations, our findings indicate that sustainability is a rather low priority for key actors. In combination with ambivalent governance conditions, this manifests as a weak sustainability focus among most resulting projects. Nevertheless, our analysis also reveals several projects focusing on selective aspects of sustainability. The phase-out therefore appears to follow the logic of signaling, and it remains unclear whether this might revert to mere energy system substitution or else aspire to comprehensive regional transformation.

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Sustainability transition; coal exit; regional development; sustainability conceptions; sustainable development goals; low-carbon transition

1. Introduction and motivation

Avoiding catastrophic climate change and other environmental and social disasters requires phasing out fossil fuels and rapidly transitioning to sustainable alternatives. This presents significant challenges in regions where coal mining and power generation have been economically crucial. In the majority of studies, coal transitions are associated with negative economic and social outcomes (Diluiso et al., 2021). Institutional lock-ins, where powerful actors reinforce the status quo trajectory (Seto et al., 2016), can hinder substantial change, confining it to mere technological substitutions while maintaining existing developmental structures. However, Rinscheid et al. (2023) propose that phase-outs can also be guided by a logic of transformation, i.e. a comprehensive shift in practices, rules, and societal arrangements.

Most studies on phase-outs have focused on sector-specific changes (e.g. power generation or fuels), or on specific areas such as economic growth, labor markets, or environmental pollution (for an overview, see

CONTACT Konrad Gürtler Konrad.guertler@rifs-potsdam.de Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS), Berliner Straße 130, 14467 Potsdam, Germany
*Shared first authorship.

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Diluiso et al., 2021). This study addresses a research gap by adopting a broader, integrated approach that examines sustainability as the overarching rationale for the regional transition of an entire post-fossil region, a perspective largely overlooked in previous research. We therefore address the following research questions: To what extent do sustainability goals shape the transition process following the coal phase-out in Lusatia, and which guiding logics can be observed? This approach links the sustainability governance and phase-out literature, which have remained largely disconnected. One central theoretical contribution has been to conceptualize the different guiding logics in phase-out processes (substitution, signaling, and transformation) as being dynamic. Linking them to governance conditions, agency, and project outputs, we suggest that old-industrial regions may go through different stages over time.

We focus on the coal region of Lusatia in the eastern German state of Brandenburg. With the German federal government's decision to phase out coal by 2038, significant financial support has been allocated to affected areas, surpassing that provided by any other country globally (ibid.). In the meantime, the first projects to receive funding have not only been selected, but also implemented. This transition support may serve as a lever to pursue sustainable pathways, especially with forthcoming environmental regulations in Germany, including stricter emissions pricing. However, sustainability transformation in this coal region faces challenges. Lusatia has a long coal mining and power generation tradition, and relevant actors might feel that they have already 'done their share' towards a more sustainable future by committing the region to the challenging transition away from coal. Furthermore, the region lacks significant innovative potential (BMWi, 2023). Given these complexities, our study examines the extent to which sustainability goals influence governance conditions, the regional development objectives of major actors, and the selection of transition-support projects.

The next section presents a threefold analytical approach. We then introduce our research design. After describing the study region of Lusatia, we present the results of our research. Section 6 discusses these findings, and section 7 concludes.

2. The role of sustainability in regional coal phase-outs

In this contribution, we investigate the following research questions: To what extent do sustainability goals shape the transition process following the coal phase-out in Lusatia, and which guiding logics can be observed? In doing so, we draw on debates concerning the phase-out of fossil fuels and sustainability governance. We first operationalize the role of sustainability in this process, thereby focusing on three concepts: Firstly, we examine how governance conditions can either facilitate or hinder sustainability objectives. Secondly, we assess the stance (supportive, neutral, or skeptical) of central transition actors towards sustainability. Thirdly, we analyze the demand side, evaluating funded projects as well as the selection processes. All three aspects are analyzed jointly, to link the degree of ambition to that of action. Expanding on conceptual contributions that view sustainability governance modes as 'dynamic relations among political processes (politics), institutional structures (polity) and policy content (policy)' (Lange et al., 2013, p. 404), we extend our analysis to include project outcomes. In a second step, we integrate our findings with different guiding logics of phase-out processes, namely substitution, signaling, and transformation.

2.1. Governance conditions and agency for sustainable regional change

Governance for sustainability involves 'complex interactions among public authorities, private business and civil society' to steer societal development along more sustainable lines (Meadowcroft, 2007, p. 299). The contested concept of governance considers that the state and its various entities are not the only actors capable of making and implementing decisions, despite often being central to such processes. Governance research has identified several conditions that are conducive to implementing sustainability. In our analysis, we follow frameworks by Steurer (2010) and Glass and Newig (2019) that refer to policy coherence, participation, reflexivity, and inter-generational equity.

Policy coherence involves 'the systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the defined objective' (OECD, 2001, p. 90). This includes both horizontal and vertical integration. Regarding horizontal integration, SD calls for governments to make their economic, social, and environmental policies coherent between departments at the same level. Vertical integration aims for the different tiers of government to work together towards common objectives.

The *participation* of diverse societal actors is not only required on normative grounds, but also for instrumental reasons: the complex implementation of SD demands stakeholder involvement in order to account for differing interests, to balance inherent trade-offs (Monkelbaan, 2019), and to help solve problems that exceed the capacity of governments or expert knowledge alone. Participation is also mentioned in SDG 16, one of the 17 Sustainable Development Goals adopted by all United Nations Member States in 2015. Overall, the sustainability governance literature suggests that higher degrees of participation foster more sustainable outcomes (Glass & Newig, 2019; Heinelt, 2002), although this depends on specific circumstances and should not be taken for granted (Jordan, 2008).

Reflexivity demands that governance arrangements ensure that institutions, processes, and strategies can be adapted in the light of sustainability challenges, which are typically dynamic, long-term, systemic, and marked by uncertainty (Kemp & Loorbach, 2006). Reflexivity requires taking different disciplines and types of knowledge into account. Monitoring and evaluation provide the foundation for reflexivity and adaption. Assessment practices that support reflexivity should be systematic, official, relatively independent, and public (Meadowcroft & Steurer, 2013).

Intergenerational equity is indispensable for sustainability, as long-term regional change has major implications for young and future generations. It can be fostered through adhering to the precautionary principle, ensuring that younger generations are part of decision-making processes, or through custodians of the future (Setälä, 2022).

2.1.1. Agency for sustainable regional change

In addition to favorable governance conditions, key actors shape regional change as their attitudes to sustainability shape subsequent action (Görmar et al., 2022; Grillitsch & Sotarauta, 2020). Agency refers to intentional, purposive, and meaningful actions. Newey and Coenen (2022) identify a lack of incentive and know-how as factors limiting collective action in old-industrial regions. Mining regions show specific patterns of structural embeddedness of local agency, such as large companies with headquarters outside the region, or strong specialization in a resource-based industry, which creates path-dependencies. Dominant actors may consciously obstruct change to protect vested interests (Busch et al., 2023). Additionally, mining areas display strong regional identities that can provide potential for cultural development but may also lead to cognitive lock-ins (Görmar & Harfst, 2019). Few previous studies link agency to the specifics of a regional sustainability transformation (e.g. Jolly et al., 2020; Strambach & Pflitsch, 2020).

To analyze actors' understandings of sustainability, we examine how they handle trade-offs and their concept of sustainability. Weak conceptions of sustainability consider natural, human, and man-made capital as mutually substitutable as long as the sum of all three forms does not decline over time. In contrast, strong sustainability maintains that natural capital cannot be substituted because the environment has intrinsic value. Balanced or sensible sustainability allows some substitutability, while at the same time defining limits on the use of natural resources and sinks. Furthermore, actors may 'ignore' sustainability by prioritizing other policy objectives, or may even intentionally reject sustainability.

2.2. The role of sustainability for transition projects

As we will discuss in relation to Figure 1 below, governance conditions and actor constellations influence the extent to which transition projects in phase-out regions are geared towards sustainability. Thus, it is worthwhile assessing the role that sustainability plays for developing and selecting transition projects. At the early

stages of a transition process, estimating the impact of funding policies and projects on sustainability indicators poses challenges due to limited data availability, long-term horizons, and multiple interacting variables (Lange et al., 2019, p. 176). Studying the initiation and selection of projects and programs as well as their ambition (in the form of claimed contributions) can indicate the aspirations of sustainable transition processes.

In the initial phase, it matters how projects are designed and developed. If the public sector is involved in initiating or selecting projects, the questions arise: (a) to what extent different departments aim for policy coherence on sustainable development (SD) between projects, and (b) whether there is awareness for either initiating integrated projects or balancing the different aspects of sustainability between projects.

In the next stage, the selection procedure needs to be considered if project proposals go through a competitive process. Policymakers influence the procedure by creating incentives and specifying criteria for project selection, establishing monitoring and compliance mechanisms, and by funding support systems for project development. A first indication is again whether sustainability goals are mandatory for all projects (and if so, what kind). All sustainability goals are reflected in the 17 SDGs and their global, national, and regional interpretations, yet policymakers can choose how to prioritize between them and how to deal with trade-offs, synergies, and uncertainties. The quality of decisions made by those selecting projects depends on both their expertise and commitment as well as the ways in which applicants must estimate potential positive and negative contributions to sustainability.

Transition-relevant projects can prioritize aspects of sustainability as main goals, e.g. developing or fostering a sustainable technology. Alternatively, projects might focus on their sustainability impact independent of, or in addition to, the main objective of a project, e.g. use of sustainable building materials that exceeds basic legal requirements. Support and advice on sustainability issues for project developers is another important consideration. Once projects and programs are implemented, monitoring becomes central (Kemp & Loorbach, 2006).

Governance conditions and actors' attitudes influence sustainability ambition, as shown in Figure 1: If both governance and attitudes are favorable, projects are more likely to deliver sustainability benefits (top-right quadrant). Conversely, if negative conditions prevail, sustainability becomes irrelevant for most projects (bottom-left quadrant). If governance conditions are favorable but dominant attitudes negative (top-left quadrant)

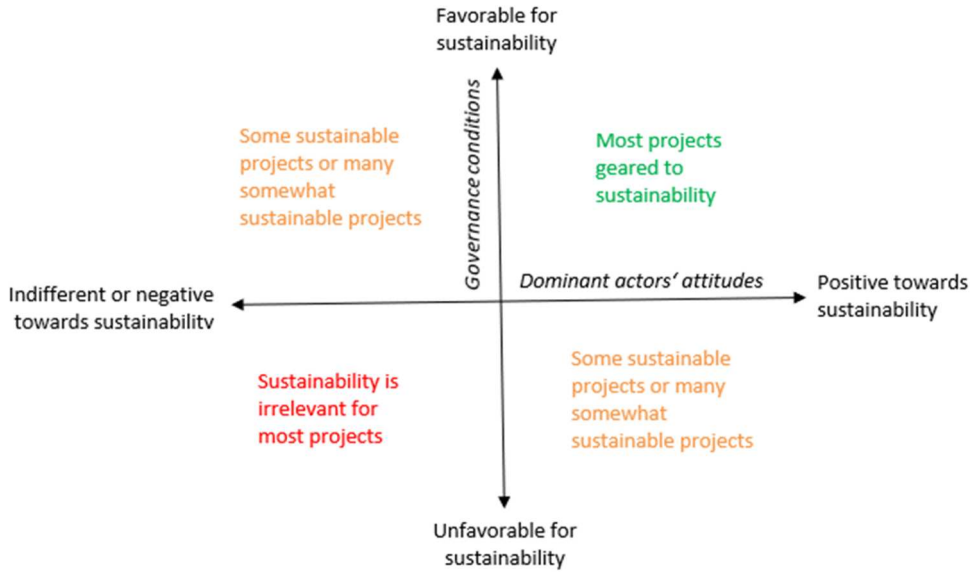

Figure 1. Project outputs: Influence of prevailing attitudes and governance conditions.

or vice versa (bottom-right quadrant), then either some projects will be geared towards sustainability or many projects will be somewhat sustainable.

2.3. Guiding logics in the coal phase-out: substitution, signaling, or transformation

The extent to which governance conditions and actors' preferences support sustainability and manifest in transition projects offers insight into the overarching logic guiding the phase-out process.

Phase-out 'refers to deliberate (governance) interventions seeking the partial or total discontinuation of a socio-technical form that is deemed undesirable' (Turnheim, 2023, p. 45), e.g. coal mining and combustion. Rinscheid et al. differentiate between 'three distinct sets of logics guiding phase-outs: substituting, signaling and transforming' (2023, p. 240), which are sometimes also referred to as functions. While *substitution* entails replacing an undesirable element, *signaling* means that the phase-out is used as 'a long-term direction-setting,' potentially triggering innovation (ibid.), regardless of whether substantive policies to reach this goal have already been implemented (Meckling & Nahm, 2019). The most ambitious logic, *transformation,* implies that 'a broader range of technologies, infrastructures or even institutions such as entire fossil fuel-based industries' would change. This often requires additional policy interventions favoring sustainability.

What would these guiding logics imply for regional transition following the coal phase-out in Lusatia? With s*ubstitution,* coal would be replaced by other forms of electricity generation, while all other factors remain unchanged. There would be no major technological developments, innovation, or new societal arrangements. The ownership structure of a dominant energy utility would remain untouched. If coal is replaced by a less polluting technology, this substitution would reduce emissions, thereby contributing to SDGs 7 and 13. However, there would be no broader contributions to other SDGs. Narrowly focusing on substitution risks diverting attention from necessary broader systemic changes (Rinscheid et al., 2021).

Signaling would imply that federal and state governments not only announce a long-term coal phase-out, but also direct regional change. They would, for instance, indicate which technologies or pathways will be supported, thereby engaging in agenda-setting. Efficacy here depends on whether such signals are credible and sufficient. Sustainability as a set of interconnected goals can serve to guide a phase-out process. In the long-term, signaling can either set a pathway towards transformation, or – if signals are insufficient – towards substitution.

Transformation could imply taking steps towards a genuinely just transition, addressing specific regional environmental problems such as water scarcity, challenging or changing ownership structures, building novel regional innovation systems, or experimenting with new political processes. The decisive indication is whether sustainability is pursued as an integrated set of goals rather than simply addressing singular SDGs. These scenarios suggest that sustainability is crucial for *transformation* and can play a key role for *signaling*, whereas simple *substitution* may be achieved with only a narrow understanding of – *or even without* – sustainability.

3. Research design and approach

The research methodology employs document analysis and problem-centered expert interviews (Döringer, 2021). The document analysis focused on laws, sustainability strategies, and transition programs at the federal and state level (eight documents, see online supplementary material), as well as all 57 available sustainability declarations for projects selected by the state of Brandenburg. We conducted nine semi-structured interviews between June and December 2022 with public servants from federal and state governments, business promoters, project developers, academics, and stakeholders in project selection workshops (Werkstätten). The interview guide and a list of interviewed experts are provided in the online supplementary material. Interviews were conducted in-person or virtually, and subsequently transcribed.

Both interviews and documents underwent content analysis according to Mayring (2014) and were manually coded using MaxQDA 2020 qualitative data analysis software. The coding system was developed based on the theoretical and empirical literature on sustainability governance, perceptions, and ex-ante assessment (see

previous section). In a second step, additional codes that emerged during the data analysis were applied to the entire dataset. Central codes included for instance governance conditions (e.g. horizontal or vertical policy coherence), and sustainability conceptions (strong, balanced, or weak sustainability) pursued by actors. Coding rules were defined in short memos to ensure consistency. All interviews were coded separately to ensure intercoder reliability. The few differences in coding were resolved dialogically.

4. Case description: governance and sustainability in the transition in German coal regions

Germany has committed to phasing out its coal industry by 2038 at the latest. The core motivation is climate protection, but the coal sector's declining profitability also played a role. The phase-out trajectory has been criticized for its low ambition on emissions reduction. The Coal Regions Investment Act (InvKG. Deutsche Bundesregierung, 2020) prioritizes two goals in selecting federally funded structural aid projects: (1) the creation and preservation of jobs and training places in the assisted areas; and (2) diversification of the economic structure and improved attractiveness as a business location (InvKG, §4(2)). In addition, supported projects should align with future demographic projections and the German Sustainability Strategy (Deutsche Bundesregierung, 2017).

In contrast to other European mining regions (Diluiso et al., 2021), the German coal regions will receive much higher funding for future regional development, amounting to around €40 billion up to 2038, with about €10 billion assigned to Lusatia in the state of Brandenburg (the focus of this study). The other part of Lusatia is located in the neighboring state of Saxony. The federal government will provide most of the transition funding (termed Arm 2). The funds mainly target the establishment of industrial, research, and administrative facilities, programs, and initiatives as well as infrastructure and ecological investments. A governing body involving representatives of seven federal ministries and the responsible state ministers, the so-called federal and state control committee (Bund-Länder-Koordinierungsgremium, BLKG), coordinates and approves the funded projects.

The federal states are responsible for about one-third of the funding (Arm 1). Funds may cover a range of economic, ecological, or social projects (see section 5.3. for details) but may not go directly to private institutions or companies. The German states with lignite coalfields have developed different processes for allocating these funds. In Brandenburg, applicants submit proposals and are first advised by the Lausitz Economic Development Agency (WRL). The initiators must then develop a project profile. The WRL and the relevant ministries provide feedback. Applicants are required to complete a sustainability declaration (cf. 5.3.1). Completed applications are assessed in five Werkstätten. These are thematically differentiated and involve 96 members (cf. 5.2. for an actor analysis). The recommendations of the Werkstätten are then examined by the Lusatian Commissioner in the State Chancellery before being submitted to a Brandenburg inter-ministerial working group (IMAG) for its decision. In addition to the support system described here, there are important, albeit less extensive, funding programs such as the EU's Just Transition Fund (JTF).

5. Results

5.1. Sustainable governance process

The degree to which governance conditions support sustainability can be viewed along a spectrum. At one end, a focus solely on coal phase-out reflects the logic of substitution, while at the opposite end, extensive changes in objectives, conditions, and structures align with the logic of transformation. Signaling occupies an intermediate position. The following section examines where the transition process in Lusatia falls along this spectrum.

5.1.1. Policy coherence (horizontal integration)

Mandating that project selection should be oriented towards Germany's and Brandenburg's sustainability strategies provides normative orientation. However, our interviewees describe barely any discussion of

sustainability during project selection. Rather, at the federal level, individual ministries have pushed for their 'pet projects' (Int. 3). Project selection therefore reflects power relations between government ministries. Ministries do not analyze whether several projects jointly work towards or balance the three dimensions of sustainability. The same holds for processes at the state level: There is some horizontal integration in general and sustainability is cited as a guiding principle, but the two are hardly connected (Int. 5). Environmental ministries at the federal and state level have demanded that project selection be aligned with sustainability goals vis-à-vis other departments at the same level. However, they have less influence than the Ministries for Economic Affairs (Int. 1, 3).

5.1.2. Policy coherence (vertical integration)

The federal and state control committee (BLKG) could serve as an arena for policy integration. However, to date, it has barely discussed whether projects (jointly) work towards sustainability, or relate well to each other from a sustainability perspective (Int. 3). The same holds for the lower level: The Werkstätten integrate state and municipal governments and diverse stakeholders, but are not geared towards sustainability. State representatives have a central role in project selection – both at the federal level and for those under the responsibility of individual states (Int. 3). Furthermore, vertical integration towards sustainability could also be stronger if the federal state, as the funding agency, assumed an unequivocal position requiring all projects to be geared towards sustainability. This, however, is not the case – partly due to the above-mentioned interdepartmental friction. Respondents from the state environmental ministry hope that the European Union (EU) taxonomy will prescribe more rigorous sustainability criteria in the future (Int. 1). The agency organizing project selection argues that it lacked the means to influence state and federal governments. What these statements have in common is that they shift responsibility to actors at other levels. To strengthen vertical integration for sustainability, the federal environmental ministry reports that it collaborates with state-level environmental ministries to increase influence on state chancelleries (Int. 3).

5.1.3. Participation

Compared to the neighboring state of Saxony, Brandenburg has developed a more ambitious stakeholder participatory process. So far, the state government has followed all recommendations from the Werkstatt process. However, Werkstatt members claim they have limited influence, because project proposals are only received at very late stages – having already been revised following feedback from the WRL and state ministries. Furthermore, Werkstätten members were selected by the state government, and there is no opportunity for outsiders to comment on the proposed projects. Similar results were found in other transformation processes: New institutions such as the Werkstätten often contribute to stabilizing dominant institutional logics (Zukauskaite et al., 2017) by creating legitimacy and by involving potential critics, but they only have low impact. In contrast, Brandenburg is currently expanding youth participation. All project proposals will have to explain how young people participate in them, and a specialized agency has received long-term funding to involve young people in both project development and selection (Landtag Brandenburg, 2022).

5.1.4. Reflexivity

Different knowledge types are fed into the process through stakeholder involvement, yet certain voices, in particular from environmental actors, are absent or underrepresented. Reflexivity further requires decision makers to constantly reflect on their policies. The Brandenburg government plans to regularly revise its funding policy and strategies. It has established an evaluation procedure for all approved projects, comprising 25 indicators focused on economic aspects such as GDP and job creation. This also includes some social, but no ecological indicators (Markwardt et al., 2023). The lack of an ecological dimension limits the possibilities for adaptation in favor of increased sustainability. Evaluation at the federal level does not include ecological factors. However, it is planned to add some in the future (Brachert et al., 2023).

5.1.5. Intergenerational equity

According to the InvKG, all approved projects should align with demographic projections. This requirement is increasingly connected to offering young people opportunities for participation. However, actions are not guided by considering the precautionary principle or long-term ecological implications. There is no impact assessment or long-term planning beyond legal requirements, nor representation of the interests of future generations.

The governance conditions signal some elements of transformation but, on the aforementioned spectrum, they skew overall towards substitution. This finding can be reinforced or weakened, depending on how strongly key players in the process speak in favor of a transformation towards sustainability. The following section therefore analyses how key players understand sustainability.

5.2. Central actors in the transition process and their sustainability priorities

The most powerful actors at the state level mainly pursue a weak conception of sustainability. The state chancellery (state level) would have the greatest leeway and power to insist on sustainability as a central governance criterion (Int. 3, 6). However, it prioritizes economic development and job creation without a strong orientation towards sustainability (Int. 2). The written response of the state chancellery to our interview questions (Int. 7) does not contain an integrated vision for sustainability. Instead, sustainability is spelled out as simply meaning 'long-term' or is reduced to economic growth, job creation, and the ecological benefits of the coal phase-out itself; inter-generational aspects are largely missing. Progress reports on the transition process hardly mention sustainability. The advisory board for sustainability in the state chancellery was not involved in drafting or revising the relevant legislation. Overall, we conclude that the state chancellery mainly limits social aspects to job creation, and environmental impacts to CO_2 reduction. While green growth projects are appreciated, there is no consideration of ecological boundaries.

The business promoter WRL is central to implementing the requirements of the state government and organizing project selection. WRL staff see their role as steering projects that have already been selected, toward a direction that is more sustainable (Int. 4). However, the staff members emphasize that they consider raising awareness of sustainability to be a lengthy process (Int. 4) and that they are not yet satisfied with the current project selection process from a sustainability perspective (Int. 6). They also argue that they simply follow the legislation, which prioritizes economic growth and job creation (Int. 4). Consequently, the business promoters also follow a weak conception of sustainability.

Some actors in the less powerful state Ministry of Agriculture, Environment and Climate Protection pushed for a stronger conception of sustainability, incorporating ecological boundaries. Interviewees claim that the relevant state legislature made no reference to sustainability before they intervened (Int. 1). However, they feel that the most they can achieve is to convince applicants to think about sustainability, but that they lack sufficient power to push for a more sustainability-oriented funding policy.

Members of the five Werkstätten discuss proposals and select projects for funding. Each Werkstatt is made up of the Lusatian Commissioner, who is part of the state chancellery, as well as a representative of a network of municipalities, and a representative of the local university. In addition, four of the five Werkstätten include ministries and chambers of commerce as well as representatives from companies, business associations, trade unions, and state-funded programs (e.g. for digitalization or education monitoring). Due to the diversity of the actors' objectives, a comprehensive analysis of the member structure would be challenging. However, it is striking that roughly the same number of actors can be attributed to the state (25) as to business and economic development (28). The Ministry of Agriculture, Environment and Climate Protection is the only actor that mainly pursues environmental objectives. No environmental NGOs are represented, and only a few civil society organizations advocate for sustainability in the Werkstätten. A Werkstatt member explained that the Environmental Ministry sometimes enquires about the sustainability indicators of projects, but that these factors do not influence decisions (Int. 5).

Federal ministries do not speak with one voice. It is in the hands of each implementing federal ministry to consider sustainability criteria, but there is no central horizontal coordination, allegedly due to so-called

departmental sovereignty. The federal Ministry of the Environment (MoE) calls for alignment with sustainability goals, yet reports conflicts with other ministries and state-level actors (Int. 3); the MoE has proposed its own ecologically sustainable projects, but only some were approved – and usually with less funding than it sought. Federal ministries further argue that their influence is limited, as state governments have been given substantial power to influence even federal projects (Int. 3).

As yet, the direction of the private sector remains unclear. While there is no general tendency to embrace sustainability, two large companies, the energy producer LEAG and the chemical company BASF, have recently invested heavily in renewable technologies, and the latter has also publicly called for a regional sustainability strategy. There is also quite substantial sustainability-oriented cooperation between research and private sector actors. While large and established companies are still dominant, support for founders and start-ups has recently increased.

Environmental NGOs have rarely publicly criticized the legislation. An expert familiar with the sector explained that, amongst environmental civil society actors, almost none have the capacity to closely follow the governance process or even to submit their own project proposals (background conversation). We approached several members of environmental groups, but could not find anyone who felt sufficiently familiar with the process to respond to our questions. Previous research on position papers from stakeholders in the region also found that environmental and social NGOs were underrepresented (Retkowski, 2021).

Trade unions, as interest groups for social sustainability, are well-represented in the governance process, yet only represent certain groups and aspects of social sustainability. We see them as regime actors rather than as niche actors, given their powerful role in the German energy transition (Gürtler et al., 2021; Kalt, 2021).

The position of project developers is mixed. The majority neither oppose – nor actively push for – sustainability (Int. 6, 8, 9). They follow sustainability if there are clear win–win situations, e.g. if the costs of insulation are more than offset by energy savings. Business promoters lament that applicants lack 'time, money, sensitivity, imagination' (Int. 4) to make their projects more sustainable. Some applicants push for sustainability, even if it involves 'slightly higher costs' (Int. 09). Their positions seem to depend on personal motivations, capacities, and municipal budgets. With some notable exceptions, this section strengthens the finding that sustainability does not play a strong role in the transformation process of Lusatia.

5.3. The role of sustainability in project design and selection

Having examined how key actors under respective governance conditions send particular signals, this section assesses how these are received by project applicants. Analyzing the available data (see section 2.3), we conduct an inventory of the current role of sustainability in the projects selected by the state of Brandenburg and the federal government.

5.3.1. Projects in the responsibility of the state of Brandenburg

At the state level of Brandenburg (so-called 'Arm 1' projects), we analyzed 57 projects in different stages (9 projects approved, 22 applied for, and 19 under development as of December 2022). The analysis includes all available sustainability declarations, which must be submitted with every project application. Applicants were asked to 'consider all [17 sustainability] goals carefully', and are required to explain in writing how a project would positively contribute to at least two goals, at least one of which should be ecologically oriented (SDGs 6, 7, 11–15). The reference categories are the goals and indicators of the federal and state sustainability strategies ('Deutsche Nachhaltigkeitsstrategie' and 'Nachhaltigkeitsstrategie des Landes Brandenburg').

We found that 14 of the 57 sustainability declarations were incomplete. In 13 cases applicants only marked the SDGs they considered relevant, but did not justify their choices. Seven projects failed to specify their contribution to ecological goals. The applicants refer on average to 3.5 SDGs (although the requirement is even lower, at only two). SDG 8 (decent work and economic growth) is indicated most often (two-thirds of the declarations; Figure 2). It is operationalized in the state sustainability strategy as 'steady and adequate economic growth,' a goal already required by other funding criteria. The second most popular goal is SDG 11

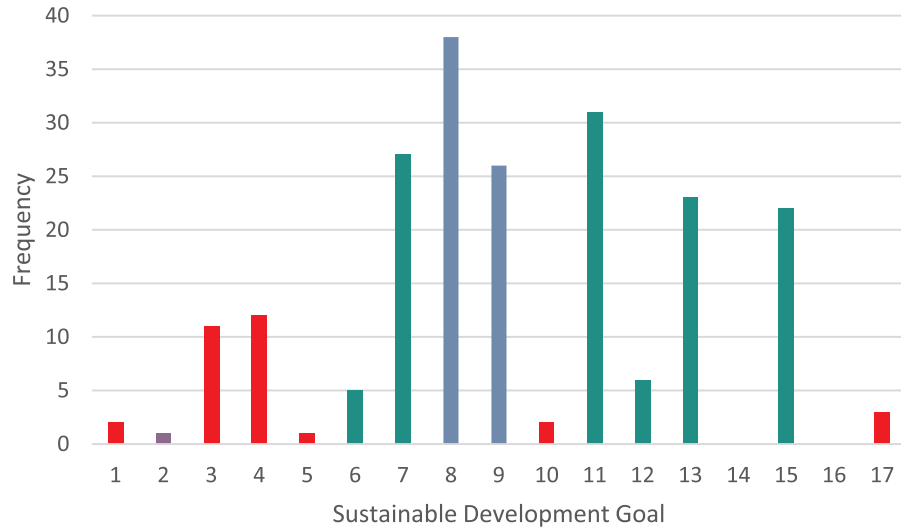

Figure 2. SDGs indicated in sustainability declarations. Colors indicate an SDG's primary dimension: Red = social; green = ecological; blue = economic; purple = mixed. (n = 57; As of 1 Dec., 2022).

(sustainable cities and communities). All projects justify their positive contribution to this SDG by arguing that they partly or fully (re)use an existing building or an area of already sealed land. The third most common goal is SDG 7: reduction of primary energy consumption.

Several SDGs are either absent or feature only rarely. This is surprising for goals such as the reduction of long-term unemployment or poverty (SDG 1), more sustainable agriculture and forestry (SDG 2), improved water quality (SDG 6), and more sustainable consumption and production patterns (SDG 12).

We analyzed project lists and sustainability declarations in detail by examining the following questions. The conclusions should be viewed with some caution:

- Firstly, based on the available information, how can the selected projects be evaluated from a sustainability perspective? This is the most important question but, at this point, also the most difficult to answer. We first looked at the planned investments for projects differentiated by the funding areas named in the Investment Act Coal Regions (Inv KG 2020, see Table 1). Six of the nine areas are easily attributable to one sustainability dimension. If we consider only these: 59% of funding is dedicated towards economic, 27% towards social, and 14% towards environmental projects. The projects in the remaining three categories mostly target several dimensions simultaneously, and thus cannot be unequivocally attributed to just one of the three sustainability dimensions. It is noteworthy that none of the projects address the 'area of nature conservation and landscape management' (InvKG; authors' translation).
- Secondly, what kinds of sustainability contributions do projects intend to make, based on their sustainability declarations? In the environmental dimension, most projects seek to reduce carbon emissions, increase the use of renewable energies, and continue to use areas of sealed land rather than undeveloped 'greenfield' sites. In the social dimension, projects mainly seek to create or improve health, cultural, research, and educational facilities. In the economic dimension, projects predominantly aim to create or improve industrial parks, business-related infrastructure, or increase the attractiveness of a site.

Have the requirements on declaring sustainability impacts encouraged projects to become more sustainable? To address this question, we interviewed three business promoters from the WRL and three project

Table 1. Planned investments for projects selected at subnational level (state government of Brandenburg; 'Arm-1-Projects'), divided by funding areas.

Funding area according to §4(1) InvKG	Dimension	Planned investment (Mio. €)	Share
Business-related infrastructure	Economic	334.2	22.8%
Transport infrastructure	All / unclear	126.4	8.6%
Infrastructure of basic public services	Social	179	12.2%
Urban planning; urban and regional development	Social	0.5	0.0%
Digitilization; communications infrastructure	Economic and/or Social	107.2	7.3%
Tourism infrastructure	Economic	57.6	3.9%
Infrastructure R&D; knowledge transfer; education and training	All / unclear	566.7	38.7%
Climate and environmental protection	Environmental	93.4	6.4%
Nature conservation and landscape management	Environmental	0	0.0%
Total		**1,465**	**100.0%**

Source: Compiled by the authors, based on Markwardt et al. (2023).

developers that have each submitted more than one proposal (8 in total). The selection included both smaller and larger projects and covered the three dimensions of sustainability.

Compared to other funding schemes, the project developers find the application process easier and funding more generous (up to 90% of the investment cost). They also claim that it was straightforward to complete the sustainability statements, and that they did not have to adjust them during the process. Investments in energy savings can be justified by resulting mid- and long-term economic benefits, but it is more difficult to justify higher costs for more sustainable materials. The business promotors claim that they aim for every project to contribute to all three dimensions:

> Economic sustainability is always a given. It must be self-supporting; it must contribute to change. In the social sphere, effects on demographics are always important. In the environmental area, it should not only fulfill legal requirements. In a building, this can be a green roof or a heat pump. The question is: Where is the environmental sustainability boost? (Int. 4)

Business promotors also claim that they have asked project developers to make their projects more sustainable, e.g. through thermal insulation or constructing solar plants. For some municipalities, financing their share[1] is already challenging, and is exacerbated by the higher costs commonly associated with more ambitious sustainability projects. The business developers also consider it easy to complete the sustainability declarations, and stated their desire for stronger regulation:

> There is a lot of new construction going on; brownfields are being re-planned, etc. (…) the projects that we are in charge of here, that are being implemented, are for the most part not doing their bit [clarification: for climate adaptation or to combat climate change]. (Int. 6)

Overall, the projects encompass all three dimensions of sustainability, albeit to varying degrees. While some SDGs are frequently addressed in sustainability declarations, others are seldom mentioned. This discrepancy is notable, especially considering that all projects are mandated to target an environmental SDG. Consequently, it appears that the existing projects make minimal contributions to these particular SDGs. Thus, there is significant variability across the different dimensions of sustainability.

5.3.2. Projects in the responsibility of federal ministries

Analysis of the federal projects is mainly reliant on the publicly available project list. As of June 2022, 54 projects were implemented through federal ministries in the Lusatia region of Brandenburg. To our knowledge, there are no sustainability declarations or reports available, as these were not required. Assessing the role of sustainability is thus even more challenging. We again addressed the first question of how the selected projects can be evaluated from a sustainability perspective.

Given the lack of additional data, the funding areas of the InvKG, in which projects are developed, provide an initial indication. However, the funding areas of §4(1) InvKG cannot sensibly be applied to all the federal projects. Of the more than €4.2 billion, 19% is spent on projects that are rather 'neutral' from a sustainability

Table 2. Planned investments for projects selected at national level (federal government, 'Arm-2-Projects') and implemented in Brandenburg's Lusatia, divided by funding areas.

Funding area according to §4(1) InvKG	Dimension	Planed investment (Mio. €)	Share
Business-related infrastructure	Economic	9.7	0.2%
Transport infrastructure	All / unclear	1,085.4	26.0%
Infrastructure of basic public services	Social	104.3	2.5%
Urban planning, urban and regional development	Social	121.2	2.9%
Digitalization; communications infrastructure	Economic and/or Social	37.4	0.9%
tourism infrastructure	Economic	0	0.0%
Infrastructure R&D; knowledge transfer; education and training	All / unclear	1,782.4	42.7%
Climate and environmental protection	Environmental	208.8	5.0%
Nature conservation and landscape management	Environmental	32.1	0.8%
Other	794.6	19.0%	
Total		**4,176**	**100.0%**

Source: Compiled by the authors, based on list of planned and approved projects for structural change in Lusatia (June 2022).

perspective, such as relocating administrative jobs to the region, ad-hoc programs, or programs that address all categories together (bottom row of Table 2); Transport infrastructure accounts for 26%, which has simultaneous economic and social benefits; 42.7% is dedicated to research and development infrastructures, knowledge transfer, education, and training purposes. This means that less than a third of the budgets are attributable to funding areas that are clearly either economic, social, or environmental in scope. There are no projects on tourism, and very limited funding directed to nature protection or digitalization.

Although it is not possible to categorize all projects as having an economic, social, or environmental focus, a few observations provide hints towards the role of sustainability for federal projects. Among the projects on research and development infrastructure, knowledge transfer, education, and training (which receive the majority of federal funding to date), there are a few dominant topics, such as low-carbon technologies and the energy transition. Thus, a large share of the projects focus on green technologies with the potential to reduce emissions, but can also bring about benefits through economic usability in the future. In addition to this focus on green growth, other projects target future challenges in the health sector, and thus could bring about social benefits in the long term. Furthermore, among the 11 proposals to improve transport infrastructure, only one is a road project and the remainder all focus on rail.[2]

We also examined two upcoming projects that are not yet included in the statistics above. These stand out in terms of funding volume, both in the range of €1 billion. Both projects show links to sustainability, namely through investment in a maintenance facility for high-speed trains (sustainable mobility), and investment in a new university medical center (thus contributing to social sustainability).

In addition, the federal government has funded two programs with a strong sustainability focus. The STARK program receives approximately 1.8% of the total federal funding, and supports sustainability-oriented transformation projects in a wide range of areas such as knowledge and technology transfer, advice, participation, and scientific assessment. Second, the program for 'municipal pilot projects for sustainability' (Kommunale Modellvorhaben Nachhaltigkeit) has an integrated sustainability focus, but only receives approximately 0.5% of the total federal funding.

There is no publicly available information on how the federal government assesses the sustainability of projects, if at all. This is left to the discretion of each ministry (background conversation).

In summary, our findings suggest that the coal phase-out process in Lusatia predominantly aligns with a *signaling* logic, with some indications of *substitution* and *transformation* emerging in certain areas. The ultimate trajectory of the region's transition remains uncertain. On the one hand, the lack of guidance through integrated consideration of all sustainability goals is the strongest indicator that the region might take a path towards merely substitution. Neither federal nor state laws identify sustainability as an aim, but only as a criterion. Sustainability is hardly discussed among the relevant decision bodies, and the participatory structure of the Werkstätten is dominated by stakeholders from the current regime. Ownership structures also remain unchanged. Intergenerational equity is only addressed in its social dimension, while ecological boundaries

are largely overlooked. Most key actors show weak conceptions of sustainability, with only a few displaying a balanced understanding.

On the other hand, there are tentative steps toward transformation in select domains such as technology and renewable infrastructure, alongside cautious experimentation with democratic innovations. However, the transformative impact of these initiatives remains uncertain. While the scope of financial aid for coal regions indicates that federal governmental intentions exceed simple substitution, there are no strong signals of fundamental transformation toward sustainability.

6. Discussion

The coal phase-out transition in Lusatia exhibits limited alignment with sustainability objectives. Economic and social goals are prioritized, with ecological objectives receiving less attention, aside from efforts to reduce emissions. The prevailing guiding logic can be characterized as signaling, although there are indications suggesting potential shifts towards substitution or transformation in the future. Given that neither governance conditions nor actor constellations seem particularly enabling of a strong role for sustainability, it is remarkable that some of the sustainability goals are addressed through several projects. This occurs in a selective way: While some sustainability goals are frequently addressed (particularly those connected to ecological modernization, competitive advantages, health, and research), others are largely ignored (nature protection and landscape improvement, the needs of marginalized groups). Different explanations are possible. We find it plausible that – to put it in the terms of the transition literature – some sustainability concerns have entered the prevailing institutional logics of the regime (Leipprand & Flachsland, 2018). This is particularly the case if they involve economically beneficial measures such as reducing energy consumption or generating renewable energy. There are only a few exceptions in which projects include exceptional measures for sustainability.

It might be argued that regions should be allowed to select those SDGs most important to them, or to which they can contribute most. However, there are at least three caveats to the selection observed herein. Firstly, a condition would be that projects do not (significantly) cause harm to certain SDGs. However, both the federal (German) and state-level (Brandenburg) processes lack assessment of negative impacts. Secondly, the absence of projects addressing certain SDGs seems problematic. In its sustainability strategy, the Brandenburg government has already translated the global SDGs to those that it considers most relevant for the state. Among others, Brandenburg's SDGs include goals related to water quality and availability, and soils. These topics are important for Lusatia (and to other mining regions), but are presently absent from project proposals. Finally, as there is no mechanism for comprehensive sustainability monitoring, it will be difficult for the governments to adjust their policies appropriately.

Afewerki and Karlsen (2022) find that regions with a diversified economy are more inclined towards proactive, sustainability-oriented policies, contrasting with the emphasis on growth and job creation in less diversified economies (as in coal regions). The latter focus has also been evident in Lusatia. However, with job creation targets already met (Markwardt et al., 2023) and a shortage of skilled labor, future funding allocations may diverge from past trends.

Regarding implications, our study underscores the importance of considering governance conditions and actors' attitudes toward sustainability conjointly. Only through this holistic approach can the translation of sustainability ambition into action, or the absence of such ambition leading to inaction, be assessed effectively. This analytical framework can inform investigations into guiding logics in *ongoing* phase-out processes (Rinscheid et al., 2023) and can be applied to other cases.

Furthermore, while Rinscheid et al.'s (2023) conceptualization of guiding logics appears static, our case study illuminates a dynamic temporal relationship among substitution, signaling, and transformation (see Figure 3). A process may commence with signaling, but evolve over time towards either transformative change or else mere substitution without a profound sustainability orientation. Approaching the guiding logics in such a way places sustainability at the center as a directional guideline. Our study region is currently in an intermediary signaling stage, but movements in various directions are discernible, confirming that energy transitions can be 'messy, conflictual, and highly disjointed' (Meadowcroft, 2009).

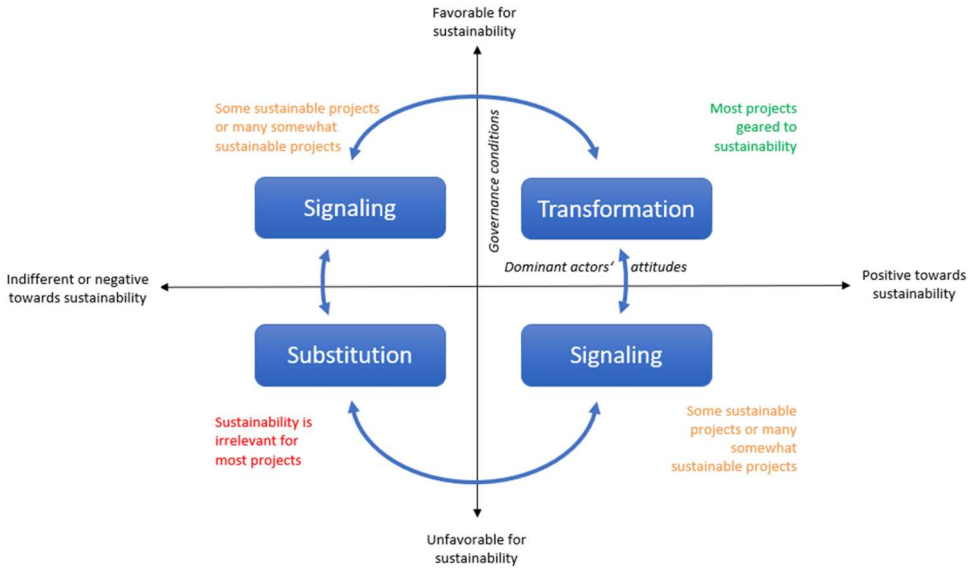

Figure 3. The three guiding logics of phase-out and their relationship to governance conditions, actor constellations, and project outputs.

The analysis also uncovers situations where governance conditions may seem favorable overall but not necessarily for sustainability. If sustainability is relevant, it seems more incidental than strategic. Policy coherence exists, yet sustainability hardly plays a role. As long as powerful actors only pay lip service to making the transition sustainable, it is likely that other motivations will dominate the process. This can also be seen, for instance, with regard to reflexivity: while sophisticated monitoring systems are being established in this case, they do not include ecological SDGs. This prompts questions of whether such decisions reflect political demands or operational challenges in addressing ecological SDGs.

Considering the ongoing nature of the coal phase-out, our findings warrant careful interpretation. Our study primarily examined the landscape and regime, shedding light on shortcomings in environmental sustainability within the process and structures, as well as the perspectives of key actors. However, our data only partially explain why certain projects promote environmental sustainability, and we lack insights into niche actors. Therefore, future research should broaden our sample to include key players involved in major projects for ecological modernization and those associated with right-wing populism, which holds significant influence in Lusatia and opposes Germany's energy transition (Energiewende) toward renewables (Gürtler & Herberg, 2021; Haas, 2020; Yazar & Haarstad, 2023). Additionally, comparing the sustainability of processes in Brandenburg's Lusatia to other coal regions in Germany (and beyond) would offer valuable insights, considering that the three other affected German states have set up quite different processes (e.g. they all employ scoring systems for project selection).

7. Conclusion

Using document analysis and expert interviews, we investigated the guiding logics and role of sustainability goals in shaping the coal phase-out process in the eastern German region of Lusatia (Brandenburg), focusing on enabling conditions, sustainability conceptions, and selected projects. The funding policy has emphasized economic growth and diversification together with job creation. A number of projects contribute to reducing emissions and improving health and education infrastructure, even though there are hardly any explicit incentives for this. Conversely, virtually no projects contribute to improving landscapes and soil, despite both issues being of great importance to the region. We posit that while certain sustainability goals have been integrated

into the regime, others necessitate targeted incentives or influential actors with strong sustainability ambitions. The guiding logic of the phase-out appears to be signaling, with potential shifts towards either energy system substitution or comprehensive regional transformation. However, entrenched political and economic actors pursue concepts of sustainability that are weak at best, and present barriers to significant change that mainly lead to path dependencies.

A key contribution of this paper has been to conceptualize the different guiding logics in phase-out processes (substitution, signaling, and transformation) as being dynamic. Linking them to governance conditions, agency, and project outputs, we suggest that old-industrial regions may go through different stages over time. This is an open-ended process, depending on how actors' attitudes evolve, and the extent to which governance conditions are not only generally favorable – but also specifically geared – towards sustainability. An improvement in that regard could occur, for instance, if policy coherence was ensured specifically for sustainability, if reflexivity mechanisms (such as monitoring and evaluation schemes) took sustainability goals into account, or if participation schemes focused on making the regional change process more sustainable. So far, however, this is not the case for the region of Lusatia.

Our findings challenge optimistic assumptions about individual agency for transformation independent of political measures and about SDG mainstreaming and policy coherence for sustainable development (Carbone & Keijzer, 2016). Given the exceptionally high funding for this specific phase-out, identifying leverage points for comprehensive sustainability transformation in Lusatia and similar cases will be paramount.

Notes

1. A smaller co-payment, usually 10% of the project volume, is required.
2. Another 11 road transport projects are earmarked for the future, given the availability of remaining funds.

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