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Facilitating the Czech Coal Phase-Out: What Drives Inter-Organizational Collaboration?

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ABSTRACT

Responses to current environmental challenges, such as the energy transition, require collaboration among diverse actors interacting in complex and conflicting policy settings. This study examines the drivers of inter-organizational collaboration within the conflictual context of Czech coal phase-out by investigating hypotheses on *belief homophily*, *political influence*, and *expert information*. It uses a sequential mixed-methods research design combining exponential random graph modeling, which controls for network self-organization processes, and directed qualitative content analysis, which validates and extends the findings from the previous stage. The results show that organizations perceived as influential and organizations providing expertise are more likely to be involved in inter-organizational collaboration. Belief homophily does not predict collaboration but is relevant for disincentivizing collaboration among actors with low-compatible beliefs, thus contributing to conflict reproduction. The study concludes that future collaborative arrangements need to avoid such design flaws as those of the recently established Coal Committee, which reinforced existing power asymmetries and conflicts.

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Advocacy Coalition Framework; coal phase-out; energy transition; exponential random graph models; mixed methods; policy process

Introduction

Transformational responses to climate change are inseparably linked to changes in natural resources management toward sustainable development trajectories. While a transition to carbon-neutral societies is a fundamental component of this process, coal phase-out is a critically important step to achieve this goal. Crucially, finding solutions

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to such complex problems requires the engagement of multiple social actors with diverse interests who collaborate and compete in defining transition pathways. As a result, actors become involved in various networks through which they attempt to influence policy outputs such as coal phase-out. The rapid exit from coal required by the Paris Agreement in turn necessitates major policy change. However, this is often difficult to accomplish due to the diverging interests of the involved actors, ranging from environmental movements to fossil industry incumbents. Collaboration among actors who do not always share the same objectives is thus assumed to be essential for negotiation, collective learning, and dispute resolution (Ansell and Gash 2007). Thus, a better understanding of collaboration mechanisms in such high-conflict environments is needed to facilitate the coal phase-out and other transition-oriented processes. We also argue that natural resources management includes a policy dimension, which can be fruitfully analyzed through the lens of policy process theories. In this context, we focus on inter-organizational collaboration within the Czech coal policy subsystem. Our overarching research question is:

What drives inter-organizational collaboration in the Czech coal policy subsystem?

Czechia is a post-communist EU country with a coal-dependent economy, the third highest coal consumption in the EU, and one of the highest per-capita CO2 emissions in the Union (The World Bank 2021). Since the Velvet Revolution in 1989, there has been an ongoing struggle over coal mining expansion, which has significantly contributed to the formation of a high-conflict environment. This conflict has not faded away even in the recent years, when the inevitability of a coal phase-out was also recognized by industry incumbents. Despite this recognition, the nature and pace of this process have been continuously contested, including by incumbents' delay tactics (see Černý and Ocelík 2020; Shriver, Adams, and Longest 2022).

Research on natural resources management (Ansell and Gash 2007), socio-ecological systems (Weible, Pattison, and Sabatier 2010), and policy networks (Fischer, Ingold, and Ivanova 2017) suggests that collaborative forms of governance facilitate participation, trust-building, and collective learning and thereby contribute to conflict resolution, which opens doors to policy change (Sabatier and Weible 2007). We build on Weible et al.'s (2010) argument that the Advocacy Coalition Framework is well-equipped to examine governance structures embedded in a broader system of natural resources management. Although the importance of collaboration for the sustainable functioning of such systems is well-documented (Carlsson and Berkes 2005), less is known about specific mechanisms that drive or inhibit collaboration (see Adams et al. 2018). Our point of departure is thus to test and unpack three well-established hypotheses on inter-organizational collaboration, assuming that such collaboration is driven by (1) belief homophily (Henry, Lubell, and McCoy 2011), (2) perceived influence (Weible 2005), and (3) expert information (Weible 2008).

Case Description

The conflictual setting in the Czech coal subsystem is mostly organized around the question of mining limits, as they prevent mining companies from accessing rich existing brown coal reserves which could last well into the 22nd century (Vlček et al.

2019). The limits were introduced in 1991 as one of the planned measures to facilitate a gradual coal phase-out in response to the ruthless development of coal production throughout the communist regime. However, the political shift toward laissez-faire capitalism and the ensuing rapid economic transformation implemented from 1992 saw decreased interest in environmental issues, and the limits thus remained open to renegotiation or rescindment, mainly because they could be overturned by a government decision at any time (Černoch and Lehotský 2019). In addition, the production of cheap domestic coal has kept energy prices low and thus has remained an important driver of economic development (Svobodova, Owen, and Harris 2021; Vlček et al. 2019).

All this set the stage for an ongoing conflict over the future of coal, which was present as early as the 1990s, increased in intensity after 2005, and peaked around 2015, when the government partially rescinded limits on the least controversial mining site Bílina just days ahead of the Paris climate conference, thereby unlocking reserves that could last until 2055 and beyond (Černoch et al. 2019). The decision was preceded by frequent demonstrations and public pressure from both sides of the conflict. The decision on partial rescindment prevented the destruction of town Horní Jiřetín and also avoided rapid job losses—a compromise that decreased tensions for some time. In 2019, the government established the so-called Coal Commission, a multi-stakeholder body dedicated to evaluating possible coal phase-out scenarios and facilitating inclusive participation, exchange of expertise, and conflict resolution (Lehotský and Černík 2019). However, the 19-person Commission was mostly populated with non-expert members, some of whom had direct vested interests, such as the CEO of the largest domestic energy company ČEZ, who was initially listed as a representative of the Confederation of Industry instead. Only two scientists and two members of environmental non-governmental organizations (ENGO) were on the Commission, with no representatives of the most affected local municipalities (Lehotský and Černík 2019). This was widely criticized by ENGOs, and an alternative parallel Shadow Coal Commission was established.

When the Commission suggested a phase-out target year of 2038 (Ministry of Industry and Trade 2020), the ENGO representatives resigned in protest. Moreover, the results of the Commission were not accepted by the government itself, mostly due to the opposition of the Ministry of Environment, which revealed its long-standing conflict over the issue with the Ministry of Industry and Trade. Consequently, the government declared to seek more expertise through an inter-ministerial comment procedure, which postponed the decision and left opportunities for more targeting from both coalitions. The current situation suggests that a coal phase-out might occur much sooner than 2038 since the price of EU ETS emission allowances has been pushing the price of coal consumption beyond market prices very fast, thus making domestic coal not economically feasible (Faltusová 2021).

A sooner phase-out could also bring all the dreaded adverse effects on local economies, which kept coal afloat in the first place. Nevertheless, the local populations of the most contested municipalities like Horní Jiřetín have always been against the expansion of mining, organizing local referenda, electing anti-mining candidates into municipal governments, and forming grassroots opposition movements (Černík 2015). A more radical climate justice-oriented movement emerged recently and joined the

Environmental Coalition, drawing attention to both the climate impacts of coal production and its impacts on broader society (Černoch et al. 2019).

The government is historically split over the issue (Ocelík et al. 2019). The Ministry of Industry and Trade has been a long-term proponent of mining expansion and opened the question of rescindment with the 2004 State Energy Policy (SEP) update (Ministry of Industry and Trade 2004), proposed a partial rescindment of the limits in 2007–2008, attempted to update the SEP in 2011 in such way that rescinding the limits would have been necessary (Sacher 2011), and again sponsored partial rescindment of the limits in 2015 (Bachorík and Valášková 2015). All strategic documents issued by the Ministry of Industry and Trade before 2015 stressed the continuation of mining, with only the 2015 SEP suggesting a very slow and gradual coal phase-out (Ministry of Industry and Trade 2015). The Ministry of the Environment has been substantially less supportive of mining expansion, emphasizing unsatisfactory levels of air pollutants attributed to coal combustion (Ministry of Environment 2017). This cleavage was apparent also in the respective acceptance or rejection of the outcomes of the Coal Commission by the two ministries.

Advocacy Coalition Framework

We ground our research in the Advocacy Coalition Framework (ACF). Its core assumption is that the policy process involves a diversity of interdependent actors and their groups that mainly occur at the level of a policy subsystem—a subset of a political system defined by a particular issue area (Sabatier and Weible 2007). Advocacy coalitions are groups of actors that (1) share policy core beliefs and (2) engage in a nontrivial degree of coordination (see Satoh, Gronow, and Ylä-Anttila 2021; Sabatier and Weible 2007). The degree of belief (dis)similarity and prevailing coordination patterns then produce different types of subsystems, specifically: unitary, collaborative, and adversarial (Weible, Pattison, and Sabatier 2010). In this research, we investigate the drivers of political collaboration in an adversarial subsystem defined by competing advocacy coalitions with low-compatible beliefs and prevailingly within-coalition coordination patterns (Weible, Pattison, and Sabatier 2010).

The focus on political collaboration reflects the ACF's assumption that policy actors use different ways to translate their belief systems into policies before their opponents can do the same. For this purpose, they share resources and seek allies as well as access to decision-making (Sabatier and Weible 2007). We have defined political collaboration (henceforth: "collaboration") as "support on a policy issue, support of other organizations in/through international organizations or professional associations, working together to find a solution of a policy problem … [or] joint official statements, joint lobbying, co-organizing campaigns and protests" (Online Appendix 1).

More specifically, we focused on three hypotheses on inter-organizational collaboration. First, we investigated ACF's core assumption that policy actors tend to collaborate and form advocacy coalitions with actors with similar *belief systems* (Sabatier and Weible 2007). Second, we examined resource dependency theory's (Pfeffer and Salancik 2003) assumption that actors competing over limited resources are incentivized to collaborate with others, typically more resourceful and *influential* actors. Third, we

explored the role of *expert information* as it affects collaboration patterns in a way that depends on the specific policy-making context (Weible 2008; Weible, Pattison, and Sabatier 2010). In addition, we accounted for *network self-organization processes* such as reciprocity and triadic closure (see Fischer and Sciarini 2016; Leifeld and Schneider 2012). Lastly, we controlled also for *inter-organizational homophily* based on the assumption that organizations of the same type tend to collaborate more due to reduced information costs and institutional opportunities (Fischer and Sciarini 2016).

Importantly, the ACF literature shows that the three investigated drivers of collaboration can be found both in collaborative (Fischer and Sciarini 2016; Weible 2008) as well as adversarial subsystems (Kammerer et al. 2021; Weible 2008). This indicates we cannot rely *only* on a general understanding of belief homophily, to focus on the prominent collaboration driver, as a tendency of like-minded actors to collaborate. Since this approach may conceal more specific, both theoretically and substantively relevant, mechanisms that generate the observed homophilous network arrangement (see Crossley and Edwards 2016). Such arrangement can result from interactions where like-minded actors collaborate to achieve shared goals derived from those beliefs and/or from interactions, defined as an avoidance bias, where actors avoid collaboration with those with different beliefs (see Henry 2011a). Although both interaction patterns contribute to belief homophily (Satoh, Gronow, and Ylä-Anttila 2021), their relative impacts on coalition dynamics and the level of conflict in a subsystem may differ.

This reasoning follows a mechanism-based approach, where mechanisms are understood as specific configurations of actors and their actions that tend to bring about a particular type of outcome (Hedström 2005)—a collaborative relationship in our case. More specifically, we investigate various *network* mechanisms (Lusher, Koskinen, and Robins 2012) that drive or inhibit collaboration (tie formation) in a policy network. Importantly, mechanisms exist in nested hierarchies (see Hedström 2005) allowing to examine how lower level mechanisms, such as avoidance bias, contribute to the operation of higher level mechanisms, such as belief homophily.

Belief Homophily

The ACF is built on a cognitive model where actors relate to the world through a perceptual filter based on belief systems that are difficult to change (Sabatier and Weible 2007). The belief systems condition actors to accept and interpret policy-relevant information in a way that supports their beliefs, a tendency called assimilation bias (Henry 2011a; Wagner and Ylä-Anttila 2020). There are three types of such beliefs, which differ in terms of their generality and resistance to change. *Core beliefs* constitute a deep ideological layer orienting actors in questions on the fundamental organization of society that is not expected to change over time. *Policy core beliefs* (henceforth "beliefs") are subsystem-specific and highly salient normative assumptions on how the subsystem ought to be organized that change only slowly. As a result, these beliefs produce cleavages within a subsystem for some time and are crucial for actors to coalesce. Finally, *secondary aspects* represent specific policy responses that are most prone to change and may be modified based on new information (Sabatier and Weible 2007). Thus, we expect that actors tend to collaborate with those who hold similar beliefs (Henry 2011a;

Sabatier and Weible 2007). The general tendency of actors with similar beliefs to share ties is called *belief homophily* (Ingold, Fischer, and Cairney 2017). More specifically, we are interested in whether belief homophily operates in the case of policy core beliefs and collaboration. Based on this, we formulated the following hypothesis:

> *H1: Actors with similar policy core beliefs tend to engage in mutual political collaboration in the subsystem.*

We are further interested in lower level mechanisms underlying belief homophily, as explored in the qualitative research stage (for more details, see Online Appendix 2). We qualitatively distinguish whether actors tend to collaborate with others with similar beliefs in order to (1) achieve *common goals* or (2) prevent incompatible goals pursued by competing actors (*common enemy*). This distinction is important as it influences conflict intensity and policy learning. The former does not exclude between-coalition collaboration and, consequently, does not prevent between-coalition learning or reduced conflict intensity. The latter explicitly encourages collaboration aimed against policy opponents, which consequently prevents between-coalition learning and tends to increase conflict intensity. We also focused on lower level mechanisms that *inhibit* collaboration due to perceived belief-based differences. Henry et al. (2011) showed there is (3) an *avoidance bias* in coalition politics that makes belief differences more important for avoiding collaboration than belief similarity for incentivizing collaboration. This may be further strengthened by a so-called (4) *devil shift*—a bias to overestimate opponents' capacities and bad intentions (Sabatier & Weible, 2007). As Fischer et al. (2016) argued, the devil shift deepens disagreements between policy opponents and hinders actors' ability to adequately assess their opponents as well as to formulate effective negotiation strategies. It further contributes to polarization and conflict at the process level, thus impeding between-coalition learning as well as policy-making in general (Fischer et al. 2016). Overall, we differentiate between collaboration-oriented (common goals) and conflict-oriented mechanisms, which are either explicitly competitive (common enemy) or encourage non-collaboration with policy opponents (avoidance bias and devil shift). Considering the above, we formulated the following expectation:

> E1: Conflict-oriented belief homophily mechanisms are more frequent than the collaboration-oriented belief homophily mechanism.

Political Influence

Although shared beliefs are considered to be crucial incentives of collaboration (Fischer and Sciarini 2016; Ingold, Fischer, and Cairney 2017) and the glue of advocacy coalitions (Sabatier and Weible 2007), there is a strong argument that actors are also incentivized instrumentally to seek collaboration with influential others (Cairney and Heikkila 2014). Resource dependency theory assumes that actors typically do not possess enough resources to achieve their objectives on their own (Pfeffer and Salancik 2003). The resulting subsystem interdependencies affect the necessity and/or desire to collaborate and contribute to inter-organizational relationships and arrangements, such as advocacy coalitions (Fenger and Klok 2001). Thus, it is expected that actors are dependent on the resources of others and tend to interact with actors that are perceived

as influential. Perceived influence is defined as believed ability to affect the actions and beliefs of others through effective and willful control of resources (Weible 2005). Weible et al. (2018, 4) further argue that *political influence*, defined as a "degree of access and effect on policy actors with authority", is among the most important resources, the value of which even increases in high-intensity conflict environments. Based on this, we formulated the following hypothesis:

H2: The more politically influential an actor is perceived to be, the more likely the actor is sought for political collaboration in the subsystem.

We are further interested in lower level mechanisms underlying the influence-based dependencies explored in the qualitative research stage (for more details, see Online Appendix 2). Here we differentiate between (1) *symbiotic dependencies* motivated by (mutually beneficial) exchange of resources (Fenger and Klok 2001) and (2) strategic *targeting* of decision-makers or otherwise influential actors. The former refers to situations where different actors exchange resources, enabling them to take actions to achieve their goals (Fenger and Klok 2001). For instance, an industry incumbent may need the support of trade unions and scientific expertise provided by academic organizations to back its goal of mining expansion. The latter captures actors' attempts to influence policy decisions to make them consistent with their own goals (Weible 2008). For instance, an ENGO may offer expert studies and alternative policy proposals to particular ministries in order to affect future policy designs. We argue that targeting aims at gradual policy change or its prevention and also counteracts parallel activities of policy opponents. In adversarial subsystems, we expect that targeting contributes to fragmentation among decision-makers, consequently limiting the potential for policy change through policy learning or negotiated agreement (Ocelík et al. 2019). Lastly, we control for *inter-organizational homophily*, which includes collaboration required by regulation, such as interdepartmental processes, or resource pooling among organizations of the same type, such as ENGO alliances, distinct from an exchange of different resources. Thus, while targeting is expected to increase the intensity of conflict, symbiotic dependency, to the contrary, offers incentives for the collaboration of actors with low-compatible beliefs. Considering the above, we formulated the following expectation:

E2: Targeting is more frequent than symbiotic dependency.

Expert Information

The ACF assumes that policy actors depend on scientific and technical information (in general, *expert information*) throughout the policy process since contemporary complex policy problems cannot be understood and managed based on common sense or unsystematic observations (Weible, Pattison, and Sabatier 2010). Expert information is understood as "content generated by professional, scientific, and technical methods of inquiry" (Weible 2008, 615) accepted by a professional community of peers (Weible, Pattison, and Sabatier 2010). Expert information then substantially influences the dynamics of collaboration as well as policy learning in policy subsystems (Sabatier and Weible 2007). Overall, it is expected that expert information exchange increases the

likelihood of collaboration since it is an important source of policy learning, instrumental problem-solving, and legitimation of previously held policy positions (Wagner et al. 2021; Weible 2008). Based on this, we formulated the following hypothesis:

H3: An actor that provides expert information to another tends to seek the other actor for political collaboration in the subsystem.

We are further interested in the lower level mechanisms underlying expert information entrainment (Weible 2008; Weible, Pattison, and Sabatier 2010), as explored in the qualitative research stage (for more details, see Online Appendix 2). Here we use the typology proposed by Weible (2008), which distinguishes different uses of expert information in the policy process. The (1) *expert-based learning* mechanism reflects a situation where actors slowly alter their beliefs about the causes of problems and preferred solutions through gradual accumulation and acceptance of expert information. The (2) *expert-based politicization* mechanism occurs when actors use expert information to back their policy positions (cf. Cairney and Heikkila 2014). The (3) *instrumental expertise* mechanism corresponds with an "ideal approach to problem solving" where decisions follow research findings (Weible 2008, 620). Since instrumental expertise does not aim to change or justify particular beliefs, we argue that only the expert-based learning and politicization mechanisms are expected to systematically affect the level of conflict in a subsystem. Whereas the former is key to between-coalition learning, the latter prevents it by reinforcing boundaries between policy opponents, which further contributes to their conflict. Considering the above, we formulated the following expectation:

E3: Expert-based politicization is more frequent than expert-based learning.

Data and Methods

The research constitutes a single-case study (of the Czech coal policy subsystem) incorporating within-case variation. The case was selected as an instance of a high-conflict policy subsystem characterized by the presence of coalitions holding low-compatible beliefs that compete to access and influence policy-making authorities and related policy venues (Ocelík et al. 2019). We used a mixed-methods sequential explanatory design (Domínguez and Hollstein 2014), combining quantitative social network analysis (SNA) methods with qualitative content analysis. SNA has been developed to capture and explain structural phenomena through the concept of a social network, defined simply as a set of actors (nodes) and a set of relationships among them (Wasserman and Faust 1994). Qualitative content analysis constitutes the interpretation of text data through a systematic coding process (Hsieh and Shannon 2005).

The data collection started with an online questionnaire conducted in the second half of 2017. Its design was based on the questionnaire outline of the project *Comparing Climate Change Networks* (Ylä-Anttila et al. 2018). Network data was collected for (1) *political collaboration*, (2) *expert information*, and (3) *political influence* (see Online Appendix 1). All three resulting networks are binary and directed. The response rate was 82% (68 responses out of 83 listed organizations). We also used semi-structured interviews to collect data on perceptions and practices among key organizations'

representatives. The data collection was conducted in the first half of 2018. The response rate for interviews was 57%, for a total of 12 interviews.

The model used to test the collaboration hypotheses (H1–3) was the so-called exponential random graph model (ERGM; see Lusher, Koskinen, and Robins 2012). ERGM is a statistical model designed to handle the specific nature of network data, namely interdependencies and model-oriented inference, which conventional statistical models cannot appropriately capture. ERGM uses so-called configurations—subgraphs representing mechanisms—to predict the presence of tie variables.

To test the hypothesis on *homophily on policy core beliefs* (H1), we included a dyadic covariate term capturing the absolute value of the difference in normalized policy core belief scores <0,1> between each pair of nodes (actors). Thus, homophily is indicated by a negative estimate value.

To test hypotheses on *perceived influence* (H2) and *expert information* (H3), we included dyadic covariate terms represented by the corresponding adjacency matrices capturing arc entrainment defined as a tendency of arcs to co-occur in dyads (e.g., organization A sought for collaboration by organization B due to perceived influence of A by B; see the hypotheses in "Advocacy Coalition Framework" section).

We also included several controls for network self-organization (see Leifeld and Schneider 2012). The reciprocity term models reciprocity; popularity and activity terms model cumulative advantage on the number of incoming and outgoing ties, respectively (for more details, see Lusher, Koskinen, and Robins 2012); and triangle terms (transitive, cyclic, down, and up) capture corresponding varieties of closure. Lastly, we controlled for inter-organizational homophily—the tendency of organizations of the same types to interact together—by including the arc and reciprocity terms within the same organizational type.

In the qualitative stage, we used qualitative content analysis to evaluate organization representatives' perceptions related to the collaboration hypotheses tested by ERGM with a focus on their underlying lower level mechanisms as defined in "Advocacy Coalition Framework" section (E1–3). The corpus consisted of 12 interview transcripts. The analysis was limited to manifested content and was directed by the theoretical framework to validate and elaborate findings from the previous stage through supporting or non-supporting evidence. Hsieh and Shannon (2005) call this approach *directed content analysis*. We used a predefined coding scheme (see Online Appendix 2) derived from the theoretical framework consisting of 11 codes capturing the hypothesized lower level mechanisms classified under the three higher level mechanisms: belief homophily, political influence, and expert information. The coding conducted by two independent coders yielded 161 coding units used in the analysis. We then simply calculated the absolute and relative frequencies of the investigated lower level mechanisms to examine expectations E1, E2, and E3. Unlike the hypothesis testing, the examination of expectations is not based on probabilistic inference but follows the logic of analytical generalizability, where qualitative empirical evidence is examined to support (or oppose) the investigated concepts (Firestone 1993).

For more details on research design, case selection, data collection, and use of the research methods, please see the extended version of this section in Online Appendix 2.

Results

Policy Core Beliefs

Before interpreting the results on the investigated mechanisms of collaboration, the descriptive information about policy core beliefs is briefly presented. Previous research established that the Czech coal policy subsystem includes two competing *advocacy coalitions* that markedly differ in their policy core beliefs and a residual group between them (Černý and Ocelík 2020; Ocelík et al. 2019). The Industry Coalition (N = 17), with superior resources, including direct access to decision-making through the Ministry of Industry and Trade, supported the 2015 mining expansion. On the other side, the Environmental Coalition (N = 18) challenges the status quo and promotes a rapid coal phase-out and consists mostly of environmental and research organizations. Figure 1 displays the distributions of the most divisive policy core beliefs within the subsystem on four dimensions: economic, environmental, political, and processual. These results show a high degree of polarization between the two coalitions as well as within the residual group across all four dimensions (see Ocelík et al. 2019). For more information, see Online Appendix 3.

Higher Level Mechanisms of Collaboration

An exponential random graph model was used to test the collaboration hypotheses (for the goodness of fit statistics, see Online Appendix 2; for the network descriptives, see Online Appendix 3). Figure 2 displays the point estimates (dots) of the model parameters, together with their 95% two-sided confidence intervals (lines).

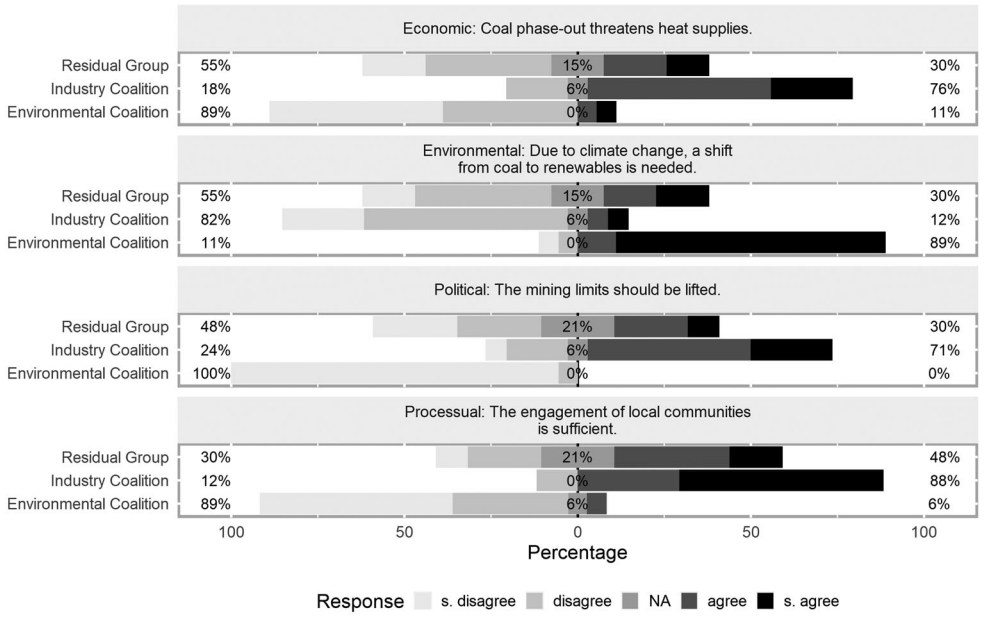

Figure 1. Policy core beliefs.

Contrary to the expectation, the first dyadic effect point estimate capturing *belief homophily* is positive, indicating that greater differences in policy core beliefs increase the likelihood of collaboration. Its confidence interval, nevertheless, ranges between −0.012 and 0.231, indicating no effect. This result thus does not provide support to H1, which assumes that organizations more similar in their policy core beliefs are more likely to engage in collaboration. The second dyadic effect capturing *political influence* is positive, as expected, and shows an interval estimate ranging between 1.259 and 1.804, thus providing support to H2. This result suggests that an organization perceived as influential by another organization is, *ceteris paribus*, more likely to receive a collaboration tie from the other organization. The third dyadic effect capturing *expert information* exchange is positive, as expected, and shows an interval estimate ranging between 3.220 and 4.004, thus providing support to H3. This result indicates that an organization providing information to another is, *ceteris paribus*, more likely also to seek the other organization for collaboration.

The dyadic effect capturing *inter-organizational homophily* (*org homophily*) as a control is positive, and its interval estimate ranges between 0.141 and 0.917. This finding suggests that organizations of the same type are more likely to form ties than those of different types. We also controlled for number of theoretically relevant network self-organization (endogenous) processes. We found tendencies toward reciprocity

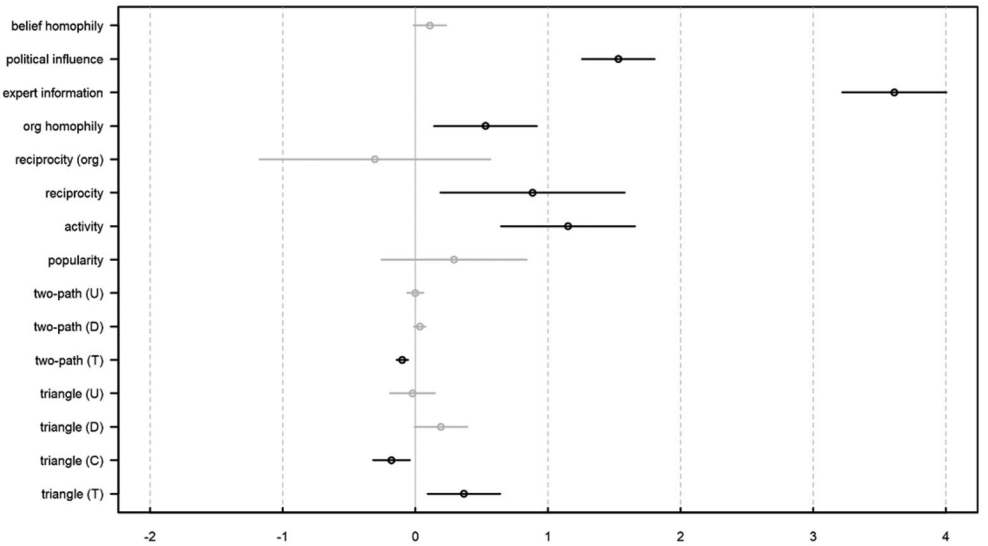

Figure 2. Point estimates and 95% confidence intervals of the model parameters. The x-axis displays the point (circles) and interval (bars) estimates of the model parameters on a logarithmized odds ratios (log-odds) scale. It shows log-odds of a political collaboration tie formation per unit change in the predictor. The edges (intercept) estimate (−4.55) is included in the model but excluded from the figure for visibility's sake. The black confidence intervals indicate an effect (exclude zero) at the 95% confidence level. The gray confidence intervals indicate no effect (include zero) at the 95% confidence level. The values of convergence t-ratios for terms in the model are less than 0.1, indicating excellent fit. We also checked the goodness of fit of our model to all configurations (56 in total) implemented in the MPNet software package. Of these 56 configurations, 4 were slightly less well-fitting. The t-ratios were only marginally above 2 in absolute value, however, so the misfit on these statistics was minor (see Online Appendix 2). For more details, see Wang et al. (2009).

(according to expectations), activity-based cumulative advantage [activity] (against expectations), and hierarchical triadic closure captured by positive path closure [triangle T] and negative cyclic closure [triangle C] (according to expectations). The positive tendency toward reciprocity goes beyond organizations of the same type, which we control for [reciprocity (org)], and indicates the presence of relational opportunity structures (see Leifeld and Schneider 2012) that reduce transaction costs and facilitate durable interactions. The activity-based cumulative advantage suggests a tendency toward seeking more collaboration partners the more such partners an organization already has. This could be due to competition from opposing coalitions' principal members increasingly attempting to influence decision-makers and more broadly governance actors (see Ocelík et al. 2019). Finally, the presence of hierarchical triadic closure indicates coalition-formation processes where brokers bring together likely collaborators (see Henry, Lubell, and McCoy 2011). Overall, these results suggest polarization of the subsystem defined by hierarchically arranged clusters revolving around active, and mutually less connected, central actors (see Howe, Stoddart, and Tindall 2020; Ocelík, Lehotský, and Černoch 2021).

Lower Level Mechanisms of Collaboration

The directed content analysis was used to identify and evaluate the underlying lower level mechanisms. Table 1 summarizes the counts of the lower level mechanisms and their shares in the higher level mechanism.

We distinguished between collaboration-oriented (common goals) and conflict-oriented *belief homophily* mechanisms (the three remaining). Our expectation (E1) was that the latter are represented more than the former. The results support this expectation. Among belief homophily mechanisms, *avoidance bias* (N = 6) and *devil shift* (N = 8) are the most frequent, which shows that actors tend to emphasize differences rather than similarities in beliefs. The former refers to the unwillingness or inability of policy opponents to communicate (avoidance bias) as well as to their irrationality, which is somewhat inconsistently coupled with their hidden agenda and increasingly detrimental influence (devil shift). Interestingly, avoidance bias and devil shift have been reported mostly by industry actors, who typically use them in their portrayals of environmental activists. On the other hand, a *common enemy* (N = 2) is the least represented mechanism in the whole corpus, which may indicate that actors avoid direct confrontation and prefer to out-compete their opponents in terms of access to decision-makers and influence in the policy process (more below). *Common goals* (N = 8) are reflected by both ENGOs and industry actors, which shows that this collaboration-oriented

Table 1. Lower level mechanism frequencies in the corpus.

Belief homophily (N = 24)				Political influence (N = 77)			Expert information (N = 60)		
Avoidance bias	Common enemy	Common goals	Devil shift	Inter-organizational homophily	Symbiotic dependency	Targeting	Instrumental expertise	Expert-based learning	Expert-based politicization
6 (25%)	2 (8.3%)	8 (33.3%)	8 (33.3%)	17 (22.1%)	35 (45.5%)	25 (32.5%)	36 (60%)	18 (30%)	6 (10%)

The numbers express absolute frequencies (counts) of the mechanisms in the corpus. The percentages express relative frequencies of the lower level mechanisms with respect to the corresponding higher level mechanisms: belief homophily, political influence, or expert information.

mechanism may be relevant for principal coalition members but not for other policy actors. Overall, belief homophily mechanisms are, rather surprisingly, represented least in the whole corpus, which may indicate that belief homophily is not critical for collaboration but rather for conflict. This finding is consistent with the results of the exponential random graph model.

The second expectation (E2) was that *targeting*, a conflict-oriented mechanism, would be more frequent than *symbiotic dependency*, a collaboration-oriented mechanism. Nevertheless, the targeting count (N = 25) is lower than the symbiotic dependency count (N = 35), thus not supporting E2. As for symbiotic dependency, actors mostly emphasized division of labor arising from institutional and regulatory arrangements of the subsystem as well as an instrumentally motivated exchange of resources. In general, symbiotic dependencies tend to be described as neutral in terms of their effects on conflict. Targeting, on the other hand, explicitly involves persuasion of either decision-making actors or other influential actors with low-compatible beliefs. As for the former, ENGOs as well as industry actors engage with ministries and political parties in order to "talk to them" or to even propose particular policy solutions. As for the latter, ENGOs in particular strive to establish collaborative relationships with industry to guide them toward a coal phase-out pathway. Direct confrontation of opponents where actors actively interfere with the actions of others was less frequent and ascribed mostly by industry actors to ENGOs. Although targeting is not more frequent than symbiotic dependency, it seems that this form of strategic interaction contributes to collaboration more than belief-homophily mechanisms. We also controlled for inter-organizational homophily (N = 17), which was reported often among state agencies and ENGOs. This could partially explain the absence of belief homophily in the quantitative stage (see "Higher Level Mechanisms of Collaboration" section) since it often involves actors with similar beliefs, especially in the case of ENGOs.

The third expectation (E3) was that *expert-based politicization*, a conflict-oriented mechanism, would be more frequent than *expert-based learning*, a collaboration-oriented mechanism. However, the politicization count was considerably lower (N = 6) than the learning count (N = 18), thus not supporting E3. Expert-based learning is reported mostly by state agencies and relates mainly to secondary aspects, such as particular instruments for reclamation. In general, it has been presented through rather ad hoc inputs from diverse actors and not seen as an integral part of policy-making. Expert-based politicization is mostly seen negatively as an unethical and manipulative use of expertise that serves the political agenda of policy opponents. This contrasts with its self-reported understanding where well-established expert knowledge or new technology, such as clean coal, legitimately supports particular policy responses, such as mining expansion, against irrationally and ideologically driven opponents. Instrumental expertise (N = 36), the most frequent mechanism across the whole corpus, primarily concerns routine operations and regulatory processes mostly involving competent state agencies and industry.

Discussion and Conclusions

Collaborative governance is widely recognized as a governance mode facilitating solutions to complex natural resources problems (Ansell and Gash 2007). Management of

energy transition processes such as coal phase-out requires the collaboration of actors with diverging interests (see Markard, Suter, and Ingold 2016), which makes collaboration not only desirable but also challenging. A better understanding of collaboration mechanisms in such conflictual environments is thus needed to learn how to respond to such challenges. Our study examined patterns of inter-organizational collaboration within the context of coal phase-out in Czechia. It represents a case of an adversarial subsystem defined by high-intensity conflict and low compatibility of policy actors' beliefs, which is expected to have a substantially lesser potential to generate policy solutions to complex natural resources problems (see Gronow, Wagner, and Ylä-Anttila 2020; Weible, Heikkila, and Pierce 2018). We tested and unpacked three higher level network mechanisms, i.e. (1) belief homophily, (2) political influence, and (3) expert information, to examine to what extent they drive or inhibit collaboration.

We first discuss our findings in relation to the Advocacy Coalition Framework. Our results surprisingly show that belief homophily does not contribute to collaboration. This is contrary to expectations about adversarial subsystems, where general distrust and devil shifting of policy opponents supposedly drives belief-based segregation (Fischer et al. 2016; Henry 2011a; Gronow, Wagner, and Ylä-Anttila 2020). While examining both consensual and conflictual climate change governance networks, Gronow et al. (2020) showed that belief homophily drives collaboration only in the latter. However, Kammerer et al. (2021) found the same pattern when comparing high-conflict and low-conflict subsystems. Moreover, the mature status of the coal subsystem should further strengthen belief homophily since actors are well aware of others' positions and the resulting salient ideological cleavages (Ingold, Fischer, and Cairney 2017).

We offer two complementary explanations of our unexpected result. First, having controlled for inter-organizational homophily, which accounted for the intense collaboration of the two highly cohesive groups (environmental NGOs and industry actors), there seem to be suppressor effects from the other two higher level mechanisms—political influence and expert information—identified as strong predictors (cf. Henry 2011b). Second, the qualitative results validate these findings by showing that actors tend to emphasize specific mechanisms of belief homophily that *do not* incentivize collaboration but facilitate mistrust and conflict, namely avoidance bias and devil shift. This pattern would indicate that belief homophily is not so important for collaboration among like-minded actors since they also collaborate based on different rationales. It does, however, seem to discourage collaboration among actors with low-compatible beliefs, which is likely reinforced by a policy network structure consisting of two rival coalitions (cf. Ocelík et al. 2019).

We argue that this tendency is even more pronounced when policy punctuation (Baumgartner and Jones 1993), i.e. sudden and major policy change, is anticipated, thus mobilizing the competing coalitions. As a result, increased within-coalition collaboration and decreased between-coalition collaboration could be expected. Accordingly, we found that principal members of both coalitions restrained from collaboration with the other side. More specifically, ENGOs often avoided collaboration with incumbents due to their concerns of cooptation that would delegitimize them within the movement. Industry incumbents then typically rejected or avoided such collaboration since they perceived any policies supporting earlier phase-out dates as "radical" or "irrational."

As expected, politically influential actors are more sought for collaboration. The relevance of resource-based collaboration drivers is well established across different types of subsystems (Cairney and Heikkila 2014), although this tendency is not universal. When studying the consensual Swedish climate policy subsystem, Gronow et al. (2020) found that actors who were perceived as politically influential were not more popular collaboration partners. However, perceived influence is widely documented to drive collaboration in adversarial subsystems (see Gronow, Wagner, and Ylä-Anttila 2020; Kammerer et al. 2021). This is consistent with Weible et al. (2018), who hypothesized that political influence, i.e. the ability to influence policy decisions, is a vital resource in high-conflict environments and that resource dependency should have less "currency" in such contexts than belief homophily (cf. Gronow, Wagner, and Ylä-Anttila 2020).

Considering the adversarial nature of the studied subsystem, we contend that a substantial part of the competition among policy actors and their coalitions happens through strategic action, i.e. targeting, which aims at decision-makers and other influential actors *regardless* of their beliefs either to "get them on board" or to avoid their vetoing. Thus, parallel targeting contributes to belief heterogeneity among decision-makers, who are "torn apart" by competing coalitions, and increases the level of conflict (Ocelík et al. 2019). The qualitative findings then show an even larger importance of symbiotic dependencies where actors seek collaboration in order to control resources and engage in the division of labor. Furthermore, governance actors, especially ministries and other state agencies, are required to collaborate with non-state actors, industry actors, as well as research organizations and ENGOs, despite their often-large differences in beliefs. In addition, it has been documented that influential actors are more likely involved in collaboration also among actors holding similar beliefs (Gronow, Wagner, and Ylä-Anttila 2020; Henry 2011b), which further weakens belief homophily effects.

As expected, expert information exchange was found to drive collaboration (see Weible, Heikkila, and Pierce 2018). This can be attributed to industry and governance actors' demands for (mostly instrumental) expertise provided by research organizations. Moreover, many governance actors, as well as industry actors and ENGOs, consider themselves producers of expert information (cf. Wagner et al. 2021). These tendencies were supported by the qualitative analysis, where expert-based mechanisms are clearly more represented than those related to belief homophily. Actors also used expert information strategically to encourage policy learning or to legitimate preferred policy solutions (see Weible 2008). For instance, ENGOs extend collaboration to industry and governance actors in order to gradually change their beliefs in favor of a more rapid coal phase-out based on provided expert information. Such expert-based learning, a collaboration-oriented mechanism, was found to affect mostly secondary aspects, not subsystem policies, which corresponds with the Advocacy Coalition Framework assumptions (Sabatier and Weible 2007). Nevertheless, this mechanism was less represented than instrumental expertise, which contributes to the status quo. Contrary to our expectations, expert-based politicization, a conflict-oriented mechanism, was the least frequent and was perceived mostly negatively as a manipulative use of expertise to back particular policy positions. We argue that this may be partially explained by the overlap between within-coalition collaboration and expert information exchange found in our previous research (Ocelík et al. 2019). Since actors tend to receive (and send)

expert information to their coalition allies, they are less likely to perceive such information as *politicized*.

Our results also speak to literature on natural resources management. Following work led by Weible (2005; Weible, Heikkila, and Pierce 2018), we used the Advocacy Coalition Framework to examine an inter-organizational network structured by the presence of two rival coalitions. Similarly to the findings of Ylä-Anttila et al. (2020), one of them is an environmental coalition led by ENGOs, and the other is "a treadmill of production" coalition including mining companies, trade unions, as well as some state agencies and research organizations (see Ocelík et al. 2019). This is consistent with the conclusions of Tindall et al. (2020), who documented the importance of actors' relational embeddedness by showing that actors' affiliation to the business-dominated and environment-dominated blocks, respectively, was a better predictor of policy preferences than their organizational type. Raik et al. (2008) likewise argued that actors' actions are strongly shaped yet not determined by their enduring social relationships and, as a remedy, suggested recognition and reduction of power asymmetries. Levesque et al. (2017) documented how decentralized distribution of power facilitates collaboration across actors with diverging interests.

Here we argue in line with Gronow et al. (2020) that the more central position of public authorities and their increased role in providing access to decision-making should reduce such power asymmetries. As a result, more inclusive and equal participation would enhance collaboration among actors and coalitions with diverging low-compatible beliefs and thereby also conflict mitigation. The bottom line is that collaboration *per se* is not sufficient to moderate the adversarial nature of the subsystem and even less sufficient to transform it toward a normatively preferred collaborative arrangement (see Weible, Pattison, and Sabatier 2010).

Considering the above, the recently established Coal Commission has yet to fulfill the key assumptions of collaborative governance, specifically due to the exclusion of local communities, overrepresentation of industry incumbents, and limited consultation competencies (see Ansell and Gash 2007). Moreover, the inconsistent government stance on the issue limited its brokerage capacity. The Commission's flawed design thus rather reinforced existing power asymmetries and amplified conflicts between the two coalitions.

There are several limitations that should be addressed in future research. The research is a cross-sectional case study providing novel empirical evidence, and thus comparative as well as longitudinal designs would substantially enhance the generalizability of the results. Furthermore, our study does not measure conflict at the dyadic level and classifies the subsystem as adversarial based solely on the low compatibility of coalitions' beliefs and their competitive interaction patterns (Ocelík et al. 2019). This prevents quantitative analysis of the collaboration–conflict interplay, which would allow examining relationships between lower level collaboration mechanisms and conflict intensity in the subsystem. Likewise, we argue that further research should focus on mechanisms of between-coalition and within-coalition collaboration. Such research would contribute to a better understanding of the transition between subsystem types.

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