Energy Politics Group

Policy Goals, Partisanship and Paradigmatic Change in Energy Policy – Analyzing Parliamentary Discourse in Germany over 30 Years.

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Abstract: The successful implementation of the Paris Agreement requires substantial energy policy change on the national level. In national energy policy-making, climate change mitigation goals have to be balanced with arguments on other national energy policy goals, namely limiting cost and increasing energy security. Thus far, very little is known about the relative importance of these goals and how they are related to political partisanship. In order to address this gap, we focus on parliamentary discourse around low-carbon energy futures in Germany over the past three decades and analyze the relative importance of, and partisanship around, energy policy goals. We find that the political discourse revolves around four, rather than three, goals as conventionally assumed; improving the competitiveness of the national energy technology industry is not only an additional energy policy goal, it is also highly important in the political discourse. In general, the relative importance of these goals is rather stable over time and partisanship around them is limited. Yet, a sub-analysis of the discourse on renewable energy technologies reveals a high level of partisanship, albeit decreasing over time. Particularly, the energy industry goal's importance increases while its partisanship vanishes. We discuss how these findings can inform future energy policy research and provide a potential inroad for more ambitious national energy policies.

Keywords: energy politics, energy policy goals, industrial policy, energy trilemma, climate change mitigation, policy feedback

The Energy Politics Group (EPG) within the Department of Humanities, Social, and Political Sciences of ETH Zurich investigates questions related to the governance of technological change in the energy sector.

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1. Introduction

In November 2016, the Paris Agreement of the United Nations Framework Convention on Climate Change entered into force. Under this agreement, all parties agree to limit "the increase in the global average temperature to well below 2°C above preindustrial levels and to pursue efforts to limit the temperature increase to 1.5°C" (United Nations, 2015). Reaching these targets can only be achieved through a rapid and deep decarbonization of the economy (Figueres et al., 2017; Schellnhuber, Rahmstorf, & Winkelmann, 2016) and particularly, the energy sector (Williams et al., 2012). The energy sector is currently a major contributor to anthropogenic greenhouse gas emissions (Mulugetta, Hertwich, Riahi, Gibon, & Neuhoff, 2014) and other environmental problems (Ebenstein, Fan, Greenstone, He, & Zhou, 2017). At the same time, a decarbonized energy sector can also help reduce emissions in other sectors, such as mobility or industry, through electrification of currently fossil fuel-based processes (Williams et al., 2012). Decarbonizing the energy sector requires a far-reaching technological transition; greenhouse gas emitting technologies have to be phased-out and replaced by low- or non-emitting technologies such as renewable energy technologies (RET) (Dangerman & Schellnhuber, 2013; Geels, Sovacool, Schwanen, & Sorrell, 2017; Hertwich et al., 2015; Rockström et al., 2017). Given the many market and coordination failures of technological transitions—particularly in the energy sector—policy intervention is needed (Gillingham & Sweeney, 2012; van den Bergh, 2013). In the Paris Agreement's climate policy architecture, each country defines its Nationally Determined Contribution (NDC) to global emissions reductions (Iacobuta, Dubash, Upadhyaya, Deribe, & Höhne, 2018; Jordan et al., 2015; Kinley, 2017). To substantiate these commitments, national low-carbon energy policies need to be

designed and implemented (Schmidt and Huenteler, 2016; Schmidt and Sewerin, 2017; Trancik et al., 2015). Given the urgency of the problem (Figueres et al., 2017), paradigmatic instead of incremental policy change is needed (Unruh, 2000). To understand policy change, particularly paradigmatic change, it is important to understand the politics behind national energy policy dynamics.

According to theoretical literature on policy change, politics are structured by institutions within which policymakers work, guided by abstract paradigms. These paradigms shape policymakers' understanding of political problems and enable them to formulate more concrete policy goals (Béland, 2009; Béland & Cox, 2016; Hall, 1993; Korpi & Skocpol, 1993). The policy goals then determine policymakers' preference for policy instruments and their design (Cashore & Howlett, 2007; Howlett & Cashore, 2009). In the tradition of Hall's (Hall, 1993) seminal study on policy change, these paradigms are understood to be very stable and only replaced in times of crisis or in the face of external shocks. Therefore, paradigmatic policy change, i.e. major shifts in economic or social policy, is understood to be the result of ideational change (Béland, 2009). However, there is an evolving discussion about the role of paradigms, ideas and discourse in policy change, with researchers challenging Hall's (1993) "top-down" conceptualization of paradigmatic policy change (Baumgartner, 2013; Carstensen, 2011; Cashore & Howlett, 2007; Daigneault, 2014; Hogan & Howlett, 2015; Howlett & Cashore, 2009; Oliver & Pemberton, 2004). In addition, there is always a spectrum of different competing or synergetic policy goals in any given policy field (Howlett & Rayner, 2007; Kern & Howlett, 2009),

which requires policymakers to take "normative decisions on the relative priority of certain goals over others and striking a politically feasible balance between partially conflicting […] goals" (Quitzow, 2015, p. 234). These trade-offs or synergies between goals structure political conflict between policymakers (Flanagan, Uyarra, & Laranja, 2011) and determine the degree of partisanship around policy instrument choice and design (Howlett & Cashore, 2009). This also affects the propensity to which any, even gradual, policy change is politically feasible. According to the extant literature, the prospects for paradigmatic policy change in any policy field are limited (Baumgartner et al., 2009; Capano, 2009; Cashore & Howlett, 2007; Lindblom, 1959).

In the field of low-carbon energy policy, political inertia is particularly strong for two reasons: (*i*) Shifts in policymakers' paradigms are uncommon and, due to its dispersed and long-term nature, climate change is not (yet) conceived by many policymakers as a powerful external shock (Bernauer, 2013; Jacobs & Matthews, 2012). (*ii*) Partisanship around climate change mitigation and competing policy goals (Mildenberger, Marlon, Howe, & Leiserowitz, 2017; Oreskes & Conway, 2010) can impede the propensity for any, even incremental, policy change, making a long-term progressive incremental pathway of policy change that builds on smaller, but cumulative, policy change hard to realize (Cashore & Howlett, 2007).

Yet, despite the odds, paradigmatic policy change has been possible in the past, for example, in Germany, which spearheaded the adoption of transformative policies, specifically the German Renewable Energy Sources Act (the German feed-in-tariff for RET), aiding the diffusion of renewable energy technologies (Jacobsson & Lauber, 2006). Crucially, this transformative

policy was not terminated or dismantled, despite changes in government coalitions over time. To understand this puzzle, and to gain insights into how further necessary paradigmatic policy changes could come about globally, we analyze the relative importance of different energy policy goals and the partisanship around them in national energy policy discourse.

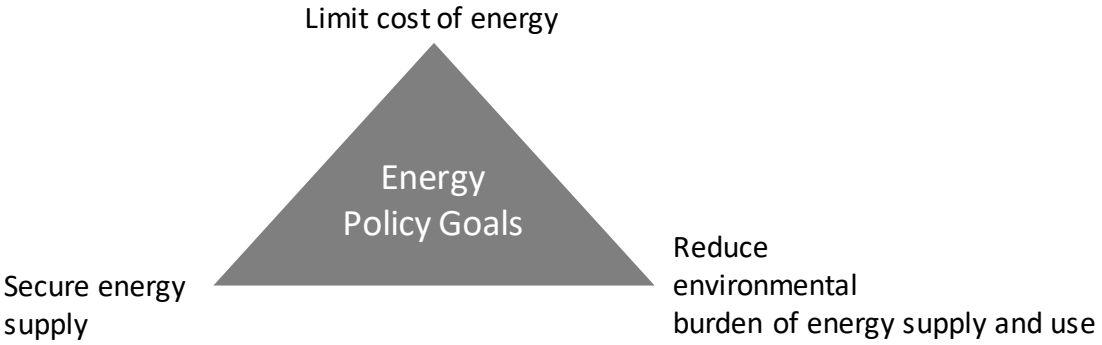

Fig. 1: The "energy policy triangle" or "trilemma".

In the energy sector, three key policy goals have been identified in the literature: (*i*) limiting the cost and (*ii*) securing the supply of energy, while *(iii)* reducing the environmental and particularly the climate burden (Edenhofer et al., 2011; Helm, 2002, 2007; Hughes & Lipscy, 2013). The terms "energy policy triangle" or "energy policy trilemma" are often used (e.g., Gunningham, 2013; WEC, 2016; Winzer, 2012) to illustrate the potential synergies and trade-offs between these policy goals (compare Fig. 1). Energy policymaking is about finding compromises between these potentially conflicting goals (Bang, 2010; Costa-Campi, del Rio, & Trujillo-Baute, 2017; Winzer, 2012). Hence, a shift in the importance of these goals might result in policy change. If one goal's importance vis-à-vis the others increases, partisanship is a key determinant of the propensity of change (Bennett & Howlett, 1992; Hall, 1993; Kern, Kuzemko, & Mitchell, 2014); paradigmatic policy change is more likely when partisanship around this

increasingly important goal is low. That is because all relevant actors would prefer a change of the policy status quo. If a goal is partisan, a condition for policy change is that the goal is central for the *governing* party or coalition (Brown & Hess, 2016; Osofsky & Peel, 2016). Although there is a lot of literature on the politics of energy transitions, especially on Germany (Jacobsson & Lauber, 2006; Kungl, 2015; Quitzow, Roehrkasten, & Jaenicke, 2016; Renn & Marshall, 2016), thus far, very little is known about the relative importance of the different energy policy goals (Joas, Pahle, Flachsland, & Joas, 2016) and discourses around them (Leipprand, Flachsland, & Pahle, 2017), especially concerning how these goals are related to political partisanship and the propensity for policy change. In the absence of such knowledge, researchers and practitioners—including international institutions—cannot effectively engage in overcoming political barriers to national low-carbon energy policy formulation and implementation.

2. Research design

2.1. Case Selection and Background

To analyze the relative importance of energy policy goals, their dynamics, and partisanship around them, we focus on parliamentary debates on the fundamental (re)orientation of the German energy system. Even though today Germany's leadership in climate and energy policy is diminishing (Kemfert, 2017), it has been a leader in renewable energy policy since the 1980s and even more so since the early 2000s (Jacobsson & Lauber, 2006; Quitzow et al., 2016). This long and exceptional history of political debates around energy policy (Renn & Marshall, 2016) as well as the observed paradigmatic policy change around RET (Lechtenböhmer & Luhmann, 2013; Schmidt & Sewerin, 2018) make it an interesting case for longitudinal analyses. As such, Germany is an "extreme case" of paradigmatic change in the field of energy policy and,

following Seawright and Gerring (2008), ideally suited for exploratory studies into the links between changing policy goals and policy change. Over the last three decades, government changes between right and left coalitions, as well as nuclear accidents, have triggered fierce debates about policy goals and energy technology preferences. In order to capture these within-case dynamics, our empirical study focuses on the periods that represent major government changes after years of policy stability. More specifically, we focus on energy debates in the 10th (1983–1987), 14th (1998–2002) and 17th (2009–2013) legislative periods of the German parliament.

In the first period, under the new center-right/free-market government, the arrival of the Greens in the German parliament, as well as the Chernobyl nuclear accident, represented the first challenges to the political consensus built around the dominant role of coal and nuclear energy technologies (Renn & Marshall, 2016). In the second period, under the new center-left/green government, this consensus eroded as policy support for conventional energy technologies continued to decrease to the benefit of RET. This was especially the case for nuclear energy, with a nuclear phase-out law adopted in 2002. In contrast, the Renewable Energy Sources Act, implemented in 2000, represented a paradigmatic change in renewable energy policy (Jacobsson & Lauber, 2006). This act introduced fixed feed-in tariffs for electricity from renewable sources, decoupled from wholesale electricity prices and higher than under the previous small-scale RET support policy (Jacobsson & Lauber, 2006). Importantly, this early policy activity enabled major advances in renewable energy technology (Trancik et al., 2015). Finally, in the third period, the new center-right/free-market government re-opened debates around the future of nuclear energy, while at the same time keeping the Renewable Energy

Sources Act in place. The ultimate decision against nuclear energy was triggered in 2011 by the nuclear accident in Fukushima, Japan. Hence, during all three periods, competition between fossil fuels, nuclear energy and RET was particularly salient in public discourse (Jacobsson & Lauber, 2006). Parliamentary debates focused on the benefits and disadvantages of competing energy technologies along with the goals introduced above. Therefore, these debates provide an excellent case for studying the relative importance of energy policy goals and partisanship around them.

2.2.Methodology

Our analysis proceeded in four steps. First, to capture the relative centrality of energy policy goals in these parliamentary debates, we used Discourse Network Analysis (Leifeld, 2016), as employed in recent publications in fields such as pension politics (Leifeld, 2013), climate politics (Fisher, Leifeld, & Iwaki, 2013) or security studies (Hurka & Nebel, 2013). This method takes into account the underlying agency structure and the interdependency inherent in political networks (Porter, Mucha, Newman, & Warmbrand, 2005) and thus goes beyond counting arguments (Leifeld, 2016). It allows linking actors to concepts; in our case, linking members of parliament to arguments on energy technologies. The results of such an analysis is a two-mode network. Fig. 2 gives a stylized overview of the model. For a detailed description of the method, see Leifeld (2016). Since our analysis aims at tracing *argument patterns* over time, we inferred relations between arguments - subsequently called concepts - (c1, c2 …) from the affiliation network – based on the underlying actor network (a1, a2 …) as shown in Fig. 2. Thus, we built a *concept congruence network*, in which two concepts c1 and

c2 are connected if they are cited by the same actor a_i. The tie weight reflects the number of actors referring to both concepts. With such a concept network, we were then able to apply network tools, e.g. visualizing the evolution of networks over time, and indicating the relative centrality of concepts (arguments) in the network. By aggregating the degree centrality value of each of the concepts supporting each energy policy goal, we calculated a goal's centrality. Degree centrality is a node-level measure, ranking nodes by how many ties they have to other nodes, as well as the weight of these ties (Freeman, 1978). Dividing this value by the network's total centrality provides the relative centrality (represented as a percentage) of the goal vis-à-vis the others. The higher the relative centrality of a goal, the more important it is in the debate. Hence, calculating a network measure of relative centrality provides a robust proxy indicator for the *relative importance* of different policy goals in debates (Opsahl, Agneessens, & Skvoretz, 2010).

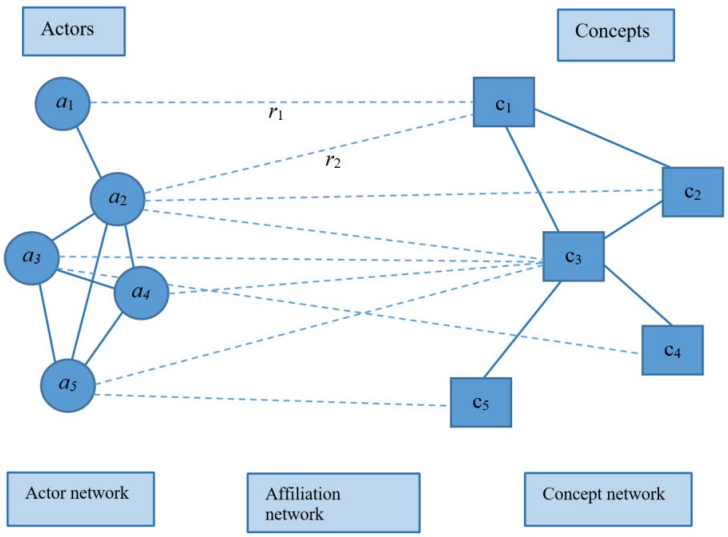

Fig. 2: A model of Discourse Network Analysis (see Leifeld, 2016).

In a second analytical step, we investigated partisanship around goals over the entire period by examining the distribution of arguments across the different goals made by each party represented in the German parliament. In the third step, we used a subset of the data to zoom in on arguments referring to RET, analyzing whether these arguments were made in favor of or against RET. Again, we analyzed the distribution of arguments across goals by each party. In the fourth step, still focusing on RET and using the same data, we analyzed the temporal dynamics of the distribution of arguments across the different goals between two clusters identified in the previous step.

2.3.Data

For data collection, we followed the steps as described by Leifeld (Leifeld, 2013). First, with desktop research, we collected relevant parliamentary policy documents on energy policy, using the official archive platform of the German parliament (http://dipbt.bundestag.de/dip21.web/bt). We restricted the population to parliamentary protocols of public debates on general energy policy topics. As decision criteria, we followed a two-step procedure. We filtered parliamentary processes according to the keyword "nuclear energy", which gave us 155 documents for the 10th, 104 documents for the 14th and 80 documents for the 17th legislative period. We selected this keyword because debates on nuclear energy technology were the only steady topic on the German energy policy agenda from 1983-2013 containing debates on the (re-)orientation of the energy sector (Renn & Marshall, 2016). With this procedure, we aim at ensuring that the case selection does not influence variations in the debates. Second, out of this corpus, we respectively chose 15, 18 and 20 documents per period, in an iterative process (Eisenhardt, 1989) based on existing

literature and qualitative analysis of the document's relevance for our research question. Since we are interested in analyzing public speech (and not other parliamentary documents such as party motions or bills), we only considered parliamentary debate protocols, which further limited the corpus to 30 documents (see Table 1). In a next step, to trace argument patterns over time, we developed a codebook through an iterative coding process, identifying relevant arguments both deductively and inductively (for more details see Table A.1 in the appendix). In this process, a single researcher encoded the articles, and a second researcher controlled the coding. This four-eye-principle increases the validity and reliability of the coding (Eisenhardt, 1989). Finally, we employed a full-text search based on regular expressions to find potentially missing statements. Altogether, our codebook includes 46 codes aggregated into four policy goals. In the 30 protocols, we coded 876 arguments by 136 members of parliament, approximately equally distributed across the three periods (see Table A.2 in the appendix). MPs are affiliated to five political parties: free-market (FDP), center-right (CDU/CSU), center-left (SPD), Greens (Bündnis 90/Die Grünen) and far-left (LINKE).

#	Protocol number	Date	Content	Number of analyzed pages
1	10/53	1984-02-09	Negative externalities of nuclear and other energy technologies	67
2	10/72	1984-05-25	Future energy strategy and conflicts between nuclear vs. coal	32
3	10/87	1984-06-29	Changes of the nuclear energy law (Atomgesetz)	7
4	10/94	1984-10-25	Alternatives to nuclear energy, from energy efficiency to renewable energy and coal	14
5	10/98	1984-11-08	Changes of the nuclear energy law (Atomgesetz)	11
6	10/132	1985-04-18	Risks linked to the further development of the breeder technology (Schneller Brüter)	37
7	10/171	1985-11-07	Future energy policy and negative externalities of energy technologies	52
8	10/215	1986-05-14	Nuclear accident in Chernobyl	11
9	10/216	1986-05-15	Proposal on the immediate phase out of nuclear energy (Atomsperrgesetz)	31
10	10/236	1986-10-03	Proposal on the immediate phase out of nuclear energy (Atomsperrgesetz)	10
11	10/255	1986-12-10	Proposal on the immediate phase out of nuclear energy (Atomsperrgesetz)	17
12	14/16	1999-01-21	Nuclear phase out plans and their consequences for Germany	34
13	14/79	1999-12-16	Future energy policy with or without nuclear energy	7
14	14/61	1999-10-07	Changes of the nuclear energy law (Atomgesetz)	28
15	14/95	2000-03-23	Energy policy for the 21st century	7
16	14/98	2000-04-06	Changes of the nuclear energy law (Atomgesetz)	29
17	14/111	2000-06-29	Nuclear phase out – an opportunity for energy policy consensus in Germany	22
18	14/146	2001-01-25	Future energy policy for Germany and energy dialogue (Energiedialog)	24
19	14/153	2001-02-16	Future of nuclear energy and consequences of the phase out for Germany	25
20	14/190	2001-09-27	Nuclear energy phase out – potential problems and criticism	24
21	14/209	2001-12-14	Law on the ordered phase out of nuclear energy	24
22	17/55	2010-07-08	Taxing nuclear energy profits (Brennelementesteuer) and nuclear phase out	27
23	17/63	2010-10-01	Eleventh law on changes to nuclear energy (Atomgesetz) and energy concept 2050	62
24	17/68	2010-10-28	Twelfth law on changes to nuclear energy and energy concept 2050	33
25	17/96	2011-03-17	Thirteenth law on changes to nuclear energy and energy consensus in Germany	24
26	17/106	2011-04-15	Program for a reliable, safe and sustainable energy system in Germany	35
27	17/114	2011-06-09	Future energy policy and thirteenth law on changes to nuclear energy, Fukushima	45
28	17/117	2011-06-30	Law on faster nuclear phase out	29
29	17/228	2013-03-14	Strong energy infrastructure for Germany	21
30	17/229	2013-03-15	Fukushima and nuclear phase out in Germany	19
				∑ **808**

Table 1: Corpus of analyzed parliamentary debates.

3. Results

3.1.Relative Importance of Policy Goals

Fig. 3 shows the results of our first analysis for the three analyzed legislative periods of the German parliament. Four main observations can be made. First, our analysis reveals that the energy policy discourse is characterized by a fourth policy goal: increased competitiveness of the domestic energy (technology) industry (illustrated in orange in Fig. 3). Qualitative analysis of our coding (see Table A.3 in the appendix) reveals that policymakers also consider positive employment effects, increases in GDP, and export potentials when debating energy technology preferences. Second, as depicted in Fig. 3a-c, the policy goal networks evolve dynamically from a slightly polarized (Fig. 3a) to a polarized (Fig. 3b) to a converged (Fig. 3c) network topology. These differences represent shifts in parliamentary coalitions around technology-specific

arguments, moving from an increasing conflict between coal, nuclear, and renewable energy (Fig. 3a and b) to an emerging energy consensus in favor of RET (Fig. 3c).

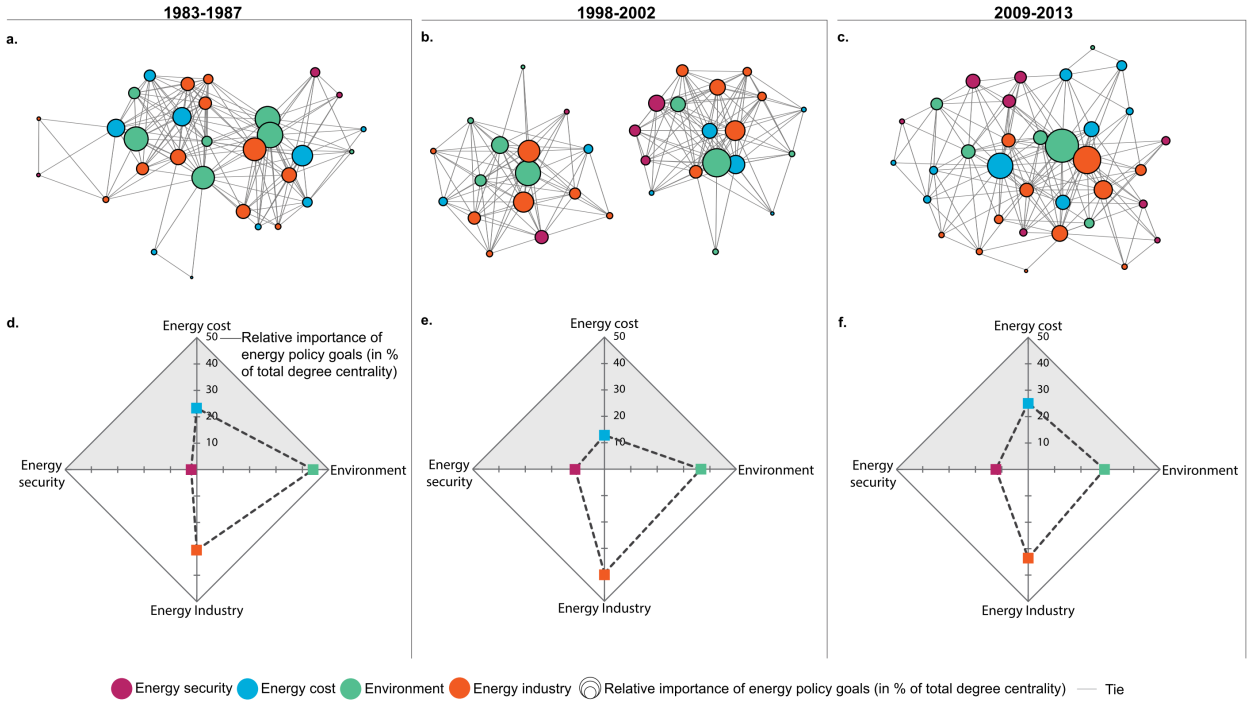

Fig. 3: The relative importance of energy policy goals in parliamentary debates from 1983–2013. a-c, unstandardized argument congruence networks. The bubbles are network nodes, which represent arguments on energy technologies voiced by members of parliament. The node color indicates an argument's affiliation to one of the four policy goals. Ties between nodes represent whether arguments are shared by the same MPs. **d-f,** radar charts depicting the relative degree centrality (in %) of energy policy goals, based on centrality analysis of the argument networks. A node's degree centrality value depends on the number and weight of ties to other nodes. The centrality of each policy goal ranges from 0% (middle of the radar chart) to 50% (respective corners of the radar chart). Note that the vast majority of arguments on the environment goal concern climate change. We used a stress minimization algorithm to obtain an efficient layout for the networks (Brandes & Wagner, 2004).

The networks show that especially the environment and energy industry policy goals are distributed across all clusters in the networks, which means the use of those arguments is spread across members of parliament (MPs) with different technological preferences. Third, over all three periods, the relative importance (measured as a percentage of the total degree centrality of each policy goal) of the environment and energy industry policy goals is the highest, both accounting, on average, for 36% and 34% of the total argument importance (Fig. 3d-f).

Energy cost and energy security arguments score 20% and 8%, respectively, on average. Fourth, the relative importance of energy industry goals remains rather stable across all periods while the relative importance of other goals varies somewhat over time. From Fig. 3d–f, environment goals become less important while both energy cost and energy security become slightly more central. This lack of major changes in the relative importance of the goals contrasts with the major changes of the networks described above. It also contrasts with expectations based on the theoretical literature on policy change, that traditionally explain paradigmatic policy change, such as the introduction of the German Renewable Energy Sources Act, as a result of changing high-level policy goals (Béland, 2009; Hall, 1993; Hogan & Howlett, 2015). To understand this contrast, in the next step, we focus on partisanship around these goals and subsequently zoom in on renewable energy.

3.2.Partisanship around different Policy Goals

When differentiating the four policy goals by party (as done in Fig. 4), we gain new insights on the partisanship of each goal. Our analysis reveals that the goal of reducing the environmental footprint of energy provision was important for all parties (ranging from 39% to 52% of all arguments made by a party). This lack of partisanship around this goal reflects that, in Germany, none of the parties in parliament during these legislative periods seriously questioned anthropogenic climate change (Lauber & Jacobsson, 2016). Strengthening the national *energy industry* is also an important energy policy goal for all parties, with the most relative mentions by the center-left (41%) and the Greens (34%), but also by the center-right and free-market party (24% and 25%, respectively), which is somewhat contrary to established expectations. Only the far-left shows a somewhat lower percentage (17%). Note that the far-left party made

many fewer arguments in total, which is partly explained by the rather small group size and the fact that it was not represented in the (Western) German parliament in the first analyzed period. *Energy costs* are a rather important policy goal for the far-left (31%), which mostly refers to the affordability of energy for poor households. For the other parties, this goal is less important (between 16% and 20% of the arguments). Regarding *energy security*, one can see some degree of partisanship between right and left parties. However, the goal does not play a major role in the discourse (compare also Fig. 3).

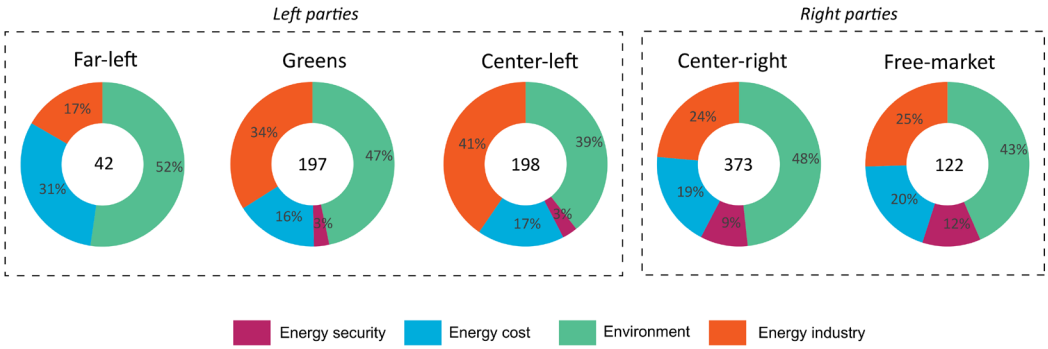

Fig. 4: Partisanship around different energy policy goals. The doughnut charts represent the frequency of arguments on all energy technologies from 1983-2013 in the German parliament, differentiated into the four energy policy goals. The number of coded arguments per party is provided in the center of each doughnut chart.

3.3. The Importance of Policy Goals and Technology Partisanship in Discourse on RET

Zooming in on arguments around RET and analyzing the importance and technology partisanship of the four goals across all three periods, Fig. 5 depicts the frequency distribution of positive and negative arguments along the four policy goals (in %), sorted by political party affiliation.

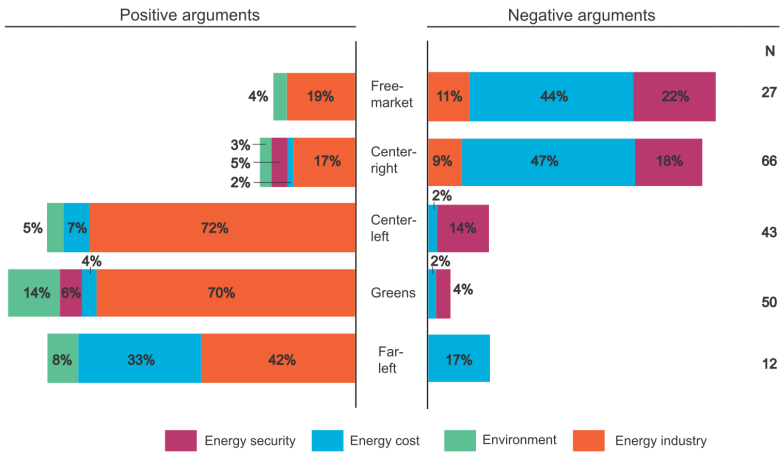

Fig. 5: The distribution of policy goals for RET across parties. Percentage of the frequency of policy goals voiced during public debates on RET from 1983-2013, sorted by political party affiliation and negative/positive arguments.

Four important observations can be made. First, the overall distribution of policy goals shows a clear contrast between left-leaning and right-leaning parties on the question of RET. While 77% and 74% of the free-market and center-right parties' arguments are negative, the center-left, green and far-left parties voiced mostly positive arguments (83% to 94% of their arguments). Second, this technology-partisanship is mostly based on arguments on energy cost and, to a lesser extent, energy security, which are primarily brought forward by the free-market and center-right parties. Third, environmental arguments on RET are all positive and mentioned by all parties in Germany. The number of environmental arguments is, however, relatively low across all parties—including the Greens. Note that this is different in the case of technologies other than RET, which explains the high importance of environment goals shown in Figs. 3 and 4. Fourth, across all parties, energy industry arguments in favor of RET outweigh negative arguments. In each party, they represent the most frequently mentioned positive arguments, indicating consensus rather than partisanship. However, in order to understand the

paradigmatic RET policy change observed from the early 1990s onwards, a temporal disaggregation is needed.

3.4. The Dynamics of Policy Goals' Partisanship in Discourse on RET

Fig. 6 shows the evolution of arguments on RET made by right vis-à-vis left parties over the three analyzed periods. We aggregate individual parties to these clusters, given their technology preference (cf. Fig. 5). Statements in favor of, or against, RET were made frequently in the German parliamentary discourse on future energy systems in all three periods. However, in the first analyzed period, statements were seldom backed up by arguments referring to energy policy goals as these technologies were not well enough known. Hence, our analysis identifies only a very low number of arguments (6 on the right and 8 on the left party spectrum) for that time-span and should thus be interpreted with caution. In the second and third period, statements are backed up by arguments relating to energy policy goals to a much greater extent, potentially reflecting policy makers' increased experience with and knowledge of RET technologies.

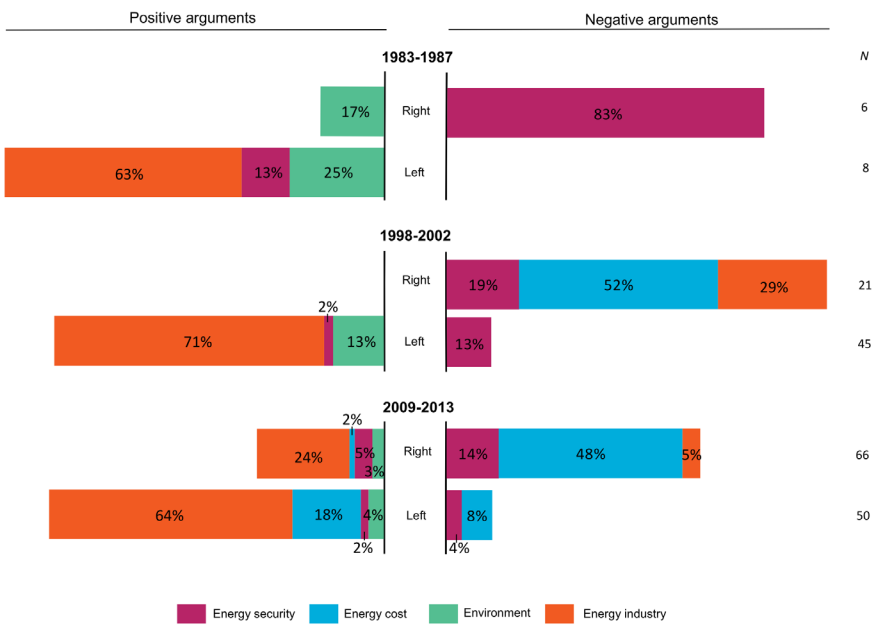

Fig. 6: The evolution of the distribution of policy goals for RET across parties. Percentage of the frequency of policy goals voiced on RET in the German parliament sorted by political party affiliation, negative/positive arguments, and time period. Right parties are: free-market and center-right, left parties are: center-left, Greens and far-left

In the second period, we observe strong overall partisanship around RET between left and right parties. Whereas left parties' arguments are 86% in favor of RET, right-wing parties fully oppose RET. When differentiating by energy policy goals, we observe no partisanship around energy security as both parties stressed the issue of intermittency of renewables, that is, the fact that wind and solar energy fluctuate due to weather changes and the day/night shift. The other three goals experienced partisanship. The environment goal was mentioned by left parties only and not at all by right parties. The opposite was the case for the goal of limiting energy cost, which was frequently mentioned by right parties but omitted by left parties. Interestingly, in the second analyzed period, we also observe strong partisanship around the energy industry goal. Analyzing the individual coded statements reveals that left parties saw RET as key technologies to strengthen the German energy industry, thereby creating jobs and export

potentials (see Table A.3 in the appendix). In contrast, right parties were skeptical of whether RET could help in keeping the energy technology industry competitive.

In the third period, we observe a different picture. While the left parties made a similar share of arguments in favor of RET (88%) as in the second period and again mostly related to the energy industry goal, arguments in favor of RET could also be found on the right party spectrum (with 34% of all arguments being positive). Interestingly, more than two-thirds of these positive arguments refer to energy industry goals. The left party-backed renewable energy policies had managed to create a significant number of jobs, thereby converting the position of the originally skeptical right parties. Note that in the third period, the parties' cost-related arguments against RET mostly referred explicitly to the accumulated costs of the German Renewable Energy Sources Act, which were passed on to the consumer via a surcharge on the electricity tariff, rather than referring to the general cost of the technologies (as was mostly the case in the early periods, see Table A.3 in the appendix). These developments indicate that across the three periods, a significant shift in the perception of RET's potential contribution to the policy goals of increasing the competitiveness of the national energy technology industry and reducing the costs of electricity supply occurred.

4. Discussion

Reaching the Paris targets and preventing dangerous levels of climate change requires paradigmatic changes in many nations' energy policies. Analyzing national energy policy discourse can help understand the politics involved in policy change. In the end, these national politics drive each country's greenhouse gas mitigation ambitions, which, in turn, will

determine the success of the Paris Agreement. First and foremost, our analysis reveals that the energy policy discourse in Germany was not only centered around the three "classic" energy policy targets discussed in energy policy literature, namely limiting the cost and reducing environmental burden while securing energy supply, but also a fourth goal, increasing the competitiveness of the national energy technology industry. When deciding on future energy systems, national economic benefits in the form of gross domestic product (GDP) and jobs within the energy supply and related technology sectors seem to matter at least as much as environmental concerns. This has important implications for future research. While several scholars have observed the importance of (green) energy industrial policy (Meckling et al., 2015; Rodrik, 2014; Schmidt and Huenteler, 2016), most (economics-oriented but also political science) energy policy literature has thus far overlooked this fourth policy goal (e.g., Gunningham, 2013; Heffron, McCauley, & Sovacool, 2015; La Viña, Tan, Guanzon, Caleda, & Ang, 2018; Winzer, 2012). In the light of our findings, some scholars seem to overestimate the role of environmental co-benefits of low-carbon energy technologies as driver for ambitious policy. The case of Chinese air pollution co-benefits, in particular, is relatively prominent in the literature (Aunan, Fang, Hu, Seip, & Vennemo, 2006; Aunan, Fang, Vennemo, Oye, & Seip, 2004; He et al., 2010). Climate policy in China is, however, strongly interlinked (and driven) by industrial policy (The Economist, 2015). Two reasons may explain the fact that the industrial policy aspect is underrepresented in energy policy literature: (*i*) discourse analyses specifically focusing on energy policy goals are thus far lacking, and (*ii*) the energy industry goal is typically not regarded as part of the energy, but rather the industry or economic, policy domain. Our analysis reveals that the political discourse on future energy systems indeed transcends into

the domain of industrial and economic policy. Importantly, this political reality should be acknowledged by future academic and practice-oriented research as it is this reality that, in the end, determines the potential for paradigmatic policy change. Ignoring it may result in unrealistic policy recommendations or in missing potential levers for policy change (see Section 6), which we cannot afford, given the urgency of the problem (Figueres et al., 2017).

A second finding of our analysis is that the relative importance of the four high-level policy goals is relatively stable and that partisanship is limited (see Fig. 4). This has implications for theoretical assumptions about paradigmatic policy change: although we did not find shifts in high-level goals or paradigms, nevertheless, paradigmatic policy change took place in Germany. This finding directly contradicts Hall's (1993) "top-down" conceptualization of paradigmatic policy change. Rather than being the result of changing high-level policy goals, the introduction and continuation of the German Renewable Energy Sources Act was the result of changing ideas about technologies: in our analysis of arguments on RET, we find changing technology-specific goals. In our view, this finding implies that linking policy dynamics with changing policy goals requires a fine-grained analysis of ideas and discourse on different levels of abstraction. In our specific case, we focused on the discourse around technology groups.

When focusing on the discourse around RET, we also observe that the partisanship between left and right parties decreased over time. In our view, this enabled the German Renewable Energy Sources Act to survive two government changes over our period of investigation. The main driver was that arguments on the energy industry policy goal shifted from negative to

positive arguments within the right parties. The German Renewable Energy Sources Act resulted in the build-up of a sizable RET industry, creating almost 380,000 jobs up to 2012 (Pegels & Lütkenhorst, 2014). This policy-induced positive feedback dynamic (Schmidt & Sewerin, 2017) helps explain why, after the change in government in 2009 when the right parties came to power, the Renewable Energy Sources Act remained in place—in contrast to the nuclear phase-out policy, which was abandoned and only re-introduced after the external shock of Fukushima. Positive feedback can also be observed regarding cost (Schmidt & Sewerin, 2017). While the cost of RET, particularly photovoltaics, were extremely high when Germany introduced the Renewable Energy Sources Act, the cost declined by approximately 90% for solar photovoltaics between 1990 and 2010 (Wirth, 2018) due to induced technological innovation and economies of scale (Peters, Schneider, Griesshaber, & Hoffmann, 2012; Trancik et al., 2015). Note that this positive feedback spills over to other countries where it can increase policy ambition (Schmidt & Sewerin, 2017). If technologies conform to existing policy goals, such as limiting the cost of energy provision through innovation, fundamental shifts to policymakers' paradigms and overcoming partisanship around policy goals (as was the case in Germany) are no longer required to achieve paradigmatic policy change.

5. Conclusion and implications for national energy policy under the Paris Agreement

Considering the restricted empirical coverage of our analysis and the selection of an "extreme case" (Seawright & Gerring, 2008) for our exploratory study, one should be careful when deriving general policy implications. However, the energy industry policy goal, its relative importance for policy-makers, and positive feedback effects should also be relevant for

policymakers in other countries or jurisdictions, reflecting the sector's economic importance. Annual global investments into the energy supply chain totaled above USD 1.7tn in 2016 (IEA, 2017), with additional investments created in the industries providing energy technologies and manufacturing equipment (Wei, Patadia, & Kammen, 2010). These industries also contribute substantially to job creation; for example, more than 10 million people globally are employed in the RET supply chain alone (IRENA, 2018). These economic considerations are particularly relevant in emerging economies (Schmidt and Huenteler, 2016; Winkler and Marquand, 2009) where economic development through the localization of job and GDP-generating industries is often the paramount policy goal (Altenburg & Lütkenhorst, 2015).

Our results reveal that no major shift in the importance of high-level policy goals preceded the paradigmatic policy change in Germany. Instead of shifts in high-level goals of policy-makers, it was rather that RET increasingly conformed to the existing high-level goals, mainly through reduced costs, industry formation, and job creation. In this sense, technological change, by changing lower-level, technology-specific goals, helped to overcome partisanship. This presents an opportunity to utilize a non-partisan logic and help remove potential barriers to ambitious climate policy. The more governments realize that low-carbon energy policy can result in economic opportunity, the more likely they will further raise their climate ambition to compete in the industrial race to a low-carbon economy (Meckling et al., 2015; Obama, 2017; Schmidt & Sewerin, 2017). China, which has already increased its Nationally Determined Contribution (Climate Action Tracker, 2018), provides an excellent showcase of a country turning into a strong driver of international climate policy. Its plan to phase out the internal combustion engine, which is driven by industry leadership considerations in the transport sector (Wang,

Sperling, Tal, & Fang, 2017; Watson, Byrne, Ockwell, & Stua, 2015), is a prime example of how industry arguments can result in higher climate ambition.

Industry arguments may also be highly important in countries troubled by partisanship around climate change, like the United States (Farrell, 2016; Howe, Mildenberger, Marlon, & Leiserowitz, 2015; Mildenberger et al., 2017). On the one hand, the more political actors realize that low-carbon alternatives can save cost while increasing local value creation and create jobs, the higher the probability that partisan differences over climate ambition will fade into the background. In turn, this can lead to more ambitious (sub)national policies, as for example in the case of wind energy in the US, which has high generation shares in several Republican-dominated states. Thus, factoring in the industry policy goal is crucial for understanding (potential) drivers of climate ambition. Importantly, economic opportunities can be harnessed at various places across the low-carbon industry value chains (Schmidt and Huenteler, 2016). On the other hand, existing industry players and logics can derail climate ambition (Moe, 2010). To prevent vested interests, such as greenhouse gas emissions-intensive industries, from blocking structural change, policy has to create alternatives for those industries. One example is coal mining: because it provides relatively high shares of GDP and jobs in some jurisdictions, the industry can have strong political power, e.g., in West Virginia, Australia, India, China or South Africa (Carley, Evans, & Konisky, 2018; Spencer et al., 2018; Winkler & Marquand, 2009). Yet, even if coal mining's share in terms of jobs and GDP is negligible across the whole economy (as in the US), it might still carry enough weight to influence some political actors (Vona, 2019).

In the case of the US, intensive lobbying by the fossil-fuel industry has led to arguments against low-carbon energy alternatives having a relatively high importance in the political discourse. Similarly, when arguments about the perceived high costs of RET are not countered by a strong case for their economic opportunities, it becomes easier for fossil-fuel proponents to tilt the political debate (Lauber & Jacobsson, 2016). It has been argued that implementing RET support policies is an effective strategy to overcome the political power of the fossil fuel industry, which is, for example, manifested in the high amounts of fossil-fuel subsidies and the difficulties in reforming them (Matsuo & Schmidt, 2017; Schmidt, Matsuo, & Michaelowa, 2017). The economic effects induced by RET policies can help build "green coalitions" that counterbalance political weights and further reduce the cost of RET (Meckling et al., 2015; Meckling, Sterner, & Wagner, 2017; Schmidt & Sewerin, 2017). Such a strategy might ultimately enable paradigmatic policy change, even in the area of fossil-fuel subsidy reform.

On the international level, institutions related to the Paris Agreement and beyond, should internalize these political realities and actively engage with the opportunities presented by the importance of the industry policy goal. To foster opportunity-seeking, international finance institutions, such as the Green Climate Fund or the World Bank, should base their selection of policies or projects to support not only on the criteria of emission reductions and abatement cost but also on the creation of a local low-carbon industry. Similarly, in technology needs assessments (Charlery & Trærup, 2019), the UN Technology Mechanism should highlight where, in low-carbon industry value chains, countries can realize economic opportunities. Also, large

parts of the climate consulting industry seems to be very much focused on climate benefits and co-benefits for the local environment and security of supply. Given the importance of the industry dimension, they should include this dimension in their consulting services. For example, information tools, such as the Climate Action Tracker (Climate Action Tracker, 2018), should in future also track GDP and job creation induced by policy intervention to reveal economic opportunities of low-carbon industries.

To conclude, low carbon energy policy is driven by (at least) four potentially conflicting goals. The better low-carbon energy technologies can address these goals and avoid conflict between them, the more ambitious low carbon energy and climate policy will be. At the same time, new technologies need time and policy support to develop. Hence, a realistic policy strategy to achieve the Paris targets should build on policy-technology feedbacks: starting with incremental policy change, then ratcheting up policy ambition over time, to ultimately achieve paradigmatic policy change.

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