Choosing Who to Foot the Bill: Distributional Politics of Green Energy Transition in Germany and the UK

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Abstract

Green energy transition is inherently a distributional phenomenon. The government can shape how the costs and benefits of this transition are allocated among society and the market in a variety of ways. I refer to these interventions as distributive strategies, which include economization, redistribution, and compensation. Variations in the use of these strategies can have a significant impact on the spread of the costs and benefits of green energy transition i) between consumers-producers, ii) among consumers, and iii) between consumers-taxpayers. For instance, in Germany, the transition disproportionately benefitted renewable energy producers in comparison to the UK due to insufficient economization. Additionally, excessive redistribution in Germany led to an imbalance in burden-sharing, favoring industry at the expense of other renewable energy consumers, such as households—something less pronounced in the UK. Finally, Germany's comprehensive compensation schemes spread the costs of the transition more broadly than in the UK. Such cross-case variations raise critical questions about the equity of green energy transition: Why are the costs and benefits distributed disproportionately in one country but not in another? What compromises its fairness? And what determines the use of strategies that dictate distributional outcomes? This research seeks to answer these questions by studying the green energy transition in two countries frequently examined in the comparative political economy literature: Germany and the UK. By situating partisan politics, electoral dynamics, and interest group dynamics within a framework akin to public choice analysis, the study explores the interplay between political parties, renewable energy consumers and producers, and taxpayers. I argue that Germany and the UK employed different distributive strategies due to the differences in the two key dimensions of this framework: (i) the partisan orientation of ruling political parties, and (ii) the organized interests of consumer and producer groups, as well as taxpayers. In addition, I demonstrate how contingent dynamics associated with these variables affected the cross-case differences in outcomes.

Keywords: Green energy transition, distributional politics, public policy, energy policy, renewables, comparative political economy, Germany, United Kingdom

I. Introduction

Green energy transition is inherently a distributional phenomenon: Typically, it imposes short-term costs on energy consumers due to the early cost of immature renewable technologies, while benefitting renewable energy producers. However, by pursuing different distributive strategies, the government can shape how the costs and benefits of the transition are allocated among actors in society and the market in a variety of ways. To illustrate, the government can minimize the cost of energy transition for consumers by using cost-effective policy instruments that maximize energy output with minimum fiscal burden. In this way, it can reduce the transfer of wealth from consumers to producers. The government can also determine the burden-sharing of the transition among consumers by shifting its costs from one consumer group to another. Furthermore, the government can also shape the distribution of energy transition expenses between renewable energy consumers vs. taxpayers by deciding how it is financed — either passing costs directly onto consumers through electricity bills or using state revenues to fund transition. These are

three main distributive strategies which I refer to as economization, redistribution, and compensation respectively.

Differences in the use of these strategies can have a significant impact on the distribution of the costs and benefits of green energy transition i) between consumers-producers, ii) among consumers, and iii) between consumers-taxpayers. Consider, for instance, the contrasting distributional outcomes of green energy transition in Germany and the UK. In Germany, insufficient economization benefitted renewable energy producers disproportionally at the expense of renewable energy consumers. By contrast, economization efforts in the UK helped the protection of renewable energy consumers. Additionally, in Germany, excessive redistribution due to generous exemptions granted to industry groups caused non-exempt/privileged consumer groups such as households and small- and medium-sized enterprises (SMEs) to shoulder a greater share of the energy transition. In the UK, the industry was not awarded with such generous exemptions that burdened non-privileged consumer groups disproportionately. Finally, even though both countries primarily financed their green energy transitions by passing costs onto the electricity bills of consumers, they also started to offer compensations from the state budget to alleviate the burden on renewable energy consumers. In particular, this strategy was extensively used in Germany. As a result, the cost of green energy transition began to be spread on a broader base when compared to the UK.

These cross-case variations raise critical questions about the equity of green energy transition: Why are the costs and benefits of the transition disproportionately distributed in one country, but not the other? What compromises fairness in the transition? And what determines the strategies that dictate distributional outcomes? These questions are especially pertinent we consider the nature of green energy transition which is potentially prone to social conflict: Indeed, climate change policies offer long-term returns for everyone on a planet at risk, but their short-term costs may concentrate disproportionally upon different segments of society and the market. This is exemplified by the 2018 yellow vest protests in France —known as *Gilets jaunes*— where thousands of people opposed the environmental tax on fuel as it financially burdened particularly those dependent on commuting. This demonstrates that market and societal actors are not necessarily willing to assume a greater burden-sharing, hindering the popular acceptance of green transition policies. The government has the option to ignore distributional oppositions. Yet, doing so can pose electoral risks. From public policy perspective, the government has also a responsibility to design public policies that minimize social conflict.

This paper aims to investigate the questions above by comparing the cases of green energy transition in Germany and the UK. Although both countries have achieved nearly identical renewable energy targets, they have done so by adopting different distributive strategies. Many factors drive these differences such as natural endowment, fiscal capacity or cost of energy transition itself. However, instead of focusing merely on such obvious structural factors, I offer a more dynamic account by employing a framework akin to public choice analysis at the intersection of the political parties, renewable energy consumers and producers, and taxpayers. I hypothesize that Germany and the UK adopted distributive strategies in their energy transitions differently due to variations in the two dimensions of this framework: i) the partisan orientation of the ruling governments, and ii) organized interests of the groups above-mentioned. In examining these factors, I also consider the impact of associated contingent dynamics.

My study finds substantial support, albeit with varying strengths: In Germany, economization was weaker compared to the UK due to unfavorable conditions such as a relatively strong renewable energy producer group that resisted the economical use of financial resources in the energy transition, and political parties' partisanship that favored producers against the interests of renewable energy consumers.

As to redistribution, it occurred on a greater scale in Germany because the country had more favorable conditions for it than the UK like a strongly organized industry and a political system that gave precedence to the interests of industry over those of non-privileged consumer groups. By contrast, the influence of the British industry on economic policy making was more limited. Furthermore, an anti-redistribution tendency prevailed in the UK political system, curtailing the feasibility of achieving energy transition by redistributing the costs to households and other non-privileged consumer groups, as was done in Germany.

Unlike Germany, the UK barely shifted the cost of its energy transition to taxpayers through compensation. Contingent dynamics pertaining to fiscal capacity, the sequencing of distributive strategies, and exigent situations like energy crises better explain cross-case variations in the use of compensation. Yet, more specific public choice dynamics also played a role such as . For example, in Germany the ruling German governments' intent to relieve non-privileged consumers, particularly the SMEs, and UK governments' reluctance to use the state budget for policy interventions, including green transition.

Following this introduction, I present a theoretical framework, including a review of the relevant literature. The subsequent section outlines methodological toolkits that inform my research. In the fourth section, I present the cross-case differences in detail. Sections five, six, and seven provide a substantive examination of each distributive strategy, exploring why the two countries adopted different approaches. Finally, the concluding section summarizes my findings and discusses broader insights within the field of comparative political economy.

II. Theoretical Framework

Previous research

Scholars have extensively studied the distributional politics of energy transition. A significant portion of this research focuses on the negative influence of carbon-intensive industries on climate change policies (Anger, Böhringer and Oberndorfer, 2008, Harrison, 2012, Cao, 2012, Cheon and Urpelainen, 2013, Hughes and Urpelainen, 2015, Harrison, 2015, Stokes, 2015, Downie, 2017, Mildenberger, 2020). However, there are also studies that explore the power of green energy sectors in shaping climate change policies (Michaelowa, 2005; Cao, 2012, Cheon and Urpelainen, 2013).

Within the broader literature of energy justice (e.g., Carley and Konisky, 2020), scholars also focus on social equity perspective. More specifically, these studies show how the burden of climate mitigation policies spreads across different segments of society, especially by income bracket (Neuhoff et. al., 2013, Farrell and Lyons, 2015, Frondel et. al., 2015, Grover and Daniels, 2017, Mastropietro, 2019, Lamb, et al., 2020 and Böhringer et. al., 2022). In the same vein, some scholars examine the cost of energy transition for consumers as a factor influencing policy designs (Finon and Perez, 2007, Grösche and Schröder, 2014). The literature also feature studies that approach the issue of distributional

politics through the lenses of other perspectives such as political institutions (Finnegan, 2022).

This paper advances the existing scholarship by introducing a new theoretical framework: "distributive strategies". There are certain patterns through which the cost and benefits of energy transition across society and the market are actively shaped by the hand of the government. I refer to these patterns as distributive strategies. This framework makes two key contributions to the study of distributional politics. First, it enables the observation of multidimensional distributional politics, highlighting actors and their associated payoffs in the policy-making process. This analytically helps identify potential points of social conflict as policymakers navigate the contentious nature of the green energy transition. At the same time, the framework demonstrates how distributional politics can turn into a powerful policy intervention in the hands of the government, especially in choosing who to foot the bill in green energy transition.

Another advantage of employing "distributive strategies" lies in its explanatory power. The process-oriented approach here provides insights into how particular distributional outcomes result from successive and sometimes contingent public policy dynamics in which some parties, aware of the payoff structures, could advance their interests, whereas others fail to act. Using the framework, one can trace specific distributional outcomes to the differential resource structures of competing groups, their ability to shape political preferences, and their capacity for action.

Finally, this research makes a substantive contribution to the comparative political economy literature in which environmental policies of Germany and the UK have been frequently studied (Mitchell and Connor, 2004, Nolden, 2013, Hall, Foxon, and Bolton, 2015, and Ćetković and Buzogány, 2016). My case studies explain the cross-case differences in question by accounting for varying public choice dynamics in the two countries. In doing so, the study adds a fresh perspective on alternative pathways to green energy transition within the existing comparative political economy literature.

Distributive strategies: Redistribution, compensation, and economization

To construct my taxonomy of distributive strategies, I utilize conventional terminology on distributional politics in political economy literature (see, e.g., Bossert and Fleurbaey, 1996, Bradley, David, et al., 2003, Iversen and Soskice, 2009, and Thewissen, 2014): While almost every public policy has distributive impacts, the government may sometimes intervene to adjust these impacts. Redistribution denotes such governmental interventions that reshuffle the costs or benefits of an existing policy from one socio-economic group to another. Compensation, on the other hand, involve policies that reimburse specific socio-economic groups that incur losses during a policy implementation process.

I also add economization as a separate distributive strategy, considering that this strategy also shapes how wealth and cost are distributed among consumer and producer groups during energy transition. In essence, economization involves employing cost-effective policy instruments that promote renewables while imposing the least economic burden on electricity consumers. Finally, I consider ignoring (Lindvall, 2017) as a latent strategy, reflecting status quo distributional outcomes which the government does not intervene to rectify. However, given its latent presence in my research, I mostly focus on the other three distributive strategies. While measuring the costs and benefits of energy transition, I exclusively refer to financial transactions made through electricity bills to

promote renewable energy. Otherwise, the cost and benefit implications of the energy transition are much more complex and multidimensional.[1]

A public policy perspective: Political parties and competing interest groups

At any *t* point of an energy transition, the government is likely to employ varied combinations of these distributive strategies, resulting in different configurations of payoffs for renewable electricity consumers and producers who also correspond to distinct strata within tax base (for an illustration see a simplified diagram in the *Appendix I*). What explains a country's adoption of a specific configuration of distributive strategies during its energy transition? Elucidating this question is undoubtedly a convoluted task given the complex causal mechanisms at play: To tackle this, I employ a parsimonious explanatory framework, partially grounded in public choice analysis. In public choice, the government often serves as a broker while multiple actors with competing interests seek to influence policy outcomes in their favor.[2] In my own framework I treat the government as a non-unitary entity consisting of political parties with different partisan orientation: Political parties often confront several policy dilemmas regarding how to distribute the cost and benefits of energy transition. I study their endorsement for a particular distributive strategy —whether economization, redistribution, or compensation— as a function of that strategy's distributional implications as each strategy can appeal to distinct consumer and producer groups, and taxpayers within their electoral base.

To operationalize this framework and produce variable-driven research, I specifically focus on two variables: i) partisan orientation and ii) organized interests. These two dimensions of public choice are closely intertwined with one another: In many cases, they correlate, but they are not the same.[3] Similar to the logic of conventional left-right spectrum, I operationalize partisanship as conventional leanings of governing political parties to align with specific consumer or producer groups — e.g., a pro-business political party associating itself with a specific producer group. I also examine the role of organized interests associated with renewable energy consumers, producers, and taxpayers. By organized interests, I refer to the capacity of these groups, including the latent one, to collectively mobilize and influence policy outcomes in their favor.

On the other hand, the explanatory power of these two variables can be sometimes limited, as their stable nature may conflict with the variability of phenomena being studied. Thus, I also turn to additional explanatory variables that can mediate and interact with these two variables, focusing on contingent dynamics.[4] As different from partisan shifts, such dynamics do not make political parties necessarily pro-consumer, producer or taxpayers but make them tentatively align their electoral interests with economic interests of these groups (e.g., high energy efficiency rendering policy makers be complacent about excess costs of policies inadvertently against the interests of consumers). In the context of organized interests, contingent dynamics can also apply if such dynamics make groups mobilize disproportionately against and for a distributive strategy they would typically support or oppose under normal circumstances (e.g., lack of opposition due to side payments or cooptation).

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[1] See Trax X2.
[2] For the literature on public choice in the context of green energy transition, see, e.g., Gawel et al., 2014.
[3] For an illustration, see TRAX X11
[4] For other possible rival explanations see Trax X12

Studying contingent dynamics as a broad, —partially as a residual variable that can encompass many factors influencing the calculations of policymakers— enables a comprehensive account of dynamics shaping distributive strategies. At the same time, however, juxtaposing them vis-à-vis public choice dynamics also help study of distributive strategies from competing explanations perspective. In this way, political analysis here offers an investigation of whether public choice dynamics or contingent dynamics have played a more decisive role in shaping the outcomes. The following subsections first outline specific favorable conditions for each distributive strategy and then associated rival theoretical expectations.

Economization

In terms of economization, the primary policy choice dilemma in energy transition for political parties lies in striking a balance between consumer and producer groups: A typical energy transition usually inflicts short-term costs on renewable electricity consumers, whereas producers benefit from the process. Considering these dynamics, it is possible to configure favorable conditions for economization and associated rival theoretical expectations as follows:

Table 1. Configuration of Favorable Conditions for Economization

Partisanship	**Organized interests**		**Contingent dynamics**
i) favoring consumers over producers	ii) powerful for consumers	iii) limited for producers	iv) facilitating economization

H_{1a}: *The UK economized its energy transition more than Germany because the favorable public policy conditions for economization were stronger in the UK.*

H_{1b}: *The UK economized its energy transition more than Germany because the favorable contingent conditions for economization were stronger in the UK.*

Redistribution

Unlike economization, redistribution only concerns costs and how these costs are allocated among different consumer groups. Here, the central policy dilemma for political parties pertains to the fairness of energy transition while spreading its burden across different societal segments. A strong industry —that will be exempted from subsidy costs— is likely to advocate for less burden-sharing through more redistribution, whereas other non-exempt consumer groups like households or small commercial companies should resist covering the tab left by the industry. Taking these dynamics into account, it is possible to configure favorable conditions for redistribution and associated rival theoretical expectations as follows:

Table 2. Configuration of Favorable Conditions for Redistribution

Partisanship	**Organized interests**	**Contingent dynamics**

i) favoring exempt industrial consumers over non-exempt consumers	ii) powerful for exempt industrial consumers	iii) limited for non-exempt consumers	iv) facilitating redistribution

H_{2a}: *Germany redistributed the cost of its energy transition from its EIIs to non-privileged consumer groups more relative to the UK because the favorable public policy conditions for redistribution were stronger in Germany.*

H_{2b}: *Germany redistributed the cost of its energy transition from its EIIs to non-privileged consumer groups more relative to the UK because the favorable contingency conditions for redistribution were stronger in Germany.*

Compensation

Promoting renewables can have regressive outcomes, as renewable subsidy charges are typically reflected in electricity bills at a flat rate —regardless of income and revenue. Compensation schemes whose financing draws on progressive taxation can counterbalance these effects. If the organized interests of consumer groups demanding progressive financing are powerful and the partisanship of the government is favorable to defending their interests, then compensation is more likely. Given that taxpayers' money is used, their organized interests and political representation are also crucial. Given these dynamics, it is possible to configure favorable conditions for compensation and associated rival theoretical expectations as follows:

Table 1. Configuration of Favorable Conditions for Compensation

Partisanship	**Organized interests**		**Contingent dynamics**
i) favoring renewable energy consumers over taxpayers	ii) powerful for renewable energy consumers	iii) limited for taxpayers	iv) facilitating compensation

H_{3a}: *Germany compensated its electricity consumers more than the UK because the favorable public policy conditions for redistribution were stronger in Germany.*

H_{3b}: *Germany compensated its electricity consumers more than the UK because the favorable contingency conditions for redistribution were stronger in Germany.*

III. Methodology

I employ an empirical strategy that leverages the cross-case variation between Germany and the UK within a comparative case study design. When conditions are not comparable enough, I incorporate counterfactual analysis as well.[5] These countries present two comparable cases that have achieved similar renewable energy targets by pursuing contrasting distributive strategies. Also, their political and economic structures exhibit variations in public choice dynamics as the explanation of interest. Though my empirical strategy focuses on cross-case variation, I provide sufficient contextual data, aligning with the nature of case study.

[5] See Trax 561

Additionally, I employ Bayesian analysis for qualitative research as a shadow causal identification strategy. This approach not only facilitates more systematic data collection from a quantitative perspective but also helps minimize issues with missing or incomparable data—problems that often undermine the most similar case design and internal validity in comparative research. Finally, it also allows me to evaluate the relative strength of competing explanations vis-à-vis each other within my explanatory framework. I present a detailed discussion of my Bayesian analysis in the *Appendix III*.

The empirical basis for this study is built on extensive and intensive qualitative data collection, which primarily consists of i) 67 semi-structured interviews with knowledgeable individuals and experts from business, politics, and non-governmental organizations and ii) a systematic investigation of two core data sources. I cite interview data anonymously, but the list of interviewees can be found in the *Appendix II*.

The two core data sources include news coverage and parliamentary documents. For news coverage, I utilized the Nexis Uni database.[6] To obtain data on political party stances and partisanship, I relied on parliamentary sources, which draw on the documents in the German Bundestag's data source *DIP*[7] and the British Parliament Westminster's digital library *Hansard*[8]. I also supplemented these sources with additional data from academic and gray literature.

More details about these data sources are available in Transparency Appendix (TRAX) where I maintain raw empirical data in a publicly accessible repository.[9] There are frequent references to the TRAX in footnotes throughout the paper.[10] Using TRAX enables deployment of rich qualitative data while preserving their context and showing empirical sources behind my analysis.[11]

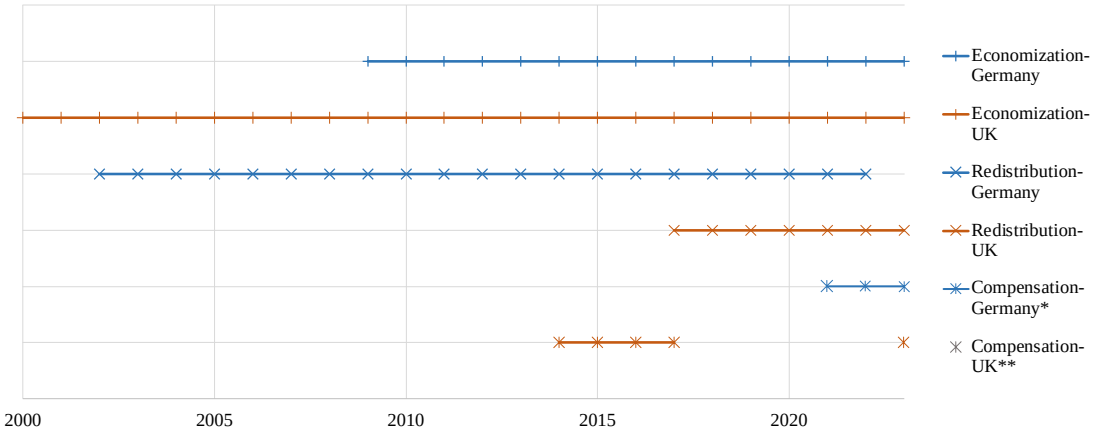
IV. Temporal variations and associated payoff structures in cross-case differences

The trajectories of green transition in Germany and the UK display different combinations of distributive strategies. One notable difference is in economization: Despite launching its transition much later, the UK was quick to adopt cost-effective measures to reduce the cost of its energy transition policies. In contrast, Germany' economization efforts primarily developed in response to escalating policy expenses from 2009 onward. Second, redistribution also diverged significantly. It was a defining feature of the German energy transition since the early 2000s, whereas it was not implemented until 2016 in the UK. Finally, both Germany and the UK introduced compensation schemes recently but the schemes in the UK were short-lived —being offered only during the exigency of 2022 energy crisis. In contrast to the UK, the schemes were introduced as long-term policy instruments. While the graph below (Figure 1) mostly details the variation in the temporal

[6] To see details about search terms, see Trax 001.
[7] Das Dokumentations- und Informationssystem für Parlamentsmaterialien (DIP), see https://dip.bundestag.de/.
[8] Hansard, https://hansard.parliament.uk/.
[9] The dataset for this will be at: Hecan, Mehmet, 2023, "Transparency Appendix (TRAX) for Distributional Politics of Green Energy Transition in Europe", https://doi.org/10.7910/DVN/RWL30A, *Harvard Dataverse.*
[10] See another application: Cambridge University Press, 2024, "Annotation for Transparent Inquiry (ATI)", https://www.cambridge.org/core/services/authors/annotation-for-transparent-inquiry-ati.
[11] See Jacobs et al. 2021.

dimension of distributive strategies, there exist additional variations, including relative ones, in the extent of these strategies, which are detailed in the next sections.

Figure 1. Use of Distributive Strategies over Years in Germany and UK



*The compensations in 2021 and 2022 were partial.
**The UK compensations during 2014-2017 were sepcifically given the EIIs.

The configuration of these strategies had significant implications for the distribution of costs and benefits of the energy transition i) between consumer and producer groups, ii) among different consumer groups,[12] and iii) between consumers and taxpayers. In Germany, for instance, the limited success in economization pitted the interests of consumers against those of producers. Additionally, redistribution practices also led to a different balance among consumer groups, favoring the industry heavily, while leaving non-privileged consumer groups overburdened. Another imbalance also emerged depending on whether the expenses of energy transition were kept to the narrower base of renewable energy consumers or spread across the broader base of taxpayers. Despite the high price tag of its energy transition over years, the recent introduction of comprehensive compensation schemes funded through the tax base made the Germany's energy transition more progressive in social terms (Table 4). In the sections below, I trace the cross-case differences in the use of distributive strategies to the variation in the different dimensions of public choice dynamics.

[12] For a discussion see Chang et al., 2010.

Table 4. Balance between Consumer-Producer Groups and among Consumer Groups

	Consumers-Producers Balance	**Within-Consumers Balance**	**Consumers-Taxpayers Balance**
Germany	Imbalanced to the favor of producers	-Industry privileged generously -Non-privileged* consumer groups overburdened**	Imbalanced to the interests of taxpayers
The UK	Imbalanced to the favor of consumers***	-Industry privileged moderately - Non-privileged* consumer groups protected	Imbalanced to the interests of consumers
	*Households, non-exempt commercial users **Though compensation schemes have alleviated the overburden recently ***Though there is improvement in the balance over time, especially starting in the late 2000s		

V. Economizing green energy transition

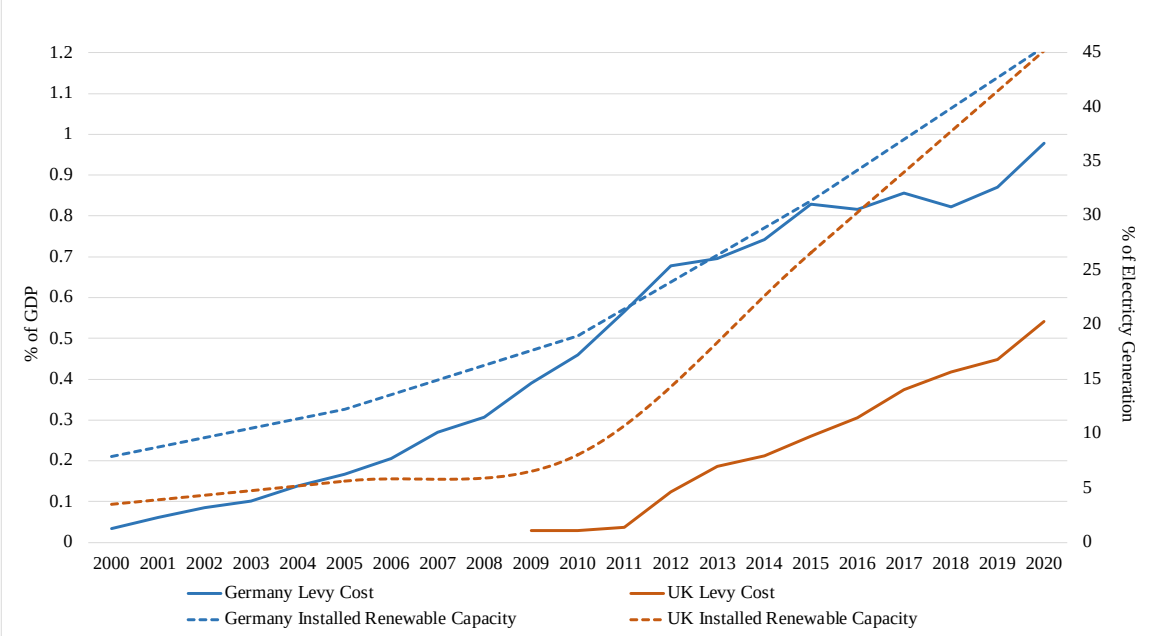
Overspending characterized the German energy transition. Compared to the UK, Germany spent more relative to its installed capacity of renewables. Resource endowment positively contributed to the UK's success in promoting renewables cost-effectively, especially onshore and offshore winds. However, even with this accounted for,[13] overspending remained an endemic problem in Germany. The country started to promote renewables when their technologies were expensive. Germany also chose policy instruments such as feed-in-tariff which prioritized fast deployment of renewables over economization. By contrast, the UK accelerated its energy transition when renewables were less costly in the late 2000s. The country also employed policy-instruments such as auctioning which prioritized economization over acceleration. As a result, the country achieved its energy transition at a lower cost (Table 5). The relative indicators also show that Germany used almost 1% of its GDP whereas the UK used a little more than 0.5% to reach comparable renewable installation capacities in electricity generation —~45% (Figure 2).

Table 5. Comparative Levy Costs over Years in Million Euros

	2010	**2015**	**2020**
Germany Levy cost	12,789.60	25,089.72	30,297.84
UK levy Cost	598.81	6,898.16	11,505.36
Source: Author's own compilation, see Trax 160			

[13] Trax 002

Figure 1. Cost of Environmental Subsidies in Relative Terms



Why did both countries have different choices of policy instruments and timing in their energy transitions? Answering these questions is key to explaining their different experiences in economization. In public choice dynamics, economization is most likely when ruling partisanship favors renewable energy consumers over producers and/or when renewable energy consumers have stronger organized interests (H_{1a}). Alternatively, when contingent dynamics favoring economization are pronounced, economization is more likely to occur (H_{1b}). Even though these favorable conditions existed in both countries, they were stronger in the UK than Germany. The table 6 below summarizes these differences.

*Table 6. Cross-case Differences in Favorable Conditions for Economization**

	Partisanship	**Organized interests**		**Contingent dynamics**
	favoring consumers over producers	**strong for consumers**	**weak for producers**	**facilitating economization**
Germany	Moderate-	Strong	Weak+	Moderate-
UK	Moderate+	Moderate	Strong-	Moderate-
	*The expressions in boxes indicate whether such favorable conditions are strongly, moderately, or weakly present in each country case. * Ordinal variables based on the numerical estimation and composite metrics used in the Bayesian analysis in the appendix			

The main difference between Germany and the UK lies in the partisan orientation of their ruling governments: Though both countries had moderately partisan governments favoring renewable energy consumers over producers, this was stronger in the UK. Electoral dynamics necessarily played a crucial role in shaping the balance between pro-

consumer and pro-producer policies, as changes in government composition and associated partisanship led to fluctuations in political support for the green energy transition over the years. Nevertheless, attributing the differences in their economization experiences solely to electoral dynamics would be an oversimplification: Beyond electoral cycles, Germany and the UK exhibited notable ideological and structural differences in their political systems, shaping their distinct pro-consumer and pro-producer tendencies.

In reality, German and British governments did not have fundamental ideological differences in economic policymaking: Both conventionally occupied centrist positions slightly to the right of the political spectrum, with British governments leaning marginally further.[14] Their cautious approach to excessive government spending fostered a cost-conscious policymaking style, which, in turn, reinforced a pro-consumer policy stance by prioritizing energy affordability for both industrial and household consumers. Their environmental policy stances were also largely similar, with both governments maintaining a solid pro-environmental outlook that could be potentially conducive to a pro-producer stance. However, various dynamics compromised their conventional policy stances: In Germany, for instance, the prominence of green industrial policy tilted the balance of the green energy transition in favor of renewable energy producers, whereas in the UK, energy poverty concerns strengthened a pro-consumer stance. Overall, these partisan differences shaped the trajectory of economization in the two countries.

Additionally disparities in organized interests help explain why economization followed different paths in Germany and the UK: Germany had a solid renewable energy sector capable of resisting economization efforts, whereas this was not the case in the UK. Counterintuitively, the consumers that could resist an expensive energy transition was stronger in Germany, due to its robust industry and SMEs. However, a possible opposition from the industry was neutralized through cooptation.

Contingent dynamics that could facilitate or undermine economization—such as energy efficiency, social safety nets, miscalculations, and co-optation—varied in their influence across the two countries. While these dynamics did not necessarily make ruling governments more pro-producer, they led to an anti-consumer bias by prompting policymakers to be complacent about the cost dimension of energy policy. These dynamics were present in both countries but only slightly more prevalent in Germany, thus offering little explanatory value.

Partisan orientation: Pro-producer vs. pro-consumer, and long-term shifts

In Germany, the green transition enjoyed varying levels of support under different coalition governments over the last three decades: CDU/CSU-FDP (1991-1998, 2009-2013), SPD-Greens (1998-2005) and CDU/CSU-SPD (2005-2009, 2013-2021). Understandably, it gained the most momentum when the SPD and the Greens forged a coalition government in 1998. They enacted an ambitious law called *Erneuerbare-Energien-Gesetz* (EEG) in 2000. Though having the same principles as its predecessor *Stromeinspeisungsgesetz*, the EEG removed the caps on renewables so they could be installed without limits.[15] Unlike its predecessor, the EEG also provided complete cost covering for renewable energy producers, significantly enhancing investment security.[16]

[14] Trax 501.
[15] Anonymous interviewee data, and also Trax 011.
[16] Trax 012

However, regardless of alternating coalitional dynamics, close ties existed between the growing green energy sector and many political parties that strengthened the pro-producer stance in the German political system.[17] To illustrate, it was actually a CDU/CSU-FDP government that introduced the 1991 *Electricity Feed-in Law* (*Stromeinspeisungsgesetz*)[18] —known as the hallmark of Germany's ambitious energy transition. At the time, the law came into existence thanks to backbenchers from both the CDU and SPD with links to the renewable energy sector, specifically hydro power.[19] Throughout the 1990s, the pro-business Kohl governments kept the law despite the opposition from Federation of German Industries (*BDI*) which advocated for a voluntary and "less costly" approach to renewable energy promotion.

For German political parties, the existence of a solid green sector generated political incentives to disregard the economic dimension of energy transition, because it was seen as an extension of modern industrial policy. As the green sector thrived in Germany, German political parties increasingly aligned their political base with it.[20] When the costs were relatively low, the public and political support to prop up a niche green sector in the German economy remained widespread and quite strong until the early 2010s: Indeed, before losing their competitive edge to the Chinese companies, German companies used to dominate the global market in photovoltaics. This also included the manufacturers of wind turbines some of which remained the leading players in the global market.[21]

In the presence of this pro-producer bias in the political system, it was relatively difficult to economize the energy transition. This demonstrated itself visibly when the federal government (CDU/CSU-FDP) faced opposition from the federal states (*Länder*) while attempting to introduce sharp cuts to solar subsidies —prompted by declining costs in the global photovoltaic market around the early 2010s. At the time, the government accused the opposition parties Greens, SPD, and Die Linke of pursuing a clientelist policy that prioritized the particularistic interests of the renewable energy sector over the public interest.[22] However, even the CDU/CSU-led states resisted drastic cuts in subsidies.[23] In some cases, intra-party fractions also worked to the interests of renewable energy producers. For instance, in 2009 the German solar sector was able to avert the government's plans to slash subsidies, with the help of two parliamentarians from CDU and SPD with closer links to the sector, despite pressure from the economic wings of their parties —especially in the CDU— to enforce severe cuts.[24]

On the other hand, it would be hard to explain the strong pro-producer stance in the German political system only with partisan shifts, as contingent political dynamics such as popular demand for green policies also played a decisive role. Unlike green industrial policy, popular support for green policies did not necessarily make political parties more pro-producer by shaping their partisan orientation. However, it led to a bias in favor of

[17] Trax 507
[18] See: IEA, "Electricity Feed-In Law of 1991 ("Stromeinspeisungsgesetz")" March 14, 2014, https://www.iea.org/policies/3477-electricity-feed-in-law-of-1991-stromeinspeisungsgesetz.
[19] Trax 507
[20] Trax 507
[21] Trax 508
[22] Trax 024
[23] Trax 020
[24] Trax 019

renewable energy producers, as parties depended on the renewable energy sector for the supply of on-demand green policies:

This is not surprising considering that the German political system has long had a strong environmental pulse and green movement, tracing back to the anti-nuclear protests of the 1970s. Today, for example, Greenpeace has a significant presence in Germany, with one-fifth of its global membership based there.[25] Representing the political interests of the environmental movement, the Greens have remained a force in parliament since the 1980s. Their presence fueled centrifugal competition among centrist parties for the so-called "green vote." In the 2000s and 2010s, the green politics became even more mainstream, with environmentally minded voters turning into an important electoral base that center political parties contested for.[26] The representation of green ideals extended well beyond the Greens and permeated the entire German political spectrum, as parties across the board incorporated environmental programs into their platforms.

While the pro-producer tendency gained traction due to both partisan shifts and contingent dynamics on the one hand, certain factors weakened the pro-consumer stance in Germany on the other. For example, energy poverty remained a relatively underdeveloped notion in German politics, not getting attention as commonly as in the British politics.[27] This dynamic potentially rendered the German political parties less pro-consumer, ultimately influencing the German governments to downplay the cost dimension of the energy transition.

Additionally, there were the impact of other contingent dynamics that could potentially generate a bias at the expense of consumers such as efficiency, social safety net and socio-economic level: As an advanced industrialized country, Germany generally performed well in these areas, reducing the political cost of maintaining an expensive energy transition at the expense of low-income consumers.[28] To illustrate, German households paid one of the highest electricity prices in Europe, but the overall costs were not high, partially due to better energy efficiency.[29,30] In a political landscape closely aligned with industrial interests, the affordability of the energy transition for energy-intensive industries was a far greater concern in Germany. However, as detailed below, the 2003 political compromise that granted industry exemptions largely alleviated these concerns, ultimately securing German industry one of the cheapest electricity prices in Europe.[31]

The reasons above lowered the political cost of an expensive energy transition for the German governments. As a result, the major focus of green energy transition was to expedite rather than to economize it starting in the 1990s. To achieve this, Germany preferred a relatively more interventionist policy instrument called *feed-in-tariff* and did not enforce stringent measures to restrain costs. It also started to promote renewables very early when their technologies were expensive. Germany's early foray into promoting positioned it as a leader in the European energy transition. This also contributed to the emergence of a market on a global scale and other countries benefited from it, but it came

[25] Trax 526
[26] Anonymous interviewee data
[27] Trax 115
[28] Trax 512, 503, and 513
[29] Anonymous interviewee data, also see 512.
[30] Useful for explaining within-case dynamics but not discriminatory for cross-case variation, see Trax 562.
[31] Trax 122

at a price for energy consumers at the domestic level.[32] Acknowledging this, German policymakers criticized their entrance into the market "much too early" and "at a far too high price."[33]

On the other hand, it is difficult to say that energy transition played out as a seamlessly rationalistic process in which policy-makers were fully aware of policy actions and their long-term calculations: In some cases, unrelated to partisan dynamics. insufficient economization in Germany resulted from policymakers' miscalculations. For instance, when the Kohl government introduced the groundbreaking *feed-in tariff*, they did not originally anticipate its widespread and popular adoption.[34] By the end of their tenure, there were already rising concerns and discontent about the cost of renewable subsidies.[35] Subsequent statements from German policymakers further highlight these miscalculations—such as Environment Minister Jurgen Trittin's infamous claim that renewable subsidies would cost citizens merely 'a cup of cappuccino' per month, which proved inaccurate.[36] Similarly, early 2000s predictions that EEG subsidy costs would remain moderate by 2015—i.e., less than ten billion euros— mostly failed.[37]

Unlike Germany, the UK experienced less dynamic variations in governmental compositions due to its electoral institutions favoring one-party governments. Over the last three decades, government compositions included the Labor's one-party governments (1997-2010), the Conservative-Liberal Democrat coalition government (2010-2015) and successive Conservative one-party governments after the 2015 election. The partisanship of these governments did not show notable differences in addressing the interests of renewable energy consumers vis-a-vis producers. However, one distinction from the Germany governments was the firmer ideological stance of British political parties on cost-consciousness.[38] Given these initial differences, stronger pro-green electoral incentives were technically needed to compromise their conventional policy positions. Moreover, such incentives were even weaker in the UK. As a result, ruling parties rarely deviated from prioritizing affordability when designing policy initiatives: When caught up in-between ecological returns of energy transition vs. its short-term economic costs, they prioritized the latter to the benefits of renewable electricity consumers.

The UK's approach to cost control contrasted sharply with Germany's: While Germany sought to curtail the mounting costs of energy transition quite reactively—following sharp increases in subsidy costs in the early 2010s—the UK adopted a proactive stance from the outset. Additionally, Germany's strategy to control costs was based "growth corridors," which assumed a quantitative approach to renewable installations. German policymakers, including Merkel, occasionally articulated *ad hoc* fiscal targets — like 3.5¢ per kWh— but they were not legally mandated.[39] On the other hand, the UK assumed a budgetary approach, promoting renewables only within the predetermined fiscal limits.

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[32] Trax 005, and also anonymous interviewees data.
[33] *Ibid.*
[34] Anonymous interviewee data.
[35] Trax 529
[36] Trax 006, also Trax XXX
[37] Trax 006
[38] Anonymous interviewee data
[39] Trax 046

It would be inaccurate to argue that a political demand for green policies did not exist in the UK. Margaret Thatcher, for instance, was the first major world leader to publicly acknowledge climate change as a challenge.[40] Unlike other free-market economies like the US, Australia and Canada, a strong alliance of conservative ideology and fossil fuel interest did not exist in the UK.[41] Over years, environmentalism also became an important issue area for political parties, culminating in the groundbreaking Climate Law in 2008—the first of its kind among major European countries. Nevertheless, as different from Germany, the existence of support for green policies did not lead to a strong bias in favor or producers: Electoral incentives were not strong enough to offset the political cost of leading an expensive energy transition. The priority of the ruling center parties remained on promoting renewables with the least cost to consumers,[42] rather than fast deployment.

Also, unlike Germany, the UK lacked potential political incentives that could have dislodged the conventional policy positions of the ruling parties such as a sizable renewable energy sector. In addition, the energy poverty as a salient issue encouraged the British policy-makers to pay closer attention to the financial implications of energy transition for consumers. Against this backdrop, the rooted "value for money" understanding also prompted the UK governments to favor policy instruments aimed at cost reduction like auctioning. Thus, instead of the feed-in tariff system which could be costly but more effective in promoting renewables —as in Germany— the Labor governments preferred market-based instruments such as *Non-Fossil Fuel Obligation* (1997) and *Renewable Obligation* (2002): These instruments were less effective in deploying renewables rapidly but at least theoretically better at curbing costs and avoiding over-subsidization.[43]

British policymakers often recognized the inadequacy of these instruments, fearing the country would miss the EU-mandated 10% renewable energy target by 2010. This situation also drove occasional calls to emulate Germany's feed-in tariff system throughout the 2000s.[44] The Labor government resisted such calls for a long time, eventually it adopted the system in 2010, but only after finding that using *Renewable Obligation* for microgeneration incurred enormous administrative costs.[45]

The new government under the premiership of David Cameron (2010-2015) largely continued Labor's policy approach: By default, the Conservatives were even more cost-averse. They attempted to revoke the feed-in tariff system by designating it as an "ill-designed policy" of the former government. However, the coalition dynamics kept the Conservatives submissive to the demands of Liberal Democrats, as in the case of the SPD-Greens coalition government in Germany.[46] In 2012, for instance, when Chancellor George Osborne proposed steep subsidy cuts up to 25% for onshore wind[47] the Energy Secretary Ed Davey countered with a moderate 10% cut, ultimately resulting in a compromise.[48] With that said, if the Greens in Germany is used as a standard for comparison, the influence

[40] Trax 015
[41] Trax 015
[42] Trax 007
[43] Trax 041
[44] *Ibid.*
[45] *Ibid.*
[46] Anonymous interviewee data, Trax 041
[47] This was also partially driven by the Tory backbenchers who opposed turbines in the countryside —i.e., NIMBYSM. See Trax 042.
[48] Trax 043

of Liberal Democrats in the coalition was limited. Liberal Democrats were a substitute at best in lieu of the British Green Party which was only marginally represented in the parliament.[49] The majoritarian electoral system prevented parties outside center parties from shaping the country's green agenda, limiting centrifugal competition for the green votes unlike Germany. Moreover, both Liberal Democrats and Conservatives had ideological affinity for market-orientated policies:[50] Only one year after coming to power, they introduced "Levy Control Framework" to rein in public expenditures funded through electricity bills and preempt any excessive cost.

The potential influence of Liberal Democrats in compromising the Conservatives' stance was also limited to one term. Towards the end of the coalition government, the Conservative Party propagated that they would adopt a low-cost energy transition profile if they could come to power on their own.[51] Indeed, after securing a majority in the 2015 parliamentary elections, they rolled back some subsidy schemes. Enjoying one party government without any challenge from other political parties and local administrations, it was relatively easier for the Conservative government to downsize renewable subsidies compared to a typical German coalition government.[52]

Organized interests

Renewable energy producers encountered severe subsidy cuts across many European countries, particularly in the early 2010s, but they held much weaker position in the UK than Germany while resisting these cuts.[53] Disparities in organized interests also played a role in shaping the divergent trajectories of economization in each country: While not matching that of its traditional industries, the strength of Germany's renewable energy sector was significant and had more institutional power.[54] By 2010, Germany's renewable energy sector employed nearly 400,000 people, a significant increase from 120,000 in the early 2000s, and generated substantial turnover.[55] With the involvement of over 600 citizen-led cooperatives and 80,000 individuals,[56] the highly decentralized nature of Germany's energy transition further added to the strength of renewable energy producers.

There are notable instances where the German renewable producers utilized their sectoral leverage to shape policy outcomes: For instance, in the late 1990s, when the Kohl government proposed capping renewable energy to appease utility companies which were unwilling to purchase expensive wind-generated electricity, the sector mobilized thousands of protesters outside the Bundestag to successfully delay the plan.[57] Likewise, in the early 2010s, the German Solar Association (*Bundesverband Solarwirtschaft*) weaponized mass protests to resist severe subsidy cuts.[58] The effectiveness of contentious politics in securing concessions is debatable, but it demonstrates the sector's leverage to defend its interests.

[49] Trax 015, Trax 560
[50] Trax 561
[51] Trax 044
[52] Trax X7
[53] Trax 562
[54] Anonymous interviewee data
[55] Trax 027, Trax 028
[56] Trax 031.
[57] Trax 025
[58] Trax 026.

Additionally, by investing in long-term FiT contracts that offered lucrative and steady revenue, thousands of German citizens and farmers became natural stakeholders.[59] During the third Merkel government with the SPD (2013-2017), this unique structure of the German energy transition clashed with transition to cost-reduction measures such as auctioning that favored big investors.[60] In response, the German authorities ended up introducing special quotas for cooperatives, resulting in a fragmented tendering system which compromised the new system's competitive efficiency potentially to the detriment of renewable energy consumers.

On the flip side, the organized interests of electricity consumers — particularly the preponderous German industry— could have counterbalanced an expensive energy transition. However, a cross-party compromise in 2003 co-opted the industry by exempting it from renewable subsidy charges. As a result, the primary force for economization was contingently suppressed. The preceding concerns of energy-intensive industries, like aluminum, about rising costs of policies to promote renewables were the original drivers of this compromise.[61] The pro-business opposition parties CDU/CSU and FDP were also critical of renewable subsidies.[62] Similarly, the economic wing of the ruling SPD, led by Minister of Economics and Labor Wolfgang Clement, advocated for abolishing the generous subsidies on the grounds that they undermined the German industrial base.[63] However, the SPD's coalition partner, the Greens objected to the rollback of renewable subsidies. The deadlock between the two parties was resolved by agreeing to a *de facto* political pact in 2003: In return for a green light for an ambitious but costly energy transition under the EEG, the energy-intensive industries were granted with exemptions from certain renewable subsidy costs. Once the government placated the industry with these privileges, the incentives for the German policy-makers to economize the energy transition largely disappeared. This political pact —which also enjoyed backing outside the coalition government i.e., CDU/CSU and FDP— became a defining feature of the German energy transition in the following coalition governments, diverting the focus away from cost efficiency.

The renewable energy sector usually lacked the same level of sectoral and institutional clout in the UK. Counterfactually speaking if the organized interests of renewable energy producers had been stronger, they could have shaped policy outcomes to their interests better, undermining the British political parties' economization efforts. Nevertheless, while there was an industrial presence for onshore wind energy in the UK, it was modest.[64] In contrast, renewable energy remained a solid sector in the German economy despite recent setbacks:[65] To illustrate, at its peak, it employed 0.5% of Germany's labor force.[66] In the UK, on the other hand, the sector comprised less than 0.2% of the labor force at its peak, with employment rising from 31,700 in 2009 to 131,400 in 2017.[67]

[59] Trax 029
[60] See, Leiren and Reimer, 2018. Also anonymous interviewee data.
[61] Anonymous interviewee data, and also Trax 014.
[62] Trax 015
[63] Trax 016
[64] Trax 053
[65] Trax 054
[66] Trax 055, also Trax 522
[67] Trax 056, also Trax 522

Additionally, community energy —the hallmark of democratizing energy transition in Germany— was also less prominent in the UK: In 2012, it accounted for ~10% of the renewable energy generation in the country, while this figure was ~40% in Germany.[68] In practice, this difference translated to a narrower electoral base with vested interests in renewable energy,[69] making subsidy cuts politically less costly for British policymakers. Indeed, proposed retrenchment policies stumbled upon less resistance in the UK. Except for the partial success of onshore wind, the renewable energy producers had limited success in moderating subsidy cut plans. In 2011, for instance, the solar industry's campaign "Cut Do not Kill" was not successful in avoiding the drastic cuts.[70]

VI. Redistributing the cost among consumer groups

When the economic cost of the energy transition is high, it is a common practice to entitle energy-intensive industries (the EIIs hereafter) with certain privileges. Both German and British governments provided these privileges by exempting industrial users from a certain portion of renewable subsidy surcharges.[71] Because these industries took on less burden, non-privileged or non-exempt electricity consumers —consisting mostly of SMEs and households— had to shoulder a higher share of the costs. As a result, the practical impact of these industrial privileges became redistributive.[72]

Germany frequently resorted to redistribution to relieve the cost of the energy transition on its industry: Yet, their exemptions were more prompt, extensive, and generous compared to those in the UK.[73] British industrial consumers faced more stringent qualifications for exemptions.[74] In the early 2010s, some policymakers repeatedly acknowledged the disparity in the treatment of EIIs in the two countries and advocated for government intervention.

Why were the German EIIs granted more economic privileges than their British counterparts? One potential explanation is that the cost of renewable subsidies was much higher in Germany than in the UK. Given more visible and escalating costs in the industry, it was unsurprising that Germany resorted to redistribution more often. Indeed, the experience in Germany shows that there exists a critical cost threshold after which the EIIs get more vulnerable to increases in their energy expenditures, making them more likely to demand privileged treatment in burden-sharing.[75] In Germany, this threshold was crossed during the early 2000s. The UK reached an equivalent threshold only during the 2010s when it accelerated its renewable investments. Even though this explanation is sufficient to explain absolute differences between the two cases, it still does not suffice to account for relative differences: that is, the fact that Germany provided more generous, prompt, and comprehensive assistance to its EIIs in comparison to the UK.

The logic of redistribution in public choice dynamics suggests that it is more likely when ruling partisanship favors the interests of exempt industrial consumers over those of non-privileged consumers and/or when exempt industrial consumers have stronger

[68] Trax 051, also Trax 523
[69] Anonymous interviewee data
[70] Trax 050
[71] Trax X4
[72] Trax 059
[73] Trax 061
[74] *Ibid.*
[75] Trax 062

organized interests (H_{2a}). Alternatively, when contingent dynamics favoring redistribution are strong, the likelihood of redistribution increases (H_{2b}). Germany had more favorable conditions that could facilitate redistribution, whereas the UK had fewer such conditions. The table 4 below summarizes these differences.

*Table 7. Cross-case Differences in Favorable Conditions for Redistribution**

	Partisanship	**Organized Interests**		**Contingent Dynamics**
	favoring exempt industrial consumers over non-exempt consumers	**powerful for exempt industrial consumers**	**limited for non-exempt consumers**	**facilitating redistribution**
Germany	Strong-	Strong-	Moderate-	Strong
UK	Moderate	Moderate-	Moderate	Strong-
	*The expressions in boxes indicate whether such favorable conditions are strongly, moderately, or weakly present in each country case. * Ordinal variables based on the numerical estimation and composite metrics used in the Bayesian analysis in the appendix			

Here, the key difference lies in the ruling governments' preferences for favoring industrial consumers interests over others, with German governments characterized by stronger pro-industrial partisan orientation compared to their British counterparts. This difference also mirrors differences in organized interests, especially in the strength of German industrial consumers. There is also a difference in contingent dynamics that favors redistribution, but it is not remarkable, providing limited explanation for the cross-case difference in the use of redistribution.

Partisan orientation: Favoring industrial consumers

In Germany, there exists a ruling consensus across political parties that the country should retain its industrial base and competitiveness on the global market, considering its contribution to the national economy.[76] On numerous occasions at the plenary sessions of the Bundestag, policy-makers reaffirmed their unwavering commitment to safeguarding the German industry seen as a national pride.[77] Although it is often avoided being described that way, the origins of this pro-industrial stance can be easily traced back to the country's remarkable industrial policy legacy.[78]

Additionally, redistribution seems to be politically justified, given the popular demand and the willingness to pay for green policies.[79] Indeed, the lack of decline in the public support for energy transition despite rising subsidy costs —amounting to around 80s%— showed that demand for energy transition was not quite price-elastic. This usually lessened the political cost of prioritizing industrial interests over households.[80] Likewise,

[76] Trax 064, Trax 065.
[77] Trax 064
[78] Trax 530
[79] Trax 080, also Trax 517
[80] Trax 080, also Trax 517. Also: Useful for explaining within-case dynamics but not discriminatory for cross-case variation, see Trax 562.

the previously discussed contingent dynamics peculiar to Germany like high energy efficiency also reduced the political cost of the excessive redistribution.[81]

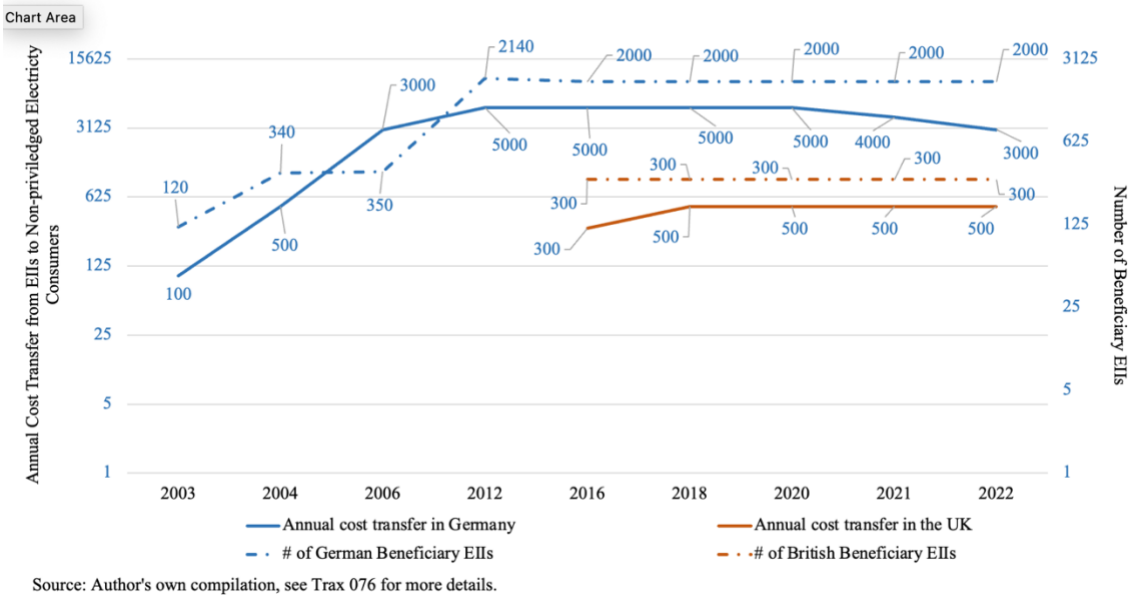
Though typically cutting across party lines, the strong pro-redistribution stance in Germany was still subject to the alternating dynamics of government composition. For instance, during the 2003 political pact discussed above, Greens did not initially endorse redistribution: Defending the polluters-pay principle, they demanded that the industry takes on equal burden-sharing like other consumers.[82] They ultimately compromised to gain SPD support for ambitious renewable energy policies. Excluding the critiques from the Greens and Die Linke, the Schröder government's redistributive exemptions enjoyed significant support, including the opposition parties like CDU/CSU and FDP.

Over time, the pro-redistribution stance in the German political system got more visible, reflecting changes in coalition governments and their associated partisan agendas. For example, in 2006, to clear the way for additional exemptions to industry,[83] the CDU/CSU-SPD government removed the 10% cap which was previously installed during the SPD-Greens government to limit the burden that could be shifted onto the shoulders of non-privileged consumers.[84] The strong pro-redistribution stance peaked in the subsequent CDU/CSU-FDP government which expanded the exemptions in 2012 to include more companies, in particular previously excluded some SMEs also known as *Mittelstand*: The 2012 reform in EEG increased the number of beneficiary companies from ~540 to ~2300.[85]

The decision to carry out energy transition by shifting the costs from the EIIs to households and other non-privileged electricity consumers is inherently political: Redistributive practices lead to significant welfare transfers, intensifying equity issues. In 2013, for instance, non-privileged electric consumers paid for 98.7% of the EEG expenditures, although they consumed 78.8% of end-use electricity.[86] In the same year, the extended exemptions resulted in a transfer of burden-sharing worth ~5 billion euros to households and other non-privileged electricity users.[87] The 2012 EEG amendment itself brought about an additional burden-sharing worth 2.2 million euros for non-privileged electricity users[88] (Figure 3). This made the question of "who pays for the German energy transition" a political issue during the 2013 election campaigns. At one point, *Die Energieintensiven Industrien (EID)* —the association representing German EIIs— ended up having to defend itself, attributing the increase in electricity prices to the unchecked expansion of renewable energy rather than industrial exemptions.[89]

[81] Useful for explaining within-case dynamics but not discriminatory for cross-case variation, see Trax 562.
[82] Trax 069
[83] Trax 072 and Trax 073.
[84] Trax 071
[85] Trax 073, see also Trax 074.
[86] Trax 073
[87] Trax 073, see also Trax 074
[88] Trax 073, see also Trax 074
[89] Trax 075.

Figure 3. Changes in Transfer of Cost from EIIs to Non-Privileged Consumers and # of Beneficiary EIIs



Source: Author's own compilation, see Trax 076 for more details.

During the 2010s, debates over the fairness of Germany's energy transition became highly polarized. Pro-market parties like CDU/CSU and FDP framed the conflict between the particularistic interest of renewable energy producers vs. the broader public interests of German consumers: Rather than redistribution itself, they attributed rising costs to the unchecked growth of renewable energy. However, while advocating for industrial exemptions, the CDU/CSU-led governments faced a policy dilemma between defending the corporate interests and helping families with cheaper electricity.[90] Ultimately, they sided with the industry, indicating that the political acceptance of the energy transition for the industry was far more critical for its success[91] and the competitiveness of German industry was at stake.[92]

Sometimes, the growing perception of the energy transition as serving particularistic interests likely fueled redistribution as an unintended consequence as well. For CDU/CSU and FDP, generous subsidies were seen as benefiting the renewable energy sector at the expense of others. Addressing this imbalance, however, was politically challenging, as rolling back subsidies risked appearing "anti-green" in a largely pro-green political environment. Granting generous counter-privileges to the industry served as an antidote and counterbalanced competing particularistic interests in the system.[93]

On the other side, political parties like Greens[94] and Die Linke[95] saw redistribution itself as the culprit for the affordability of energy transition for all: While acknowledging the importance of exemptions for EIIs, they were highly critical of handing over these

[90] Around a few tens of euros, Trax 078
[91] Trax 079
[92] Trax 077 and 078
[93] Trax 081, 082
[94] Trax 083, Trax 072, and Trax 073
[95] Trax 084

exemptions excessively.[96] Die Linke called for even more radical measures to rectify the equity issues in burden-sharing.[97] When in opposition, the SPD took a cautious stance on redistribution, consistent with its progressive line of politics. However, its stance got more favorable after replacing the FDP in the third Merkel government in 2013. Under Sigmar Gabriel's leadership, the SPD visibly aligned itself with industrial interests.[98] Gabriel challenged the idea of rolling back industrial privileges arguing that doing so would not result in remarkable savings for German households.[99]

As different from German governments, the UK governments' partisanship did not strongly favor the interests of industrial energy users. When the policy costs of supporting renewables started to increase in the early 2010s, the coalition government acknowledged the concerns of the EIIs and expressed its commitment to shield the UK's remaining industrial base.[100] However, this political support remained modest, not comparing to the one in Germany. [101] For some, the UK governments' balanced and cautious policy stance to safeguard industrial interests was neither excessive nor insufficient —as it is supposed to be.[102] Across political parties — whether Labor, Conservatives, or Liberal Democrats— there was usually little variation in this approach.[103]

In the British political system, the principle of minimal intervention conventionally provides assistance to industry only in exceptional circumstances and lets market players maintain their competitiveness independently.[104] This "too much *laissez-faire* attitude"[105] stands in sharp contrast to the proactive approaches of continental countries like Germany and France. In parliamentary debates, some British policymakers frequently criticized the shallow and sluggish support extended to their industries.[106] For the same reason, these policymakers and EIIs often cited Germany's proactive measures to protecting its industrial base during the energy transition[107], urging their government to take similar precautions to ensure a level playfield with their European competitors.

The divergent approaches of the two countries towards industry became particularly evident when the EU Commission sought to regulate industrial exemptions under its Europe-wide state aid rules: Germany continued to grant the exemptions despite ongoing investigations by the Commission and potential infringement of EU state aid rules. In contrast, the UK, though considering granting similar exemptions since 2012, had waited for clearance from the Commission first. The British government acknowledged that the privileges enjoyed by the continental EIIs put its own EIIs at a disadvantage. However, unlike the German government, it was not complacent about the compatibility of such privileges with EU subsidy regulations.[108] Problematizing this difference, prime minister Cameron emphasized that the EU had rules to follow, and the UK would adhere to them.

[96] Anonymous interviewee data
[97] Trax 086
[98] See Trax 078. Anonymous interviewee data
[99] Trax 088
[100] Trax 093
[101] Anonymous interviewees data
[102] Trax 094
[103] Trax 209
[104] Trax 096, 097, 098, and 099
[105] Anonymous interviewee data
[106] Trax 098
[107] Trax 096, 097, 098, 099, and 100
[108] Trax 098

At the Commission, Germany also proactively advocated for regulations realigned with its industry's interests.[109] By contrast, the UK usually took a subservient approach, band-wagoning the directives from the Commission.[110]

Even after introducing the exemptions, the UK government usually required substantial and convincing evidence from the industry to warrant exemptions —e.g., as seen in the case of 2017 governmental review and consultation process.[111] In contrast, the German government distributed such exemptions with less stringency.[112] This approach frequently drew even the criticisms of German opposition parties due to associated social-equity issues, and even Chancellor Merkel herself acknowledged that some companies were exploiting the industrial privileges.

The UK could have undertaken an aggressive green agenda by redistributing the growing cost of the energy transition from the EIIs to households and other non-privileged commercial electricity users. After all, this was how Germany maintained its ambitious energy transition without inciting significant backlash from its industrial base. However, the UK governments did not support redistribution, viewing it as particularistic. During the Conservative-Liberal Democrat coalition, there was a clear political stance against advancing energy transition by exempting the industry at the expense of other consumers[113] Unlike the German policymakers who prioritized the affordability of the energy transition for industry, the primary political concern for the British policymakers was to ensure affordability for all consumer groups.[114]

Here, political incentives to maintain an affordable energy transition influenced the process as well. Electricity prices, a highly politicized issue in the UK,[115] were central to this concern: Given millions of British households affected by fuel poverty,[116] providing affordable energy was a priority for political parties. Surges in electricity prices usually amplified these concerns, as seen during the fluctuations in global energy market in 2013.[117] Redistribution would technically push more households into fuel poverty by increasing the portion of their incomes on energy-related expenses.[118] Additionally, it was structurally challenging to pass on higher energy costs to British households, whom lived in less energy-efficient housing, some of which dated back to the Victorian era.[119]

Organized interests

The powerful organized interests of German industries certainly contributed to their ability to secure privileges. Historically, Germany's industrial sector has wielded considerable political clout, supported by their robust associational power. Accounting for over 18% of the national economy—significantly higher than European and global averages[120]—the

[109] Trax 102, Trax 103, and anonymous interviewees data
[110] Trax 102
[111] For detailed analysis, see Trax 104
[112] Trax 105, and anonymous interviewees data
[113] Trax 106
[114] Trax 107, 108, and 109
[115] Trax 111
[116] Trax 112
[117] Trax 113. Also: Useful for explaining within-case dynamics but not discriminatory for cross-case variation, see Trax 562.
[118] Trax 114
[119] Useful for explaining within-case dynamics but not discriminatory for cross-case variation, see Trax 562.
[120] Trax X3

industry possesses intrinsic leverage that ensures preferential access to economic policymaking.[121] This influence makes political parties highly responsive to industrial demands, epitomized by the saying in Germany "the industry rules politics, not the other way around."[122] For this reason, the German government swiftly intervened to shield industrial interests when rising energy transition costs started straining manufacturers in the early 2000s.

On the other hand, significant opposition to industrial exemptions also emerged from NGOs like *Greenpeace* and the Federal Association of Consumer Organizations (*vzbv*). *vzbv* argued that the majority of consumers opposed such industrial privileges.[123] The association contended that concerns over competitiveness and job losses did not justify the excessive benefits granted to industries, advocating instead for a fairer distribution of costs to maintain public support for the energy transition.[124] Nevertheless, despite these substantive critical voices, it remains uncertain how effectively civil society in Germany was able to counterbalance the pro-redistribution dynamics.

SMEs, particularly the *Mittelstand*, could have potentially mounted an organized opposition to exemptions, as they, like households, bore the financial burden left by the EIIs. However, despite their prominence in the German politics, they lacked the influence wielded by larger industries. More crucially —as will be detailed in the next section— rather than challenging exemptions outright, they either sought gaining inclusion in them or advocated for the complete elimination of EEG charges, favoring general taxation to fund renewable energy instead. The 2012 amendment to the EEG realized their demands to a certain extent. This development contingently weakened anti-redistributive dynamics in terms of organized interests. Otherwise, intuitively speaking, the strong presence of SMEs in Germany should have strengthened the anti-redistributive camp.

In comparison to their German counterparts, the EIIs in the UK received less generous exemptions. This can partly be attributed to the lower cost of the UK's energy transition, which placed less financial pressure on British EIIs, reducing their incentive to mobilize and advocate for exemptions. This mobilization dynamic, however, explains only the nominal differences in the scale of redistribution between the two countries. In relative terms, British EIIs benefited from less generous exemptions compared to their German counterparts.

In both countries, the EIIs have amassed their organizational power through distinct bodies —*EID* in Germany and *Energy Intensive Users Group* (*EIUG*) in the UK. However, *EIUG* structurally enjoyed less economic power, translating into reduced political significance and limited involvement in shaping economic policies. For instance, the manufacturing sector in the UK accounts for only about 8% of the economy,[125] with an even smaller portion attributed to EIIs. While UK EIIs directly employ ~210 thousand people and indirectly support ~800 thousand jobs, their German counterparts directly employ ~850 thousand people and indirectly contribute to ~2.5 million jobs.[126] Even after

[121] Mostly thanks to influence of industrial lobbies on center parties like CDU/CSU and SPD. Anonymous interviewee data. And also Trax 063.
[122] This is especially said for auto industry. Anonymous interviewee data.
[123] Trax 090
[124] *Ibid.*
[125] Trax 091
[126] Trax 092

adjusting for labor market size differences (~33 million in the UK versus ~46 million in Germany), the disparity remains significant.[127]

In the formation of a strong anti-redistribution stance in the UK, counterintuitively, the organized interests of non-exempt consumer groups did not play a remarkable role.[128] This was largely because the cost of energy transition in the UK was not high enough to provoke their mobilization. To illustrate, while redistribution increased household electricity prices by around £40 in Germany, it added only £3 in the UK.[129] However, consumer associations like *Citizens Advice* joined the consultation process by the government, opposing any expansion of industrial exemptions.[130] Research suggests that consumer groups in the UK may have slightly better organizational capacity and public perception than their German counterparts.[131] However, even if the cost of energy transition had turned into as a contentious topic as in Germany,[132] it remains unclear to what extent the organized interests of non-exempt consumer groups could have been effective in forcing a cheaper energy transition. After all, the consumer groups and NGOs in Germany had limited success in achieving this.[133] Besides, unlike Germany, there was not a sizable base of SMEs in manufacturing which could have potentially opposed redistribution in an exclusive exemption regime. Given this, the strength of non-exempt consumers in the UK against redistribution pressure is questionable compared to their counterparts in Germany.

VII. Compensation for the growing costs

Germany and the UK implemented compensation schemes in their energy transitions with different scopes and durations. While Germany utilized comprehensive compensation as a long-term policy, the UK provided partial compensation to renewable energy consumers for only a limited period.[134] Of course, several dynamics like differences in fiscal capacity and cost pressure account for these variation in the scope of compensation schemes. While acknowledging the greater influence of such contingent dynamics, I also trace some roots of these cross-case differences to public choice dynamics.

Like economization and redistribution, compensation has a logic that can be grounded in public choice dynamics: Accordingly, compensation is more likely when political parties have strong partisanship that prioritize the specific interests of renewable energy consumers over the broader interests of taxpayers and/or when these consumers have stronger organized interests (H_{3a}). Alternatively, when contingent dynamics favoring compensation are strong, the likelihood of compensation can be higher (H_{3b}) Although the differences are less pronounced than in economization and redistribution, Germany had more favorable conditions that could facilitate compensation, whereas the UK had fewer. The table 4 below summarizes these differences.

[127] Trax 092
[128] Trax 117
[129] See Trax 118.
[130] Trax 119.
[131] Trax 120, also for a discussion see, Nessel, 2019.
[132] Some questions whether this has turned into a big public concern: Anonymous interviewee data
[133] In general, they are weak by structural reasons: Anonymous interviewees data.
[134] Beforehand, the only compensation strategy that the UK used was between 2014-2017 when it aimed to relieve the EIIs. See Trax X5 for more information.

*Table 8. Cross-case Differences in Favorable Conditions for Compensation**

	Partisanship	Organized Interests		Contingent Dynamics
	favoring renewable energy consumers over taxpayers	**powerful for renewable energy consumers**	**limited for taxpayers**	**facilitating compensation**
Germany	Moderate	Moderate+	Strong-	Moderate-
UK	Moderate	Moderate	Strong	Weak-
	*The expressions in boxes indicate whether such favorable conditions are strongly, moderately, or weakly present in each country case. * Ordinal variables based on the numerical estimation and composite metrics used in the Bayesian analysis in the appendix			

In terms of partisan orientation, UK governments tended to prioritize household protections, whereas German governments' stronger support for renewable energy consumers primarily stemmed from efforts to protect SMEs rather than households. Additionally, UK governments were generally less inclined to use the state budget for policy interventions, serving for the protection of taxpayers' interests better. In the same vein, SMEs' organized interests played a key role in securing government compensation in Germany, whereas this was largely absent in the UK. In both countries, general consumers and households had weak organizational representation, with consumer rights largely advocated for by NGOs. As to taxpayers, Germany had an association that represented their interests, whereas associational aspects of taxpayers were weaker in the UK. Counterintuitively, this association supported using state funds/taxes to finance the energy transition, adding to a contingent positive dynamic in favor of compensation in Germany. Other contingent dynamics such as rising cost pressures on non-exempt consumers due to insufficient economization and excessive redistribution further fueled the push for compensation in the country. Overall, the noticeable variation in contingent dynamics better explain cross-country differences in compensation, while public choice dynamics can be also helpful to qualify why Germany implemented more extensive and prolonged compensation schemes than the UK from an alternative perspective.

Partisanship orientation: Rescuing SMEs

After nearly four decades of its energy transition, Germany eventually introduced a compensation scheme in 2021 to alleviate the rising electricity costs burdening electricity consumers. Prior to this, there have been already calls for compensation, driven by (i) uncontrollable increases in the renewable subsidy costs and (ii) growing equity concerns —both closely related to poor economization and excessive redistribution. Germany's industrial electricity prices were among the highest in Europe. However, when exemptions were counted, the German industry enjoyed one of the cheapest electricity prices in Europe.[135] Nevertheless, buying off political opposition of the industry through redistribution worsened the burden of the energy transition on the non-exempt consumer groups like households and the SMEs. The 2021 compensation scheme was the government's response to such mounting energy cost pressures that it had failed to contain

[135] Trax 122

particularly on non-exempt consumers. In this sense, contingent political incentives to protect the interests of non-exempt consumers primarily drove compensations schemes, despite the preceding governments' partisan reluctance to use the tax base to finance the energy transition.

The Greens were the first political party to propose using the federal budget to finance the energy transition, especially to address the mounting criticisms against the EEG.[136] However, this did not receive endorsement from Merkel's governments: Being fiscally conservative, the conventional policy stance of CDU/CSU and FDP were not intrinsically conducive to using taxpayers' money to address the distributional issues of the energy transition.[137] Instead, their focus was on tightening the subsidy regime and expanding redistribution. However, as discussed beforehand, Germany's economization efforts were sluggish and largely ineffective: The 20-year contracts granted to older, inefficient renewable plants made rapid reductions in subsidy costs unattainable.[138] In the short term, such attempts stabilized the EEG costs at best rather than reducing them.

In addition, despite the CDU/CSU-FDP governments' initiative to include the SMEs in the exemption regime, the ensuing CDU/CSU-SPD government was forced to narrow eligibility criteria for exemptions under pressure from the EU Commission. As a result, fewer companies qualified for exemptions, rendering extending the umbrella of redistribution no longer a viable option to relieve SMEs under the umbrella of redistribution. In this context, the CDU/CSU-led coalition governments gradually grew more receptive to the idea of helping out businesses with compensation schemes applicable to all electricity consumers as the Commission's state aid rules prohibited discriminatory practices: By the late 2010s, there was a discernable shift in political leaning towards compensation,[139] despite the initial resistance rooted in fiscal conservatism.[140] As Peter Altmaier, then Minister for Economic Affairs and Energy, stated, the government's decision to compensate EEG costs sought to reconcile climate mitigation policies with business interests.[141]

Despite emerging political and societal consensus, partisan orientation in favor of SMEs were necessary but not sufficient condition for compensation: It was actually the revenues from carbon pricing system that made compensatory schemes possible. Assuming a neutral budget approach, the government chose to spend these revenues to finance renewable subsidies rather than holding them in the state coffers. By doing so, the government used the carbon pricing — which is itself a regressive policy instrument[142] — to incorporate a progressive component into the EEG, which is also regressive as it applies to all electricity consumers regardless of income or revenue.

On the other hand, the Energy and Climate Fund (*Energie- und Klimafonds*), where carbon tax revenues were pooled, could only partially finance the compensation schemes. Expanding the initiative by the last Merkel government, the newly formed SPD-FDP-Greens coalition decided to compensate the EEG fully by 2023. It is not surprising to see such a policy change given the inclusion of political parties with prioritizing equity

[136] Also being joined by others as well Trax 126
[137] Trax 128
[138] Trax 129
[139] *Ibid.*
[140] Trax 130
[141] Trax 132
[142] Due to its disproportionate burden on low-income consumers

concerns like Greens in the government composition. However, this change also came amidst the energy crisis in Europe driven by Russia's invasion of Ukraine.[143] In other words, another contingent dynamic compelled the government to supplement these funds with the state budget.[144]

To summarize, in Germany the implementation of compensation strategies was driven by pivotal contingent dynamics, such as the rising costs of the EEG, the availability of alternative funding sources, and the energy crisis. However, Germany's adoption of compensation as a long-term policy also reflected specific public choice dynamics such as the strong inclination within the German political system to safeguard SMEs. Without this deep-seated tendency, it is difficult to think that Germany would have demonstrated the same commitment to the compensation schemes.

Financing the EEG through carbon taxes and the state budget helped reconcile a growing tension between the two main fractions in the German energy transition: those closely aligned with traditional industrial interests and those prioritizing ecological considerations.[145] The 2003 political pact had previously settled this tension to a certain extent. However, the growing cost of energy transition and disproportionate burden-sharing placed on non-privileged consumers brought the viability of the pact into question over time. By funding the energy transition through taxation, the government sought to bridge the widening chasm between the two camps, which had begun to resurface again in the early 2010s.[146]

A contrast to Germany's approach, the UK implemented compensation measures briefly and conditionally during the 2022 energy crisis. As in Germany, the energy crisis in Europe also served as a contingent political catalyst for the Liz Truss government to introduce the *Energy Bill Relief Scheme*. The scheme pledged to offset green subsidies for two years whenever annual energy bills exceeded £2,500, starting in October 2022. Funded through taxpayers' funds and increased borrowing, the scheme was projected to save electricity consumers around £150 a year. However, when the energy costs fell below the £2,500 threshold due to improving market conditions, the government discontinued the compensation in July 2023.[147]

Like the Germany government, several other contingent dynamics influenced the UK government's decision to compensate renewable energy consumers. One notable one is fiscal capacity, as the government's ability to offer such programs ultimately hinges on the budget. Indeed, in comparison to Germany's national carbon price system, the UK's carbon pricing system still produced substantial revenue, but comparatively in a smaller amount, limiting its capacity to fund compensation schemes. Moreover, given the lower cost pressures associated with its energy transition, it is unsurprising that the political will for extensive compensation mechanisms was weaker in the UK.

With that said, specific policy choice dynamics also influenced how Germany and the UK approached compensation: First, although both countries had similar fiscally conservative policy-making styles, the prevailing partisan orientation in the UK was usually more reluctant to allocate tax revenues for financing compensation schemes.

[143] Trax 139
[144] Trax 138
[145] Trax 140
[146] Trax 141
[147] Trax 142

Conservative governments in the UK usually demonstrated caution regarding the costs associated with the energy transition, including compensation mechanisms. This approach was evident during the UK's brief experience with compensation schemes in the early 2010s: Despite announcing a £300 million package in the 2014 budget to cover renewable energy subsidies for EIIs,[148] the UK government offered industrial compensations only for a few years between 2014-2017. It ultimately transitioned to German-style redistributive exemptions, citing several factors including fiscal and administrative challenges to justify this shift. The British Treasury was also reluctant to allocate state revenues for financing renewable energy.[149] Officials acknowledged the difficulty of "getting money out" of the Treasury.[150] With their ideological focus on minimizing public spending, the Conservative-led governments perceived compensation as a burden for the Treasury and unsustainable in the long-run.[151] This was also compounded by the "deficit reduction programme"[152] which crippled the government's preceding intentions to provide more relief for the EIIs. Additionally, the cost of compensation schemes rose each year, making it difficult for the government to maintain such compensations withing budget constraints.

Similar budgetary concerns also hindered the UK government's ability to continue the *Energy Bill Relief Scheme* introduced in 2022, despite the political demands to keep green subsidies off electricity bills for a longer period.[153] Some Conservatives, critical of placing green levies in electricity bills, advocated for the use of taxation to make electricity more affordable.[154] In the same vein, appeals also came from opposition parties like the Liberal Democrats who supported using "windfall taxes" to fund green levies.[155] Utility companies, like *Eon*, also backed the continuation of the compensation policy: Labeling the levies as "a regressive tax", they urged the government to fund these costs through general taxation.[156] Despite this pressure, the succeeding Sunak government "slyly" placed the costs back onto consumers in 2023,[157] once energy prices dropped, rendering the £2,500 price cap obsolete.[158]

To some extent, the stricter use of compensation policies in the UK was understandable given their cost: Estimates, though varying, suggested that scrapping levies and offering full compensation could cost the Exchequer—i.e., the Treasury— around £5 billion a year, with a net relief around £150 per annual energy bills.[159] However, like Germany, the UK was also able to accumulate carbon revenues through its emission trading schemes (ETS): Data from *Office for Budget Responsibility* shows a remarkable increase in these revenues over years (Table 9). Yet, in contrast to Germany's budget neutrality approach, the UK does not earmark carbon tax revenues but channel them to the general

[148] See: Trax 143
[149] Trax 145
[150] Trax 145, 146
[151] Trax 145
[152] Trax 147, Trax 148
[153] Trax 150
[154] Trax 151
[155] Trax 150
[156] *Ibid.*
[157] Trax 152
[158] *Ibid.*
[159] Based on the 2021 estimations, see Trax 155

state budget.[160] This does not mean that the UK avoids spending on climate policies at all. It uses the state budget, to which carbon tax revenues accrues, but does not deploy an equivalent amount of revenue. A study by *New Economic Foundations* reveals that the UK government allocated £5.5 billion of £6.5 billion carbon tax revenues toward reducing carbon emissions,[161] whereas continental countries are better at reinvesting these revenues with Germany reaching 100% recycling.[162]

Table 9. Carbon tax revenues from ETS, in £ billion*

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
UK†	0.6	0.5	0.4	0.3**	0.3	1.6	1.3	1.0	5.8	6	3.5††
Germany	0.7	0.9	0.7	0.9	2.2	2.7	2.2	10.8#	11.3#	16	15.7
	*Based on both European and UK ETS (Emission Trading Scheme) and German National Emissions Trading System † Rounded fiscal year (i.e., 1 April to 31 March) #Including national ETS. * *Based on 2019 March outlook, for October 2018 outlook it is 0.4 †† Forecast Source: Own compilation, see Trax 163										

The way the UK use its carbon revenues can change in the future due to potential political pressure to recycle them. However, the UK does not also have a good record in budget neutrality. For instance, in 2010, the government retained £1 billion from *Carbon Reduction Commitment* in the state coffers to address the budget deficit, rather than recycling it back into the participants of the program.[163] Additionally, the UK government's decision to lower emission caps in 2023 caused a significant reduction in the forecast revenues through ETS, indicating its reluctance in stricter carbon tax regime and financing broader goals of energy transition through such taxes.[164]

Overall, the experiences of Germany and the UK demonstrate a difference in how taxpayers' money is used. It is true that the prevailing fiscal prudence especially under successive Conservative governments[165] contributed to a tighter renewable subsidy regime in the UK which was key to its better economization. This in turn benefitted renewable electricity consumers. However, the same dynamics also led to a stringent compensation regime which undermined a progressive financing of energy transition, ultimately disadvantaging electricity consumers in lower socioeconomic segment.

A potential change in political will for compensation is possible under a government with a different ideological composition, despite the ideological affinity of the British political parties in fiscal conservativism. For example, the Labor previously supported maintaining compensation schemes due to its concerns about equity when the Conservative government replaced compensation schemes for the British EIIs with redistributive exemptions back in 2016. While in opposition, they signaled that they would

[160] Though the government uses the same budget to finance other environmental programs as indicated above, see Trax 153.
[161] Trax 153
[162] *Ibid.*
[163] Trax 154
[164] Trax 153.
[165] Anonymous interviewees data

support compensation due to its more equitable burden spreading.[166] Nevertheless, even the new Labor government has not made any changes to the existing compensation policies in their first year since coming to power in 2024.

Organized interests

The formation of political demand for compensation was also influenced by underlying dynamics related to organized interests, particularly in civil society . Frequent calls were made to finance the energy transition in a progressive way, especially for low-income people. To illustrate, German consumers association *vzbv* advocated for a federal fund, financed by corporate and income taxes to socialize the costs of energy transition instead of the *pay-as-you-go* system in the EEG.[167] In 2017, surveys also revealed that public opinion favored using taxation to cover the EEG costs.[168] Concerns over the rising cost of energy transition for domestic electricity consumers certainly heightened the political salience of compensation in Germany.

Yet, these concerns were often mild, considering the mitigating factors specific to Germany such as the absence of severe energy poverty and gains from energy efficiency.[169] The target group in the German compensation schemes was more specifically the SMEs that did not qualify for the exemptions granted to EIIs despite their high electricity costs. As the most organized non-exempt consumer groups, their advocacy played a crucial role in the introduction of compensation schemes.[170] Throughout the 2010s, these businesses frequently circulated the idea of "spreading the EEG costs more widely" by using tax revenues: By 2014, associations representing a variety of sectors such as bakery and textile, along with consumer groups, gathered tens of thousands signatures to petition for the termination of the EEG and the financing of renewables through taxes. The volume of signatures was so large that the Bundestag was required to review the petition by law.[171]

The salience of the country's costly energy transition also mobilized other associations like the Federal Association of Energy and Water Management (*BDEW*) and the Association of the Chemical Industry (*VCI*). Voicing similar concerns, they even threatened legal action against the EEG at the Federal Constitutional Court. They argued that the logic of financing mechanism in the EEG was not much different from the now-defunct coal penny (*Kohlenpfennig*), a levy on electricity consumers introduced in 1974 to subsidize fossil fuel-based electricity generation.[172] Drawing on the Court's reasoning in overturning *Kohlenpfennig*, these associations contended that financing renewables was a public initiative and, therefore, the state's responsibility in the long term rather than that of electricity consumers. In the same vein, German research institutions, including the Federal Environment Agency (*UBA*), IASS, and Agora, also explored alternative financing methods for the energy transition, advocating for the full or partial use of tax revenues.[173]

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[166] Trax 149
[167] Trax 133
[168] To see the context of surveys, see Trax X6.
[169] Useful for explaining within-case dynamics but not discriminatory for cross-case variation, see Trax 562.
[170] Trax 123
[171] Trax 124
[172] Trax 125
[173] This paragraph as a whole is from Trax 126

The term "Taxpayers" is often vague given its broad definition and unclarity regarding how their organized interests look like. With that said, the pressure groups like the Association of Taxpayers-Germany (*Bund der Steuerzahler*) existed in Germany and they posed an opposition force against additional burdens and debt on taxpayers. However, in the specific context of financing the energy transition, they endorsed the government's decision to reduced EEG costs through compensation.[174] Their counterintuitive support was likely driven by two factors: the contribution of carbon taxes to the state budget and broad societal backing for spreading the costs across a wider tax base.

In the UK, on the other hand, given the relatively low cost of its energy transition, there was little pressure for relevant organized interests to mobilize for compensation. Counterfactually, had the transition costs been as high as in Germany, organized interests could have played a more prominent role, matching the one in Germany. However, there are also certain differences worth considering here: Due to its smaller industrial base, the UK lacked a significant organized presence of non-exempt SMEs that could exert pressure for compensation.

Alternatively, the households in the UK could have exerted pressure for compensation. Yet, unlike non-exempt businesses, they did not form an organized pressure group, leaving the much of advocacy to NGOs that worked on the issues like consumer interests and energy poverty. Similar to Germany, there were calls to cover the costs of energy transition through the state budget in a progressive way —e.g., National Energy Action.[175] Parliamentary working groups also advocated for additional safeguards in existing fuel poverty programs to protect low-income families.[176] However, these calls did not translate into substantial political pressure. Given the low subsidy costs and limited impact of redistribution, the British government did not face significant political pressure to implement compensation.

In terms of organized taxpayer interests the UK lacked a clear stance, in lieu of a structured association like *Bund der Steuerzahler*. The pressure groups such as *TaxPayers' Alliance* did not take an explicit position on compensation —whether negative or positive. In this sense, the organized interests of taxpayers did not come to play a visible role in the design of compensation schemes.

VIII. Concluding remarks: Putting dynamics of public choice in perspective

In the eyes of policymakers, the politics of green energy transition is essentially the art of balancing the competing interests of different consumer and producer groups within their political bases. Choosing who to foot the bill is inherently challenging, and if mismanaged, it risks causing social conflict. In this respect, the objective of this paper is to highlight multiple distributional conflicts inherent in the energy transition and to underscore the necessity for policymakers to secure political acceptance of the energy transition by pursuing diverse distributive strategies —namely, economization, redistribution, and compensation.

Both Germany and the UK utilized all three distributive strategies, but the conditions facilitating each strategy varied across the cases. This research provided varying levels of support for the hypotheses regarding the influence of public choice dynamics vs

[174] Trax 134
[175] Trax 156
[176] Trax 157

contingent dynamics on these strategies: Public choice explanations, such as partisan orientation and organized interests, best account for differences in economization (0.976), followed by redistribution (0.951) and compensation (0.679). In contrast, contingency explanations best explain differences in compensation (0.970), followed by economization (0.812) and redistribution (0.766) (Table 10). Overall, public choice dynamics more effectively explain the cross-case variations in economization and redistribution, while contingency dynamics better account for variations in compensation. Where public choice dynamics provide limited explanatory power, explanations regarding contingency related dynamics —like miscalculation, cost pressure, cooptation, fiscal capacity and popular support for green policies— offer stronger explanations. As intervening variables, these dynamics also shape how policy-makers and different interest groups approach each distributive strategy.

Table 10. Summary Table for Bayesian Analysis

		$Pr\ (P\|k)$	
		Priors	***Posteriors***
Economization	**Public choice**	0.5	**0.976**
	Contingency	0.5	0.812
Redistribution	**Public choice**	0.5	**0.951**
	Contingency	0.5	0.766
Compensation	**Public choice**	0.5	0.679
	Contingency	0.5	**0.970**

It is also essential to acknowledge the interdependence between the distributive strategies as another explanatory factor. The strategies used to resolve distributional issues do not work in a stand-alone way: The failure of one strategy in containing distributional spillovers usually triggers the need for additional strategies. For instance, the failure to economize green energy transition increased the need for redistribution and then compensation as complementary strategies in Germany. In this sense, redistribution and compensation are integral to economization as supplementary distributive strategies.

A hierarchy also exists between redistribution and compensation: Given its financial burden on the state budget, policymakers prefer utilizing compensation as a last resort. This explains why Germany and the UK introduced compensation only after other strategies proved insufficient in containing the distributional issues of the energy transition. The experiences of both countries suggest that as the costs of green energy transition policies rise over time, so does the need for distributive policy interventions.

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