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Greening the Car? Conflict Dynamics within the German Platform for Electric Mobility

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Abstract: The environmental crisis due to air pollution, high CO₂ emissions, noise from traffic and soil ceiling requires profound changes to the car-dependent transport system. This article examines the political dynamics of German transport politics, focusing on the National Platform for Electric Mobility (NPE), a high-level political forum that aimed to accelerate the run-up of the electric mobility market in Germany. The NPE provides an interesting case to study the strategies of stakeholders in influencing policy-making and shaping alternative pathways to the car-centered transport system. The paper focusses on actor constellations and the conflicts that arise within the NPE, as well as the temporal dynamics within the electric mobility debate. The findings suggest that the NPE contributed to a narrow understanding of mobility transformation based on road transport and electric cars, but that it is better described as ecological modernization. Within this narrow framework, a fundamental conflict unfolds between strong advocates versus those slowing down the ecological modernization of the car. A third group demands at least a partial departure from the automobile-centered model but remains marginalized within the NPE. Aside from this core conflict, members of the NPE struggled over the location for battery cell production, the introduction of a purchase grant known as the environmental bonus, and the expansion of battery recharging infrastructure. These issues illustrate that discussions within the NPE relate to the political debates about the future of mobility, which have intensified in Germany in recent years. However, the case of the NPE shows that high-level stakeholder platforms are not an adequate forum to legitimately deliberate and to practically contribute to a wider and more fundamental rethink of future mobility concepts.

Keywords: electric mobility; Germany; stakeholder participation; sustainability; transformation; transport policy

1. Introduction

In Germany the car dominates passenger transport. Automobility is associated with significant costs for the environment and society in the form of high CO₂ emissions, air pollution in cities, large-scale land sealing by roads and parking lots, congestion, and risks to health and personal safety in road traffic. However, as Wolfgang Sachs noted decades ago, the impacts produced by the car system reach much further. We have long since been dealing with a “second-order” environmental crisis [1] (p. 588). Consequently, with the automobile monopoly and:

“a priority on rapid through transit, no environment hospitable to the pedestrian is possible. The most decisive consequence of motorization is the destruction of the vital basis for nonmotorized movement and this goes for the all-around “clean” car as well.” [2] (p. 192).

In recent years, the problems of the automobile-centered transport system have become increasingly politicized—not least because, to date, the transport sector has not contributed to climate protection. In contrast to other sectors, CO₂ emissions in the transport sector rose by as much as 3.7 percent between 1995 and 2018 [3]. Certainly, cars have become increasingly efficient over time, but their increasing prevalence has led to rebound effects. In addition, new cars registered in Germany are becoming larger and heavier, with sport utility vehicles (SUVs) becoming more popular [4]. In view of the great importance of the automobile and the overriding importance of the automotive industry for Germany’s economy, politicians, trade unions, and even to some extent environmental NGOs have primarily viewed electric cars as the solution to traffic-related environmental problems. Over the past ten years, this topic has developed a new dynamic in German transport policy.

To date, research has done little to address these political developments, the conflicts associated with them, and their significance for the transformation of the transport system. Scientists have primarily been concerned with developing visions and concepts for socio-ecologically and economically sustainable mobility (e.g., [5–7]). From this perspective, the car remains essential, and the idea gained ground that transformation will only be possible with the car instead of against it [8] (p. 78). Recently, more studies have been published that examine the dynamics driving ongoing political changes. Thiele et al. [9] argue that the policy field is becoming politically relevant. This is due to the growing pressure from worsening environmental crises, and the 2015 ‘Dieselgate’ emissions-cheating scandal—when illegal activities by major car manufacturers (e.g., Volkswagen) that aimed to circumvent legal limits to exhaust emissions became public. However, studies underline that transport policy continues to be dominated by strong lobbying activities that restrain sustainable transport development [10,11]. To this end, the car lobby leverages its close ties to political institutions, which it has built up over decades [12]. Recent analyses, however, raise doubts that the automobile companies and their lobby association (the German Association of the Automotive Industry, VDA) speak with one voice [13]. Instead, new constellations of actors emerge in the debates about alternatives to diesel- and gasoline-powered engines.

The aim of the paper is threefold: firstly, analytically, it aims to strengthen the focus on the political dimension of the mobility transformation, including the arising competition around framings of how to understand and react to socio-ecological and economic trends, and the significance of power politics. These debates reveal the fundamental conflicts about what is to be sustained, for whom and to what end, and the unequal power relations involved. This analytical focus brings a democratic quality back into the scientific debate of transformation that is centered around technocratic approaches of sustainability governance [14]. Secondly, empirically, the paper provides insights into how and with what arguments and strategies stakeholders in Germany influence developments in the mobility market, particularly the run-up of electric mobility in Germany. Finally, the overall and more practical impetus of the paper is to contribute to a rigorous transformation of the current transport system in Germany. Thereby, it seeks to shed light on the potentials and weaknesses of governance structures such as stakeholder platforms to balance unequal power relations and to bring transformation forward.

Using the National Platform for Electric Mobility (NPE) as a case study, we explore the following questions: Who is driving change in Germany’s transport policy and who is thwarting it? Which conflicts are developing? The NPE existed from 2010 to 2018 and brought together around 150 stakeholders from different social sectors. We understand the NPE as an institutional terrain for negotiation processes in which controversies and interests are revealed and actors struggle for interpretative sovereignty. The NPE is a particularly suitable case to highlight the political dimension in the process of transforming the German transport system. It brought together central actors who have much to lose in a transformation away from the car-centered model: those who benefit from a shift from fossil-fuel to electric mobility, and those who advocate for public interests such as consumer

and environmental protection. The NPE provides insights into how actors struggle for sovereignty of interpretation and assert their interests and whether, and if so how, new constellations of actors are being constituted in the face of change. Finally, the NPE also sheds light on the transformative potential of dialogue-oriented governance instruments, such as stakeholder forums. Thus, the case study bears relevance for the academic and political debate on transformation beyond the German context.

This ex-post analysis examines the structure and functioning of the NPE, and which conflicts and actor constellations developed in the course of its work. Based on our findings, we argue that a fundamental change in the transport system does not come from within its political institutions (such as the state apparatus in the narrower sense) and attached corporatist platforms that seek to advance innovation in the automobile industry. Instead, external pressure from bottom-up initiatives is required to push for transformation.

The project's analysis of the NPE has drawn on a range of data accessible via desk research such as official reports (of Federal Ministries and the NPE), press releases of organizations, newspaper articles, semi-scholarly literature, academic publications and 21 stakeholder interviews. The stakeholder interviews were an important source of information considering the limited amount of accessible data on the topic of the NPE. The guideline-based expert interviews were conducted in Germany during 2018 and 2019. The participating experts were from business associations and companies (The General Automobile Association of Germany (ADAC), Bosch, The German Association of the Automotive Industry (VDA), Volkswagen (VW), German Start-ups Association)), labor unions (The German Trade Union Confederation (DGB), (Industrial Union of Metalworker (IG Metall)), civil society organizations (Allianz pro Schiene, Friends of the Earth Germany (BUND), Environmental Action Germany (DUH), Nature and Biodiversity Conservation Union (NABU), Traffic Club Germany (VCD), Federation of German Consumer Organizations (VZBV)), public authorities (e.g., Federal Ministries), political parties (The Left Germany, The Greens), that, based on their knowledge, provided insights into the disputes surrounding automobility in Germany and particularly the workings of the NPE. The interviews aimed to reconstruct the central lines of conflict in transport policy and within the NPE; their condensation into material policies; and to elaborate the differing visions of the future transport system. Interviewees were selected for reasons of variety of perspectives, knowledge about the topic German transport policy, and experience with the NPE. The interviews were conducted face-to-face, recorded and transcribed. To evaluate the data material, the study used content analysis. The core empirical challenges of the study were the limited amount of data on the deliberations taking place within the NPE and the high politicization of the topic. Interviews served as a crucial source of information. However, there are limits to this method given that interviewees may not be fully informed, their views may be based on assumptions, and their memories may have shifted in the course of time. Primary sources such as the progress and interim reports of the NPE and press releases were consulted to check (and, if necessary, supplement) interviewees' statements. Secondary sources such as newspaper articles serve to embed these statements within broader contexts.

Our findings show that the transformation of the transport system has largely been reduced to a form of ecological modernization that builds on electric cars. Within this framework, a fundamental line of conflict develops between actors who either encourage or slow down ecological modernization. A third group is critical of this narrow understanding, but cannot assert itself in the debates. Within the NPE, the actors struggled with issues such as an environmental bonus—a premium paid by the federal government, aiming to incentivize purchases of all electric-powered and plug-in vehicles—, battery cell production, and the promotion of the necessary recharging infrastructure. These conflicts illustrate how the actors influence the course of ecological modernization. They also reveal how the existing power relations within transport policy are reproduced in platforms such as the NPE.

The rest of the paper is organized as follows: Section 2 describes the main features of transformation debates in the context of multiple crises—such as the ecological crisis and the financial crisis of 2008—and outlines the analytical heuristic. Section 3 summarizes the contextual conditions under which the NPE was founded, and specifies its structure and operation. Section 4 presents findings on the conflict

dynamics and actor constellation that emerged over time. Section 5 discusses the role of the NPE in a socio-ecological transformation of the transport sector, and concludes with an outlook on how a mobility transformation can (still) be possible.

2. Multiple Crises and Transformation Framework

The 2000s were marked by various crises. First and foremost, the outbreak of the financial and economic crisis in 2008 led to considerable economic setbacks, especially in 2009. The automotive industry was among those that were hit hard. Worldwide, passenger car production shrank by 5 percent [15] (p. 49f.). Compared to other countries, German car makers did not experience a major crisis, as previous years had brought high profits. Thanks to extensive government support measures such as reduced-hours working benefits and purchase bonuses, they were even able to increase their profits in the following years [15–18]. Although the expansion of automobile production made it possible to stabilize employment levels post-2008, at the same time the environmental problems caused by the automobile worsened.

In parallel, awareness of the problem of anthropogenic climate change, which is mainly caused by the burning of fossil fuels, increased significantly in the 2000s. Examination of the transport sector shows that technology and control-optimistic crisis management exacerbated the climate crisis and caused other far-reaching problems. Governments in industrialized countries such as Germany promoted agrofuels as being ‘climate-friendly’. This fueled speculation on cereal markets and led to rising prices worldwide for food crops such as corn. This has contributed to so-called hunger riots in numerous countries, such as Mexico [19]. This brief outline indicates that we are dealing with a multi-crisis constellation in which various intertwined problem dimensions interact [20].

Crises are processes in which social conditions, the routinized processes of social organization, or everyday practices are interrupted. They are phases of insecurity, as those processes that are perceived as normal are disturbed. At the same time, there is also a chance that social reality may be questioned and new points of orientation sought. This is also the background against which the Enquête Commission “Growth, Prosperity, Quality of Life—Ways to Sustainable Economic Activity and Social Progress in the Social Market Economy,” established by the German Bundestag in 2011, should be placed.

The multi-crisis constellation was also taken up in the scientific context. Markard et al. [21] state that a new, inter- and transdisciplinary field of sustainability transition studies has been established since the 2000s. Within this field, the terms transformation and transition are often used synonymously. Often, the underpinning theories of change, ontologies, or methodologies, and principles of transformation and sustainability, remain unclear [14]. Karl Polanyi was a major influence on the concept of transformation. In his book “The Great Transformation” [22] he analyzes the changes from the feudal to the capitalist mode of production, which he understands as the process of disembedding the economy from society, associated with strong shocks and social conflicts. In social-ecological contexts, the term transformation is experiencing a renaissance with reference to democratic change towards sustainability (e.g., [23,24]), even if it is not used in an analytical sense (as per Polanyi) but instead to guide future developments.

Common to recent research on transformation, such as the much-acclaimed comments on planetary boundaries in the context of the Anthropocene debate [25], is that such studies take the ecological crisis as their starting point. The diagnosis of the problem is clear: the ecological footprint of humanity far exceeds planetary ecological carrying capacity. There is an urgent need for a transformation towards an ecologically sustainable economy, a different way of producing and consuming, and a different mode of living. But what could such a fundamental change towards a sustainable society look like? What has to change? And which social structures and institutional arrangements are shaping the path of unsustainable economic activity and consumption?

There is by no means a consensus on such questions in the scientific debate. Brand [26], for example, identifies a new critical orthodoxy in the application of the transformation concept, which provides a radical diagnosis of problems such as climate change and makes claims about possible solutions.

However, the new critical orthodoxy—and this is especially true of the Anthropocene-approaches—is not based on an analysis of existing social power relations, which are responsible for creating numerous socio-ecological problems. Against this background, it is not surprising that the radical description of the problems corresponds with proposals for solutions that aim to optimize existing governance regimes. In this respect, there is no questioning of the inadequate and domineering way in which ecological crises are dealt with; rather, the approaches are based on a great ‘steering optimism.’ However, changes towards sustainable societies are brought by various pathways that are inherently contested: “Politics and power are important to how pathways are shaped, which pathways win out and why, and who benefits from them” [27] (p. 3), [28].

In turn, this criticism points to the fact that different ideas and social practices can be differentiated in the field of sustainability transformations. In conceptual terms, Stirling [29] sums this up via the ideal-typical distinction between transformation and transition. He understands transitions in the sense of the change of the new critical orthodoxy as

“managed under orderly control, through incumbent structures, according to tightly disciplined technical knowledges and innovations, towards a particular known (presumptively shared) end. This typically emphasizes integrated multidisciplinary science directed at processes of instrumental management through formal procedures in hierarchical organizations sponsored by the convening power of government.” (p. 62)

Transformations, on the other hand:

“involve more diverse, emergent and unruly political alignments, challenging incumbent structures, subject to incommensurable, tacit and embodied social knowledges and innovations pursuing contending (even unknown) ends. Here there is a much stronger role for subaltern interests, social movements and civil society, conditioning in ambiguous and less visible ways the broader normative and cultural climates in which more explicitly structured procedures are set.” (p. 62)

In the following, we take up this ideal-typical distinction in analyzing ongoing changes in the German transport sector. It particularly serves to draw attention to the power relations that determine pathways for transformation. As such, the analysis queries how negotiations within the NPE contribute to undermining transformation in the transport sector, and to what extent they renew existing power relations.

3. The Founding and Structure of the NPE

Before turning to the NPE it is important to emphasize that Germany is a “car-dependent society” [30] (pp. 76–93). It was the automobile, in particular, that facilitated a process of increasing prosperity in Germany during the so-called ‘economic miracle’ after World War II. To this day, the automotive industry is the leading industry of the strongly export-oriented German economic model. This is reflected in the balance of trade: In 2018, the automotive industry achieved foreign sales of 276.6 billion euros [31]. The automotive industry is also very important for Germany’s domestic labor market: more than 800,000 people are directly employed in the automotive industry, and several hundred-thousand others are indirectly attached to it [32]. The car is deeply ingrained in everyday and cultural practices. Furthermore, at least since the 1950s, the automobile is also dominant—specifically in transport infrastructure planning, but also in other fields such as urban and landscape planning. Infrastructures have been tailored to the needs of the working population. The interurban and highway network has been steadily expanded, while at the same time the rail network was partially dismantled. However, growing automobility has left its mark and is a significant contributor to the emerging ecological crisis. In the 1970s, international debates about the limits of growth and sustainable development raised awareness for a much-needed transformation towards more socially, ecologically, and economically sustainable practices. This also stimulated political discussion in Germany concerning alternative futures within the transport sector (e.g., [8]).

3.1. Electric Mobility Defined as Battery-Electric Cars

In this context, the electric car played an important role. Car manufacturers, suppliers, the electricity industry, politicians, and also environmental associations engaged in research and development of new technologies in the early 1990s [33]. In 1991, Varta AG—a long-established German company that produces batteries—predicted that there would be one million electric cars registered in Germany by the year 2000 (quoted after [33], p. 7). There were support programs for battery and power unit development and for pilot projects to test electric vehicles, such as on the German island of Rügen. Some federal states even introduced an environmental bonus for the purchase of e-cars. From the mid-1990s, debates on the electric car seemed to dissolve. At the beginning of the 2000s, only 2534 e-cars were registered in Germany (as of 2002, Federal Motor Transport Authority, cited by [34]). This did not change until the middle of the first decade of the 2000s, when electric mobility returned to the political agenda in the context of climate protection debates. In the German Federal Government's Integrated Energy and Climate Protection Programme (2007), electric mobility was defined as a decisive component for achieving climate protection goals and reducing CO₂ emissions. The National Electromobility Development Plan states that Germany is to “develop into a lead market for electromobility and thus enhance the competitiveness of the automotive and supplier industry as one of the most important pillars of German industry in the long term” [35] (p. 4). Against this background, there was almost a sense of déjà vu when in 2010 the German government set a target of one million electric cars by the year 2020.

The National Platform for Electric Mobility (NPE) served as a forum to achieve this goal. The Federal Government launched the platform on 3 May 2010. The NPE's task was to combine all forces from business and industry, politics, and science, and to deliberately develop strategies for the run-up to the e-mobility market [36]. Four federal ministries, namely Economics (BMWI), Transport (BMVI), Environment (BMU), and Education and Science (BMBF), had already addressed the topic prior to the founding of the NPE. They all had corresponding departments and funding programs, such as the BMU's support program for electric mobility and the BMBF's materials research programs. The BMWI also had a bundle of measures to promote market-oriented projects and transport technologies. The BMVI, in turn, established a “Platform for Electric Mobility” in 2008, which was based at NOW (National Organisation for Hydrogen and Fuel Cell Technology). The NPE aimed to more closely coordinate these parallel activities and to establish the policy field of electromobility (#Interview NPE) [37]. However, the ministries were also in competition with each other and had different roles within the NPE that will be detailed further in the following Sections 3.2 and 4.

The exact meaning of electromobility was already defined in the National Electromobility Development Plan as referring to road transport and, in particular, to passenger cars and light commercial vehicles [35] (p. 6). However, it can also include city buses and other vehicles such as e-scooters. Electric mobility was thereby defined as “complementary paths” to hydrogen and fuel cell technologies [ibid.] that are to be developed within the National Innovation Programme Hydrogen and Fuel Cell Technology. The core criteria for the definition of electric mobility was the driving technology that focused on Plug-In-Hybrid Electric Vehicles, Range Extended Electric Vehicles, and Battery Electric Vehicles. The NPE followed this definition but limited its focus on the automobile. The NPE dealt with all stages of the value chain, such as battery technology, charging infrastructure, network integration, certification and standardization, information and communication technology, and the appropriate framework conditions for expanding the e-car market. No role at all was assigned to rail transport, the electrification of public transport, or even road haulage. With the Electromobility Development Plan and within the work of the NPE the future of electric mobility was thus narrowed in two ways: it focused on road transport and foremost on the automobile, and thus on a specific mode of transport, and even more so on battery-electric vehicles, and thus on a specific technology. There are no other comparable stakeholder forums that cover topics such as electric mobility in rail or freight transport or Hydrogen and Fuel Cell Technologies. Taking the overall trends in transport policy into account, developments in transport policy at the end of the first decade of the 2000s can be defined by the slow

recognition of new automobile technologies in existing car-oriented structures. This path can, at best, contribute to a form of ecological modernization, but not to a transformation that seeks to solve the multiple socio-ecological problems attached to automobility.

The impetus for establishing the NPE came primarily from the Federal Chancellery. The National Academy of Science and Engineering (acatech) also played a vital role in the foundation and organization of the NPE (#Interview NPE) [37]. For example, an acatech report from spring 2010 already highlighted ways in which the run-up to the e-car market could be organized and where the challenges lay [38]. It recommended the establishment of a National Electromobility Platform, chaired by two ministries to coordinate activities. The key issues identified in the report, such as standardization, battery technology, and recharging infrastructure, were reflected in the titles of the NPE working groups [38] (p. 14).

3.2. Structure and Functioning of the NPE

The NPE was given high priority from the start. This is reflected in the fact that it operated at a high political level of state secretaries and heads of department. In addition, the Federal Chancellery approved the NPE's reports and was thus indirectly involved in its work. There was one State Secretary of each ministry, namely for Economics and for Transport, who, together with Henning Kagermann, the President of acatech, chaired the NPE's steering committee. The steering committee was the decision-making body of the NPE, and included the chairs of six working groups. An additional editorial team supported the steering committee in preparing reports and other publications. Several times a year, the six working groups brought together some 150 representatives from industry, science, politics, and other stakeholders such as trade unions and environmental associations. On the part of the Federal Government, the NPE was supported by the Joint Office for Electric Mobility (GGEMO). Here, a delegation model applied in which each of the four federal ministries sent a representative.

In addition, acatech also chaired the organization through Kagermann, who moderated the NPE and coordinated its communication. Over time, Kagermann's office increasingly took over coordination tasks from GGEMO (#Interview NPE) [37]. This included, for example, all matters relating to content, writing reports, and organizing editorial meetings. The preparations for the steering committee meetings were also closely linked to Kagermann's office. Kagermann again acted more or less as the spokesperson of the NPE (#Interview NPE) [37].

The NPE consisted of about 150 different stakeholders and representatives of administrative bodies. In addition to central automobile manufacturers such as VW and suppliers such as Siemens, the NPE also included organizations such as the VDA, the ADAC, IG-Metall as the central trade union, various start-ups, research institutions and the Federation of German Consumer Organizations, and the German environmental NGO NABU. However, the various interests were not equally represented. For example, the BMVI and BMWI played a more important role than the BMU and BMBF. Each of them, together with a state secretary, provided a chair of the steering committee. However, the extent to which a ministry was able to assert itself ultimately depended also on individuals in the ministries and on the political backing that person was given in-house (#Interview NPE) [37].

In addition to political logics, social interest groups were also represented to varying degrees in the NPE [11]. The automotive and supplier industry formed by far the largest group (22 percent) in the NPE, and the electrical industry and IT sector accounted for a further 15 percent of representatives. In contrast, civil society actors, i.e., representatives of environmental protection and consumer associations, accounted for just three percent, and trade union members two percent. The mid-sized groups represented universities and science (14%), the chemical and battery industry (14%), and politics, administration, and authorities (9%). As we will show below, environmental and consumer protection groups in particular were barely able to assert their views in the discussions against industry representatives.

Schwedes et al. [11] previously compiled findings on the working methods within and between the NPE committees. They show that, due to its informal communication channels and unstructured working methods, the NPE's decision-making procedures remained opaque. This concerned,

for example, the absence of a minority vote in the working groups, contact with the media, and exchanges between the working groups. The authors conclude that the high degree of informal procedures within the NPE contributed to the inability of the weaker interest groups to assert their concerns. Furthermore, the working groups were primarily led by industry representatives, who also dominated the steering committee. NABU was the sole environmental organization in the editorial team, which played an important role in the work of the NPE as it was there that the actual conflicts were fought out and the positions smoothed (#Interview NPE) [37].

Numerous environmental associations criticized the NPE's working methods as non-transparent [39]. This included the awarding of contracts to independent institutes and service providers, as well as the criteria for funding the NPE's recommendations. Critics also demanded that the discussion papers of the editorial team and the working groups, as well as the minutes of the steering committee, should be available to the members of the platform. The organizational setup of the NPE allowed for decision-making processes that were dominated by executive bodies and industrial stakeholders. The NPE can therefore be described as a forum that—with marginal participation of environmental and consumer interests—aimed to advance innovations solely within the automotive industry. In the next chapter we develop a temporal classification of the NPE and analyze the struggles that unfolded within the forum.

4. Conflict Dynamics and New Actor Constellations

In the literature on the NPE, some scholars argue that stakeholders such as the automotive and supplier industries have been particularly successful in pushing their interests through [11]. This finding implies that this industry sector pursues largely homogeneous interests. However, recent studies have cast doubt on this assumption. Haas and Jürgens [13] show, for example, that the three major German automotive manufacturers (BMW, Daimler, VW, Stuttgart, Germany) have pursued different goals with regard to propulsion technology. This led to a strong conflict between VW and the VDA that culminated in 2019. While the VDA called for further openness to technology, VW insisted on a commitment to battery-electric propulsion as the future technology. It is therefore necessary to analyze in more detail which actors are committed to electromobility and in what ways, and which constellations of actors and lines of conflict have developed within the NPE's narrow focus on electric cars.

4.1. A matter of Timing

As previously mentioned, the topic of electromobility has gained attention since the late 2000s. However, this is not a linear process, but rather three phases can be distinguished. In the first phase, from the financial crisis in 2008 until 2011, the automotive industry and politicians were euphoric in the press. The then chairman of VW, Martin Winterkorn, believed that the future belonged to the electric car [40]. Dieter Zetsche, then head of Daimler, defined electric cars as an "important component of future mobility" [41]. Siemens Chairman Peter Löscher even defined it as a "multi-billion market" [42]. This first phase of optimism ended, paradoxically, shortly after the start of the NPE.

Subsequently, in the second phase between 2011 and 2015 electric mobility lost importance in debates on the future of mobility. Looking at the leading mobility trade fair, the International Automobile Show (IAA), in 2011, Greenpeace expert Wolfgang Lohbeck stated: "The enthusiasm for electromobility is over. Hardly anyone talks about it anymore, at most the Chancellor" [43]. The German automobile industry recovered quickly from the economic crisis and, beginning in 2010, manufacturers were once again making high profits from the sale of diesel and petrol cars. One of our interviewees also noted that the NPE experienced typical technological and innovation policy cycles (#Interview NPE) [37]. In the beginning there was enthusiasm, with ambitious goals for technological development and market expansion. With such expectations, pressure grew over time to deliver, to bring products forward, and ultimately to achieve the goal of one million vehicles by 2020. At the same time, however, the problems within the NPE became apparent, concerning issues such as battery

production, range, charging infrastructure, and the price of e-cars. The discussion of electromobility gained new momentum from the Dieselgate scandal of 2015 (#Interview NPE) [9,37].

This phase since 2015 is characterized by increased importance of electric mobility and a new dynamic in the field. This is because the automotive industry's loss of legitimacy following Dieselgate, and the associated personnel changes (particularly in the VW Group) have opened up new opportunities for the development of electric cars. BMW pushed ahead with the development of e-cars and launched its i3 model as early as 2014. In addition, German cities experienced a series of lawsuits against high air pollution levels, filed by the NGO German Environmental Aid. Also, the European Commission filed a case against Germany for exceeding critical air pollution values that were agreed upon by the European member states. The Chinese e-auto quotas and new competitors such as Tesla put additional pressure on German car manufacturers to promote e-mobility [44]. These overall dynamics and developments were also reflected to some extent in the NPE (prior to its dissolution in 2018).

4.2. A Fundamental Conflict between Hastening and Hindering Ecological Modernization

Across the temporal phases, three different groups of actors can be identified within the NPE. The first group included those slowing down ecological modernization of the car. This proved to be the dominant group of actors during the NPE's term. It included IG Metall as well as the car manufacturers, some suppliers, and the VDA. None of these actors directly argued against the electric car. However, by referring to necessary preconditions and insisting on technological openness, they slowed down the market run-up. The second group comprised those seeking to make electric cars more widely available and who were pursuing new, digital, and networked concepts in the mobility sector. They can be described as the group pushing ahead with ecological modernization. This included the BMU, the energy suppliers, and large numbers of start-ups in the mobility sector. A third group within the NPE consisted of those who sought to address issues beyond the ecological modernization of the automobile. However, this group was hardly involved in the work of the NPE and was therefore largely marginalized. The group included the environmental and consumer protection associations and the Association of German Transport Companies (VDV) as a lobby group for local public transport. This assignment of individual actors to one of the groups should not be understood as a rigid affiliation. Rather, they can be assigned along this major fault line in order to structure the field. There are also quite different positions within organizations such as IG Metall and the car manufacturers, regarding the future of e-cars. Especially within the VW group, a clear shift can be observed in recent years towards a proactive policy of pushing for e-cars.

The first dominant group includes actors whose attitude towards electromobility is ambivalent because they are strongly anchored in the traditional fossil-fueled automobile system and, at the same time, have to open up for alternative technologies. This is particularly evident among car manufacturers and trade unions. One interviewee spoke of a "double strategy" among these actors (#Interview Representative of Federal Government I) [45]. "And that means [...] they act like that and say 'Yes, electric mobility is very important'. And when the instruments are up for debate 'No, no, no, it can't be done that fast. There are so many questions to be answered, so many questions left unanswered'." Conversely, this strategy slows down developments in e-mobility. However, these actors are not homogeneous.

The role of IG Metall, which represents the interests of employees in the automotive industry, is ambivalent. The union is facing a dilemma. On the one hand, its primary role is to preserve the well-paid jobs in the automotive industry. At the same time, the mid-term prospects for the industry are uncertain, and a shift towards new technologies is becoming increasingly necessary. This tension is also reflected in the attitude of IG-Metall. It argued throughout the working period of the NPE that electromobility will cost Germany thousands of jobs [46]. It also presented arguments for slowing down developments, i.e., that electricity needs to be one hundred percent renewable before electric vehicles can represent an alternative to diesel and gasoline propulsion. "That's why Berthold Huber [then first chairman of IG-Metall, and member of the NPE steering committee] insisted in the "Platform":

The electricity must come from renewable energy. With success. The NPE has clearly committed itself to this. And also, the federal government.” [47]. Also, as the debate on electromobility picked up speed again around 2015, it advocated a necessary openness to all technologies [48]. Despite this stance, IG Metall insisted that the entire supply chain in e-mobility must be located in Germany. This ambivalent strategy might lend some truth to IG Metall’s description of itself as a new “driver with traction” that takes necessary boundary conditions and realities into account (#Interview IG Metall) [49]. However, in recent times there seems to be a growing openness to debate within IG Metall on the question of how the transformation of the car industry can succeed [50].

The attitude of car manufacturers is similarly ambivalent. One interviewee criticized that “the basic problem with the e-car is that it’s almost a running joke that the car industry always says, ‘yes, and in two years the e-car revolution is coming,’. But it’s real, and you’ve been hearing that for 10 years now. And now it’s exactly the same thing again.” (#Interview VZBV) [51]. Other actors also saw a lack of enthusiasm for electromobility, although perspectives among the manufacturers varied (#Interview ADAC) [52] and therefore slowed down further developments within the NPE. As one interviewee pointed out, the car manufacturers acted according to the motto “we don’t openly say that we are against electromobility, but on the contrary we pretend to be in favor of it. But we only push instruments that don’t work; and those that are effective, we have to prevent” (#Interview Representative of Federal Government I) [45]. However, there were also differences between individual car manufacturers. BMW was among the first to commit itself to electric power systems. The group developed the i3 model and launched a large-scale trial involving 500 electric Mini models in 2008, but this failed due to the limited range of the cars at that time [53] (p. 90). More recently, BMW pursues a path without committing itself to any particular technological preference. In the Winterkorn and Piech era, VW showed a rather skeptical attitude towards electric mobility. Although VW supported the initial euphoria, Winterkorn speaks out pessimistically in 2010: “In the long run, there will be no money to be made from it” [54]. In 2015, VW’s head of branding Diess (who moved from BMW in 2014) argued for the production of lithium-ion batteries in Germany [55]. Since 2018, under the leadership of Diess, the company has pursued development of electric cars. Daimler has taken a (somewhat unsuccessful) middle position. It has long been a leader in the development of fuel cell technology. It announced the start of the Necar 5 (“New Electric Car”) for 2004, but nothing came of it. In 2014 the company announced that it would begin series production of hydrogen-powered cars, but then postponed the start until 2017. Daimler has not promoted the electric car for a long time. Only recently, in 2019, the company announced that it will release various electric cars. With this ambivalent attitude among German car manufacturers, it is also difficult for suppliers to clearly position themselves in the market. These component suppliers are heavily dependent on the auto manufacturers and must therefore perform a certain balancing act between improving existing technologies such as diesel and investing in new technologies. In view of those uncertainties among the auto manufacturers, their component suppliers remain hesitant about optimizing existing technologies (e.g., of diesel cars) on the one hand, and committing to emerging technologies on the other (#Interview Bosch) [56].

In contrast to the first group, a second group is pushing for ecological modernization by means of electric cars. This includes, for example, the Ministry of the Environment, start-ups, and the electricity industry. For energy suppliers such as E.ON, RWE, and Vattenfall, electric mobility represents a new business model if they can provide the charging infrastructure and connected services and sell additional electricity. Digital electromobility also opens up new business opportunities for start-ups. In the area of charging infrastructure in particular, new platforms such as Interchange and Plugsurfing are emerging, which make it easier for customers to charge their e-cars throughout Europe. They aim to ensure that the energy and transport sectors are more closely linked in the future (#Interview Start-ups) [57]. The Ministry of the Environment is pushing for the market launch of e-cars in order to achieve major successes in climate protection as quickly as possible. Parts of the federal executive bodies also see great opportunities in sectoral coupling and the switch to 100 percent renewable energies to drastically reduce CO₂ emissions. From the Ministries’ perspective, technological solutions

are the best way forward, as less social resistance is to be expected than, for example, with modal shift or a traffic subsistence strategy (#Interview Representative of Federal Government I, II) [45,58].

Compared to these ‘ecological modernizers’, there is a third group that is more critical of the discussions about the electric car. These are primarily the environmental and consumer associations, which do not reject electric mobility per se, but call for more far-reaching measures. This is evident in a joint statement from the German Renewable Energy Federation, WWF, NABU, and Climate Alliance on the third progress report of the NPE [39]. The associations declared tax incentives for electric cars, as envisaged by the NPE, to be counterproductive. They expressed the necessity to discuss small, light, energy-efficient and resource-saving vehicles and ambitious CO₂ limits of 80 g per kilometer by 2020 in order to reach climate change targets. The NGOs further requested a broader debate regarding the contribution of electric mobility to climate protection. This implied, for example, a critical discussion of the environmental impact of resource extraction and the seeking of appropriate recycling systems. In addition, the Alliance criticizes that electric mobility is narrowly defined as relating solely to electric cars. Instead, it calls for a more comprehensive understanding of electromobility, including rail and new mobility options such as e-scooters. This direction is also taken by the Association of German Transport Companies (VDV), which has repeatedly criticized the Federal Government’s one-sided policy of promoting electric cars that results in marginalizing public transport (including the VDV) [59]. However, some topics were largely ignored, such as the social and ecological problems associated with resource extraction; the electrification of public transport; and the role of the customer; and impacts on consumers, for example concerning data handling. This third group had only limited success in incorporating its demands into NPE reports. One interviewee commented that at some point marginalized actors “no longer felt represented within the NPE” (#Interview VZBV) [51].

4.3. Contradicting Conflicts and Reproduction of Power Relations

The identification of the three groups of actors is helpful in structuring the conflict dynamics within the NPE. The following sections discuss the NPE’s internal conflicts regarding: establishing battery cell production in Germany, haggling over the ‘environmental bonus’ purchasing incentive for electric cars, and the funding schemes for charging stations. It will be shown that the actual conflict situations are complex, but that the constellations of actors identified above are helpful points of reference. In addition, the conflicts make it possible to trace how existing power relations in the transport sector are reproduced in the field of electromobility.

4.3.1. Struggles over Battery Cell Production in Germany

The conflicts surrounding battery cell production reflect the core conflict between the first group supporting ecological modernization and the second one slowing it down. Political representatives such as the former State Secretary for Economics Matthias Machnig (SPD, Social Democratic Party), strongly supported the production of lithium-ion batteries in Germany. According to one interviewee, Machnig was outraged about the delaying strategy of the automotive industry: “For years you have been telling us that something has to be done, and you do nothing. And every time it comes down to a decision, you say, ‘We can’t decide yet, we don’t know enough.’” (#Interview Representative of Federal Government I) [45]. The trade unions also urged the companies to establish domestic battery cell production in order to retain jobs in Germany and strengthen an employment-oriented change within the automotive industry, especially as political pressure concerning issues of climate change and the pressure on the industry from foreign producers increased over the working period of the NPE (#Interview DGB) [60]. According to IG Metall, the battery cell is a “key technology, where gigantic dependencies are imminent.” (#Interview IG Metall) [49]. The German Federation of Trade Unions (DGB) went the extra mile. In their opinion, “the larger manufacturers are trying to avoid responsibility. There are various research projects, but the companies obviously only want to get involved once the product is marketable, so we actually expect the OEMs to take a somewhat more offensive stance.” (#Interview DGB) [60].

The supplier Bosch in particular was under pressure to engage in battery production. However, the company rejected the demands of politicians and trade unions, arguing that battery cell production in Germany was not profitable and that the upfront costs would be immense (#Interview Bosch) [56]. Bosch assessed the risk to be of such magnitude that the venture would require at least a decade to become profitable. The companies would have to ensure at a very early stage that the cells could be distributed. In other words, it would be necessary to guarantee that the battery cells to be developed and manufactured by the auto suppliers would actually be purchased by the car manufacturers. However, those conditions were not met at the time. However, such a consumer guarantee model already existed elsewhere, for instance between Panasonic and Tesla.

Within the NPE, these discussions took place high up in the Steering Committee, attended by all the industrial representatives. “But it was a tough negotiation process, and in the end the roadmap was presented to the outside world.” (#Interview NPE) [37] This roadmap was published in 2016. It outlined the framework conditions that would be needed to establish battery cell production in Germany. The report suggested that an investment of approximately 1.3 billion euros and financial stamina would be required. It assumed that the production costs would be redeemed over a period of up to 10 years. The report advised considering state support [61] (pp. 7, 45) especially as the production involves great uncertainty as to whether such an investment would pay off for industry. Ultimately, politicians and trade unions failed in their attempts to oblige the supplier Bosch.

The struggles over battery cell production underline the ambivalence within trade unions: On the one hand, the trade unions have an interest in securing well-paid jobs and those assured by labor agreements within the fossil industries. On the other hand, they must open up to new technologies in order to secure a high level of employment in the future. The conflict also highlights the ‘wait-and-see’ approach of the automotive industry, which has long delayed developments in e-mobility. However, the pressure is growing, and VW and the supplier Siemens, for example, have since entered into partnerships over several years to produce lithium-ion batteries in Europe [62,63].

4.3.2. The Environmental Bonus—A Matter of Will and Timing

The issue of a purchase incentive for e-cars was long disputed within the NPE as a central suggestion of the actor group favoring ecological modernization of the car (#Interview NPE) [37]. Back in 2009, Rainer Brüderle, then Minister of Economics, and Peter Ramsauer, then Minister of Transport, ruled out purchase incentives. Ramsauer argued that electromobility had to become commercially attractive to the extent that “there was no need for state incentives to buy on top of it” [64]. Brüderle warned against an “international race for subsidies.” He pointed out that the government had already pledged 500 million euros by 2011 to promote electromobility [65]. Within the NPE it was commonly believed that a purchase incentive would not be enforceable (#Interview NPE) [34]. In contrast, the Environmental Ministry and in particular the then Secretary of State Machnig (who later moved to the Ministry of Economics), already campaigned for such a scheme in 2009 in attempts to subsidize the purchase of electric cars registered between 2012 and 2014, by between 3000 and 5000 euros [64]. However, this proposal was not accepted at the time.

The discussion of a purchase incentive received new momentum around 2015, because sales of electric cars lagged behind the targets. Within the NPE, the question arose of how to reach the defined target of 1 million cars by 2020. According to one interviewee, the problem analysis was that: although the charging infrastructure was expanded and manufacturers also supplied new models, the price of e-cars was still too high (#Interview NPE) [37]. At the same time, pressure grew as registrations of electric vehicles increased significantly in other countries such as Sweden and France where subsidies were available. This sparked new interest across NPE members. An agreement was reached on a purchase subsidy in 2016, but probably only because “BMW in Munich made a strong case to the CSU [Christian Social Union in Bavaria, the regional sister party of the Christian Democratic Union] and the CSU suddenly lobbied for the purchase subsidy” (#Interview Representative of Federal Government I) [45]. The background to BMW’s lobbying was that sales figures for the i3, which had been launched

in Germany in November 2013, were significantly below expectations. Machnig (SPD), the then State Secretary for Economics, together with the Ministry of the Environment, once again campaigned for a purchase premium. Top-ranking politicians from both the SPD and CSU parties favored the idea and, ultimately, the CDU leadership also agreed. Accordingly, the introduction of a purchase subsidy was then decided at a car summit at the German Chancellery in April 2016. Under the scheme, electric cars would be subsidized by 4000 euros (for e-cars up to a list price of 60,000 euros), to be funded equally by the federal budget and the automobile companies. Environmental and consumer associations criticized the government's actions, and start-ups were also of the opinion that a tax rebate or cuts similar to those in the Netherlands or Norway would be more successful (#Interview Start-ups) [57].

The dispute over the environmental bonus illustrates the dynamics within the electromobility debate. The topic again became particularly relevant when BMW launched the i3 and lobbied the regional CSU party in Bavaria to introduce an environmental bonus. In return, the company entered into an alliance with the second group within the NPE, those seeking to accelerate ecological modernization, who had long argued for the environmental bonus. The case also shows that change largely depends on the will of the automotive industry and matters of timing. The year 2015 in particular was marked by the Dieselgate scandal, and it became apparent that the target of one million electric cars by 2020 would not be achievable.

4.3.3. Controversies over Charging Infrastructures

Conflicts also arose concerning the recharging infrastructure as an essential precondition for electric car mobility. Several studies have shown that the range of electric cars influences buying behavior (e.g., [66,67]). Accordingly, working group 3 of the NPE, chaired by Karsten Wildberger of E.ON and Roland Busch of Siemens, focused on the development of the charging infrastructure. The discussions primarily concerned rapid-charging stations in public areas that are important for long-distance traffic. As one interviewee pointed out, the issue of charging infrastructure could also have been better addressed in order to achieve nationwide electrification; and that one must also "create incentives and legal prerequisites so that I can also do this in the private sector, so that a charging infrastructure can develop there" (Interview VW) [68]. This applies, for example, to multi-story car parks or new buildings, where the installation of charging stations could be made legally binding.

The design of charging cables was a source of many disagreements. There were conflicts between the providers of charging infrastructures and the automotive industry. One side sought shorter development cycles and more rapid expansion of the e-car fleet, whereas the other side had recently launched diesel products that it also wanted to be profitable (#Interview Representative of Federal Government I) [45]. On a more technical level, there was "a basic conflict between the utilities, i.e., the energy supply companies and the [auto sector] OEMs and suppliers." (#Interview NPE) [37] The automotive industry argued for cables attached to the charging station. Energy suppliers preferred cars to carry their own cable, as charging points are always at risk of vandalism. This option was also supported by local governments, who were averse to cables attached to stations for liability reasons (#Interview Representative of Federal Government I, II) [45,58].

Further conflicts emerged regarding the policy of publicly funding charging infrastructure. In May 2016 the Federal Cabinet adopted a market incentive program for electromobility. Ref. [69] A total of 300 million euros were allocated to partly fund the installation of at least 15,000 publicly accessible charging stations from the start of 2017 until 2020; 100 million euros were allocated for charging up to 22 kW and 200 million euros for rapid-charging stations with capacities of 22 kW and upwards. One interviewee was skeptical that the funding would benefit different stakeholders to the same extent (#Interview Start-ups) [57]. The argument goes that funding programs disproportionately benefit large German companies familiar with the application procedure defined for the German context. Also, preconditions for funding foresee that charging stations are connected to an IT-backend for e-roaming. Via these platforms, drivers of electric cars can charge their vehicles using a single access medium, regardless of who operates the charging station. Currently, only a handful of e-roaming

platforms exist, such as ‘Plugsurfing,’ e-clearing.net by Smartlab, and ‘Intercharge’ by Hubject [70]. Hubject, for instance, is a joint venture between the large companies in the automotive and electricity markets: BMW, Daimler, Volkswagen, Bosch, Siemens, and EnBW. It claims to be the largest charging network worldwide, with more than 200,000 charging stations and more than 600 B2B partners across 46 countries (as of 21. April 2020) [71]. The current “Charging infrastructure for electric vehicles” funding guideline not only promotes the installation of charging points, but simultaneously specific technological options and business models that are dominated by large players in the energy and automotive industries (#Interview Start-ups) [57].

The conflicts surrounding charging infrastructure highlight several issues. Firstly, it is apparent that these are ‘at right angles’ to the main line of conflict between supporters and those slowing down electric mobility. For example, the automobile companies were hesitant to switch to e-cars, but then wanted to be involved in the development of new business areas. Also, the focus on rapid-charging stations in public spaces turns e-mobility into a contested business field. Start-ups, as well as the quasi-monopolists of the German energy and automotive industries, are competing for market share, whereas with large ventures (such as Hubject) the established power relations tend to prevail.

5. Change from within the System is Unlikely

Politics, industry, and (to some extent) environmental organizations reacted to the employment crisis in the course of the economic and financial crisis of 2007/2008, and the ecological crisis, by pushing for electric mobility. The NPE was therefore established, but ultimately contributed to a rather narrow understanding of the concept that focuses on passenger transport—specifically the automobile—and on battery-electric technologies. Based on that definition, political measures to tackle the multiple crises are constrained to variants of automobility. As such, the current path in transport policy follows the logic of ecological modernization, simply exchanging one propulsion technology by another within the same transportation framework [see also contributions in 18]. This does not set the course for a far-reaching transformation, which would rely on new mobility structures and behavior patterns and that would prevent, in the words of Wolfgang Sachs [2], a “second-order” environmental crisis.

Despite the narrow focus of the NPE, the analysis shed light on the following questions: Who is driving change in Germany’s transport policy and who is thwarting it? Which conflicts are developing? Findings show that there is a fundamental line of conflict between actors who seek to either promote or slow down the ecological modernization of the car. The car industry is hesitant to change its established business model, and has thwarted any profound change. Also, the trade unions are among the actors slowing down a switch from fossil fuel-based cars to electric vehicles. These actors used a double-strategy. They would openly agree to electric mobility but at the same time they prevent instruments that are useful for pushing for it. In contrast, a second group consisting of the Federal Ministry of the Environment, the electricity industry, and start-ups are pushing for an ecological modernization by means of electric vehicles. A third group sought to address issues beyond ecological modernization. Actors such as environmental and consumer protection associations and the Association of German Transport Companies sought to address issues beyond electric vehicles such as smaller, energy efficient cars and more rigid CO₂ standards. However, this group could hardly assert itself. Due to its structure, the representation of stakeholders and their participation in the decision-making bodies, the NPE provided a forum for industrial interests to shape the course of transport policy. As such, it reaffirmed the existing power relations between industrial and environmental and consumer-oriented interests. This suggests that a forum such as the NPE does not provide a legitimate space to deliberate mobility concepts as an alternative to the car-centered transport model.

Beyond the fundamental conflict between the promoters and those slowing down the ecological modernization, minor conflicts arose—that is the struggle over battery cell production, and haggling over the vehicle environmental bonus and the design of the charging infrastructure. They show that automotive industry did not speak with one voice as previous studies suggest [11]. German auto

manufacturers such as BMW, Daimler, and VW have each pursued different strategies right from the start. BMW invested more in battery-electric technologies, whereas VW only belatedly changed course under the direction of CEO Bernhard Diess [13]. Daimler, on the other hand, has pursued a path that was more open to diverse alternative technologies and was a pioneer in the field of fuel cell technology. The conflicts further illustrate that the policy field of electric mobility is highly controversial and entangled with temporal dynamics. It questions whether a stakeholder platform provides an appropriate space for opposing interests to come up with a joint strategy to reach a politically defined target; in this case one million electric vehicles on Germany's roads by 2020.

And indeed, the NPE clearly failed in this primary goal. At the end of 2019 a mere 136,617 electric cars were registered in Germany [72]. A section of the NPE's final report implies that all actors shared responsibility for this failure, as the delay was caused by "the lack of wider timely availability of vehicle models, the later implementation of the support programme for the development of the charging infrastructure, the lack of a legal framework and the delay in implementing the environmental bonus" [73] (p. 6). Nevertheless, the NPE laid the foundations for the expansion of electric mobility in Germany. Several interviewees pointed out that it helped to make positions and negotiation processes more transparent and that it revealed underlying conflicts early on. As such, it supported the political process of establishing Germany as a lead market for electric mobility (#Interview NPE, Representative of Federal Government I, Bosch, Start-ups, Representative of Federal Government II) [37,45,56–58]. Ultimately, the NPE also initiated some regulatory measures, such as the Electric Mobility Act (enforced in 2015) and the Charging Station Directive (effective 2016).

Summing up, the analysis of the NPE shows that Germany is, at best, pursuing the path of a transition of its transport system (see [29]). It follows a technocratic governance approach to orderly steer the switch from fossil-fuel cars to electric vehicles in order to solve the ecological problems caused by road transport. However, this strategy is neither sufficient to solve the mounting environmental pressures such as soil ceiling and energy and resource exploitation; not speaking of the social inequalities promoted by a car-centered transport system. Nor is this strategy supported by those benefitting from the traditional fossil-fuel system. Overall, this study highlights that it is important to pay more attention to the political dimension to better understand the strategies of lobbyism, the unsatisfying outcomes of transport policy-making, and the narrow focus of German polity (see also [10–12]). However, findings are limited in their generalization due to the nature of case studies. More research is needed that puts questions forward such as 'Who is speaking for whom in processes of transforming the current transport system? What are the strategies of incumbent actors to assure their interests? What is the transformative potential of transport policies, for whom, and to what end?'. For the German context, pursuing such questions remains a crucial task as the trend of a technological transition continues at present. This becomes particularly clear with the Climate Protection Law of 2019 [74]. Germany's Climate Action Plan 2050 [75] sets a challenging target of reducing transport sector emissions to 95–98 million tons of CO₂ equivalents by 2030. In order to ensure this goal, the Climate Protection Programme 2030 [76] (that was agreed on 19 September 2019) defines measures that focus predominantly on electric cars, although it also highlights investment in the rail network and a shift of traffic to rail. Further subsidization and funding will be provided without addressing specifications on the size or material impact of electric automobiles. Thereby, the Climate Protection Act follows the approach of the NPE in restricting what is an urgent transformation of the entire transport system instead to a narrow switch to electric cars.

Despite these developments, changes in the political landscape could lead to a transformation of the transport system. This is due, not least, to the many initiatives that are emerging locally. Examples include the Berlin initiative "Fahrradvolksentscheid" ('Cycling Referendum') and various alliances for a fair-priced local public transport system. The current COVID-19 crisis is demonstrating just how effective these bottom-up activities are. In a very short time, Berlin districts such as Friedrichshain/Kreuzberg have succeeded in installing pop-up cycle lanes and converting streets into playgrounds for children. This was made possible as Berlin has a mobility law that was pushed for

by its Fahrradvolksentscheid. Certainly, and despite all these initiatives, it is particularly important in times of COVID-19 not to lose sight of the role of public transport as a critical infrastructure that ensures residents are able to access essential services. In the long term it will be crucial to extend public transport and make it more attractive; to provide additional space for cyclists and other forms of micro-mobility, for pedestrians, playgrounds, and recreation areas; and to further reduce the valuable public space that cities allocate to private vehicles when in use (i.e., traffic) but also their additional spatial demands when not in use (e.g., valuable public space that is assigned free or at very low cost for on-street parking, parking lots, etc.). This would create necessary structures for a genuine transformation of mobility [77]. The NPE contributed little to such a change. It stood for the predominant strategy of an orderly, top-down controlled transition that perpetuates car dependence and dominance while simply modernizing its powertrain.

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