Energizing the Future: Redesigning the EU's Energy Market in the Beyond Growth Era

– A Case Study of Germany

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Abstract

"The Single Energy Market can well be Europe's best asset to ensure its success in a novel global order"

(Letta, 2024, p. 61)

This paper deals with the market design for the energy transition. It follows a three-step approach. The first part of the thesis describes behavioral economics and looks in particular at its influence on policymaking. It discusses how behavioral economics can be used to influence the behavior of electricity consumers and promote public support for energy transition regulations. The second part describes the development of energy market regulations using Germany as an example and compares the different market design options that can be used to respond to changing market circumstances due to the growth of the market share of renewable energy sources. The final section argues in favor of working towards a European solution and presents the Beyond Growth debate.

Authorship declaration

I hereby declare and confirm that this thesis is entirely the result of my own work except where otherwise indicated.

I acknowledge the supervision and guidance I have received from Dr. Artur Bogucki.

This thesis is not used as part of any other examination and has not yet been published.

13.08.2024, Laura Alina Schneider

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A. Introduction

The European Union (EU) is one of the greatest political and cultural achievements of our times, creating peace, economic prosperity and political unity (European Union, 2023). However, the global landscape and the EU itself have drastically changed since its inception. Climate Change, wars, economic crises, and the Covid-19 pandemic have severely impacted the economies worldwide, diminishing also the EU's potential and competitiveness on the global market (Letta, 2024, p. 61; Shanmuga Priya et al., 2021, p. 1294, p. 1299). One of the leading challenges currently faced by the EU is the energy transition (European Parliament, 2023, p. 2).

Germany regards itself as a pioneer in this area and has indeed achieved a substantial expansion of renewable energies since the implementation of the Renewable Energy Sources Act (EEG) in 2000. Initially renewable energy technologies were only economically viable through subsidies. Thus, policies have given substantial financial support to the development of renewable energy sources. Subsequently, energy production by renewable sources increased significantly, nowadays making up a considerable market share while the costs of the technologies have decreased substantially, due to innovation, improved system solutions, mass productions and specific investments (Frauenhofer ISE, 2024, p. 10). For example, in photovoltaic, the wholesale prices for crystalline modules in Germany fell from EUR 310/kWp in 2021 to EUR 270/kWp in 2023 (Frauenhofer ISE, 2024, p.20).

This raises the question if the current electricity market design is still suitable to maintain security of supply and consumer friendly prices and how an alternative electricity market design could look like. The falling costs of renewable energy technologies ask for an evaluation of the renumeration

system while market failures persist. Security of supply still cannot be guaranteed with solely renewable energy sources. The objectives of the energy policy design are changing and must adapt to the developments on the electricity market and geopolitical realities.

It cannot be ignored that the energy transition requires a common effort of the Member States (MS) and cannot be achieved single-handedly. A common action in the energy transition will also mitigate the cost for each of the members and create a stronger Union. The EU is not at the stage of planning to pursue the energy transition but at the stage of implementation and thus must agree on the approach it will adopt and how to finance it. A joint action should aim towards a fair allocation of costs, relieving businesses as well as consumers while raising social acceptancy and therefore uptake.

In the changing geopolitical order, sustainability becomes increasingly important to prosper economically and maintain competitiveness and relevance as a global player (Letta, 2024, p. 12). It is imperative to achieve the green transition as a failure would lead to environmental, economic and geopolitical consequences and directly affect the future of the EU. The green, digital, and security transition, if achieved, will create opportunities for industrial leadership, avert the impact of climate change, which are affecting Europe stronger than expected, and strengthen its international role (Letta, 2024, p. 29).

The energy transition has no clear pathway to follow but needs constant adaptation. It is therefore beneficial to compare the challenges and strategies of the various MS to be able to work out a common approach on the European level. It will be argued that the future is to be found in the creation of a Single European Energy Market. The EU needs to stay competitive in the face of other global powers like the USA and China who themselves have adopted instruments to strengthen their global competitiveness (Letta, 2024, p. 11). The upcoming legislative term will be

decisive for the implementation and success of a Single European Energy Market (Letta, 2024, p. 6 f.). This topic is therefore of high relevance.

This thesis follows a three-part structure: The first part analyzes how the law is used as an instrument of behavioral change to promote a desired outcome and how it is employed to design a market. The second part focusses on Germany as a case study. This chapter highlights the development of energy policymaking and possible options for the market design. In the last chapter the options for a new market design are put into the European context and the departure from the classical maximization of welfare objective with the Beyond Growth initiative is discussed.

B. **Literature review**

Behavioral economics has emerged in the mid 21st century. The term „behavioral economics dates back as far as 1947, when the psychologist George Katona employed it for the first time in consumer surveys (Heukelom, 2014, p.75). However, the concept is commonly associated with the work of Kahneman and Tversky in the 1970s. Fundamental articles from Amos Tversky and Daniel Kahneman were „Judgement under Uncertainty: Heuristics and Biases“ from 1974 and „Prospect Theory: An analysis of decision under risk” from 1979. Since then, behavioral economics produced a wide range of papers, developing and elaborating on different aspects. Cass R. Sunstein describes in his article from 1997 titled „Behavioural analisis of law“ the effects of cognitive and motivational distortions and how they might be counteracted. Thomas Ulen has published the articles „Behavioral Law and Economics: Law, Policy, and Science“ in 2014 and „European and American Perspectives on Behavioural Law and Economics“ from 2015. Eyal Zamir and Doron Teichman discussed the history of behavioral economics, the dual-process

theories and heuristics and biases in their article „behavioral studies“ from 2018. Gregg Sparkman, Lauren Howe and Greg Walton published „How social norms are often a barrier to addressing climate change but can be part of the solution“ in 2021 which focusses on the role of social norms in shaping human behavior. In the area of behavioral economics and policymaking Sander Van der Linden, Adam Pearson and Leaf van Boven published „Behavioural climate policy“ in 2021. Joachim Weimann published „behavioural climate policy“ in 2010. Especially coined to the influence of behavioral economics on the European Energy Market is the article „Why Do We Need Responsive Regulation and Behavioural Research in EU Internal Market Law?“ from Kai Purnhagen from 2015 and even more particular for Germany the article „Verhaltensökonomie und rationale Klimapolitik“ from Rupert Pritzl from 2023. In the area of behavioral economics and policymaking, the article „The role of behavioural economics in energy and climate policy“ from 2011 by Michael G. Pollitt refers especially to the energy transition.

The second chapter uses the work of Jörn Schaube from 2022 „Das EEG im Wandel 2010–2017“ to describe the creation and the development of the EEG until 2017. The article from Acatech, Leopoldina and Akademienunion from 2020 with the title „CO2 bepreisen, Energieträgerpreise reformieren. Wege zu einem sektorenübergreifenden Marktdesign“ describes the various options for designing the market for a more efficient pursuit of the energy transition. The research group Haucap et al. with the article „Erneuerbare Energien effizient und wirksam fördern“ from 2022 poses the question whether the current market design is still adequate for an electricity market dominated by renewable energies.

The third chapter is mainly based on the report from Enrico Letta which is titled „Much more than a market“ from 2024. It provides a vision for the future development of the European Single Market. Crucial for the area of the energy transition is the part of the report where Letta advocates

for the creation of an EU cross-border electricity market. Lastly, the European Parliamentary Research Service published the study „Beyond growth: Pathways towards sustainable prosperity in the EU“ in 2023. It describes that the focus on the Gross Domestic Products as the sole measure of success does not always correctly portray the situation of a state and needs to be complemented by greener and more inclusive indicators. Finally, this closes the circle with the first chapter by advocating for a behavioral approach in policymaking.

C. Creating a framework for the promotion of the expansion of renewable energies

I. The Law as an instrument for behavioural change

Amongst the primary objectives of law is the influence of behavior, through the imposition of sanctions or by giving incentives. Nevertheless, there is a more nuanced and potentially even more effective strategy to alter human behavior by shaping their moral beliefs. Influencing moral norms through laws can reduce the necessity for continuous enforcement and oversight substantially. For instance, if a regulation stigmatizes harmful behavior such as smoking, and emphasizes the risks for others, this can lead to a widespread societal rejection of the behavior. The harmful behavior thus is not only illegal but created a new social norm that deems smoking unacceptable. At the same time, legal rules can encourage behaviors that are socially desirable or beneficial, like recycling or conservation of energy or water. This can make them more convenient and socially appealing and thus integrate them into the public’s moral framework. This shift in moral attitudes highlights that law can be a powerful instrument not only for regulating actions but also for transforming societal norms and values.

1) Relevant concepts

For a better understanding of this work, the most important concepts should be briefly defined at this point. When mentioning the law this is understood “the enforceable body of rules that govern any society” or “one of the rules making up the body of law” (Law, 2022).

Social norms are “behavioral regularities that are experienced as obligatory” by the members of society (Rostain, 2000, S. 992). A policy as in policymaking is a “course of action for tackling a political problem” (Harward Law School, 2022). Lastly, regulations are “government intervention[s] in the market activities of businesses and private citizens through licensing (granting of permissions) or other means for the purpose of achieving certain economic policy goals” (Nakagawa, 2011, p.2).

2) From rational choice to behavioral economics

Enrichment and, in particular, applicability result from overlaps and cooperation between different disciplines. The legal sciences have used economic theories to explain individual market behavior. The fundament of traditional law and economics assumes that human behavior is rational, meaning that an individual’s aim is to maximize their expected utility, so they consistently follow certain preferences (Chorvat, McCabe & Smith, 2005, p. 39). Economic analysis of law takes on the positive, prescriptive and normative form. The positive facet predicts behaviors, the prescriptive facet aims to show how society can reach a set objective, and the normative facet is occupied with what a society should do (Sunstein, 1997, p. 1178). The interplay between law and economics serves to contextualize human behavior in the market and the legal system.

According to the rational choice theory, individuals are a *homo oeconomicus* who in conditions of scarcity select rationally between various alternatives the one that is the most beneficial according to a set of ranked and stable preferences (Mathis & Steffen, 2015, p. 31; Rostain, 2000, p. 977). It assumes that individuals are rational maximisers, trying to maximize their expected utility or self-interest (Korobkin & Ulen, 2000, p. 1055; Ulen, 2015, p. 5). The thin version of the rational choice theory does not offer behavioral predictions but describes human behavior ex post while the thick version aims to predict it ex ante (Korobkin & Ulen, 2000, p. 1067). Thus, for policymakers only the thick version should serve as a tool when choosing among different policy options as a mere understanding of its effects after it has been enacted does not have much utility apart from generating learning effects.

However, in the 1970s Kahneman and Tversky argued that rational choice theory was rarely able to adequately predict the behavior of individuals. Based on their experimental research they suggested that individuals often make suboptimal choices and fail to maximize their utility (Tversky & Kahneman, 1974, p. 1124; Ulen, 2015, p. 5, Korobkin & Ulen, 2000, p. 1069). Instead of possessing perfect rationality, the rationality of individuals is bounded, meaning that their behavior is influenced by the costs of processing information, the general limitations of the human mind, cognitive errors and motivational distortions. Thus, the decision-making process of humans does not maximize for outcomes but rather optimizes or satisfies (Korobkin & Ulen, 2000, p. 1069, Sunstein, 1997, p. 1175). The rational choice theory reduces the preferences of an individual for reasons of simplicity and tries to identify typical patterns for certain groups (Mathis & Steffen, 2015, S. 33). Meanwhile, the behavioral approach recognizes that individuals are determined to

optimize not maximize and are not wired to perform rational decisions in the economic sense, especially not on regular basis.

II. Behavioral Economics and policymaking in the energy transition

1) The meaning of Behavioral Economics

It has been argued that it would be beneficial to replace assumptions of the rational choice theory with the more detailed vision of behavioral modeling to offer more reliable predictions and more satisfactory descriptions of reality (Chorvat, McCabe & Smith, 2005, p. 40). A more realistic psychological context for the assumptions of the rational choice theory increases its explanatory power. In a first step, the assumption of perfect rationality is rejected. Secondly, the concepts of biases and heuristics are introduced (Mathis & Steffen, 2015, S. 36 f.). For example, loss aversion is a phenomenon suggesting that if people feel a loss stronger than they will be pleased with an equal benefit. Thus, citizens will feel stronger about their right to breathe clean air than they would if companies had a right to emit pollution (Sunstein, 1997, p. 1179). Furthermore, individuals are averse to extremes and will strive to find a compromise between several alternatives which give special importance to framing (Sunstein, 1997, p. 1181). Other heuristics are self-serving biases, unrealistic optimism, and overconfidence which bar on the risk-bearing of the individuals and thus affect regulatory work. Individuals tend to underestimate the risks they are facing, which is why the threat of climate change might not be a motivation for change.

2) Weaknesses of Behavioral Economics

One criticism of behavioral economics is that it "takes a theory to beat a theory", meaning that behavioral economics is not a complete theory that can precisely predict human behavior and that until then policymakers should stick to the rational choice theory (Ulen, 2014, p. 28). Still, the shortcomings of the theory do not justify its non-application, especially considering the weaknesses of the rational choice theory. Every science has a prevailing paradigm that is the best current explanation but as every simplification is inherently incomplete and incorporating anormalities into the standard model becomes exceedingly complicated to a point where the development of a new paradigm becomes more elegant (Ulen, 2014, p. 30). Critics point out that the results of behavioural economics are found in experiments and are sensible to experimental techniques. This questions whether the theory can be applied to real economic situations (Chorvat, McCabe & Smith, 2005, p. 41). It must be remembered that behavioral economics is a young theory and that understanding human decision-making is an extremely complex subject. Thus, policymakers need to be aware of the limitations of both theories, the rational choice theory and behavioral economics, and proceed with caution when introducing legal rules (Ulen, 2014, p. 42; Sunstein, 1997, p. 1184). When enacting laws and regulations in energy transition and environmental protection, policymakers must consider that individuals might not comprehend the full risks that climate change presents or be overly optimistic concerning measures that have been taken.

3) From Behavioral Economics to policymaking

The legal system consists of procedures and structures for exchange, rights allocation, introduces descriptions and thus provides a context in which individuals make their decisions. As context influences choices, behavioral economics are crucial for the construction of the legal system. The legal system can be adapted to influence the preferences and values of the society internally in courts or externally in transactions (Sunstein, 1997, p. 1177). Policymaking in the energy transition is confronted with particular challenges. It is the nature of climate change that the window for taking measures is short while the implementation of measures or the lack of such have long-term effects (Van der Linden et al., 2021, p. 431). As the expected behavior of actors differs under the rational choice theory and behavioral economics, it is important to decide which theory should be taken as a basis for policymaking (Chorvat, McCabe & Smith, 2005, p. 42). Human behavior can be most adequately explained by a combination of different scientific fields where none claims the monopoly on insights about behavior and policymaking (Jones, O'Hara O'Connor & Stake, 2011, p. 140). The goal of policymakers is to create incentives that will align private and public interests (Ulen, 2014, p. 9). Standard regulatory tools may be ineffective as individuals might not respond to traditional policies predicted by the rational choice theory (Ulen, 2014, p. 9). When enacting legal rules, tools of behavioral economics help policymakers predict to a greater degree how different groups of subjects will react possible legal regulations and how the regulatory system can be shaped to incentivize the desired behavioral outcome as well as how legal institutions must be structured to maximize the socially optimal outcome (Korobkin & Ulen, 2000, S. 1072; Rostain, 2000, p. 980). Considering the mentioned limitations of the rational choice theory, modifications and amplifications through the behavioral economics must be made to offer a basis that describes

more precisely how decision making takes place and on which policymakers can formulate legal strategies (Korobkin & Ulen, 2000, p. 1067). Also, policymaking on the basis of behavioral economics does not only predict or shape behavior but also serves to increase social acceptance (Sparkman et al., 2021, p. 546).

The way the subjects of legal rules will react to them depends not only on the legal rule itself but also on the context. The reaction of individuals will depend in big part on reference points the individuals recognize and how the choices position itself relative to the status quo (Korobkin & Ulen, 2000, S. 1067). Individuals are neither completely self-interested nor are they completely altruistic but present a mix of motivations that can be made prevalent one or the other through the right incentives. But the adjustment of behavior through behavioral economics requires a lot of sensitivity. Outcomes of empirical studies suggest that a slight adjustment in conditions can induce individuals to contribute despite the incurrence of costs or not contribute at all (Rostain, 2000, p. 1002).

4) The special role of social norms

Climate policy appeals largely to the morality of humankind (Pritzl, 2023, p. 163). As climate cange and the energy transitions are too complex for individual to navigate on their own, even though they might support the goal, societal norms can support the decision making of individuals as a reliable source of motivation (Sparkman et al., 2021, p. 529, p. 532). Social norms are the foundation for the normative structure of societal obligations. This breaks the assumption that

actors are fundamentally self-interested as they might deviate from this assumption to avoid these informal social repercussions (Rostain, 2000, p. 992).

The benefit of relying on social norms is that they are internalized and thus do not require enforcement and correlated costs (Rostain, 2000, p. 993). Very closely connected to the idea of internalizing social norms is the idea that individuals compete for esteem in the eyes of others and will act in a way that is regarded as commendable even if that meant incurring costs. With the number of people following this conduct rising, the reputational cost of not following these conducts also increases and consequently a social norm is born (Rostain, 2000, p. 996). Some consumers voluntarily participate in the financing of public goods. However, the more often the experiments were carried out, the less willing individuals were to cooperate, and the more free-riding behavior became apparent. The free riding also increased with the decrease of social cohesion and the decrease of communication. This can be explained with the tit-for-tat strategy where each side shows reciprocal willingness to cooperate (Pritzl, 2023, p. 160). The special challenges of cooperation will be discussed in the next part.

5) The problem of cooperation

Climate protection is an international public good and the solution to the climate problem can be called the “mother of all cooperation problems” (Pritzl, 2023, p. 161). When individuals form groups, the members receive benefits that are not available to them independently. If these groups create public goods, they will only do so if the costs are offset by the benefits they receive as members of the group. The costs can also incentivize some group members to free ride on the

benefits while avoiding the costs (Rostain, 2000, p. 992). In the context of energy policies various players are involved, and problems of cooperation can arise in the context of individuals and states.

In the case of individuals, people may deem that they are at very low risk of being affected by climate change, for example if they do not live in an area subject to flooding. Thus, they might have less motivation to act. Climate change creates costs that are often individual, giving others the opportunity to free ride on these efforts. (Sparkman et al., 2021, p. 530). The above-described social norms also help to resolve this cooperation problem. If a social norm is dynamic, meaning that it states that more people are engaging in a certain behavior, creating a trend that is expected to continue, individuals are likely to change their behavior in this sense (Sparkman et al., 2021, p. 539). For example, if the social norm states that more and more people are choosing a vegetarian diet, this is more likely to develop traction than if it states that a part of the society eats vegetarian. The social nature of humans incentivizes them to act according to the collective effort of a group (Sparkman et al., 2021, p. 541). Also, social norms compel people to act in a cooperative manner and even against their own self-interests as they want to be seen acting fairly. Therefore, if policymakers encounter a cooperative issue, they must align self-interest and group interests and consider the social and cultural context of the society in question (Rostain, 2000, p. 991; Sunstein, 1997, p. 1186).

In the case of states, every state creates its own policies to approach the energy transition but as a transnational problem, strict national measures cannot efficiently account for all aspects of this complex task. Tackling the energy transition therefore requires international cooperation whether through climate agreements or through the creation of a European Single Energy Market. This

cooperation comes with its own challenges and thus is a highly complex setting (Rostain, 2000, p. 992). When states aim to align their strategies, government delegations are formed that consist of negotiators who are individuals but represent the group's interests (Weimann, 2010, p. 285).

In this context, with several players and various possible strategies, game theory comes into play (Rostain, 2000, p. 977). The game theory models are applied unchanged to the behavior of government delegations and the payout functions used in the models contain the capita GDP of their countries as motive for their choices. The model thus assumes that government delegations behave as custodians of the interests of their voters who are rational and strictly self-interested. This leads to the politicians also being strictly rational to secure their re-election (Weimann, 2010, p. 285). Behavioral economics have found that individuals tend to cooperate more than predicted by game theory as many individuals expect cooperation and reward it. Still, a large part is not cooperative, which creates heterogeneity (Chorvat, McCabe & Smith, 2005, p. 48). Heterogeneity can also be found within that group that is represented by the delegations as voters have differentiated preferences. Thus, government delegations cannot only seek to maximize per capita income and consequently the behavior of government delegations becomes difficult to predict (Weimann, 2010, p. 286). The above-mentioned social rules also affect states in cooperative scenarios. Many countries want to maintain a green image, as Germany who proclaims itself a pioneer in climate policy. Social norms signal the willingness to enter cooperative relationships (Rostain, 2000, p. 998). States might enter agreements if they feel that each participant is equally involved and affected (Rostain, 2000, p. 991; Sunstein, 1997, p. 1186). An approach based on social norms and morals inevitably leads to purely symbolic measures that are not efficient or effective and may even be counterproductive. If political actors engage in demonstrating goodwill, it can lead to cognitive dissonance among politicians and citizens alike. A moral approach cannot

coordinate climate policy behavior but can even be counterproductive (Pritzl, 2023, p. 164). This can be seen, for example, in the fact that the climate policies of almost all European countries are highly inefficient, as they use significantly more resources than would be necessary to realize the European emission reduction targets (Weimann, 2010, p. 286).

Individual overconfidence is one of the central weaknesses of individual decision-making. It can make decision makers believe that they can correctly grasp and judge even complex relationships with little information. This overconfidence can also occur in groups (Pritzl, 2023, p. 166). Germany has described itself for years as the pioneer of the energy transition, but the shortcomings of the energy policies have disproven this wishful thinking as an illusion of reality (Pritzl, 2023, p. 166). Furthermore, the "status quo bias" leads to individuals prioritize the current state and resist changes and the sunk-cost-fallacy leads to actors to adhere to a decision that turns out wrong because the policymaker wants to appear consistent and wants to protect its reputation (Pritzl, 2023, p. 166). In case of Germany the EEG funding needs to be revised but the sunk-cost-fallacy could be the reason why policymakers do not want to break with the chosen path of the last more than twenty years.

6) Behavioural Economics in designing the European Single Market

a) Historical backdrop

The transition to renewable energies is not the first energy transition as the invention of the steam engine in the eighteenth century and the switch to coal from wood can be seen as the first energy transition. The second transition took place with the transition to oil and gas as of 1910. Both were

bottom-up transitions, driven by the advantages they brought to the market. This was not the case in the third energy transition, triggered by the oil crisis in 1973, when cost intensive nuclear energy was introduced to the market. The transition to renewable energy is thus the fourth energy transition and the second one that needs state action to be introduced into the market against market forces. Challenges posed by this transition are construction and production costs, collision with land interests, supply insecurity and infrastructure insufficiencies. These are some of the externalities that must be internalized though regulations. Even though this is not the first energy transition it comes with its own unprecedented challenges for policymaking (Mathis & Huber, 2018, p. 22 f.). Behavioral economics becomes fundamental for two aspects. On the one hand it is needed to facilitate the introduction of renewable energy technologies into the market. Still, the combat against climate change cannot merely be let by technical solutions but must be accompanied by the change of behavioral patterns in society towards more conscious consumption and effective uptake (Ekardt & Wieding, 2015, p. 82).

b) Designing a market

A design refers to a plan or pattern. A market design therefore does not describe the workings of the market on its own but assumes that the state has adopted certain rules to create certain dynamics in the market. The market crowds out inefficient businesses, creating an evolution effect that leaves businesses with successful business strategies, generating a bottom-up understanding (Jones, O'Hara O'Connor & Stake, 2011, p. 109). Demand and supply create the prices, but this might not always agree with social objectives like environmental protection ir innovation. The state can intervene and influence the market to aligns it with desired social objectives. From a law and economic perspective this is called the optimization of social welfare (Acatech, Leopoldina und

Akademienunion, 2020, p. 15). To promote climate protection and achieve welfare maximization at the same time, the intervention of the state is necessary (Acatech, Leopoldina und Akademienunion, 2020, p. 20).

Intervention into private decision-making can be justified by externalities, public goods, severe informational asymmetries, collective action issues, and the redistribution of income and wealth (Ulen, 2014, p. 9). In the case of the energy transition several negative externalities can be found: the detrimental effect that pollution of fossil energy sources has on health, the destruction of the environment and the consequent rise of temperature. Positive externalities are innovation and infrastructure expansion amongst others. Market participants must internalize these negative externalities through taxes, apportionments, levies or regulations. An optimal design would correct the allocative market failure. Instruments to battle the negative externalities of environmental pollution are combatted with environmental policy instruments and the financing of the public budget is addressed with fiscal instruments (Acatech, Leopoldina und Akademienunion, 2020, p. 16).

From a behavioral perspective the law can serve as a means of steering social conducts into a desired direction and to discourage conduct that policymakers regard as unwanted (Korobkin & Ulen, 2000, S. 1054). Laws will affect the conduct of the citizens it governs regardless of whether that is the objective or a side effect. In the case of the energy transition, it is important to steer the behavior of individuals in several aspects. For one, the behavior of consumers should be steered to reduce energy consumption and accept the cost burden of the energy transition in energy and product prices. For another, the EU can employ behavioral economics to encounter negative

externalities, use restrictions, Pigouvian taxes or tradable permits to ban or limit the damaging behavior, in this case pollution though fossil energy sources or the overuse of energy (Pollitt & Shaorshadze, 2011, S. 19). Behavioral economics research outcomes suggest that tradable permits can lower environmental morals as they convey the notion that pollution is acceptable if the price is paid. Also, if taxes are employed to change behavior, it has been found that this can only been done through high taxes that create a crowding-out effect or low taxes that create environmental moral, but not through medium taxes that crowd out environmental morals like tradable permits (Pollitt & Shaorshadze, 2011, S. 19).

Behavioral tools can be used to set incentives for individuals to act in a manner that is beneficial for themselves and society. The law can employ policies to change behavior through incentives. It can take on the form of prohibitions, which might not be proportional or change the choice architecture of the individuals by debiasing through nudges (Mathis & Steffen, 2015, p. 36 f.). When employing the law its costs must be weight against its benefits, and it has also to be considered that the legislator might not have all the necessary information about the individuals' preferences or be themselves influenced by biases (Mathis & Steffen, 2015, p. 44). As the EU abides by the founding treaties, debiasing needs to fulfill the requirements of transparency and democratic legitimacy. It can therefore not take on the role of a benevolent dictator (Mathis & Steffen, 2015, p. 44 f.; Sunstein, 1997, p. 1178).

According to the dual-process theory, people perceive information through one system that operates quickly based on heuristics acquired by experiences and a second system which requires effortful mental activity to reach a decision (Kahneman, 2011, p. 33; Zamir & Teichman, 2018, p.

21). For policymakers the decision to adopt certain laws runs through system 2. However, the more complex the situation, the more policymakers are tempted to take generalized measures and simplify their strategies. In the case of complex problems there are more options to choose from or the options have more attributes. In this case, actors might simplify strategies to minimize efforts. Even though it is easier to create universal, simplified rules, in the face of the versatility of interests of groups and individuals, it is unlikely to be able to align all those different interests on one single goal. Policymakers need to identify the different groups and their interests and create several situation-specific minitheories to react to this collection of interests, instead of using one universal theory (Korobkin & Ulen, 2000, p. 1073). Policymakers will not be able to understand the incentive effects of legal rules only through the rational choice theory, but they will have to supplement the mentioned shortcomings of this theory with behavioral economics to create a more predictive tool for policymaking (Korobkin & Ulen, 2000, p. 1075). A more comprehensive theory will lead to more comprehensive and situation-specific laws.

The success of the top-down macro-economic regulations in the European internal market depends substantially on the social bottom-up backup of the citizens. The regulation must be responsive to avoid a so-called legitimacy market failure and can do so by using behavioural economics. This will result in regulations which respond to the needs of the citizens and incentivizes MS to act in accordance with the interest of the European internal market. (Purnhagen, 2015, p. 51 f). Social acceptance is of the outmost importance for the success of the internal market. This is especially true in the energy transition which comes with costs and benefits that must be allocated equally to avoid social backlash and thus a legitimacy market failure. Legal rules must aspire to be effective and measured against their opportunity costs (Korobkin & Ulen, 2000, p. 1054). Responsive

regulation can be created based on democratically elected intermediaries, surveys or dialogues with interest groups. As MS are reluctant to give up competences, the EU finds itself in a constant struggle for maintaining competences against regulations. Behavioural research can provide insights about cultural and societal needs which can then be used to strengthen the position of the EU in the introduction of new regulations (Purnhagen, 2015, p. 58 f.). An important fundamental principle for the design of the Energy Market is the level playing field. Renewable energies are not to have competitive disadvantages. The aim is an undistorted competition between energy sources and the promotion of the discovery principle of the market (Acatech, Leopoldina und Akademienunion, 2020, p. 16). Each MS must be able to trust that costs and benefits will be distributed equally and fair between them.

Thus, the EU must employ a variety of measures apart from the European Union Emissions Trading System (EU ETS) to maintain or employ other measures to foster environmental morals and incentivize the desired behavior of the states and individuals. Using the instrument of a CO2 price can promote climate protection on a national level, promote technological development and pursuit a joint European effort as will be discussed in the following chapters (Acatech, Leopoldina und Akademienunion, 2020, p. 22).

To conclude, behavioural economics are essential to create an efficient internal market and avoid legitimacy market failures. This way behavioural insights can help to create a highly competitive European Single Market.

D. Case study: The special challenges of an electricity market in transition - readjusting to changing market conditions, options in Germany

I. Origin and objectives of the Renewable Energy Act (EEG) in Germany

1) The German Stromeinspeisungsgesetz (StrEG)

The Law on the Feed-in of Electricity from Renewable Energies into the Public Grid, short Electricity Feed-in Act, in German Stromeinspeisungsgesetz (StrEG), was passed the 7th of December 1990 and came into force the 1st of January 1991. This was the starting point for renewable energy legislation. The StrEG constituted the structural elements of grid connection, purchase and remuneration obligations, which were also decisive for the consecutive EEG, and made the electricity market accessible to private producers of renewable energy on a larger scale (Schaube, 2022, p. 155). The funding mechanism was the payment of a feed-in tariff which differentiated according to the technology and was based on the average end consumer price achieved two years previously. Benefitted were solar energy and wind power. The StrEG aimed to set incentives for the construction and operation of small plants. A downside of the law was the link to the end consumer price which reduced the renumeration of renewable energies during poor market developments. Also, solar energy needed additional municipal support programms to sustain itself (Schaube, 2022, S. 157; Seibt, 2014, p. 16).

2) The enactment of the Erneuerbare Energien Gesetz (EEG)

In the 1998 federal elections, an SPD-led federal government emerged for the first time in alliance with Bündnis 90/Die Grünen, which set a different agenda. The new government aimed to phase out nuclear energy and to promote and expand renewable energies to a much greater extent (Schaube, 2022, p. 158). This led to the creation of the EEG. The role model for the EEG was the Aachen model which in 1995 introduced for the first time a cost-covering renumeration and the obligation of energy suppliers to feed energy from private solar of wind power plants into the electricity grid (Seibt, 2014, p. 17). The EEG 2000 aimed to double the share of renewable energies by 2010. To this end, the structural elements of grid connection, purchase and remuneration obligations introduced by the StrEG were applied without restriction, obligating grid operators to connect and prioritize renewable energy sources without the limitation of five per cent of the total electricity of the electricity grid operator that was stipulated by the StrEG. While the StrEG established a feed-in tariff dependent on electricity prices, in the EEG the feed-in tariff is fixed for a long-term renumeration period, technology-specific and cost-covering, benefitting a wide range of renewable electricity generation technologies, including wind power, photovoltaics, run-of-river power, biomass and geothermal energy (Schaube, 2022, p. 165). The entitlement of energy producers to a fixed feed-in tariff and the obligation of the grid operator to receive the electricity led to additional costs which were borne by the electricity customers through the EEG apportionment (Schubert et al., 2018, p. 118). The EEG 2000 led to a strong growth of renewable energies in the market and thus to a moderate but continuous increase of the EEG apportionment. This led to concerns of energy-intensive companies regarding the rising electricity prices and to address these concerns and relieve these companies, a special compensation scheme was

introduced, distinguishing between privileged and non-privileged electricity consumers (Schaube, 2022, p. 171).

In the case of solar installations, the subsidy was so successful that the fixed subsidy cap was soon almost reached, and the credit volume of the 100,000 Roofs Programme (HTDP) was almost exhausted. In response, a system size-related graduation of feed-in tariffs was introduced in 2003, irrespective of the installation location. The size restriction and the subsidy cap were abolished and feed-in tariffs were increased. This led to a further boom in the solar industry (Schaube, 2022, S. 172).

3) The amendment of 2002

Following the re-election of the red-green coalition government in 2002, the Federal Ministry for the Environment drew up a progress report which served as a working basis for the amendment of the EEG (Seibt, 2014, p. 18). The EEG 2004 aimed to increase the market participation of renewable energies to 12.5 % by 2010, thus doubling them, and to 20 % by 2020. The centerpiece of the amendment was the adjustment of feed-in tariffs. The aim was to force and incentivize the producers to reduce production costs. This was to be achieved by raising the feed-in tariffs but applying an annual degression for the various technologies. The EEG 2014 maintained the basic structure of the EEG, but it has become much more differentiated and consequently more complicated (Schaube, 2022, p. 175, Seibt, 2014, p. 19).

4) The amendment of 2009

After the early federal elections in 2005, the black-red government agreed to continue the previous policy and retain the main points of the law when amending the EEG. The aim of the EEG 2009 was to increase the share of renewable energies to at least 30 % by 2020. To this end, the differentiated remuneration structure was further expanded, and the remuneration rates were essentially increased. They were only reduced in the area of photovoltaics to avoid over-subsidization of the technology and the annual degression in this area was increased. There were innovations in the form of the option of unsubsidized direct marketing and the green electricity privilege, but these did not give the EEG a new character and were therefore in line with the spirit of continuity (Schaube, 2022, S. 184; Seibt, 2014, p. 19).

5) The amendment of 2012

Following the nuclear accident in Japan in March 2011, the German government presented an energy transition package regarding the future use of nuclear energy in Germany and aiming finally phase-out the nuclear energy by 2020 after the phase-out of nuclear energy under the red-green government in 2002 and the return to nuclear energy by the black-yellow government in 2010. As part of the energy transition, the EEG was also amended. The amendment sets the goal of increasing the share of renewable energies to at least 35% by 2020 and to at least 80% by 2050, as well as promoting the integration of renewable energies into the supply system (Gawel & Purkus, 2013, p. 44; Seibt, 2014, p. 20). Renewable energies had developed rapidly since the EEG 2000, with photovoltaics far exceeding the BMU's forecast, which is why the subsidy costs and therefore

the EEG apportionment increased and a reduction in the remuneration rates for photovoltaic systems became necessary. Solar subsidies had already been adjusted in the run-up to the amendment, which is why only moderate adjustments were made as part of the amendment. The EEG 2012 includes expansion targets that extend beyond 2020, retains the key structural elements and adds the optional market premium as a third instrument for optional direct marketing. Above all, adjustments were made to the remuneration regulations (Schaube, 2022, S. 213 f.).

6) The amendment of 2014

The share of renewable energies in the electricity supply had also increased considerably across the EU. They became a leading technology for future electricity generation in Europe and gained relevance in the internal market. The EU responded to the following fragmentation of the internal energy market through soft law and governance processes. The EEG 2014 is also the result of this Europeanisation process. The European influence is reflected in the principles of the amendment. The direct marketing subsidized by market premiums, the transition to tenders and the Europe-wide opening of the support system are particularly noteworthy (Kröger, 2016, p. 86). The EEG 2014 includes an expansion corridor and technology-specific expansion paths with the aim of making expansion easier to plan. The minimum expansion targets were replaced by an expansion corridor, according to which renewable energies should account for at least 80 % of electricity generation by 2050, with interim targets of 40 to 45 % by 2025 and 55 to 60 % by 2035, and specific expansion paths were prescribed for the respective technologies. A significant change was made to the subsidy system. The optional market premium model was only to be used in exceptional cases and was essentially replaced by feed-in tariffs as part of mandatory direct

marketing. The green electricity privilege was abolished and only mandatory direct marketing in the market premium model and other direct marketing was retained. In addition, the competitive determination of the level of support via tenders was introduced to introduce tenders into the EEG by 2017 (Schaube, 2022, S. 514 ff.).

7) The amendments of 2017 and 2021

In the EEG 2017 the aim of this innovation was to make the expansion more cost-efficient while maintaining the diversity of players and the targets set in the expansion corridor. The market share of renewable energies was to increase to 40 to 45 % by 2025 and to 55 to 60 % by 2035, while the target of achieving a share of 80 % by 2050 was maintained. Tenders as a funding mechanism have now been extended from photovoltaics to wind energy and biomass. Only generation plants with an installed capacity of ≤ 750 kW were exempted, meaning that over 80% of new renewable energies to be added were covered by the tendering obligation (Schaube, 2022, p. 751 ff.). A further change took place in 2021, which will not be discussed further here.

8) The amendment of 2023

The most recent amendment took place in 2023. § 1 EEG now sets an even more ambitious objective to reach the share of 80% of renewable energies until 2030. The outstanding feature of the EEG 2023 is the abolition of the EEG apportionment. According to § 60 I 1a EEG old version, a value of 0 cents per kilowatt hour is to be applied for the EEG apportionment for the period from 1 July 2022 to 31 December 2022, after which the apportionment was abolished entirely. Only

electricity producers which cannot sustain an economic operation without financial support due to the generation costs are remunerated with a feed-in tariff or market premium. The feed-in tariff applies to solar installations up to 100 kW. The market premium applies to solar installations up to 1,000 kW in direct marketing. In both cases, regular subsidy rates apply to solar installations in partial feed-in and increased subsidy rates apply to those in full feed-in (Bundesnetzagentur, 2024; Umweltbundesamt, 2023). The difference between the energy producers' renumeration entitlement and the sale value of the produced electricity on the market create a financing gap (Gesetzesentwurf, p. 6, Drucksache 20/1630). With the abolition of the EEG apportionment, the financing of this gap through the electricity price has also been cancelled. From now on, this will be covered by the federal government's special fund "Energy and Climate Fund". As most of the resources in this fund come from the proceeds of national fuel emissions trading, this regulation means that income from CO2 pricing is now passed on to households and companies (Gesetzesentwurf, 2022, p.6).

The abolition of the EEG apportionment can bring great relief for consumers and can therefore be seen as a means of making the energy transition fairer and getting society on board. However, it is questionable why the EEG surcharge was retained for so long. The answer to this question can probably be found in behavioral economics. As previously described with the sunk-cost fallacy, adherence to political strategies once chosen can be justified by continuity, and the legislator does not want to make a fool of itself. It is therefore to be welcomed that the move away from the EEG apportionment was now also financially possible. However, it remains questionable whether market premiums and feed-in tariffs are the right means of financing the energy transition or whether there may be a better alternative. This question will be answered in the next step.

II. Possible market designs

1) Renumerating renewable energies

There are different options to design a market for the energy transition. A new energy market design is expected to fulfil the criteria of effectiveness, political feasibility, cost efficiency, social acceptance, legal feasibility and connectivity. As a new market design must be seen in the European context, it would have to meet the requirements of the EU state aid law in Art. 107 ff. AEUV (Haucap, 2022, p. 696).

The different instruments at hand can be classified as market-based and market-independent. Market-based instruments are renumeration models that pass on price signals, distorting them as little as possible. The advantage of market-based instrument is that they result in efficient incentives for market-oriented behaviour and adequate investments decisions. This requires that wrong incentives are being avoided, which could result from the coexistence of a direct funding model and the EU ETS in form of a waterbed effect (Haucap, 2022, p. 695). The downside of market-based instruments is that they could result in higher investments risks. Thus, especially for new technologies in the infant stages a direct model might be more suitable. As the new technology develops, direct models should be only transitory. When the new technology is more solidly implemented and more widely used, the model should be replaced by a model focused on cost efficiencies to maintain social acceptance and fairness on the market. While a direct model is used, the price should be created through tenders which are controllable and limit the premium to the necessary amount for the expansion of the technology in the market (Haucap, 2022, p. 695 f.).

There are two options for the remuneration of electricity generation from renewable energies: Market Premiums and CO2 price. Market Premiums can be fixed, one-sided sliding or two-sided sliding.

a) Fixed market premium

A fixed market premium renumerates renewable energy directly on the electricity exchange with a fixed premium in cents per kilowatt hour. The premium is independent of the fluctuation of the capture price and remains constant for the time established. (Haucap, 2022, p. 696). As the revenue is composed of the capture price that is fluctuating and the fixed premium it creates an incentive for market-oriented behaviour. Electricity producers will also be incentivized to increase flexibility to shift the feed-in from low capture price periods to times with higher capture prices and achieve a better distribution (Haucap, 2022, p. 697).

b) One-sided sliding market premiums

One-sided sliding market premiums define a certain surcharge price. When the energy is sold on the market for a capture price below this price, the difference is offset by the premium. If the price achieved is higher however, no additional payment is made. This means that this model is not independent from the market price and does not guarantee a constant premium but a minimum renumeration (Haucap, 2022, p. 696). The advantage is that producers gain certainty about the minimum revenue and temporal price fluctuations are mitigated, reducing investment risks and the

self-cannibalisation. This is especially important for private investments that rely on a minimum price. The current EEG uses one-sided sliding market premiums in combination with direct marketing as the predominant model for promoting renewable energies (Haucap, 2022, p. 698). The disadvantage is that in contrast to the Fixed Market Premium, it does not pass on market incentives undistorted. Producers are not incentivized to react to price changes, which would be desired by the economy (Haucap, 2022, p. 698). As shown the one-sided sliding premium does not pass on the incentives created by the market through fluctuating market prices and it is therefore more challenging to connect this model to the EU ETS (Haucap, 2022, p. 698).

c) Two-sided floating premium

A two-sided floating premium, also known as a contract for difference, compensates for deviations in the capture prices realised on the market from the agreed hammer price, both upwards and downwards, with a positive or negative premium. The disadvantage of rigid price fixing is that it harbours the risk of potential disincentives and makes integration into international systems such as the EU ETS is significantly more difficult. They are therefore not used in Germany and will not be discussed further here (Haucap, 2022, p. 701).

d) CO2 price

The CO2 price as an indirect option for the promotion of renewable energies promotes them by increasing the cost of energy creation by fossil energy sources. As the EU ETS already covers the electricity sector, the introduction of the CO2 price in Germany would mean ideally a first step to

a European wide solution (Haucap, 2022, p. 696). The CO2 price is technology neutral, affecting all energy sources and market based. Less CO2-intensive electricity producers would gain a competitive advantage over more CO2-intensive plants (Haucap, 2022, p. 696). The risk of the introduction of a CO2 price is carbon leakage. This term describes the risk that companies might outsource their production sites to countries with lower or no CO2 prices or to unregulated areas (Acatech, Leopoldina und Akademienunion, 2020, p. 10, Haucap, 2022, p. 698). This would result in losses for the economy and from an international point of view the emissions would not be saved but shifted to other countries. Therefore, it is important to include as many emissions and countries as possible to avoid carbon leakage. It is to be expected that Germany would be rather reluctant to introduce a CO2 price if it would not be followed by a larger number of states. A national solution to avoid this waterbed effect could be that the state buys certificates in the EUTS and thus withdraws them from the market. Another solution could be to negotiate to decrease the total volume of emissions in the EU ETS (Acatech, Leopoldina und Akademienunion, 2020, p. 24; Haucap, 2022, p. 695). All in all, it would be most desirable to advocate for a European solution.

Another risk is that the absence of direct premiums, the strong dependence of the renumeration of the electricity price and no guarantee of a minimum revenue may lead to a higher investment risk which could negatively impact on the diversity of investors as the high financial risk may be a deterrence. Also price fluctuations of the CO2 price could lead to insecurities. This could be solved through a minimum price of a price corridor with a maximum and minimum price range for the CO2 price (Haucap, 2022, p. 699). Also, the introduction of a CO2 price could lead to higher electricity prices which could decrease social acceptance for this measure (Haucap, 2022, p. 699).

2) Steps into the future

It should be advocated for a CO2 price as the central climate policy instrument as it enables climate protection on the national level, promotes the development of low-emission technologies under market conditions and can serve as a first step for a European agreement (Acatech, Leopoldina und Akademienunion, 2020, p. 23). Germany has taken a first step in the direction of implementing a CO2 price with the “Klimapaket 2030” in 2021. A separate Emission trade system will introduce a CO2 price for the heat and transport sector. It states that until 2025 the certificates will have a fixed price decided annually. Afterwards the price is to be set by the market. In the time until 2025 the emission trading has the effect of a tax. It is questionable if this is legally possible as a direct tax on CO2 emissions is not allowed under German financial law. The German government also aspires to extend the EU-ETS system to the heating and transport system (Acatech, Leopoldina und Akademienunion, 2020, p. 13).

The introduction of a CO2 price is the most adequate model for the future. As the current system in Germany is however based on fixed premiums, the introduction of a CO2 price would imply a sharp break and could not be executed immediately. Germany would have to work towards this system with additional support mechanisms as a fixed or one-sided premium during a transitional period in order to ensure that the targets for 2030 are being reached (Haucap, 2022, p. 699).

E. Beyond Germany: A proposal for a legal framework of an EU cross border electricity market

As seen in the case study, solely national solution will not be as efficient as a European-wide effort. It should be advocated for an EU cross border electricity market.

I. Advocating for an international solution: A single European Energy Market

The Russian military invasion has redesigned the geopolitical landscape and has made the EU more dependent on the USA and China. The intensity of the crisis even led to MS imposing temporary export restrictions on gas and to compete for gas export countries. Still, the Single market ensured electricity supply and effectively managed the gas allocation, avoiding blackouts or shortages and thus being an important asset in the creatin of a unified response to the crisis (Letta, 2024, p. 61). The European Market is still suffering the aftershocks of the crisis which might cause deindustrialization as the energy costs and retail prices are higher than those of Europe's competitors. As this can be countered by increasing the share of renewable energy sources and limit the dependency on energy imports, it created a political momentum for a stronger market integration that must be used to create the Single Energy Market (Letta, 2024, p. 62).

The market for energy trading is well-functioning but setting incentives for investments into renewable energies are largely left to the national governments. With a rising number of MS and the subsequent complexities of the several legal systems, the benefits from economies of scale cannot be ignored (Letta, 2024, p.4). As European companies are small compared to those from the United States and China., a single market would serve to confront this size deficit and foster

the growth of European companies to ultimately create a robust economy and strengthen the position of the EU on the global stage. Especially in the areas of finance, energy and electronic communication the integration must be accelerated, and the European industrial capacities must be made compatible with the transition goals (Letta, 2024, p. 8 f.). In the global landscape, Europe cannot compete with fossil producers like the USA on gas or oil prices or with state-controlled economies like China, but it can create independency and competitive advantages by creating a scale energy market and increase the amount of renewable energy sources (Letta, 2024, p. 62). The lack of integration in the financial, energy, and electronic communications sectors is a primary reason for Europe's declining competitiveness (Letta, 2024, p. 8). These challenges could be met with the creation of a single European Energy Market which would give Europe a competitive advantage over the US, marked by regulated and unregulated markets on an ageing electricity grid and the Chinese reliance on foreign regional markets (Letta, 2024, p. 63).

As the previous chapter has shown, Germany is taking steps to advance the energy transition and adapt to arising challenges. However, single actions by MS have natural limitations. The single market was created with less MS and a different political scenario; a context which has since then drastically changed and to which the single market must adapt as an ongoing project (Letta, 2024, p. 3). The creation of a Single Energy Market would leave the choice of the energy mix to the MS but guarantees market integration to make the transition to a renewable energy production more cost-efficient by reducing the cost for grid development, energy storage, flexibility solution, mitigating external shocks and investor risks, while mobilizing investments by private capital (Letta, 2024, p. 62).

The Single Electricity Market must be created on the basis of interconnectivity. Although the EU legislation with the regulation 2019/943 stipulates that a minimum share of 70 per cent of

transmission capacity must be made available for electricity trading with neighbouring MS by the end of 2025, many MS are likely to miss this target (Letta, 2024, p. 64). It is necessary to pave the path for interconnectivity as connecting the electricity grids of the MS is fundamental for promoting the integration of renewable energies. Well-connected energy grids will increase the cross-border electricity flows and ultimately lower the system-costs and the costs for consumers (Letta, 2024, p. 64).

Mutual trust between the MS is of primary importance. Every MS must be able to rely on being supplied with energy by the other MS at time given according to their needs and that the prices are accessible and predictable. A single European Energy Market would require institutional arrangements to fortify this trust in institutional arrangements and balances the benefits and costs equally between the MS (Letta, 2024, p. 63). This goal can only be achieved if the European Single Market can offer a continent-wide infrastructure for electricity trading which requires synchronization and cooperation across energy sectors and national borders like hybrid offshore wind projects and solar power. The cooperation between MS also serves as to reduce the costs of procuring flexibility and demand response though better integration of renewable energies, finally lowering system-costs and costs for consumers. An example of a successful transnational cooperation is the North Seas Energy Cooperation (Letta, 2024, p. 63 f.).

II. Financing a single European Energy Market

1. Mobilizing capital

It's one thing to set a goal, it's another to realise it. There is no doubt that the MS want to realise the green transition and therefore there is no obstacle in terms of ideology. However, the financial barrier has to be addressed in order to implement the ambitious agenda. So far, a discrepancy exists between the commitments announced and the actual funds disbursed (Letta, 2024, p. 26). To achieve a well-integrated European Single Market the focus must now shift towards financing the transition through public and private resources (Letta, 2024, p. 11). A lack of a solid financial integration will stall the progress of the fair, green, and digital transition. The systematic nature of the costs of the transition calls for a for a fair allocation of costs, shared equally to maintain social acceptance. Achieving the goal of the transition can therefore serve to gain recognition for the importance of integrating the financial markets in Europe. It is important to shift awareness to the fact that financing the transition is also a strategic decision that will strengthen Europe's competitiveness on the global stage and benefit citizens, businesses and workers in Europe (Letta, 2024, S. 11).

According to the European Commission, an additional 620 billion Euros are needed to finance the objectives of the Green Deal and RepowerEU. However, the EU is facing a funding gap in two senses: the procurement of the amount and the type of funding. The EU can procure resources through private or public funds. Especially for the development of new technologies public funds might not be the most adequate. Therefore, public and private funds need to be complementary to each other (Letta, 2024, p. 29).

a) Private capital

In a first step, private capital must be mobilised. The discrepancy between the EU's GDP and its share in global market activities is striking and can be traced back European resources being diverted to the economy of the USA and US asset managers and thus detracted from financing the EU's strategic objectives. Integrating the financial services withing the Eruopean Single Market should retain European private savings and draw in foreign resources (Letta, 2024, p. 28). The EU must aim at harnessing and retaining the EU's financial and economic resources by creating a European financial market in form of a Saving and Investments Union that is attractive and efficient enough to not only retain private savings but also draw in foreign investments. Only by making full use of its resources and additional foreign ones, the EU can fund its ambitions and strengthen its position as a global player. Creating a Saving and Investment Union does not only serve the finance sector itself but is imperative to achieve the fair, green and digital, transition (Letta, 2024, p. 11, p. 28). Also, to mobilize private capital, new financial instruments must be developed. The Letta repost advocates for the use of Green Bonds (Letta, 2024, p. 65).

As public capital will not always be the most suitable for financing the green transition and especially in the face of the large sum that must be mobilized, private funding will play a crucial role. As the market for public private partnerships is small compared to other advanced economies, the Letta repost proposes a reform that should shift the market from in-house models to contractual and institutional public-private partnerships and strengthen the regulatory framework in which insurance companies and pension funds should be more involved (Letta, 2024, p. 31).

b) Public capital

The second step is the mobilization of public capital. The challenge is to address market failures where they arise through national targeted public support without fragmenting the European Single Market through distorted competition. The level playfield should not be unbalanced by harmful national subsidies. The Letta report proposes to avoid the distortion of the level playing field by expanding the EU level funding support while procuring a strict enforcement of State aid at a national level. It proposes to introduce a state aid contribution mechanism which finances pan-European initiatives and investments with national funding (Letta, 2024, p. 11, p. 26). Funding for the construction of cross border infrastructure has been received though the TEN-E farmwork and the Connecting Europe Facility (CEF) and is not sufficient to achieve the needed amount, while funds of the Recovery and Resilience Facility (RRF) have been used to finance national investments. It is crucial to increase the amount of funding through the CEF (Letta, 2024, p. 65).

The EU needs to adopt a strategy to confront instruments adopted by other global players like the USA or China through European public investments. The USA through the U.S. IRA employ tax incentives as means of regulating the energy market in a simple and speedy manner (Letta, 2024, p. 67). It is not possible to create an industrial strategy tool like the IRA in the short term and the focus should lie on the enhancement of the existing framework, but in the long term, new political instruments need to be defined (Letta, 2014, p. 27). In the EU the access to funds is complex and lengthy which makes it more difficult for companies to find appropriate project financing (Letta, 2024, p. 67). This could be improved if the management of funding programmes and incentive schemes were centralized and managed by a single executive entity. The Letta report proposes to establish a Clean Energy Delivery Agency modelled on the European Climate, Infrastructure and Environment Executive Agency (CINEA) (Letta, 2024, p.67). Lastly, green securitization could

increase and diversify the availability of assets and increase banks' balance sheet capacity to finance the transition (Letta, 2024, p. 32).

2. Retaining European funds: The creation of a Savings and Investments Union

The creation of a Savings and Investments Union and the fair, green, and digital transition can benefit each other mutually. The Saving and Investments Union serves to finance the transition, while the letter creates a political momentum for the foundation of the former (Letta, 2024, p. 29). Creating the Savings and Investment Union comprises the structural areas of supply of capital, demand for capital and the institutional framework and market structure to regulate the capital movement and must be addressed jointly by the EU institutions, MS and market actors (Letta, 2024, p. 30).

Due to the fragmentation of national welfare systems and pensions schemes, European institutional investors like pensions funds are of significantly smaller size compared to other advanced economies. The Letta report puts forward the creation of an auto-enrolment EU Long-Term Savings Product to accumulate capital (Letta, 2024, p. 30). Another vital long-term institutional investor are insurance companies, which have even larger financial assets than pension funds but different investment modes. More supervisory convergance and collaboration between national authorities could unlock more insurance company capital (Letta, 2024, p. 3).

More unused potential can be found in European retail savings that could be channelled into the real economy by an EU-wide scheme that allows private savers to invest in alternative funds. Still, the recently revised European Long-Term Investment Fund (ELTIF) has not achieved the desired traction. Investing in alternative funds would bring the benefits of providing non-listed assets with

resources, democratizes investments and the creation of a European market for alternative assets. An impediment to this instrument is the lack of tax incentives, which should be introduced with a minimum threshold to make the ELTIF successful (Letta, 2024, p. 30).

In the EU private investments are supported through InvestEU and similar guarantee schemes by national governments. The Letta report advocates for the introduction of a specefic European Green Guarantee (EGG) to support banks that are lending funds to green projects and companies. This guarantee should also be extended to private debt funds. This would provide an incentive to banks to allocate funds to finance the green transition while neutralizing the risk (Letta, 2024, p. 31).

Creating a connection between the funding of the fair, green, and digital transition and the development of the Saving and Investment Union is crucial.

3. **Energy diplomacy**

Cooperation should not only take place within the EU between the MS but should also transcend its borders. Accordingly, the Union should endeavour to find strategic partners outside of the EU. Example given by the Letta report are pipeline connections from North Africa or electricity interconnections from the Eastern Mediterrian shore or across the Black Sea (Letta, 2024, p. 68). For potential candidates for accession to the EU, participation in the European energy market could also be a preliminary stage to joining the EU (Letta, 2024, p. 68). While the EU aspires to increase its members, this political aspiration must be balanced with the economic dimension in form of the Single Market. If the Single Market shall be used as a first step for the accession of new members both dimensions must be aligned. This means, avoiding cherry-picking, introducing

financial support mechanisms and compensating externalities some MS might suffer (Letta, 2024, p.139).

For partnerships with non-European countries, especially countries on the African continent with vast potential for renewable energy production, the EU will have to compete with other global players. It is therefore important to make a cooperation with the EU attractive by offering partnerships that create values in these communities (Letta, 2024. p. 68).

III. The welfare-optimal deployment of renewable energies: from growth to beyond growth

The energy transition creates costs and benefits that might not be adequately depicted by the Gross Domestic Product (GDP) leading to the beyond growth debate, simultaneously taking place in the European context.

1) Measuring welfare with the GDP

Traditionally. the measurement of success of a country is economic growth, referred to as the "increase of the size if the economy over time" and measured in the GDP (EPRS, 2023, p. 1). The GDP was developed in the 1930s following the Great Depression to manage the war economy and post-war recovery (EPRS, 2023, p. 1). Until the 1980s the economic growth of a country and decreasing inequality went hand in hand. As the economic performance rose, living conditions, life expectancy and the general health of the population improved (EPRS, 2023, p. 8). Thus, the GDP was an adequate measure for the overall economic performance of a country. However, while

GDP growth still increases the national income, nowadays it is also associated with rising inequalities and environmental degradation, while not necessarily leading to an increase in wellbeing (OECD, 2023, p. 17). The GDP is not able to measure welfare, distribution, the environmental impact and over a certain threshold the increase in the GDP does not bring more happiness to society. Also, severe events, like natural disasters may raise the GDP but not increase the wellbeing of citizens (EPRS, 2023, p. 10).

In case of the energy transition, when reducing carbon emissions, the EU MS might fear that their sustainable policies might have an adverse impact on their economic growth, for example through carbon leakage. On the other hand, the promotion of innovation might also increase economic growth (EPRS, 2023, p. 12). However, according to the innovation paradox an increase in innovation does not necessarily lead to more economic growth (EPRS, 2023, p. 14).

Still and despite efforts to adapt or replace the GDP, it remains the most important economic indicator for policymakers during decision-making processes. Rising prosperity grants citizens access to higher standards of living and the GDP as one single number is very tangible and as a standardized measure allows for easy comparisons (EPRS, 2023, p. 9).

2) Moving beyond growth

There are several strategies that could be or have been implemented to address the shortcomings of the GDP. Mission-oriented policies like the European Green Deal aim to address societal challenges in this case climate change. A mission-oriented policy approach aims in a legitimate

direction, is credible, meaning not overly ambitious to be achievable, needs to mobilize actors of change. The mission can be an accelerator, trying to make a change as fast as possible or a transformer that requires a systematic change. Furthermore, transition requires experimentation and leads to a learning effect. Lastly, especially small-scale and local solutions will require upscaling (EPRS, 2023, p. 39 f.).

Existing policy frameworks that aim to improve social and encouraging aspects are the 2017 European Pillar of Social Rights and the UN 2030 Agenda with the Sustainable Development Goals (SDGs). The 2017 European Pillar of Social Rights sets twenty principles to foster fair working conditions and opportunities on the labor market as well as social protection and inclusion. Even though it is not legally binding (EPRS, 2023, p. 40). The SDGs is a substantial part of the UN 2030 Agenda and sets 17 goals to combat poverty, improve health and education, protect the planet and foster prosperity and peace while encouraging economic growth (United Nations, 2015, p. 14, EPRS, 2023, p. 38).

The SDG is tightly linked the EU resilience strategy and is crucial for preparing economies for future shocks and disruptions (EPRS, 2023, p. 47). The Commission's 2020 strategic foresight report (SFR) states that resilience is the ability to resist challenges and should be the new compass for the EU. To increase resilience in the EU forward-looking policies must be adopted (European Commission, 2020, p. 5 ff.). Resilience frameworks can be integrated in a growth-driven society, but the aspirations lie beyond growth (EPRS, 2023, p. 38).

There are several tools and instruments for moving beyond growth. Trade promotes the economic growth and welfare of a society through the creation of labor among others and thus contributes to the SDGs. Modern trade policies are not merely focused on economic growth but also consider human rights and sustainability (EPRS, 2023, p. 61). International trade produces Greenhouse Gases and thus seems irreconcilable with sustainability. However, trade can make innovation and low-carbon technologies accessible, and this foster the transition to a low-carbon economy. Examples for trade agreements that use trade policies to tackle climate change are the 2019 EU-Japan Economic Partnership Agreement or the EU-New Zealand FTA (EPRS, 2023, p. 63). Tax and social benefits can also serve as an instrument as they can have redistributive impacts in the EU and during times of crisis can serve as automatic stabilizers (EPRS, 2023, p. 64 f.).

An important tool to confront inequalities and avoid financial concentrations are financial flows. Restructuring the financial market should thus be considered. Firstly, more awareness for social aspects should be created in financial markets. Social finance consists of social impact investments, socially responsible investments and venture or traditional philanthropy (EPRS, 2023, p. 69). Investors need to be made aware of the risks associated with unsustainable activities (EPRS, 2023, p. 69). Also, green bonds need to be promoted as the most successful sustainable finance instrument so far (EPRS, 2023, p. 70). Finally, the EU taxonomy plays a crucial role to mobilize funds for the climate and environmental goals (EPRS, 2023, p. 72).

3) Behavioral Economics go Beyond Growth

Creating an efficient market alone will not be sufficient to combat the climate crisis but needs to be supported by a reduction in the demand for energy, material, land and water while maintaining wellbeing. This can only be achieved through behavioural changes which can be promoted through means of behavioural economics. So far, traditional means of restraining harmful behaviour through traditional interventions like mandates, bans or regulation have proven insufficient. This is largely due to the fact that they do not sufficiently account for people's behaviour based on psychological plausibility (EPRS, 2023, p. 80). As discussed in chapter one, the rational choice theory does not sufficiently account for cognitive and motivational distortions. Using behavioral economics can enrich policymaking with new tools that benefit society (EPRS, 2023, p. 81). Policymakers can employ traditional instruments that are behaviorally informed. As such, financial incentives can be used and made even more effective through framing. Also, information instruments can motivate individuals to engage in certain behaviors, if they are better informed and the information is framed in a certain way (EPRS, 2023, p. 81). Behavioral insights can also help policymakers to better choose between regulatory options. Next to these traditional instruments, behavioral economics has also inspired the creation of new policy instruments like nudging, boosts, thinks and nudges plus. Nudges promote behavioral change through the presentation of an option for example as a default option. Boosts do not target the behaviour per se but try to improve competences like energy literacy. Lastly, thinks provide citizens with the option of getting involved in deliberations and nudges plus add this deliberate element to nudges which may lead to a co-design (EPRS, 2023, p. 82).

F. Conclusion

This thesis has described how effective energy transition can be achieved from the perspective of EU Single Market perspective, while arguing that the only way forward is through the Beyond Growth paradime which champions at its core behavorial insights. that the argument supports that behavioral economics can help to shape social norms and morals to steer the behavior of citizens in the desired direction to change the consumption of energy, as well as markets for the increased financing and uptake of green energy innovation. The second part outlined the development of the German Energy regulation in form of the EEG. It has shown that the EEG stands in the sign of continuity and only recently has abandoned the EEG apportionment to alleviate energy consumers. The constant need for an amendment to the EEG results from the development of renewable energies on the market, leading to higher market shares and economic independency. It then discusses the various options for a market design. Considering the different options, the introduction of a CO2 price would meet the needs of the market best, and policymakers should not hold on to a policy just for the sake of consistency. However, transforming the current system comes with its own costs and challenges. While the introduction of a CO2 price in Germany is recommended, it should only be the first step in advocating for a European wide solution. In this sense, the third chapter describes the benefits the creation of a European Single Market would have and the discussion of the beyond growth debate, which finds that economic growth should not be considered an end itself but should consider multiple social and environmental goals to prove efficient.

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