Problematising the green transition of Europe

A poststructuralist policy analysis on the emerging multi-levelled system of European green hydrogen governance

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2 LIST OF ABBREVIATIONS

- Appendix – (appx)
- Connecting Europe Facility
- European Court of Justice – (ECJ)
- European Green Deal - (EGD)
- European Parliament – (EP)
- European Union – (EU)
- Gigawatt hours – 1.000.000.000 watt-hours – GWh
- Greenhouse Gasses - (GHG)
- Member of the European Parliament – (MEP)
- Multi-level Governance - (MLG)
- Power-to-x - (P2X)
- Renewable Energy Act - (EEG
- Research and Innovation – (R&I)
- Terawatt hour - 1.000.000.000.000.000.000 watt-hours - (TWh)
- Trans European Network for Energy - (TEN-E)
- Trans European Network for Transport – (TEN-T)
- What is the problem represented to be - (WPR)

3 ABSTRACT

European politics is saturated with climate policy. When the European Green Deal was introduced in 2019, it came with a commitment to climate neutrality by 2050 and the subsequent industrial development strategy of 2020, made it a guiding principle for EU policymaking alongside a digital transformation of Europe. Playing an important role in the effort to reach climate neutrality in time is the development of green hydrogen and deploying it in the energy sector. Hydrogen can be produced with sustainable energy sources, making it the carbon-free solution to issues regarding fuelling of planes, ships or trucks, storage of electricity, and as a key ingredient in sustainable steel manufacturing. Research indicates that much policy making, and in particular European policy, exists in a system of governance called multi-level governance. Multi-level governance accounts for the dispersion of authority upwards, downwards, and sideway between the supranational, national, and subnational levels of governance from a multitude of actors from the public sphere, business sectors and civil society. Policies for the long-term future of green hydrogen is not exempt from this. This paper seeks to analyse three pieces of policy from across the multi-level governance spectrum. Policies from the European Union, Germany, and the region of North Germany set out plans for the development of the needed hydrogen technologies, creating pipeline and electrolyser infrastructure, and a broad palette of initiatives to increase demand for green hydrogen solutions. The analysis is carried out by applying the 'What's the problem represented to be' approach to policy analysis, which emphasises the policy as an active constituent of a problem, rather than acting as a solver of externally fixed problems. From this framework, I seek to analyse the potential space for resistance towards the problem representations identified, for the overall purpose of improving the policies. The analysis identified pervasive problem representations concerning how the current cost of green hydrogen and lacking positive financial incentives make it unviable from an economic perspective. Furthermore, it was found that the key concepts of cost and investments significantly limit how the policies are able to utilise the full spectrum of market development measures. This opened up the analysis to ways of thinking differently about the identified problem representations. In answering the paper's problem formulation, I created a space that resisted the existing problematisations concerning the cost-effective nature of the proposals within the policies. I argued that the concept of cost should be raised above its short-term business-centric perspective to a pluralist perspective that considers the long-term effects of inadequate and untimely climate action.

4 KEYWORDS

MULTI-LEVEL GOVERNANCE – WPR – CLIMATE ACTION – POLICY - EU – HYDROGEN – POWER-TO-X

5 INTRODUCTION

For those who study the European Union and what policies emanate from it, there can be little doubt as to what the priorities of the future of the European policies look like. Ursula von der Leyen's commission has made the twin transition of Europe's digitalisation and of reaching the goal of climate neutrality by 2050, the guiding principles for the EU (European Commission, 2020a). As a part of the latter priority, the development of sustainable technologies and energy sources are at the core of much policy-making in the EU. Policies regarding a sustainable energy sector are, as many other policy areas, vastly complex, covering a range of facets. Priority is given to ensuring a stable supply of price-competitive and sustainable energy (ibid.). Substantial resources are being facilitated into research on energy-efficient technologies and buildings *via* the plethora of project funding and investment instruments that the union administrates. The EU is determined to create a transition towards zero-emission energy sources and a more sustainable approach to the consumption of resources so that the destruction of our planet can be halted and hopefully reversed. The Commission explains itself how hydrogen is a puzzle piece with potentially great importance.

> *"Hydrogen can be used as a feedstock, a fuel or an energy carrier and storage, and has many possible applications across industry, transport, power and buildings sectors. Most importantly, it does not emit CO2 and almost no air pollution when used. It thus offers a solution to decarbonise industrial processes and economic sectors where reducing carbon emissions is both urgent and hard to achieve. All this makes hydrogen essential to support the EU's commitment to reach carbon neutrality by 2050 and for the global effort to implement the Paris Agreement while working towards zero pollution."* (appx. a, p.1)

A successful development and deployment of green hydrogen solutions for the energy markets and carbon-heavy industries are essential in achieving the needed transition towards climate neutrality. A critical analysis of the intersection between supranational, national, and subnational levels of governance, will enable me to give a nuanced and detailed assessment of contemporary hydrogen policies. By merging the perspective of horizontal and vertical authority dispersion of multi-level governance with the *What's the problem represented to be* (WPR) approach to policy

analysis that focuses on how representations of problems are created by deploying enabling practices and underlying knowledges that exist within, I intend to answer the following research question:

What space can be opened for the resistance and disruption of pervasive problem representations found in the European, German, and North German green hydrogen policies?

To answer this, a two-fold critical approach is necessary. Firstly, I will, through the perspective of multi-level governance uncover and interrogate pervasive problem representations shared by the policies analysed. The pervasive nature of problem representations implies that their effects of limiting thought and language can be found throughout the content of the policies. A poststructuralist analysis allows me to give a comprehensive and critical account for the nature of the problem representations, what prerequisite knowledges that allows them to become, their institutional background and their limiting effects on thought and language.

Secondly, these findings will allow me to reflect on if and how a space within the problem representations can be opened up for resistance with the purpose of improving them. A problem representation is opened by interrogating what can be found within in a way that exposes possibilities for change. By reflecting on the forms of knowledges that allow for the representation of a problem in a certain way, with the perspective of the impending and ongoing climate crisis, I explore the possibilities for thinking differently about a problem representation. I will make a critical argument for the ways that I believe these problem representations should be reconceived, in order to raise ambitions and to remove constraints on policy decisions.

The paper is structured in a conventional way, where I begin by giving an account as to why I find hydrogen important in the global effort to minimise man-made global warming. Following this will be an outline of theoretical considerations regarding multi-level governance as introduced by Gary Mark and Liesbet Hooghe, and supported by other relevant work, is outlined. This section will also consider additional theoretical considerations by Fritz Scharpf, alongside any concerns regarding the functionality of multi-level governance. Next will be a literature review that highlights how multi-level governance has been applied to climate action and what experiences this has produced. The following methodological section will contain matters concerning the theory of science, data selection, case selection, etc. Chiefly it will elaborate on how multi-level governance is operationalised in synthesis with Carol Bacchi's WPR approach to policy analysis.

Multi-level governance offers a descriptive perspective on the interconnected nature of policymaking as engage multiple actors across multiple levels of governance. By applying multi-level governance, I turn the analysis a direction towards certain features of governance. The WPR approach to policy analysis enables me to interrogate these features and uncover what meanings they contain, how they became, and what effects they produce. The analysis is structured along with the six questions of WPR, with the sixth question containing the critical reflection on possible avenues for improvement. [Elaborate on why they together make it useful or write it more clearly]

6 GREEN HYDROGEN AND POWER-TO-X.

For this section, I will establish why green hydrogen and P2X is chosen as the topic for this paper. I will give a simplified explanation of the technologies involved, their potential for the green transition of our society, and their shortcomings. I will do so, without losing myself and the reader in formulas of chemical reactions, technical specifications, or other such details. This section will end with a brief note containing the working definition of green hydrogen.

We already have some of the tools needed for a climate-neutral future, with renewable energy sources such as wind turbines, photovoltaics, hydropower, and nuclear fission. This is under the assumption, that the energy supply of the future is diversified in nature and scale. An assumption that leaves the climate ambitions looking like a utopia, because although this diverse set of renewable energy sources is produced in increasing quantities cannot effectively be stored and their output is sometimes unpredictable. Wind turbines do not produce electricity when the wind is not blowing, and when it is storming, they generate more electricity than needed by the consumers. Another crucial hurdle is to answer the question: how do we deal with industries that are highly difficult to decarbonise? Some sectors cannot be electrified simply due to the sheer size of the batteries needed, such as shipping and aviation (Burre et al. 2020) Other sectors, such as steel and iron production cannot easily decarbonise as electricity cannot reach the temperatures needed.

Enter hydrogen. Hydrogen (H_2) is the first element on the periodic table, with the simplest molecular structure of one proton and one electron, and it is the most abundant element in our known universe (Lee, 2020). According to the Intergovernmental Panel on Climate Change (2020), the European Commission (2020b), and the International Energy Agency (2020), hydrogen is a crucial part of the technological effort for reaching net-zero GHG emission in a few decades to limit and reverse the increasingly severe climate crisis threatening humanity.

Hydrogen can potentially be used as a way to store renewable electricity for when the natural conditions do not allow for its generation, or for during a storm or period with an abundance of sun. In these instances, the output of electricity will exceed the consumption of the end-users. So far, no adequate storage solutions exist where the industrial quantities of green electricity can be satisfyingly saved for later use. One possible solution to this is converting green electricity to hydrogen, which can be stored as a gas or a liquid in tanks and distributed more readily.

The method to produce hydrogen is electrolysis and taught in basic physic classes, where water is given an electric charge splitting the water molecule (H_2O) into oxygen and hydrogen molecules. No GHG is introduced in the process, and therefore no GHG is released to the atmosphere when the hydrogen is burnt or otherwise spent. Most of the hydrogen produced today is used in ammonia production, an important ingredient in fertiliser manufacturing and when a rocket is launched into space, it is likely powered by a fuel containing hydrogen. (Lee, 2020) But hydrogen holds more potential, and the concept of P2X is an important aspect of the future for sustainable hydrogen.

P2X or power-to-x is in short, the conversion of one form of energy into another form. It can be understood by the example of wind turbines where wind (kinetic energy) is converted into electricity (electric energy). The x stands for the various end products that are available after the renewable energy has been converted. There is power-to-hydrogen, power-to-fuel, power-to-gas, power-to-liquid, power-to-methane, and power-to-heat, which are only some of the applications. The potential of this is that industries and sectors that have previously been considered neigh-impossible to be decarbonised, can reduce their GHG emissions or possibly eliminate them completely by running on so-called liquid electricity (e.g., jet fuel based on green hydrogen) or introducing clean-burning hydrogen into the furnaces (Burre et al., 2020; Mærsk, 2020). If realised on a large scale, this can reduce the emission of the transportation goods by land, air, and sea and in the best case completely emission-free.

The application potential for hydrogen in a climate-neutral future is great, but there are concerns and limitations too. Due to the limited scale of production capacities, green hydrogen is significantly more expensive than fossil alternatives. The current small scale of green hydrogen productions also leaves a technological gap, where a significant upscaling of electrolysis capabilities is needed before industrial needs can be met. Horizon Europe, the EU's R&I funding programme, has issued a call for the demonstration of a 100-megawatt electrolyser in an effort to support upscaling, make it a strategic objective to install 6-gigawatt worth of electrolysers by 2024. Public

perceptions might also be negative towards hydrogen due to a perceived danger associated with its highly flammable nature. If these concerns can be met, then there can be no doubt the green hydrogen and P2X are an essential part of the endeavour to reaching climate neutrality within the coming decades.

6.1 Colours of hydrogen

In the text above and the paper, the concept of 'green hydrogen' is at the centre. The concept of green hydrogen is understood in the same way that it is applied throughout the policies analysed. Colours, depending on their carbon content and the technology that was used in the production, vary from, grey, to blue, and turquoise. They are not relevant as these types of hydrogen are not carbon-neutral. In the European Commission's Hydrogen Strategy, the phrase 'clean hydrogen' is used, but it is similar to the German and North German, 'Green Hydrogen'. The definition is as follows:

"Green hydrogen is produced via the electrolysis of water; the electricity used for the electrolysis must derive from renewable sources. Irrespective of the electrolysis technology used, the production of the hydrogen is zero-carbon since all the electricity used derives from renewable sources and is thus zero-carbon" (appx. b, p. 28).

7 THEORETICAL FRAMEWORK

7.1.1 Introducing Multi-level governance

This paper applies a theoretical framework that relies primarily on the foundational writings of multi-level governance with the injection of other scholarly work when necessary. Multi-level governance offers valuable insight into the processes of policymaking, where it is complementary to the rather stringent and critical WPR approach to policy analysis guiding the answers to the six questions in the direction of multi-level governance.

Gary Marks (1993) was the first to introduce the concept of multi-level governance into the study of how European structures of authority interact in the policymaking process. Later in the same decade and onwards, he began collaborating with Liesbet Hooghe (1996; 2003; 2010) and others (Hooghe et al., 2001; 2015; 2020, 2021) and began developing a new approach to policy making in the EU, wherein governance in the EU takes place across an ever-increasing set of levels of governance. The authority over the making, implementation, and judication of policy, which are binding and considered to be legitimate (Hooghe et al., 2020), is dispersed horizontally and vertically along with these levels. While not completely dismissive of its importance, the roles of

the state and states executives are diluted severely, and this gives increased consideration to supranational and subnational authorities plus other non-state actors such as corporations and civil society. Besides high-level intergovernmental negotiation, the interactions, and processes at the lower levels of governance are also given attention.

I look to this excerpt from Kay and Daniell's (2017) introductory book to the field to express how multi-level governance is understood for this paper:

> *"The concept of multi-level governance tends to refer to systems of governance where there is a dispersion of authority upwards, downwards and sideways between levels of government – local, regional, national and supra-national – as well as across spheres and sectors, including states, markets and civil society."* (p. 4)

7.1.2 Defining a level

It remains somewhat unclear what defines a level but based on the writings from Hooghe and Marks (2003) and Zürn, et al. (2010) I will define a level as a field over which an actor or entity, constrained by territorial authority or organisational purpose, has the jurisdiction to exercise legal policy-making and implementing powers over in pursuit of a common good. A key feature to a level is that somebody must have autonomy over it, limiting reversals of legitimate policy decisions to some degree. These levels can be constrained territorially, but they can also be constrained by their purpose. In some systems of multi-level governance, the levels are nested into each other in the style of the Russian babushka doll. At times, the relationship between levels is hierarchical in the sense that regional policy at times can be subordinate to national policy. Other times the levels can supersede this and work directly with higher levels. An actor or body make policy for the public good to distinguish between multi-levelled public governance and multi-levelled corporate governance, which is purely in pursuit of private aims. Additionally, the definition of governance, also by Zürn, et al. (2010) that "…*governance encompasses the sum of regulations, including policies, programs, and decisions designed to remedy a public problem via a collective course of action"* (p.2).

The Babushka-style nature of multi-level governance is underpinned by two sets of logic, where governance is seen as the efficient delivery of public goods otherwise unobtainable to the community and governance as the "expression of the desire for self-rule by a group that sees itself as a distinct community" (Hooghe et al. 2020, p 193). Benefits and cost are contained within a community. Libraries or benches in the park are best decided by local authorities because they have

a better grasp of the preferences and conditions of the local community. As the costs and externalities increase in scale, so does the level responsible. Pensions and health care are as such often governed by national authorities. As the scale grows past territorial borders such as the case of global disease outbreaks, continental and global governance regimes are called for. The second set of logic explains how systems of governance are shaped by the self-perception of the communities governed. Consider how Scotland is a distinct community that also hold a distinct legal status in the UK or how the regions in Spain are shaped by regional identity rather than scale (ibid, p. 195-196)

7.1.3 Multi-level Governance

An elaboration of the multi-levelled approach to governance begins from the seminal piece titled *Structural Policy and Multi-level Governance in the EC* by Gary Marks (1993). Marks argue that a satisfactory inquiry into policy processes must look further than the theoretical dichotomy of neo-functionalism and intergovernmentalism because they miss the critical layer of subnational actors and the interconnected nature of the system. Although the member states of the European Community sat at the outer parameters of a policy e.g., in terms of treatymaking and budget-setting, supranational institutions, such as the Commission increasingly gained a higher degree of autonomy as an active participant in the framing and implementation of policies and how the budget was spent, e.g., in terms of the regional development programmes.

In 1996, Marks also began a fruitful collaboration with Liesbet Hooghe, with whom he wrote the article *Europe with the regions: Channels of regional representation.* They pointed towards the developments, where European municipalities and regions began to establish offices, independent from national authorities, in Brussels and engaging in quasi-diplomacy. They concluded that the national governments had lost their role as the primary conduit for subnational actors and international networks. Subnational actors were no longer exclusively nested within the nation-state and could act of their own volition. The role of the nation-state, in international policymaking, was weakened and new modes of regional communication, cooperation, and interaction had been created.

Multi-level governance was conceptualised further in *European Integration from the 1980's: State-centric v. Multi-level governance* (Hooghe et al., 1996). Literature on European integration primarily focused on the role and agency of states. Especially, liberal intergovernmentalism was popular around the turn of the century and had overtaken neo-functionalism, as the theory of choice for the explanation of European integration and policy

processes. With this paradigm, the state was the primary actor in European integration processes. This state-centric approach understood the states, or state executives, are rational actors that engage in a zero-sum bargaining game for integration. The results of the bargaining reflect the lowest common denominator, where states could maintain a degree of control over outcomes because they cannot be coerced into deeper collaboration than desired. In the state-centric approach, supranational actors or processes are allowed to exist to the extent that they served the continued interest of the states (Mann, 1993; Moravscik, 1994).

Multi-level governance developed as a strong critique of the top-down analytical frame often applied to the study of European integration and policy-making. The assumptions, that competencies between local, national, and supranational governmental institutions are shifted not only upwards to the European Union but also downwards from the nation-states to regions and cities, have become a popular addition in policy studies across many sectorial fields.

States control over policy has become diluted and redistributed, in part to the EU institutions (The Commission, The European Parliament, The European Court of Justice, etc.), but also in part to regional and local actors who are given increased agency over the implementation of policy on a regional and local scale. Hooghe et al. (2021) argue that a process of regionalisation and internationalisation is taking place and that the EU is in a superposition. The EU is a polity in a superposition being supranational and intergovernmental, international, and domestic, all at the same time. The states and their executives are still actors of great importance, but the processes where states engage in a zero-sum negotiation that gives a significant influence to the lowest - common denominator, has become limited. It is in the arbitration between supranational, national, and subnational governments that policies, politics, and polities are shaped.

Another aspect where states saw their power shrink, is by the virtue that they no longer hold exclusive rights over the connections between European and domestic actors. Subnational actors' abilities to engage in transnational partnerships and with supranational actors in "para-diplomacy" have grown steadily with the opening of EU-offices which are hybrids between embassies and developments units, and trans-national network such as the Covenant of Mayors committing cities to the reduction of GHG emissions (Kern, 2010). While an important addition to the understandings of European policymaking and implementation, the governing capacity of these partnerships has been drawn into question. Coined "Transnational Municipal Networks", they are adopting a soft power approach to policy implementation as they are lacking authority to force members towards policies, and they lack punitive sanctioning powers (Bulkeley & Kern, 2009).

7.1.4 The phases of multi-level governance

Multi-level governance is proposed by Marks and Hooghe (1996) as an explanation of policy-making in the EU by four loosely conceptualised phases, policy-initiation, decision making, implementation, and adjudication, and with actors drifting in and out of the spotlight. A key realisation of multi-level governance is that all actors have their specific role to play, and scholars grasp these roles and how they cooperate, coordinate, and how they can be in conflict.

The Commission has the exclusive right to *policy-initiation*, meaning that the Commission is in charge of agenda-setting with inputs from member states, MEP's, or other interested parties. The opinion of states is in this phase relevant, as a policy has to pass through the Council as a part of ordinary legislative procedure. However, the Commission acts independently, often setting the ambitions higher than that of the lowest common denominator (ibid.).

The second phase is *decision making*, where states for long have sat at the top alone, wielding a final say over European policy-making. The Single European Act and subsequent treaties enabled a dilution of state power by strengthening the role of the EP and the Commission has also seen its role in legislative processes strengthened. In the general mode of passing legislation in the EU, the power of the EP is equal to the Council. The MEP's and the state executives must generally reach a consensus before a policy can be made. Of course, there are veto powers, which gives states significant power to block domestically unpopular policies and scenarios where intergovernmental negotiation are the most effective policy tool for crisis management. It is argued that a veto rarely resolves an issue, and the state has not been able to achieve more than a temporal block, where an alternative course of action was introduced, and the outcome differs little from its original course (ibid. p. 363).

Implementation is the third phase, where *comitology*, understood as the vast system of committees in the EU that participate in the making, adoption, and implementation of policy comes to play. While states follow regulation processes closely and formally holds the responsibility for implementation, the Commission leads the day-to-day implementation of policy, in the system of committees, where also subnational actors and various interest groups are active. Multi-level governance presupposes that the inclusion of every layer of government is essential for effective governance. Not only civil servants, but also private interests, technical expertise, and individuals are included in the implementation of policy (ibid.).

In the last phase, *adjudication*, the European Court of Justice (ECJ) wields control over the European legal order. The ECJ was founded with the task of giving lawful interpretations and applications of the treaties. Over the years the ECJ has expanded its role as an enforcer of the European legal order to also include activist interpretations of the laws and these interpretations can shape the legal order. While the ECJ rulings often take precedence over national laws, of course, the ECJ rely on other actors to bring issues before the court and for the member states authority to enforce their rulings, but the decisions made have nonetheless been an important driver for European integration (Marks & Hooghe, 1996).

7.1.5 The two types of governance

Hooghe and Marks introduced new concepts to analysis of what they saw as a strong tendency of decentralisation and regionalisation of governance regimes – referring to the shift of authority towards European and regional governance government and away from central government (Hooghe et al, 2020). Transnational regimes had also proliferated significantly at the time of writing, similarly to public/private partnerships at the international level (Hooghe & Marks, 2010). Their works were shaped by the presumption that authority was becoming – and should become – increasingly dispersed horizontally and vertically among a growing number of actors. A dispersion across jurisdictions has multiple conceived benefits such as a better ability to match the heterogenicity of citizen preferences; better facilitation of credible policy commitment; and it can foster a better environment for innovation. In their normative approach to multi-level governance, Hooghe and Marks distilled existing research into two contrasting types of international organisations (Zürn, 2020).

Firstly, they identified type I governance that is built similarly to the federalist system. In this system, the dispersion of authority to different jurisdictions is at a limited number of levels. This limited number of levels varies e.g., in Malta there are two and in Germany, there are six (Hooghe & Marks, 2010, p. 19), These jurisdictions are considered general-purpose insofar that they encompass a wide range of policy responsibilities and often a judicial system and representative institutions. Furthermore, membership to a type I MLG system, contains inherent territorial boundaries, so that jurisdictions do not intersect. The Westphalian principle of the sovereign state is extended into the jurisdictions. The lower levels of jurisdiction are fully encompassed into the higher levels. The architecture of type I systems is generally modelled after the familiar structure with elected representations, a judiciary, and an executive. Additionally, they are often considered

stable for extended periods, with a radical adjustment of jurisdictions being rare, while the allocation of policy competencies is subject to change (Hooghe & Marks, 2010.)

Comparatively, type II governance disperse authority across infinite levels into independent and purpose-oriented jurisdictions. These levels of jurisdiction are organised on an *ad hoc* basis, for a specific need, when the need arises. Examples of these are different interregional forums for planning and coordination of policy such as interregional commissions, task forces, covenants of mayors, etc. Systems of type II governance are often nested within type I governance, but with varying degrees of authority. Type II governance is inherently flexible in its design, intended to make it responsive to fluctuating citizen preferences or functional requirements. This also makes type II governance fluid, making for easy disbandment when no longer relevant (ibid.).

7.1.6 MLG effect on national sovereignty

In the literature on European regionalisation and integration, there is a convergence on the idea in the EU, authority has indeed become multi-levelled. Disagreements arise, however, on the impact of this development and who is driving the process. As elaborated above, in multi-level governance, authority over policy decision is being dispersed. This dispersion is widely unidirectional where competencies over policy decisions do not move down from the European level to the national level and neither from the supranational level to the intergovernmental. Rather than a series of independent bargains, levels of governance proliferate and increase in numbers across the board, but they rarely get disestablished. The EU as a system is thus argued to be growing increasingly decentralised and regional, but without negating state sovereignty. Nation-states remain in control over the delegation of decision-making competencies but to the actual processes around decision making their influence has been diminished (Hooghe et al, 2015).

7.1.7 Modes of multi-level governance

This section outlines Fritz Scharpfs (2001; 2009) modes of cooperation within the European system. These modes give a sense of under what institutional circumstances policy is made in a multi-levelled system of governance. Scharpf (2009) initially introduced four modes of interaction based on their capabilities of problem-solving and institutional legitimacy, but later he boiled them down to three. Firstly, he introduces the intergovernmental mode: the lowest level of institutionalism wherein national policies is coordinated at e.g., the European level by agreements that follow the lowest common denominator. Legitimacy is derived from the democratically elected governments and the problem-solving capabilities are constrained by consensus-seeking.

Secondly, under the term the supranational-hierarchical mode: policy competencies are gathered at the highest supranational level e.g., ECJ, European Central Bank, Commission. In this mode of interaction, supranational institutions may perform their governance without the inclusion of democratically elected actors such as the member states or the EP. In this mode, legitimacy rests entirely on the belief that professional authorities have the capacity to realise shared norms, goals, and values. The European legal orders are insulated from politics, in comparison to national democracies, which enables the use of the ECJ as a legislative option. By making the ECJ rule on a piece of legislation or a violation of the legislation, the Commission can effectively bypass directly elected officials (Scharpf, 2009).

An alternative path available to the Commission is that of "joint decision", also known as the ordinary legislative procedure, where the Commission initiate legislative propositions, the Council, and the Parliament, offer their opinion and amendments, through up to three rounds of reading. The national governments have remained with some influences as they are able to block legislation through the Council. However, supranational actors can block or change policies, that are desirable to the member states. As elaborated above the EP has only grown in mandate, comitology has proliferated largely and the Committee of Permanent Representatives (COREPER) boosts the capacities for coordinated European action (Scharpf, 2009, p. 73-75).

7.1.8 Concerns with multi-level governance

In the sections above I have given a detailed description of what multi-level governance is and its importance to the analysis of policy. Multi-level governance is ambitious in the sense, that it attempts at gives a rather nuanced picture of something as dizzyingly complex as the EU. As a theory, however, there are significant shortcoming that needs addressing.

Also raising concerns regarding multi-level governance is Simona Piattoni (2010) in an article, where she outlines theoretical, normative, and empirical challenges. She also points to the first challenge to multi-level governance of making testable and falsifiable statements. She also notes that multi-level governance has oozed into the political discourse and policy scientists should be cautioned of their role in creating reality. Piattoni also explores the empirical challenge by asking, what empirical data scholars should look at when testing the theoretical propositions of multi-level governance. It is argued that one of the main priorities for multi-level governance scholars should be to develop and elevate the concept from its descriptive status to a theory, that withstands empirical falsification. Thirdly, she considers the normative aspect and asked researchers to reflect

on whether or not policy, made through multi-level governance should be considered as having a higher degree of legitimacy.

Paul Stephenson (2013) did similar work in an article, where he gave a historical account of where multi-level came from and how it had developed throughout the years. But he also made clear that for multi-level governance to continue being an effective analytical tool, it needs to evolve, in order to progress into the studies of other multi-level systems around the globe, the interconnectedness of the worlds multi-level systems, and a stronger focus into early-state policymaking.

Another impactful piece was written by Andrew Jordan (2001), where he effectively laid out the theoretical debate between multi-level governance and *liberal intergovernmentalism*, pointing out missing pieces to both sides. Liberal intergovernmentalism had not been adequately tested on the integration of *low politics* and the predictions of multi-level governance have not been measured against *high politics* such as defence or foreign policy (2001).

The weaknesses and limitations introduced above do indeed paint a grim picture for the use of multi-level governance in its current form. However, I intend to overcome these limitations, that renders multi-level governance largely descriptive, by merging it with a methodological framework that adds analytical and critical layers. The descriptive features will be useful when identifying problem representations, and the WPR will take the analysis deeper. This is fully elaborated in the section where I operationalise multi-level governance and WPR policy analysis together.

7.2 REVIEW OF ADDITIONAL LITTERATURE

7.2.1 Multilevel governance and climate action

The following section is a review of the academic landscape of the application of multi-level governance into the field of climate change. This review is assembled to give the reader an understanding of what scholarly works this paper builds upon and what gap is addressed.

In the beginning, multi-level governance was a break from the dichotomy, where two opposing schools of thought claimed to be the one theory that could explain why European integration happens. Since then, the perspective has also been applied to other complex systems and with a sector-specific scope on for example European cohesion policy or climate policy. Multi-level governance scholars see the potential for its theoretical development that can give a better

understanding of policy and a flexible tool that is adjustable to ever-evolving problems across ever-shifting territorial boundaries (Wälti, 2010).

The case for a multi-level governance approach to climate policy has effectively been expanded to the ongoing processes of climate action policies in urban areas. Subnational actors on the urban and local levels are able to act with sovereignty on matters such as GHG emission reductions, environmental protections, and public transportations. Cities and their climate action policies are often being analysed, as being in a vacuum. This would abandon important information regarding the cooperative and conflicting relationships that are necessary for cities to engage in. Many of looming crisis that cities are facing requires trans-sectorial, trans-jurisdictional, and multi-scalar cooperation. Understanding cities mechanisms and capabilities for policy-creation and -coordination on climate action, as being within a multi-level system of governance is important. By recognising that issues and solutions are not conveniently limited by political and territorial levels, valuable insights can be found (Hughes et al, 2018, p. 4-6).

In the anthology *Climate Change in Cities* (2018), multi-level governance is applied with the focus on the USA and is applied to 12 American municipalities and their various efforts to build climate resistance. A top-down approach has been effectively applied to the solution of technical problems of immediate danger, for these local administrations. However, when dealing with the more complex issues of climate actions, this has largely been ineffective, both because the American centralised problem-solving capabilities are not adjusted to the real-world complexities and how the shifting of political leadership also shifts policy priorities. In the American federal system, smaller municipalities are more likely to enact climate actions policies in an environment, where the higher levels of government have acted, in comparison to a decentralised system (Homsy, 2018). Whether these results describe features inherent to the American system of governance or if they have a more general character remains inconclusive.

Andrea Sarzynski (2018) examined how the city of Baltimore and its system of multilevel governance has been able to adopt climate resilience plans. The chapter concludes that the existing regime of multi-level governance was instrumental in the proper allocation of finite attention and resources. Furthermore, the analysis suggests that there could be a ‘social limit’ as to what can be done when consideration is given to existing norms and expectations to what is the responsibility of the central government.

Successful climate action policies require multi-level leadership in terms of embedding and institutionalizing sustainability, policy alignment, and creating strategic partnerships (Dale, Burch, Robinson, and Strashok, 2018). Their case study on municipality experiences in British Columbia further argues that explicit multi-level governance is needed as it incentivises and motivates local government action. Their experiences from the Ontario region elaborates that, innovative mechanisms for financing can both trigger sustainable and significant reductions on GHG emissions but also make MGL more inclusive.

Bulkeley and Betstill (2005) argue in their case study of sustainable policy-making in Newcastle upon Thyne and Cambridgeshire, that to apply the multi-level governance approach successfully, researchers must seek the full picture, rather than selecting a single level for analysis. Policymaking takes place in all spheres of government, and even so in emerging transnational networks, which blurs the conventional understanding of governance levels. What also interest the policy researcher with a multi-level governance perspective is also the conflict between the levels and their effect on the outcomes. Bulkeley and Newelles's book *Governing Climate Change* (2015) builds on this, by stipulating that understanding climate governance is a simple exercise if one does so through a globalist and institutionalist lens. This leaves climate action insufficiently understood and gives an overly simplistic view of the field. The climate crisis is multi-levelled in nature, evolving all actors across all levels and jurisdictions, and the same can be said about actions to mitigate and counter.

In the first decade of the 21st century, much research was done on the topic of urban climate governance – i.e., how local authorities developed their regimes for energy effectivization, sustainable public procurement strategies, and resilience to the crises looming in the future etc. These efforts were documented as primarily driven by public policy entrepreneurs, transnational municipal networks, and private industry actors (Bulkeley & Kern, 2009). Policy entrepreneurs are the local public officials, that champion a cause and seek to put it on the agenda to initiate change. These 'champions' can only take thing so far, as they inevitably encounter obstacles that limit their impact and efforts. This is where the emerging transnational networks function as a laboratory, creating a permission structure for climate governance experimentation and progression (Hoffmann, 2011).

Jörg Kemmerzell (2018) subdued the positive outlook on urban climate governance networks, by concluding that these networks, like the Covenant of Mayors, are mainly preaching to the choir and his analysis suggests that they are most effective when locking in already established

norms and practices by exchanging best practices and established shared methodologies, and not when it attempting to spark new policies in the actors not yet committed to climate action.

An interesting perspective on the intersection of geopolitical, environmental and energy interests in the Baltic Sea, where a wide array of actors from across the multi-level governance system are collaborating and conflicting, was written by Ann-Sofie Hermanson (2018). She demonstrated how an analysis of a rather limited geographical area (the Baltic Sea) and policy field (energy policy), becomes a complex matter when all international, European, national Macro-regions and subnational actors are given satisfying attention. The works underline the normative dimension of multi-level governance where policy decisions can be improved by a broad-spectrum involvement of actors and administrative levels.

The purpose of this section has been to locate a gap in the scientific literature on multi-level governance, particularly focusing on the EU's climate action policies. The trend in multi-level governance literature appears to be centred around urban and municipal actors. These subnational levels have been shown to hold a substantial amount of agency to act and the impact of individual policy entrepreneurs or 'champions' can drive the effort. While the efforts of the city and municipalities are tremendously important, little analysis is conducted into policy analysis across a multi-level system of actors. In the studies conducted and reviewed above, the multi-level governance approach is something that *ought* to be considered, when analysing and making climate policy. The works referenced above have also been centred around cases from northern America and multi-level governance has generally proliferated globally away from Europe towards, Brazil and Indonesia (Di Gregorio et al., 2019), India (Jörgensen, Mishra & Sarangi, 2015), and Senegal (Vedeld, et al., 2016).

A current trend, in the existing literature, is that much attention to consolidation theoretical concepts or making elaborating or clarifying commentary. In connection with the critiques outlined above regarding the theoretical validity of multi-level governance, much attention is paid to the theoretical development of central concepts and philosophical discussion of what multi-level governance is. Multi-level governance's impact on the sovereignty of states in relation to the work of Thomas Hobbes on sovereignty and governance (Russel, 2017). The relationship of the two modes of governance has also been revisited and argued as being non-binary in which they are independent of each other (Zürn, 2020). Arjan Schakel argued that the regional and subnational aspect of multi-level governance can be pointed towards the power-sharing that exists between supranational, national, and subnational actors (2020).

In the sections above have I outlined important contemporary pieces of literature that show the state of play for multi-level governance. This literary review reveals a gap for this paper to address. I want to elevate multi-level governance out of theoretical ruminations into the realm of practical application focusing on multi-level governance on what the concept *can* do rather than discussing its limits or possibilities for reconceiving. I would like to move multi-level governance back to its European roots and apply its descriptive features to analyse policies from multiple levels simultaneously and in direct relation to each other within the framework of poststructural policy analysis. Multi-level governance is the theoretical lens that guides the analysis towards specific problem representations within the policies.

8 METHODOLOGY

This first section will contain all considerations pertaining to the theory of science applied for this paper, which is the poststructuralist variation used by Carol Bacchi's policy analysis. Following, will be an elaboration upon the data selection and the empirical considerations behind this and lastly, the design of the project and the method utilised with outlined, again with due methodological considerations described.

8.1 Epistemology & ontology / what can be known and how can it be known.

By applying the perspective of poststructuralism inspired by Carol Bacchi, who is inspired by Michel Foucault, I search for the meaning of 'reality that is lodged in between. In between actors, policies, institutions, norm's, assumptions, etc and not what meaning that exists endogenously or exogenously. This is in contrast to the positivist perspective, where a singular reality exists and waits to be uncovered or a social constructivist where reality is a product of social forces (ibid. p.32-33)

I apply a version of Carol Bacchi's WPR approach to poststructural policy analysis. Bacchi herself departs from a paradigm, inspired by Michel Foucault's epistemological and ontological assumptions which therefore also will be the guiding principle for this paper (Bacchi & Goodwin, 2016, p. 21-22). Foucauldian poststructuralism perceives that the world is made up of a plurality of social practices and that multiple realities exist *within*. When a singular reality is presented, it is a deliberate and political choice. Practices are what constitute realities and an emphasis on their fluctuating nature means that objects or subjects, or things are never static. They are always in a state of becoming, which leaves them open for resistance and a rethinking. Practices and problem representations are, according to Bacchi (2009), how we are being governed. Bacchi's is not

interested in the perspective of the policy as a problem-solving device where policy sits outside and solves a "fixed problem" but rather how the representation of a problem governs our way of thinking and speaking (Bacchi, 2009, p. 3-4).

Unlike the other traditional scientific paradigms that strive for objectivity, poststructuralism has a normative political ethic. Political choices are found everywhere in this paper, deliberate and political choices are behind data selection, theoretical and methodological considerations and in the analysis. The goal is to identify problem representations and open them up to be challenged and countered if they are deemed to be limiting in a hurtful manner. Foucault and Bacchi perceive all policy work as political work, and the policy analysis produced, contains the politics that creates realities.

"And yet, with Foucault, the WPR approach, as seen above, does not shy away from discussions of power and contestation. Indeed, it invites analysis of forms of authority and assessment of effects and promotes a view of research as political practice." (Bacchi & Goodwin, 2016, p. 8).

8.2 What is Carol Bacchi's 'what is the problem represented to be' approach to policy analysis?

The following section will, for this paper, outline the novel WPR approach to policy analysis. While the WPR approach is a tool of many uses, it has found its best use in research on policies pertaining to criminal, identity, and health matters, where it can be used to dismantle the oppressive exercise of power over what is real, that is causing harm to exposed groups by omitting them from policies or by targeting them as the problem. Green hydrogen is largely a technological matter and while the policies analysed for this paper have the purpose of making the world a better and cleaner place for humanity, the people are to a large extent not the target of the policies directly. Industries, institutions, political action are at the core of these policies, and therefore I synthesised my own variant of the WPR approach, where certain questions are altered or omitted to better suit the subject matter.

Nonetheless, the foundation was laid in 2009, when Australian feminist political scientist Carol Bacchi, produced a book titled *Analysing Policy: What's the problem represented to be*? that challenged the commonplace assumption to policy analysis, that actors making policy reacts and attempt to solve a problem that is exogenous to the policy-making process. Bacchi argued that a necessary exercise when making policy is framing what the problem to be solved is. This framing

of the problem is found within the policy and is what Bacchi called the act of problematising or making problem representations. At the very least how the problem is represented. When policy-making actors are forming problem representations, they are also inadvertently creating subjects, objects, and places. They are establishing categories, placing them in contradictory binaries and dichotomies, limiting how an issue can be thought of. Aspects of reality are purposely omitted from policy´. All of this is not a malign exercise in manipulation, but a necessary aspect of policymaking. By understanding these aspects, we can understand what effect a policy has on life and how it, if need be, can be challenged and replaced.

Below is my adapted version of the WPR approach, based upon C. Bacchi and S. Goodwin (2016) *Poststructural Policy Analysis: A Guide to Practice*. New York: Palgrave Macmillan, p. 20.

What's the Problem Represented to be? (WPR approach to policy analysis)

Question 1: What is problematised in the specific policies?

Question 2: What deep-seated presuppositions or assumptions, regarding multi-level governance, underlie this representation of these problematisations?

Question 3: How has this policy and its problematisation been shaped by multi-level governance? How are they being defended and disseminated?

Question 4: What is left unproblematic in this problem representation? Where are the silences? Can the "problem" be conceptualized differently?

Question 5: What effects are produced by this problematisation of multi-level governance?

Question 6: Should the problem representation and policy be disrupted and replaced, if so, then how?

In the first question, the task is to make an interrogation of how problems come to be and how they are represented within the policies. For this paper, I will look specifically at how problematisations are built on themes and concepts from multi-level governance. The first question works backwards following the logic that if we know the remedy, then the problem being solved can be identified. Policymakers are actively choosing a course of action that fits their way of problematising an issue. The poststructuralist aspects are critical from the beginning, which opens the policy up, allowing policy analysts to reflect on how governing takes place and what effects are produced (Bacchi & Goodwin, 2016, p. 39-40). This first question is a seemingly simple exercise

that works as a lever for "opening up' the policies for the further parts of analysis to progress by assessing what is being problematised (ibid. p. 21)

In question two, I identify assumptions and presuppositions that "lodge within problem representation" (Bacchi, 2009, p. 5). An interrogation of the knowledges that are a prerequisite and taken for granted within the policy, makers must take place, so that their limiting effects on what can be thought and said of an issue can be further dismantled. Leaning Foucault's understanding that knowledge 'is not "truth" but what is "in the true", what is accepted as true' (Bacchi & Goodwin, 2016, p. 28). Bacchi proposed two analytical concepts that make these forms of knowledge apparent, binaries and key concepts. Using a binary in policymaking produces a relationship between X and Y, with an implied hierarchy in that X often excludes Y (Bacchi, 2009, p. 8-9). Secondly, we must look for the key concepts in a policy. Key concepts are open boxes, into which actors contest to fill their meaning. These concepts help us understand what premises the policymakers are working under (Bacchi & Goodwin, 2016, p. 21).

For the third question, Bacchi introduces a Foucauldian genealogy where the history of the problematisations and the knowledges surrounding them must be examined to understand how a problematisation has come to be. Foucault concept of genealogy is an archaeological study of how ideas and practices in the past have shaped problem representations. The goal is to bring this knowledge to be presented as a tool for the reconceiving of problem representations. (Bacchi & Goodwin, 2016).

Genealogy is particularly useful when analysing societal norms that have an extensive history, like the work Foucault has done for example the Western penal systems or sexuality. I will, therefore, differ slightly by analysing the contemporary institutional configurations and circumstances that allow the problem representations to become but also defend and disseminate them. Hydrogen does not have an extensive history from which knowledge can be extracted. The contemporary governance and political environment that allowed the problem representations will be examined instead. Policies from international, European, national, trans-, and subnational levels will build a picture of the processes and institutions that shaped the policies. The configurations and modes of multi-level governances as explained in the theory section will be particularly useful for this question. A critical assessment of how these configurations and processes defend and disseminate the problem representations are also included in this question. By assessing the role of multi-level governance in the formulation of a policy, knowledge regarding its past can be uncovered and used in the later reshaping of its future.

With the fourth question, Bacchi encourages that the policy analyst 'thinks otherwise' and assess what has been left out of the policy proposals. In Bacchi and Goodwin's (2016) own words: "The point is to destabilize an existing problem representation by drawing attention to silences, or unproblematized elements, within it" (p. 22). With this question, the analysis opens up the problem representation to inventive and critical ways of thinking. By stating that something is overlooked, I certainly inject my own reality into the problem representation. This fuel the political and critical turn of the analysis.

Moving on to question five, where the effects of problem representations are highlighted and examined. A three-fold analysis that considers the discursive effects produced by a problem representation, the subjectification effects that assign social spaces and relationships to the implicated actors, as well as lived effects where the real-world impacts are assessed. The purpose of this is to elevate the analysis of the textual and symbolic into the material world. Question five allows for a reflection on the complexity of these effects and how they place limitations on what can be said and thought. The earlier questions and particular question two are useful in the search for subjectification effects (Bacchi & Goodwin, 2016, p. 23).

With the sixth question, Bacchi intends to open a space for the reflection on forms of resistance and counter-conduct. The purpose of this part is to explore the potential for challenging pervasive and authoritative problem representations (Bacchi & Goodwin, 2016). The location and dissemination of the problematisations will be covered in question three, leaving a stronger focus on their disruption. I will apply a personal and political ethos when I look at how the general limitation of the policies can be overcome and how ambitions can be raised. Question 1-5 will support my argumentation as I will deliver the paths towards resistance in accordance with my ideological and political worldview.

8.3 Why 'What's the problem represented to be' and what are the limitations to its use.

Carol Bacchi's WPR approach to policy analysis is the analytical tool of choice because it has a strong capacity for critical analysis, with its way of approaching policy as a tool for governing. Bacchi's proposal for policy analysis broke with conventional wisdom, that policy-makers are reacting to an exogenous problem. WPR require that I look inside the policy and the formulation of the problem that it inevitably creates. It also requires abandoning the belief that policy is the governments best way of 'solving' a problem. By breaking this understanding and stepping into the 'mechanics' of the policy, the research departs from the conventional way of analysing policy. Attention is not given to an exogenous or endogenous analysis of the 'fixed' problem or from the

actors and the meanings that they hold in their heads, towards the policy and what the policies 'do'. (Bacchi & Goodwin, 2016, p 21)

Just like multi-level governance shifted the centre of attention away from the state, WPR shifts the focus onto the problem representation. What remains is the most important feature, the policy. By targeting the problem representations within policy, and the way people are governed by them, WPR creates a foundation for an analysis that is analytical and critical every single step of the way.

As mentioned earlier, WPR is particularly useful in the analysis of health, social, and identity policies, where the governance of people are at the centre. A policy on the treatment of cancer has a more imminent effect on people's lives than how sustainable the electricity that comes out of the socket is. At least in the short term. In essence, WPR is concerned with how people are governed and thus shaped by how policy represent problems (Bacchi, 2012). 'Policies, it is claimed, are not simply reactions to "people who exist", conceptualized as unchanging and essential. Rather, policies are involved in shaping what it is possible for people to become, illustrating how power is a productive force (Bacchi & Goodwin, 2016, p. 50).'

The application of WPR outside social policies has limiting effects in itself. Policy is perceived as something that affects people from a social perspective, whereas I apply it to these functional policies. What happens when a method of policy analysis that developed around social policy, is removed from this context and is applied to the analysis of markets and economy? Is it even possible to make such an analysis? I argue yes, although with some modifications. Such a stringent design and method as WPR has might turn the analysis towards less relevant features, in the context of this paper. The depth of the analysis might also be affected, as I am unable to satisfyingly draw on a reservoir of historical processes and practices that allow for a problem representation to emerge and I am unable to adequately account for how the problem representations are a productive force in shaping what is possible for people to become as the policies do not target people.

Fortunately, Bacchi leaves a sliver of flexibility into the framework for WPR (Bacchi & Goodwin, 2016, p. 24). I can amend the approach to fit the needs of this paper, by maintaining the rigorous interrogation of knowledges, inevitabilities, and silences found within the policies and adjust the focus away from people towards business, policymakers, policy-users, etc.

Lastly, WPR offers the opportunity to produce a critical and subjective analysis of pervasive problem presentations and their impact on shaping realities. The potential for making a subjective critique with the intention of improving the policies and their ways of problematising allows me to insert myself into the analysis and engage personally in process of problem representation.

8.4 Empirical data

In the following section, I will present the selection of policies applied as data sets in this paper alongside their context and any methodological considerations.

This paper is a policy analysis from the perspective of multi-level governance to critique and disrupt the European green hydrogen regime. As such I have selected policies across three levels of European governance. Atop is the policy paper titled: "*A hydrogen strategy for a climate-neutral Europe"*, in which the European Commission (2020) presents the strategic road for the development and upscaling of green hydrogen capabilities as a part of the ambitions of reaching climate neutrality of the union by 2050.

I will, on the national level, analyse arguably the single most powerful state in the EU with a strong industry centred on hard-to-decarbonise commodities such as steel, chemicals, and vehicles: Germany. Germany has recently adopted a "*National Hydrogen Strategy"* (2020), which holds the potential to set the tone and ambitions for the rest of Europe. The strategy contains 38 concrete measures to be taken in terms of production capabilities, research, application in the chemical sectors, etc. Currently Germany's hydrogen consumption regardless of 'colour' is estimated at 55 TWh and by 2050 the demands are expected to rise to the range of 110-360 TWh. The strategy sets out the accommodate that by massively scaling up the green hydrogen production and make it an essential aspect for the decarbonisation of Germany, establishing a clear ambition to become a global leader on hydrogen, including plans for its use in international trade.

At the subnational level, I will include the "*Hydrogen Strategy for North Germany*", in which the German states of Bremen, Hamburg, Lower Saxony, Mecklenburg-Western Pomerania, and Schleswig-Holstein introduces a comprehensive policy including business actors and the researching communities in the region (2019). The strategy for Northern Germany gives several advantages that give the region potential: the large industrial ports of Hamburg and Bremen, underground caverns ideal for the storage of hydrogen, and a "great" capacity for the on- and offshore generation of renewable electricity.

8.5 The case for Germany

This paper seeks to analyse strategy papers on the development of the green hydrogen section, with a descent from the European level, through the German national level and ending with the North German states on the regional level. The decision of these policy papers is deliberate and several considerations factor into the choice. Firstly, there is the matter of availability. The majority of EU member states have in the time of writing, not publicised explicit long-term plans for the development of their green hydrogen sector. Germany has such plans, both nationally and regionally. These plans useful as empirical data for this paper, because they both contain tangible targets such as an electrolysis capacity threshold that must be achieved by 2030, and concrete measures for the fulfilment of the targets. With these as my data sets, I can meaningfully analyse actual policy, rather than policy ambitions.

Secondly, the choice is based upon Germany's economical, geopolitical, and geographical context. Germany is one of Europe's largest and most populous members, with one of the world's strongest economies, especially in terms of hard-decarbonise commodities. Germany is a major trading partner both with other EU members and global powers3 like Russia, the USA and China and is located in the middle of Europe the policies of Germany have ripple effects on the whole union and continent. While analysis produced may not be general, the role of Germany as a European and global power increases the importance of critical analysis of its policies.

Many of the arguments apply to the region of North Germany. Their plans for green hydrogen were readily available as they were one of the first to publish their strategy in the 4th quarter of 2019. The states participating in the North Germany strategy also have favourable conditions for large-scale deployment of hydrogen solutions with two of Europe's busiest ports in Hamburg and Bremen-Bremerhaven and coastal waters for renewable electricity generation. The North German states are also geographically situated close to the Scandinavian countries, Poland, the Netherlands, giving even the subnational policy an international dimension.

8.6 How the WPR method to policy analysis and multi-level governance is operationalised.

This section will explain how theory and method are operationalised and how they will be paired in the analysis of European and German national and regional green hydrogen strategi.

As presented in the theory section, multi-level governance functions well as a descriptive tool but lacks the functionality of a scientific theory. These theoretical shortcomings are bypassed by fusing the

descriptive themes of multi-level governance with the stringent design of Bacchi's poststructural approach to critical policy analysis. While I have modified the WPR method to fit the needs of this paper, the general structure with a sequence of questions remains intact. Hence, the analysis will be structured around answering these questions from a multi-level governance perspective. When a question seeks to identify problem representation in a specific policy, this paper will explicitly identify and interrogate problem representation within the theme of multi-level governance.

The paper is structured around the six WPR questions, that seeks to discover the pervasive problematisations and the knowledges and practices that are shaped and given shape in the policies and challenge them. Each question will contain the analysis of the three datasets and end with a sub-conclusion in which the findings will be summarised. Qualitative empirical data is the basis of the analysis but will be supplemented when necessary. The analysis is deductive in the manner, that the theory and methodology is the point of departure from which the analysis forms new knowledge. In essence, multi-level governance provides the analysis with 'what to look for' and WPR with 'where and how to look'. In this aspect, WPR is, in addition to being a method for analysis policy, a part of the theoretical framework. WPR offers a certain explanation as to why a policy is made the way it is and effects it has, within a comprehensive framework of analysing the phenomenon of policy. Multi-level governance lacks this framework, but instead offer an understanding of how a system with multiple actors across every conceivable level engage in policy-making and implementation together. By merging these two understandings, significant meanings can be discovered, which will then be critically assessed and dismantled in the final question of the sequence. Question 6 will function as a traditional discussion chapter where findings are reviewed and their meanings are discussed Following this will be a section, that will conclude the paper and present relevant findings.

8.7 Delimitations

This paper is based on poststructural policy analysis and the decision regarding methodological choices places certain limits on the scope of the research and the conclusions that can be derived. WPR is a relatively open-ended form of analysis, where the interpretive engagement begins immediately. Behind every aspect of this paper is a deliberate choice regarding how I intend to represent reality. Bacchi's poststructuralism specifies that policy work is political work, and policy research is political research, understood as the choices made enable a specific reality to become (Bacchi 2009, p. 20).

By choosing WPR, I delimit the analysis towards the critiquing of how governance control what becomes reality through the representations of problems. WPR steers the analysis towards

points of resistance Points where knowledges that are being taken for granted can be reimagined. This reflects my political beliefs that authority must always subject to critique.

I apply the concept of multi-level governance because I argue that climate action policies exist in a system where actors from every level engage with each other in a pluralist of collaborative, conflicting and contradictive ways. In this regard, I have decided to analyse three policies from a spectrum ranging from the supranational, national, and subnational levels.

The actors chosen for the analysis are the EU, Germany, and the North German region. Policy decisions made by these actors will have an impact, not only on a national and European level but globally, and as such, they and their policies must be subject to critical scrutiny. This confines the scope of the analysis and the conclusions derived from it. The findings from this project will primarily account for problem representations and practices found within the policies and their interconnectedness. As such I will not be able to produce general statements regarding the nature of European hydrogen policy as a whole and on policy decisions made by outside actors.

In the choice of an environmental topic concerning the advancement of green hydrogen, lies a deliberate choice as well. How environmental policies are being governed and how the policies themselves govern, has long-term impacts on the lives of people, and the planet. My choice to engage with this topic in a critical manner is based on the interest of improving them not only for the governed but also for those whose perspective is missing from the policies.

I have outlined my personal beliefs and choices and how these delimit the analysis. Being reflective of these enables me to apply them in a way that gives my finding a unique analytical layer of subjectivity. These choices and the resulting work as such reflect my political ethos of resisting hurtful practices of governance for the benefit of people and the environment. Conclusions and general commentary are a product of these delimiting choices and are highly subjective. Another writer could approach the same texts, with the method and theory and arrive at different conclusions. I nonetheless contend that my arguments and findings are valuable additions to the field of policy analysis.

9 ANALYSIS

9.1 **Question one**: What is problematised in the specific policies?

Starting from the top, I will answer the question for each level separately and bring together the problematisations in the end. Each level of governance is distinct in its makeup of actors,

territory, politics, and values. Each governing actor also has a unique set of tools and purposes, with which it must make policy for the benefit of the governed. It is because of this that the EU cannot govern the same way the north German region govern. Their policies differ and the problematisations similarly differ, which is why they will initially be analysed on their own. However, because of the intertwined nature of the multi-levelled system of governance, there will be occurrences of policy overlapping. As the analysis progress, the common nature of the policies and their problem representations will become apparent, and their general nature will be interrogated.

A hydrogen strategy for a climate-neutral Europe

A central problematisation of European hydrogen governance is regarding the matter of money, addressing the question of how the pricing on green hydrogen can be brought down. Current methods for the production and distribution of low-carbon and green hydrogen remain too expensive for it to have real potential in the transition towards climate neutrality. It is estimated, within the policy that the production of hydrogen with renewable electricity caps out around 5,5 €/kg, while the conventional fossil hydrogen is cheaper at 2€/kg (appx a, p. 4). The central part of the European policy is how costs can be reduced and how climate neutrality can be achieved in a cost-effective way that makes hydrogen not only economically viable but also profitable. The problem is thus represented as hydrogen being too expensive and not cost-effective in its current state. As such the primary focus of the policy is centred on various approaches are being taken to the reduction of hydrogen prices. Infrastructure needs to be built and repurposed, technological advances need to be made, and policies need to be coordinated.

A proposed solution to bringing green hydrogen prices down for a more sufficient deployment of the needed infrastructure is through, a dense ecosystem of schemes, programmes, plans, networks, etc. Some have the configurations of quasi-diplomatic networks for subnational actors to coordinate, others are designed to bring research and innovation (R&I) actors together for the development of trans-European projects, and some are focused on channelling money towards infrastructure and investment.

While some of these ecosystems can be characterised as knowledge-sharing organisations like the Hydrogen Energy Network, the bulk of the ecosystems are centred around financing green hydrogen projects and the upscaling of technologies. By building more production facilities, supporting public procurement, and furthering the technological developments, expectations of a boost in demands and a price reduction. Schemes such as Next Generation EU is long-term

rebuilding Europe in wake of the Covid-19 pandemic; the ERDF and the Cohesion Fund, which supports a hydrogen infrastructure between the regions; the Just Transition Mechanism, which limits losses associated with the transition towards renewable energy; the Connecting Europe Facilities (CEF) that targets the repurposing of existing gas pipelines and carbon capture, are a few of the financing tools utilised to the EU.

So, what is the problem? The problem is represented as being the under-utilisation of this ecosystem by the stakeholders. For the strategy to work, the opportunity for funding needs to be exploited by stakeholders, who also need to engage more readily in the knowledge-sharing, so that best practice can be disseminated. This is best done within the confines of an EU framework. The EU seeks to represent a problem regarding a lack of Europeanisation. A successful transition towards green hydrogen can be efficiently reached through a collaborative European effort. By problematising as such the EU partly approaches this as an indirect integration project of aligning the national green hydrogen sectors through transnational partnerships and infrastructure.

Another problematisation is the need for policy cohesion between the members states national hydrogen policies such as the EU's own "Hydrogen Initiative". An initiative that contains plans for building electrolysing plants within the EU and in neighbouring states, so that a target capacity of 80 GW can be reached. This problematises lack of engagement by member states and hydrogen stakeholders for the coordination of electrolysis policies and collaboration on green hydrogen projects. A so-called "Important Project of Common European Interest" (IPCEI), with the majority of member states participating, is being promoted, alongside a commitment to coordinate and fund future IPCEI's in the hydrogen value chain (appx a, p 2).

Also introduced is The European Clean Hydrogen Alliance as a vehicle of engaging business stakeholders and civil society and creating "a pipeline" of viable investments. These networks can foster partnerships with a wide array of actors from a wide range of sectors (appx a, p. 8). A main target is to create visibility around hydrogen and, advocate for a stronger engagement of lower-level politics. The EU does not only try to nurture a demand with large industrial investment plans, but a more local approach with local electrolysis units fuelling transit busses and trains, and decentralised "hydrogen valleys" based upon hydrogen infrastructure in small-scale ecosystems, is also envisioned.

The EU disposes of a wide range of these financing instruments, that can cover an issue from virtually every angle. The goals are to apply these into a dense support structure consisting of

funding tools, regulations, and planning. The future of the European hydrogen market is problematised, in part, as in need of technical regulations and a harmonisation standard, a collaborative and trans-European green hydrogen infrastructure, a reliable flow of funding for research, and investments.

National Hydrogen Strategy.

The problematisations of the German federal government has some similarities to the European strategy. The German national strategy problematises a lack of national collaboration and coordination from a governance perspective by proposing several network configurations creating public-private partnerships, that can generate a steady investment flow and support demand for hydrogen solutions. On the federal level, a special "National Hydrogen Council" consisting of experts, researchers, business sector interests and other stakeholders, will be established and tasked with giving policy recommendations to the government. This sprouts an additional coordination office, that will assist the coordination of federal policies in accordance with the recommendation of the council. Expanding the coordination and planning network with the proposed working group, where the *Länder* (the 16 state subdivisions of Germany) are kept in the loop of the hydrogen council's activities (appx. b, bp. 14). This problem representation partly stems from a goal of making hydrogen governance more efficient and partly from a desire to maintain some level of authority over the national agenda.

Besides the goal of building and expanding the national web of partnerships, the German policy problematises the current state of the European and transnational frameworks for green hydrogen projects. They need to be expanded also needs to be strengthened. The EU internal market and its regulations are limited in its ability to support the desired upscaling of national hydrogen policies. The German Hydrogen strategy proposes, what they call a European Internal Market for Hydrogen, where the regions that are considered to have particularly favourable conditions for the generation of renewable energy can distribute this energy freely internally in the EU (appx. b, p. 10). This frames the problem similar to the EU as that the deployment of green hydrogen solutions as a European project. By problematising lacking Europeanisation, Germany seeks to defer some measure of authority to the European level which can give easier access to renewable energies produced by other member states and the state can limit their investment in their own green energy generation.

Renewable energy produced from photovoltaics in the southern European states and wind turbines in the North or Baltic Sea should be able to flow freely without restrictions internally on

the EU markets. This proposed to be done by fitting market regulation to the needs of the industry, making clear systemic standards for the classification of energy sources, expanding the network of pipelines, and strengthening cross-border collaboration. The policies above should be handled through the already existing foundation of the EU. As found within the German policy (appx. b), the government states that:

"The issues and conditions that have to be addressed in order to foster the domestic ramp-up of hydrogen technologies and to build up an international hydrogen market can only be successfully handled within the context of the European internal market and regulatory framework" (p. 10).

The German federal government problematises a lack of initiative. In terms of leadership on the European level, where the EU must act as policy initiator, a facilitator of investment, and regulator. Supranational leadership is desired so that the benefits of a broad collaborative effort can be fully reaped. This perspective by the Germans also includes trans-national partnerships as a necessity to the realisation of Germany's hydrogen ambitions.

The policies contain plans for significant investments in electrolysers of varying scales. To successfully manufacture the needed quantities of hydrogen, renewable electricity must be imported from European partners where the natural conditions are more suitable. These partners have access to favourable wind turbine locations in the north and Baltic seas or sunny areas ideal for photovoltaics in the south. Germany wants to intensify its cooperation with neighbouring countries to the north and south, from which they will import green electricity and export green hydrogen, from its upscaled production capabilities, via a refurbished distribution infrastructure.

No country is an island on its own, and the issue of hydrogen governance requires policy-making on every level of governance. Underdeveloped international partnerships, lacking European regulation and national market-creating policies, untapped potential trans-national export of renewable electricity, and subnational actors needed to develop and implement workable green hydrogen solutions, are all being problematised. To some extent, Germany can be argued to disperse responsibility and agency with its problem representations.

North German Hydrogen Strategy.

In many aspects, the regional strategy for North Germany mimics the European and national strategies. The policy problematises the lack of technical standardisation as ideally solved at the European level, where the northern states will participate in the process through committee

work. The coalition argues that this lack of harmonisation of technical standards result in an uneven playing field and varying qualities of hydrogen products, a similar argument was made by the German government and the Commission. Also, problematised is the successful adoption of green hydrogen, as a market issue by pointing to the lacking regulatory framework. Regulation at the higher levels of governance levels must seek to mitigate, technological and pecuniary shortcomings that are currently endemic to the green hydrogen sector (appx. c, p. 28-29).

Another coalescing point is that of communities. The North German states problematise the lack of regional organisation, solved with the "North German Hydrogen Coordination Group" and their primary forum: "The Conference of Ministers of Economics and Transport for the North German Coastal States". This group is designated to represent the coalition in certain national and international matters in an effort to shape legislation and explore possibilities for cooperation. Insufficient intra-regional coordination and representation that the national level is a clear problem representation within the policy (appx c, p. 27).

Stronger incentives that can boost hydrogen demands in industries is desired, as well as a parallel upscaling in electrolysis capabilities. The joint strategy of the five northern states, position themselves as having ideal prerequisites for being a national centre for the envisioned hydrogen economy. Ideal natural environment gives a positive outlook regarding off-shore wind turbines from Germany's coastal waters, natural caverns as ideal for hydrogen storage, and several industry hotspots which can be converted into consumers of hydrogen and hydrogen products. The industrial ports of Hamburg, Bremen, and Bremerhaven hold particular potential for a transition towards hydrogen solutions. North Germany's future with renewables is proudly and confidently established with the phrase that "With its large share of electricity from renewable sources, North Germany already contributes to achieving the objectives of the energy transition, more than any other region" (appx. c, p.10).

The regions also express an interest in establishing hydrogen hubs, which will be local spearheads of the hydrogen economy coupling generation and distribution, with the demands of mobility and industry, to strategic significant sectors. Over time, these hubs are expected to become interconnected and become the complete hydrogen grid in northern Germany (appx c, p. 16-18). In line with the phases of multi-level governance described by Hooghe and Marks, this would be in the phase where the region can apply its influence in the comitology processes and implement concrete policy with the tools available.

One aspect, where the North German states differ from the national strategy is the way that they problematise the lack of transnational and regional cooperation. This is showed in the way they act with relative autonomy in the field of trans-national cooperation. In the multi-level governance terminology, the northern states envision a form of 'quasi-diplomacy', where joint-research activities, hydrogen projects, and business ventures, across the confines of territorial borders, is enabled. These acts of 'foreign policy' are with interested neighbouring *Länder,* but also potentially as trans-national partnerships with the neighbouring Netherlands and partner regions in Scandinavia. The future for potential international cooperation goes as far as Japan, Australia, the USA, and China, amongst others. These ambitions are an expression of the increased agency that multi-level governance has enabled for subnational actors. The state and its executives no longer hold a neigh-exclusive right to engage in foreign relations, and the subnational actors have a high degree of autonomy over their foreign relations (appx. c, p. 30-31).

Subconclusion

Overall, the three policies from three different levels of governance represent similar central problems. Described throughout the policies, is an untapped potential for transnational or European networks that enables national and subnational actors to engage with one another to share knowledge, coordinate efforts and initiate project partnership with each other. Another significant common problematisation is an inadequate regulatory and legislative framework. Every level represents that regulation and legislation on every level needs to accommodate the emerging hydrogen market with reliable product standards and measures that artificially reduce pricing to a realistic level for the time being. Thirdly, plans for an upscaling in investment and an expansion of funding opportunities regarding the upscaling of electrolyser capabilities and the development of adequate pipeline infrastructure is needed across the levels. Investment and lacking thereof is problematised throughout the three policies, through the proliferation of new and existing programmes for both public and private funding.

While there are points of convergence between the three policies, they also represent the three distinct but nested levels of governance. The Commission problematises, according to the competencies that it has, the tools available and the different perspective afforded by the level, the same can be said for the German state and the coalition of north German states. Policies at the European level represent a need for a comprehensive investment agenda, in order to develop technologies and build infrastructure, coordinating networks, are missing. Further problematised is the desire for adequate transnational networks within the EU system, where knowledge can be

exchanged, projects developed, and investments coordinated. The federal German government problematises the apparent lack of hydrogen generation capacity, to meet the expected demands of the future. To remedy this, it is proposed that national investments are made to develop hydrogen technology as well as exploring all avenues of accumulating the needed renewable energy, preferably delivered by the neighbours to the north and south in particular. At the lowest level of governance analysed, problematisations are found regarding a lacking trans-national foreign policy, where the coalition can act unified in a national setting, as well as European and International.

9.2 **Question two:** What deep-seated presuppositions or assumptions, regarding multi-level governance, underlie this problematisation?

After identifying problematisations in the first question, the next task lies in the interrogation of the underlying knowledges necessary for the problem to be conceived the way that it is. Which unexamined ways of thought enables the constitution of a problem? This is a part of the process where a problem is picked apart meticulously so that the potential for challenge and disruption opens up. A policy is the implicit, sometimes explicit, proponent of a reality and the taken for granted knowledges that allow this reality to come to be. Underlying inevitabilities, assumptions or presuppositions are found in binaries or key concepts. These can be seen as empty boxes, in which policymakers give certain meanings and create dichotomies.

An essential key concept widely applied in the three policies is ‘investment’. Investment is essential because a large issue pertaining to hydrogen governance is how the projects that build infrastructure or support research into the needed technologies, can be funded. Investments are conceived of in the way, as something that requires a specific legislative and organisational framework, so that money can be channelled to the projects that can help towards the realisation of the goals. Every level has its own funding programmes like the EU’s ‘Horizon Europe’ and Germany’s ‘National Decarbonisation Programme’. North Germany has their own, but they are not mentioned by name (appx. c, p. 28-29).

Investments are exclusively something that is centred around the flow of money. The funding for these financial investments is generally found in the first two phases of the policy-making process. The need for investment is formulated in the policy initiation phase by the European Commission or the Federal German governance, in their respective policies. Money is allocated to funding schemes in the decision-making phase, where the policy-makers bargain for a specific amount. Investments are then distributed under the implementation phase, where actors from the lower levels have a significant say in where the money will be flowing.

In a similar vein, the key concept of 'cost' is revoked. The three policies all attributes cost a negative meaning essentially focused on the pricing of hydrogen as per kg/€. Cost is exclusively attributed the meaning of a numerical value, something purely financial. The cost of hydrogen must be brought down, otherwise, the cost for the companies and users of hydrogen becomes too high. Costs occurred when making and distributing hydrogen must be brought down, so that by transitioning towards a climate-neutral energy sector, the price in terms of financial value become "manageable". This will happen partially through the subsidising of research that can lead to a higher hydrogen output and an upscaling of the production capacity and other sectors' consumption of green hydrogen. It becomes incumbent on the public authorities to assume the costs and the risks of increasing cost associated with these measures and not on the private market actors.

Regulation is a key concept that is frequently brought up in the three policies, and often in the context of something that is needed, clearing the path for the private enterprises to access the market at a minimal cost. "An enabling regulatory framework" (appx. a, p. 2) is required to remove any obstacles for successful market development and fulfilment of the goals of production and demand in the hydrogen strategies. Especially the technical aspects of hydrogen production need uniformity, or standardisation, levelling the playing field for hydrogen producers and giving the end-users confidence in the sustainability of the hydrogen or its derivative products.

The sub-European levels of governance are labouring under the understanding that this sort of regulation must take place at the levels above so that the EU-wide market can be equal for all. North Germany seeks to influence regulatory decisions at the EU and the federal level with joint representation to exercise its influence the most (appx. c, p. 31) and the German state wants to influence and progress union-wide legislative packages (appx. b, 25). Regulation as a key concept covers multiple aspects. It can cover the harmonisation of technical standards, the ambiguously 'sector coupling', or market design. What they have in common is the meaning that it is something handled by the higher levels.

The Commission appears to agree, as it proposes a clear agenda that will enable compatibility of hydrogen infrastructures in-between countries, with clear rules that minimise administrative gridlock (appx a, p. 16), and the blending of hydrogen with natural gas to smooth over the transitional phase (ibid, p. 15). These are the sort of regulations that are desired and needed and would make the conditions of the markets even for all actors. They would raise consumer confidence in the quality of the hydrogen products. The end-goal is "An open and competitive EU market with prices that reflect energy carriers' production costs, carbon costs, and external costs

and benefits would efficiently provide clean and safe hydrogen to end-users who value it the most" (appx. a, p. 16).

A central premise that this presupposed knowledge is based on, is that climate change is framed as an economic issue rather than an environmental or even a social issue. Stakeholders across the green hydrogen value chain cannot fully benefit from green hydrogen unless cost is brought down. This is underscored by the policies, where the problems are approached by channelling massive amounts of money in the development of technologies, new business models, and potentially profitable markets. The problematisations are grounded in a belief that the best way of making climate action policies, is to create a structure that allows corporations to act rationally with monetary subsidising or support otherwise.

A general presupposed knowledge is the making of a particular social space taking place within the policies, is that each level has a specific role and specific competencies. A level has a specific set of tools available and a responsibility to act within the scope of these tools. All three governance levels facilitate investments on differentiating scale and scope. But the core diverging points are that the EU's role is to establish a regulatory regime that enables a viable hydrogen economy with price adjustment and where hydrogen is subject to technical specifications. Furthermore, the role encompasses the building of networks that bring various stakeholders together across levels and borders. The federal German government is to a large extent a coordinator of the German states. A federation consisting of 16 states that have a significant degree of autonomy and as such, much of the matters pertaining to the implementation of the policies lie with the states. Of course, some implementations take place at the federal level, primarily in the way of providing funding and incentivising the switchover to hydrogen solutions in heating, transport, or industrial sectors. However, the role of the implementor is attributed to the subnational actors, exemplified by the coalition of North German states and their creating of specific measures regarding the "hydrogen hubs", the pipeline infrastructure or procurement plans.

Subconclusion

In the paragraphs above, I have given an account of the underlying knowledges that are a prerequisite for the problematisations within the policies. A central theme can be found in the way that these key concepts are a hindrance to the realisation of the ambitions on the application of hydrogen. The hindrance lies in the financial feasibility of the current hydrogen technology. The price needs to be brought down by increasing investments and regulations should be tailored following the needs of the markets. An understanding of how the roles are distributed is apparent,

with the EU in charge of creating a pan-European hydrogen coordination network, a dense funding network and trickle-down regulation; Germany's role is to make a cohesive strategy for its 16 states and to handle part of the implementation; the subnational North German hydrogen coalition acts with relative autonomy in matters of implementation and transnational partnerships.

9.3 **Question three:** How has this policy and its problematisation been shaped by multi-level governance? How are they being defended and disseminated?

The analysis expands into an assessment of how the influences of multi-level governance have affected the problematisations. How can the circumstances surrounding these policies and their problematisation be characterised? What significance have they had for each other? By knowing what events, geopolitical squabble, and circumstances exist endogenous as well as exogenous, I can discover insights into how the problem representations came to be. This enables me to locate points of attack later in the analysis. Therefore, the findings in this section are valuable when exploring the potential for resistance and reconstitution of the problem representation. By learning of the foundation on which a problem is built upon, alternative paths of the problematisations can be found.

Anthropogenic climate change and its mitigation emerged as a field of increasing political focus in the last decades of the 20th century. In 1995, the United Nations Framework Convention on Climate Change (UNFCC) held the first conference of parties (COP) in Berlin and two years later the Kyoto Protocol was signed, which established legally binding GHG emission reduction targets. In the light of the expiration of the commitments of the Kyoto Protocol in 2020, a new agreement was reached at COP21 in Paris in 2015. The Paris Agreement is signed and ratified by the EU and its member states, committing its signatories to the effort to limit the increase in global temperatures at 2 degrees Celsius.

George Homsy (2018) argues that subnational actors are more likely to enact climate action policies when the federal system has led the way pointing towards a potential policy trickle-down effect taking place. The ambitions of the global community in Paris did trickle down to Commission President Ursula von der Leyen's first significant piece of policy, The European Green Deal (EGD). With the EGD, the Commission utilised its role as policy initiator to the fullest. The EGD is the announcement of the realignment of the EU's political focus, to be centred on the fulfilment of the commitments made in the Paris Agreements. An ambitious and concrete goal was announced in the policy: reaching zero net emissions of carbon by 2050.

This alignment is taking place simultaneously with the prioritisation of the EU's digital infrastructure and capacity. These priorities are reflected in *A New Industrial Strategy for Europe* (2020), where the Commission envisions a twin-transition towards climate-neutrality and digital leadership. While some passages in the hydrogen strategy, the EGD, and the industrial strategy are devoted to the altruistic aspects of climate action and digitalisation, there are neoliberal and geopolitical concerns at the core. Future markets must be created and conquered, and the strategic sovereignty of the essential infrastructure of the EU is to be ensured.

Pervasive problem presentations regarding market support and development, are rooted within the DNA of the EU, whose founding principles are neo-liberal if nothing else. After the devastating wars in Europe in the first half of the century, the two superpowers France and Germany decided to create interdependence between them. Common European energy policies were already at the forefront with harmonising the coal-powered energy sector and steel productions with a set of policies that regulated markets under the authority of a supranational institution. Initially, without a climate change perspective, the European Coal and Steel Community (1952) and the European Atomic Energy Community (1957) were founded with the purpose of establishing and securing internal energy markets partly tasked by granting and guaranteeing loans and delivering funding for research. Through its lifespan, the portfolio of exclusive policy competencies of the various iterations of a European community has grown with inclusions of fishery and customs policies and shared competencies on justice and migrations matters. At the core is still the trade- and market development competencies, where the commission continues to defend and disseminate the problem representations found in this analysis. Developing the economy by establishing advantageous market features and funding the development of new products is a crucial part of the EU's *raison d'etre* (Schlacke & Knodt, 2019).

A similar perspective can be applied in the context of Germany and its northern states. Certainly, the Paris Agreement and the EGD served as verification of climate action, creating a permission structure for member members states and subnational polities to pursue ambitious climate policies, but still within the restrictions of economical and geopolitical circumstances. In 2019 Germany was the 4th strongest economy in terms of GDP and 3rd in global exports at $1.44T and carbon-heavy commodities are a crucial aspect of this. Vehicles for air, land, and sea accounts for at least 20% of Germany's exports and steel and iron products are at 4% (OEC, 2021). Policy decisions to transform these industries have complex and serious long-term effects on business and people's lives.

Add into the considerations Germany's natural gas pipeline with Russia, the Nordstream I and the underway Nordstream II projects. The pipeline network running through the Baltic Sea, transporting natural gas from Russia through the economic zones of Germany, Denmark, Finland, and Sweden landing in Mecklenburg-Pomerania. Geopolitical concerns are raised, like many of Germany's traditional allies from Europe and the Americas are strongly critical regarding closer collaboration with Russia, and Germany's commitment to the end of fossil fuel use is also being questioned by national and European politicians. On the other hand, it is argued by the proponents of the pipeline, that natural gas is less damaging than coal or oil and as Germany is phasing out coal-powered electricity, natural gas can make the transition towards renewables more palpable (Wettengel, 2021).

Blending Fritz Scharpf's work on different modes of multi-level governance and Hooghe and Marks work on the phases of multi-level governance gives an understanding of the circumstances of the policies. While originally developed, specifically on the European Union as a system, the analysis can usefully be extended to the EU as a part of a system that also encompasses actors on a higher level of governance (the UN) and subnational actors. The work of the UNFCC and the Paris Agreement is largely a result of the intergovernmental mode, where state executives engage in a lowest common denominator-based negotiation. Then, the Commission can apply its exclusive right to policy initiative and turn these intergovernmental climate action commitments into concrete policy propositions in the so-called supranational-hierarchical mode. In the next phase of decision-making, the Commission must cooperate with the state executives and the European parliamentarians, to reach a consensus with the 'joint decision making' procedure. Policies can be further governed in the judiciary phases, which again are a part of the supranational-hierarchical mode.

This could be a part of the explanation why the role of the actors appears so well-defined and understood within the policies. As analysed in the first two questions, each level has a defined role in the processes of making policy and implementing them. The policies trickle down from the higher levels to the lower levels where the implementation takes place. From the UN level, through the European and national level, to the subnational level, where the subnational actors apply the means made available to reach the goals set. This is the essence of multi-level governance, where the subnational level is nested within the federal level, which in turn is becoming increasingly nested within the European and international level. State-centric authority over policy is distributed without being watered down, along with the levels.

Multi-level governance has also shaped the problematisations regarding the desired proliferation of networking and governance organisations, across levels and borders. This is arguably in the effort to transport part of the authority over implementation, into these organisations following the model for type II governance. Unlike the public authorities or governments that govern with a general-purpose jurisdiction, these entities have a specific purpose. An example of this is the European Clean hydrogen alliance, which has the purpose of bringing actors from the private and public sectors as well as civil society together to implement the policies and visions in the European Hydrogen Strategy vision. This is an organisation that is loosely organised, with little authority, although nested within the jurisdiction of the EU. It is based on the specific needs within the European hydrogen policy, and it is crossing all levels while being fluid in its framework. A similar configuration can be found in the 'North German Hydrogen Coordination Group' and the 'National Hydrogen Council', where the scientific community and the business sector will be able to offer opinions and recommendations to the implementation processes.

The applications of type II governance structures serve multiple purposes. The engagement of researchers and scientists gives the perception that policy decisions are sound and valid because they are grounded in science. The business community's involvement ensures the economic viability and growth potential of the policies. Type II adds legitimacy and reflexibility to the governance. Because it becomes more responsive to the preferences of the people and functional developments of the technology.

Subconclusion

The development of the hydrogen strategies is grounded in the ambitions of the Paris Agreement and the subsequent European Green Deal. The ambitions of the policies trickle down through the levels, where they become increasingly operationalised. Within the policies, is an understanding that the transnational levels set the ambitions plus coordination of the supportive measures, and the national and subnational levels make the concrete plans and implement them. A feature of this is the expansion of the type II governance regime. Throughout all three policies, is the establishment and dissemination of institutions of a special purpose, trans-jurisdictional, and flexible governance structure. Following multi-level governance, these type II modes of governance, increase the reflexibility regarding the fluctuating preferences of the people and they boost the legitimacy of policy-decisions because they are founded on expertise from the science and business communities.

9.4 **Question four:** What is left unproblematised in this problem representation? Where are the silences? Can the "problem" be conceptualized differently?

Before the rethinking of the problem representation in the sixth question, the analysis draws attention to features that are unproblematised, silenced or features that needs to be reconceptualised.

A policy is a solution to a problem and working backwards shows that the problem is framed a particular way, which is a prerequisite for the solution to be framed in a particular way. Convoluted as it may be, a deliberate choice is made regarding what the policy should contain. Policy-making is problem-framing. The inclusion of some aspect runs parallel with the exclusion of another aspect. This is not inherently a malign manipulative choice, but rather a necessity when making policy. Question four examines what is missing from the policies. Missing knowledges and problematisations reveal central pieces for reconceptualization.

The concepts of investments and costs are applied with the singular understanding, as being about money at the core. Money is needed to be channelled to the right people and the right projects as investments or project funding. Investments are needed so that the right materials can be bought for the electrolyser plants or so that the researchers and construction workers can be paid their salaries. Cost must be brought down so that stakeholders do not lose money when engaging in the transition towards green hydrogen. Costs need to be brought down so that the end-users can make a rational and cost-minimal decision of adopting green hydrogen solutions for their factories or their vehicles. The policies reflect the structure of our society, in that money is a prerequisite for any action. However, cost and investment contain more meanings, non-financial meanings that are unproblematised in the policies.

Investment can also be understood as believing, supporting, or committing. Political, personal, or emotional capital is placed to a cause or a project, increasing ambitions or legitimacy, are completely unproblematised. It goes without saying that the projects mentioned throughout the policies need financial investments and funding to be realised. That is the way of the world. A political will already exist, otherwise, the strategies to transform and diversify our energy sectors would not have been made. A political will with a commitment to accept an initial loss of capital until the sector becomes profitable is at best limited and at the worst completely missing. The markets should be secured first, and technologies need to be proven before the full deployment is conceivable.

Unfortunately, the effects of climate change are already felt, and they are only going to increase. Any action to reduce the anthropogenic climate changes or at least to mitigate them should have been taken yesterday rather than tomorrow. This requires a political will or investment. A political will to make decisions, that make ways of the energy sector that are fossil fuel unprofitable. This is the kind of investment where the policy-makers are committing to green hydrogen even though it might not be economically viable in the short-term, but long-term necessary. Unproblematised in the policies is the concept of investment as being the willingness to apply political capital to drive policy decisions needed for the timely transformation of all society, in light of the climate crisis.

However, it is not completely unproblematised. As shown in the North German strategy, "Private stakeholders demand that politicians and public administration should show greater dedication and visible commitment to hydrogen-based technology… The public sector should also lead by example, for example by sourcing hydrogen-powered vehicles for public fleets or public transport" (appx. c, p 14). Cost attributed as something policymakers must bring down, the need for political leadership and investment is also placed on the public administrators. The role of private actors and corporations as risk-takers and leaders is silenced in the policies.

Cost should also be conceived of differently. A singular focus on the immediate costs for the industry stakeholders is found throughout the three policies. Compared to grey hydrogen, the costs associated with the transition to green hydrogen is caused by lacking infrastructure, an inadequate supply of renewable electricity, etc. Therefore, the policies focus on bringing the production costs significantly down, for the industry end-user to perceive it as a feasible alternative to fossil gas. Again, this is centred on money and the fact that this endeavour must be cost-minimal or "cost-effective" (appx. a, p.2). The policies silence an alternative understanding cost altogether.

A non-pecuniary understanding of cost can offer a wider and more encompassing definition, than simply "the amount or equivalent paid or charged for something" (Meriam-Webster, 2021). A wider understanding would encapsulate the costs that occurred with a failure to adequately transform the energy sector, which could result in increasingly harsher climate catastrophes such as drought, floods, and wind phenomena. By not addressing these concerns, communities across the globe are facing the destruction of liveable and arable areas, which result in mass migrations and debilitating famines. Scare tactics aside, the potential for future events such as these have a cost that cannot be accounted for with a quantifiable number. The potential and significance of these policies far increase the neoliberal premise of growth and market development on which they are currently

based. The potential of these policies as a response to the global climate crises is virtually silenced throughout the policies.

What are the costs that occur with a failure to decarbonise steel production, maritime shipping, the effective storage of renewable electricity? In the short-term and solely economic sense, costs might eclipse profits, but the calculation of the long-term benefits are lacking. Cost is understood as being tangible and in the immediate future. Cost is easier to grasps when it concerns money going in or out. The application of cost as meaning what is the consequences of not making the green transition in time is unproblematised through the entirety of the policies.

The role of private non-state actors in terms of accepting part of the cost and emotional investment is largely unproblematised. They are accepted as rational actors that will act in their self-interest. Costs for the development and deployment of hydrogen technologies and infrastructures are therefore to be primarily on public authorities as they have a stronger stomach for risk-taking. Public actors are often in control of specific funding tools and a way of distributing investments to various projects.

What remains is the role of non-state actors. The public policies, made by the public actors, will be designed to make the green hydrogen economy economically sound, if not profitable for the private actors in the business sector. These private stakeholders can therefore invest on the ground floor with a high degree of confidence in the future profitability of the market, ensured by the public authority. Steel manufacturers or chemical producers are facing little risk when betting on green hydrogen. The bulk of risk is taken by the public authorities that are putting large amounts of capital, political and financial, into these policies, with the private actors there to collect the checks with limited risk for their investment in the development of a new market with a strong public backing.

The argument above is not necessarily based on the premise that private business actors need to abandon aspirations of profit and be more willing to assume risk and raise their level of ambition. In a society based on a market economy, the assumption that businesses will act in accordance with political ambitions without strong incentives to do so is naïve. In the three policies, across the three levels, policy-makers are primarily applying the carrot by using positive incentives to encourage private actors to drive the progress. Incentives such as investments, favourable legislation, and infrastructure projects could drive progress a long way. What is missing from the policies is the stick as means of driving the transition further and at a higher pace.

The somewhat punitive or restrictive measures could incentivise private actors to further transition towards green hydrogen, with taxation or banning of certain products. Found in the EU's policy are phrases like "enabling framework conditions" or "a supportive policy framework" (appx. a, p. 6; ibid. p.13). They are not accompanied by similar negative phrases like restrictive framework conditions. The policies are all conceived with positive and incentive-based tools seeking to foster development and growth. Reconstructing this should include an incentive and regulatory structure that deter what is undesired. Like hydrogen based on fossil resources or a carbon-heavy solution when zero-carbon solutions are readily available.

Subconclusion

In the policies, the concepts of investments and cost are problematised in a seemingly singular way, that places a strong focus on money, growth, markets, and profitability. What is silenced throughout is how the commitment and ambitions of actors, not only the public authorities, can be strengthened in their credibility. The focus on limiting costs and the funnelling of funding is endemic to the general approach of the three policies centred around the creating of positive incentives. They all contain calls for a regulatory regime that eliminates obstacles for potential hydrogen producers and end-users. They all contain the schematics for a supportive network that enables subsidisation of the various efforts into building the European hydrogen economy. What remains unproblematised is the stick in that carrot-and-stick metaphor. The policymakers are reliant solely on the belief that the private actors can be convinced to drive the transition towards hydrogen in the energy sector when the market becomes profitable. This question has opened up a space for the reconstruction of problem representations as also including wider definitions of cost and investments and the possibilities of incentives that deter undesired solutions.

9.5 **Question five**: What effects are produced by this problematisation of multi-level governance?

An understanding of the problem representations, their underlying knowledges and constitutive circumstances leads the analysis to an exploration of the various effects produced. Firstly, there are discursive effects, that show how the discourse in policies are placing limitations on what can be thought and said. Subsequently, the analysis looks past what exists in the text, and at what effects are placed on social space. These subjectification effects are when a particular position in a social relation is made and the subject to inhabit are made to inhabit this space. Again this puts certain limitations on how subjects can think or act, but also on how actors see their own position in this social space. This effect does not imply choosing what subject position to occupy,

nor does it imply a predetermination. Actors can inhabit multiple subject spaces as the effects are distributed amongst multiple selves in a pluralistic and often contradictory manner. The lived effects are the analysis of how the two aforementioned effects are not entirely textual but have real-world effects. When asking this question, the analysis makes possible the reflection on the complex web of implications and effects, created by the problem representations.

Discursive effects

In the three policies, the discursive practices around "regulatory framework" or "regulations", stand out as having significant effects, limiting the way policy can be conceived of. Discourse frames regulations as being primarily about technical standardisation, which streamlines green hydrogen products and distribution channels, or schemes which 'level the playfield' with subsidising, making green hydrogen cost-competitive compared to carbon-heavy alternatives. As touched upon in the earlier questions, a lack of enabling regulations or the apparent need to strengthen regulatory frameworks is problematised. As argued in question four, regulations are a tool for the incentivising of desired business models, rather than the disincentivising of the undesired. Limiting policymakers to primarily seeking to create enabling schemes for the development and support of markets and spending large amounts on investments and funding for R&I.

In addition to the limiting effects on regulations as something that is applied as a positive incentivising tool, limitations are also put on where the regulations are coming from. The regulatory frameworks are created at the public level, after which they trickle down to lower levels of governance and outwards to the benefit of private business- and R&I actors. The North German region seeks to make some regulations themselves, regarding public procurement guidelines and license practises on hydrogen products, but do not seek to make substantial market regulations. They defer market regulation to the federal government with a list of concrete suggestions (appx. c, p.32). Similar to the federal government, which seeks primarily to coordinate the *länder* and make enabling regulations, they also defer the market-wide regulatory policies to the European level. The European level has the competencies to regulate the union-wide markets and to create large incentive structures reaching all member states and associated third-country states.

Subjectification effect

Initially, the subjectification effects highlight a binary, which divides subjects into the makers of policy and the users of policy. Additionally, as put forward in the earlier questions, the policymakers' social relationship, is being defined by which level that accommodates which policy

areas. The idea behind the subjectification effect is the drawing of attention towards how actors are implicated in problem representation and how they are produced as specific kinds of subjects.

Policymakers/policy-users become a subject space where roles and purposes are assigned according to the space that the actor occupies. This is a changing dynamic where actor A can make policy A and be the targeted beneficiary of policy B. Yet they remain intertwined and sometimes even overlap. Policymakers like the Commission, the Federal German state, and the North German region, make plans for investments, create institutions for coordination, amend existing legislation, etc. The policy users can be the private actors that seek investments in electrolyser plants or the scientist that needs funding for the next technological development. To some extent, the policy-user is included partially in the decision making processes by participating in institutions like Hydrogen Europe and Germany's national Hydrogen council and the lower level of governance can also be a policy-user like North Germany seeking a reformation of the federal renewable electricity markups (appx. c, p 31), presumably on behalf of the private actors in the region. The premise of this subject space is that the role of the policy-makers is to create an environment, where the policy-users can act rationally in accordance with cost and benefits to make a choice that maximises their net benefits.

Secondly, a subject space is made around the social and political relationship between the three policy-makers and the allocation of policy-making competencies. As introduced in question two, there is an understanding implicit within policies, that different policy competencies are distributed amongst the policies makers. European and national primary law distributes competencies and the policies defend and disseminate these. Treaties are primary law and they allocated policy-making competencies within the EU. At the same time, the treaties also delimit the areas where the EU has no competencies. The same goes for the primary law of Germany, the *Grundgesetz für die Bundesrepublik Deutschland*, wherein the *Länder* are given a high degree of executive independence, but in some areas, like the railway or highway system, the federal government has executive competencies. This shapes the way that multi-level governance can be thought of. It becomes inconceivable that the subnational level should make policies concerning the regulatory framework, even though the subnational policies might be more ambitious than the policies of the levels above them. Why would they make technical standards of the hydrogen products, when that competence lies at the European level.

Lived effects

The policies for the transition towards a hydrogen economy are still in the initiating phases, and with a long-term perspective that has climate-neutrality as the goal post in 2050, a

comprehensive assessment of the lived effects is too early to give. However, some insights into how the policies are producing reality can be uncovered by examining legislative processes and transnational policy negotiations across the governance levels. In 2020, the commission proposed a "revision of the TEN-E regulation for energy infrastructure (REFIT)". In this proposal the framework for the Trans European Network for Energy (TEN-E) was granted new provisions that would place green hydrogen and other green energy sources under the CEF, creating a stream of EU funding giving direct attention to the linkage of energy grids across state boundaries and investment in electrolysers. Additional investments are also expected via the upcoming revision of the Alternative Fuels Infrastructure Directive, which will direct investment into the upscaling of an infrastructure that supports alternative fuels, such as batteries and hydrogen. The investment will take place via the TEN-T scheme. This removes obstacles for the investment in hydrogen-fuelled vehicles, because the refuelling infrastructure becomes available, creating growth in fuel demand that will run parallel with the expected and enabled growth in hydrogen-powered vehicles.

The Renewable Energy Act (EEG) is a bundle of German legislation, passed in 2000, that creates market incentives for owners of facilities that produce renewables and is given some credit for significant growth in offshore and onshore electricity so far (Schulz, 2020; Appunn, 2021a). After other periodical changes, it was amended again in December 2020. Amending it exempts hydrogen producers from an EEG surcharge, which is normally put on most energy consumption, on the condition that they use renewable electricity in their facilities.

On the regional scale, little has come out in terms of regulation but the North German actors are partnering up with businesses to develop market possibilities for an increase in both production and demand for green hydrogen. One project will generate green hydrogen from offshore electricity and distribute it on the existing gas infrastructure with a hub in Bremen with the "Clean Hydrogen Coastline" (Appun, 2021b) and in Hamburg, a consortium consisting of private companies like Shell, Vattenfall, Mitsubishi, and Airbus is forming. They plan on applying for European IPCEI funding to develop and produce steel with green hydrogen and to transition parts of the energy infrastructure to match this focus (Reuters, 2021). The political ambitions and the promises of heavy subsidisation in the coming decade appear to give large international corporations confidence in the future competitiveness of the green hydrogen economy.

Subconclusion

Within the policies, the discursive features have a limiting effect on how regulations are conceived as a tool for public policymakers. Limits are constructed in the way the regulations

become something that should have an enabling effect for potential actors on the emerging hydrogen markets. Discursive effects limit how regulations can be conceived as exclusively subsidising schemes and measures for the standardisation of products and technologies. The effects on how the problem can be represented are also seen in the subjects that are being formulated. Two sets of subject positions are being established. One subjectification effect divides actors into policymakers and policy users, where the makers of policy, must make policies in the best interest of the policy users. Another effect creates a social relationship amongst the policy-makers, where competencies over different policy areas are allocated along with the levels, explicitly or implicitly. The real-life effects of this are seen in policy decision following the analysed strategies. The European Commission made strides with the revision of existing directives so that sustainable hydrogen was also included in plans for infrastructure investments. Germany is creating positive incentives for the renewable electricity producers within their existing EEG legislation, and in North Germany, states are initiating public-private partnerships with international carbon-heavy corporations.

9.6 **Question six:** Should the problem representation and policy be disrupted and replaced, if so, then how?

Question six emphasizes the possibilities for the contestation of the inevitable truths that are being produced and disseminated within the policies. Divided into two focuses, the first part highlights the processes and authors that produce reality. The second part reflects on forms of resistance and question how the pervasive problem representation could, and indeed should be challenged, and for what purpose. These acts are important because the questioning opens up the dominant problematisation for a new (and more just) problematisation. Answering question six reflects an underlying subjective ethos of what is right and how the problems should be represented.

The approach to the sixth question requires considerations for the areas that the policies are covering. WPR was developed by the feminist political theorist Carol Bacchi, as an analytical tool that can critically assess policies. Policies are analysed as a political utility that creates problems and governs people. The origin of the WPR approach makes it particularly useful to highlight authoritative governing where dividing practises produce ‘subjects’, ‘places’, and ‘objects’. As mentioned in the methodology, the analysis of these dividing practices is particularly beneficial when interrogating the effects that policies have on people. The EU, German, and North German hydrogen policies are not targeting people, they are targeting specialised market actors, researchers, and other hydrogen stakeholders.

The policies in question can hardly be argued to perpetuate power dynamics where people are subjectified with racial, sexist and other derogatory forms of knowledge. However, they are producing and disseminating limitations regarding how policies in the multi-level system of governance are being conducted and being thought of. This is the advantage of WPR, as it allows me to dive deep into the policies, not in the textual sense, as other forms of policy or discourse analysis do, but rather into the meanings and effects found within, with the intention of improving them.

Multi-level governance was developed to break the state-centric mould of liberal intergovernmentalism, the view on the policymaking in the EU as driven by primarily neoliberal principles are complimentary. As showed in the preceding questions, policy-making has been diluted along with the system of European governance. On each level, public policymakers are initiating and creating policy according to the tools available and their competencies, and they defer policy actions to the appropriate level. Furthermore, the policy-makers problematise a lacking development of the subsidisation structure for the business stakeholders to benefit from. This is the central problem representation of the green hydrogen policies and as shown in questions two and three, are defended and disseminated by the three policymakers and market stakeholders.

And they are not necessarily wrong. However, it appears that only one side of the tools for market development is being fully utilised. Time is of the essence and the full spectrum of policy tools need to be applied. There is no question if policymakers should seek to support and subsidise the desired low-carbon or carbon-neutral solutions. Markets need to develop in profitability, so that a green European energy sector can become self-sustaining and so that their impact towards climate-neutrality can be fully realised. They should also actively seek to suppress the behaviours and technologies that contribute to the rapid progression of climate change, at a higher rate than the current measures allow. The problem representation should be expanded into also including measures that suppress and dismantle the existing hard-to-decarbonise institutions at a faster rate than what is currently the case. Climate action policies should not be centred on profitability in the short run as a goal in itself. Ambition levels need to be increased so that policymakers can show greater willingness to accept risks in the short term for the realisation of long-term targets.

It should not be neglected, that some measures, that put some limits on or tax emissions, already exist in the EU and some associated states. The Emission Trading systems (ETS), put a cap on total GHG emission and creates an according number of emission allowances. The cap is lowered in every phase and the number of allowances is also diminishing. In theory, the ETS is aimed at

making compliance with long-term climate ambitions, cost-minimal. The systems also contain a structure where emission allowances can be traded. Targeting stationary GHG emitters from the energy and industrial sector, the system is a cornerstone in European climate policy. The system has indisputably a substantial contribution to the reductions in participants GHG emissions. But concerns have been raised over the current form of the ETS and how the systems can more adequately contribute to the long-term reduction goals. A lack of stringency and consistent prices create insufficient market incentives for foundational innovation at the corporate level (Rogge, et al, 2011). Additionally, Germany has recently passed legislation that levies a carbon tax on transportation and building sectors. Prices start at €25 per tonne CO_2 in 2021 and will then rise to €75 in 2026. The German carbon tax system is a step in the right direction and has compatibility potential with the ETS. However only petrol, diesel, heating oil, natural gas and coal fuels for transport and heating are taxed, leaving grey hydrogen out of the equation (Wettengel, 2020).

For the purposes of this paper, the EU has been considered a part of a multi-level system. Simultaneously it is also a multi-level governance system in itself. The European strategy as analysed is a proposal containing no concrete policy actions yet. However, both legislative bodies, the Council and the Parliament's Committee on Industry, Research and Energy (IRE) has produced their position papers on the matters. Both parties echo the problem representations identified in this analysis concerning standardisation regulations and positive incentive structures. Revisions of the ETS to produce needed incentives and further investments toward private actors should be secured by EU institutions like the European Investment Bank and the CEF, according to the Council (2020). Diverging from the conventional market centred problematisation, the IRE committee also proposes that due consideration is given to: "…the advantages of a 'multi-directional' system where consumer play an active role in energy supply. The Member States shall ensure that all citizens have the right to produce, consume and store their own energy individually or as a community...." (European Parliament, 2021).

The analysis above and in the five questions before, show that many of the right measures are being taken. Yes, subsidising is needed to foster a willingness to take risks on a technology still in its early stages. Yes, regulations are needed so that end-users can be assured of their hydrogens CO_2-neutrality. Yes, transnational collaboration is needed amongst the European states and region, and with associate and neighbouring states. But the problematisations regarding hydrogen need to also consider how hydrogen produced with fossil fuels can be sufficiently deterred. The problematisations also need to consider how these policies can benefit the individual or the smaller

communities, with procurement plans and provisions that allow for small-scale hydrogen production or consummation fit to households or small towns. The problematisations also need to break with the pervasive understanding that these development strategies should have a short-term perspective that is cost-minimal. The global and European transition towards climate-neutrality requires a sacrifice from all actors and it is going to be expensive. By assuming risks and losses in the short term, the long-term political goals set by the international community can be realised even faster and become an even stronger conduit for change across all aspects of life.

10 CONCLUSION

This paper has critically examined green hydrogen policies in a multi-level system of governance and explore a potential space for resistance toward pervasive and restrictive problem representations. This was done by using the descriptive features of Liesbet Hooghe and Gary Marks' concept of multi-level governance to comprehensively grasp the increasingly diverse and pluralist nature of policy-making in symbiosis with Carol Bacchi poststructuralist approach to the analysis of policy, where the problem representations within the policy are opened up *via* a series of six questions. The policies are actively engaging in problematising, and as such the knowledges that can be found within the policies become an active ingredient in the resistance towards the problem representations and the endeavour to improve them.

In question one, I found problem representations that turned out to be pervasive through the three policies. European, trans-national, and trans-regional partnerships and cooperation needed to be established and disseminated. All three strategies proposed the funnelling of large amounts of investments into green hydrogen. R&I projects to facilitate a needed upscaling in production capacity and pipeline and electrolyser infrastructure that can meet the expected demands are some of the primary targets for funding. As such all three levels problematise the lack of money as a primary problem representation.

In question two I interrogated central types of knowledges that are necessary for the problem representations to come to be. I examined how investment is exclusively understood as being about channelling finance to support the strategies. I also examined how the key concept of costs is revoked as being something that needs to be reduced in order to make green hydrogen as a climate action tool economically feasible. Lastly, I analysed the underlying assumption regarding how policy roles are distributed, with the EU having the role of investor and organiser of trans-

national networks, the German government as a coordinator of the German states, and the North German region an implementer of policy and a somewhat independent actor in foreign relations.

In question three, I gave an account of how international and European diplomacy has shaped the hydrogen policies. The ambitions of the Paris Agreement and the European Green deal has created a permission structure for national and subnational climate policies, by setting ambitious targets by capping the global rise in temperatures and reaching climate-neutrality within the coming decades. The question also revealed the dispersion of authority vertically, where climate policy becomes increasingly Europeanised and regionalised. Policy trickles down from the supranational level, through the multi-levelled system of governance, which also facilitates an increasing number of type II modes of corporations, where subnational actors participate independently.

In question four, I reconceived the uncovered problem representations and their underlying enabling knowledge. I explored the silences around the concept of investments and approached it differently by conceptualising it as also being about political investments or risk-willingness. Cost, as a key concept was also expanded into also encompassing the human and environmental costs of not acting sufficiently on the climate crisis in time. I reconceptualised the general approach of the policies that focus on creating an enabling regulatory framework built upon positive incentives and favourable market regulations. With the carrot and stick metaphor, I argued that the regulations and incentives that deter undesired technologies and practices are missing from the policies.

In question five, I examined the effects of the problem representations and their way of limiting thought and action. Through discourse, regulations are being limited as a tool that should enable and support desired courses of action, rather than the inverse. Within the problem representations, the subjectification effects limit the social relationship between policy actors from across the levels and the way that they perceive what policy tools are available. In the material world, effects were found in the way that the policy-makers have implemented policy and amended regulations since the publication of their strategies.

In question six, I answer the problem formulation ‘What space can be opened for the resistance and disruption of pervasive problem representations found in the European, German, and North German green hydrogen policies?’, by exploring a space for resistance and rethinking the essential problem representations found in the analysis, with the intention of improving them. I have opened a space for the disruption of the pervasive problem representations, by arguing that policymakers should abandon their business-centric approach to green hydrogen governance and

rather adopt a more multi-faceted perspective. A perspective that also includes the needs of the individuals and how small communities can benefit from localised hydrogen production. When doing so, attention should also be given to how the pervasive problematisation of short-term cost-efficiency can be replaced by a long-term perspective that considers the costs of not doing enough. The global and European transition towards climate-neutrality requires a sacrifice from all actors and it is going to be expensive. The short-term assumption of risk and loss of profit should not eclipse the long-term goals of societal change.

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