Flipping the Switch: How Does the European Green Deal Change the Conditions for European Railway Integration?

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Abstract

The European Green Deal (EGD) seeks to decarbonize the EU's transport sector and to that end significantly shift transport from other sectors to rail. However, the railway sector is still mainly organized in the national borders of the member states and lacks sufficient cross-border infrastructure, as well as technological and legal cohesiveness to compete against road and air transport on the European level. Drawing on Walter Mattli's concept of supply conditions, this thesis asks how the EGD changes the conditions for European railway integration. Using document analysis to evaluate European-level initiatives and the 27 individual National Energy and Climate Plans (NECPs) of the member states, this thesis finds that, under the premise of the EGD, most EU member states show a willingness to contribute to the bloc's climate targets by strengthening the position of rail. The Commission is driving that change by increasing the competitiveness of the sector and concentrating EU resources on the expansion of cross-border infrastructure and interoperability. Nonetheless, European railway integration is still missing an engaged large member state that would assume leadership in railway investment and standard-setting.

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List of Abbreviations

CEF	Connecting Europe Facility
CJEU	Court of Justice of the European Union
Commission	European Commission
Council	European Council
CTP	Common Transport Policy
ECL	European Climate Law
EGD	European Green Deal
EIB	European Investment Bank
EMU	Economic Monetary Union
ERA	European Railway Agency
ERTMS	European Rail Traffic Management System
ETS	European Union Emission Trading System
EU	European Union
GHG	Greenhouse Gases
HSR	High-Speed Rail
MFF	Multiannual Financial Framework
NECP	National Energy and Climate Plan
Parliament	European Parliament
RRF	Recovery and Resilience Facility
SSMS	Sustainable and Smart Mobility Strategy
TTR	Timetabling and Capacity Redesign Programme

Introduction

The President of the European Commission, Ursula von der Leyen, wants the European Union (EU) to be climate-neutral by 2050 (Herszenhorn 2020). With the European Green Deal (EGD), a set of initiatives and policies on the national and European level that formulate and address the EU's climate goals, the Commission has rolled out a plan to achieve that. On the way to climate neutrality, the EU's economy and society has to transform, including the reduction of GHG emissions in the EU´s transport sector by 90% (European Commission 2020a). Being one of the most climate-friendly transport technologies, the integration and expansion of European railways is "at the heart of […] policy to make EU mobility more sustainable" (European Commission 2021c). This thesis assesses the EGD's design vis-a-vis its suitability to reshape the conditions for European railway integration.

To strengthen the role of railways in Europe, the EGD has to address the challenges of railway integration, a struggle that is as old as the EU-institutions themselves. While the Common Transport Policy (CTP) of 1957 provided a successful framework to integrate road and air transport, it failed in the case of railways as the Court of Justice of the EU (CJEU) pointed out in a judgement in 1985 (Auswärtiges Amt 2020). The following attempt of the European institutions to create an "efficient and competitive EU-wide railway network – the single European railway area" (European Council 2022) only had limited success. The focus within the European transport sector remained on the expansion and integration of air and road transport. As of 2010, the construction of 70% of European railway lines dated back to before 1900 (Martí-Henneberg 2013, 126). While the length of lines in use in the EU-27 decreased by more than 9% between 1990 and 2020 (Directorate-General for Mobility and Transport 2022, 80), the highway network increased by 91% in the same timespan (Directorate-General for Mobility and Transport 2022, 78). Most cross-border connections between the national railway networks still stem from the time of the German and Austro-Hungarian Empires (De Feo and

Ferrari 2021), and 149 out of the 365 existing cross-border connections were not operational in 2021 (Heinrich Böll Stiftung 2021, 20). Between 2006 and 2019, the modal share of rail in passenger transportation stagnated around 7% in the passenger market and between 12% and 13% in freight transportation (European Union Agency for Railways 2022, 69). In 2021, Investigate Europe judged the European railway system as "derailed" (Investigate Europe 2021).

To reach its goals, the EGD plans to revive the role of railways in Europe. Its ambitious climate goals commit the EU to take the necessary steps towards a cohesive, sustainable European economy. Therefore, it faces the task of consolidating a railway sector that has been dragging behind in integration since the Treaty of Rome. *The logic of regional integration: Europe and Beyond* by Walter Mattli (1999) provides the concepts used in this thesis to evaluate the design of the EGD's approach to the railways. In short, Mattli introduces two sets of conditions for integration to be successful. The first set requires economic actors to see the potential to profit from integration and "demand" (Mattli 1999, 42) for political action to realize that potential. State actors then have to fulfil "supply" (Mattli 1999, 42) conditions to successfully deliver integration (Mattli 1999, 42–57).

From the beginning of the European project, integrated transport was seen as an enabler in pursuit of the famous four freedoms of European integration, the free movement of goods, services, capital, and labor (Mattli 1999, 72). So far, the demand for integrated transport in the EU has been satisfied mainly with road transport and aviation. This thesis therefore analyzes how the designs of the EGD change the supply-side of Mattli's integration conditions for the railway sector, asking the question: How does the EGD change the conditions for European railway integration?

Using document analysis to evaluate the EGD's European-level initiatives and the 27 individual National Energy and Climate Plans (NECPs) of the member states, this thesis finds

that most EU member states show a willingness to contribute to the bloc's climate targets by strengthening the position of rail. The Commission is trying to drive that change by increasing the competitiveness of railways in relation to other transport modes and by steering common EU resources into the expansion of cross-border infrastructure and interoperability. On the one hand that promises to have immediate positive effects on the interconnectedness of the European railway network. On the other hand, it uses EGD resources to fuel an ineffective pre-EGD railway policy that keeps the sector fragmented, privatizes profits, and leaves the major investments and responsibilities with nationally thinking structures. Through Mattli's lens, the European railway integration is still missing an engaged large member state that would assume leadership in railway investment and standard-setting to really achieve an effective railway integration model.

This thesis proceeds as follows: Chapter 1 conceptualizes the EGD and engages it with economic integration theory. Also, the major lines and challenges of pre-EGD European railway policy are reviewed. Building on that, Chapter 2 further conceptualizes supply conditions and challenges in the pursuit of European railway integration, drawing on the concepts of Mattli (1999; 2012). Chapter 3 gives a quick methodological overview on document analysis and how it is used in this thesis to assess the EGD before introducing the analyzed documents. Chapter 4 presents the findings of the document analyses and discusses them in the context of Mattli's supply conditions. In the conclusion, this thesis calls for further research on the intersection of the EGD and European integration.

Chapter 1: Literature Review

As a first step, this chapter reviews the rather limited literature on the intersection of European integration and the EGD and engages it with theoretic approaches to economic integration. The second section gives a short overview of the literature on European railway integration and its challenges.

Section 1.1. The European Green Deal and Its Promise for European Integration

For the first time officially presented by the European Commission in December 2019, the EGD was established as the umbrella term for a continuing series of EU policies. Continuing in this context means that the EGD also subsumes unpublished future policies that pursue its goals. The initiatives under the EGD tie sustainability and economy together in all policy fields, following the aim to reduce the EU's greenhouse gas (GHG) emissions by 55% until 2030 (compared to 1990 levels) and turn Europe into a climate neutral economy by 2050 (European Commission 2023a). As a relatively new occurrence, the EGD's long-term consequences can hardly be researched at this point. In consequence, there are only a few scholars who have published on it in the context of European integration so far. They focus mainly on the structures that are affected by the EGD. The focus on sustainability and the size of the policy project makes the EGD an interesting topic for climate policy scholars, but the subject of the matter could have wider implications for the European project and its economic integration. Although the EGD does not directly give the European institutions more power over its member states and merely "draws on the existing EU economic governance framework for implementation" (Bongardt and Torres 2022, 171), it is expected to have a substantial impact on the architecture of the European project. Wolf et al. (2021) hypothesize that the EGD and its investments have the potential, due to its multi-sector approach, to reinitiate economic growth and increase the living conditions of people across Europe, if it manages to combine "carbon taxes and direct regulation with EGD-oriented public investment" (Wolf et al. 2021, 2–3). By increasing the

EU's fiscal capacity through the introduction of market-mechanisms for sustainability across sectors and by turning the recovery strategy from the Covid-19 pandemic into EU supervised sustainable investment, according to Bongardt and Torres (2022) the EGD should even be discussed "alongside the single market and EMU [Economic Monetary Union]" (Bongardt and Torres 2022, 181).

Being an economic restructuring project, it is evident that the impact of the EGD on railway integration should be considered from an angle that incorporates the economic dimension of integration processes. Krapohl (2017) points out that most European integration theories explicitly or implicitly consider the increase of welfare and economic efficiency that the integration of economies curtail as a driver for European integration. In that, as Krapohl writes, they are following a trade liberalization logic based on Ricardo (1821) and his followers, who highlight the benefits of free trade, namely efficiency gains through economic specialization, and Krugman (1980), who thematized the increase of cost-efficiency through scaling production for larger markets (Krapohl 2017, 36–37).

Scharpf (1995) perceives this free trade logic as deeply engrained in the fundament of the EU. In his analysis, he draws on Tinbergen (1965), who conceptualized negative integration as the removal of trade barriers on the one hand and positive integration as the regulation of markets on the European level on the other hand (Scharpf 1995, 7). For Scharpf, negative integration has become the supreme principle of European cooperation and is relentlessly pursued by the European institutions, furthering the abolishment of trade barriers and the liberalization of the European market (Scharpf 1995, 8–12). In contrast, positive integration initiatives are still subject to bargaining processes between the member states. In the legislative supervision of the EU's single market, the different interests of the member states can forestall or diminish the effectiveness of European legislation. This can, for example, result in insufficient European frameworks for environmental protection or welfare standards (Scharpf

1995, 12–20). Mattli (1999; 2012) perceives both, negative and positive integration, as complementary. He defines successful integration "as the voluntary linking in the economic domain of two or more formerly independent states to the extent that authority over key areas of domestic regulation and policy is shifted to the supranational level" (Mattli 1999, 41). This definition includes the economic efficiency effects of linking economies, but also considers the need for functioning supranational commitment and coordination. In his complementary theory, Mattli defines conditions for integration to succeed. These are further explained and drawn on in Chapter 2.

The EGD is considered transformative for the state of European integration as it anchors a positive integration rationale at the foundations of the European market. Bongardt and Torres describe the EGD as a "building block to the European economic model" (Bongardt and Torres 2022, 174), a comprehensive framework around the general European climate goals. Utilizing the Covid-19 pandemic as a door opener for new European-level public investment, the allocation of the new Multiannual Financial Framework (MFF) from 2021-2027 and the additional NextGenerationEU budget already contain investment commitments to sustainability (Bongardt and Torres 2022, 177–79). Bloomfield and Steward (2020) interpret the systemic impact of the EGD in a similar way. Although they see some of it rooted in former EU environment and climate change regulation, they point out that the EGD also intervenes in the structures of the finance sector as well as the systemic sectors of energy, buildings, mobility, and food (Bloomfield and Steward 2020, 773). By providing an example of the legal orientation that the EGD offers to public and private investment, Bloomfield and Steward see sustainability arising as the new basis for economic development. In their words, the EGD "reoriented the European process of macroeconomic coordination from growth to sustainability" (Bloomfield and Steward 2020, 770).

The case of European railways is interesting in this context for two reasons. Firstly, as mentioned in the introduction, the EGD needs a substantial modal shift from road and air transport to rail to reach its climate goals. Stronger integration of the railways is therefore needed to reach the EU's climate goals. Secondly, all attempts to integrate the sector have failed so far, as further reviewed in the subsequent Section 1.2. If the EGD really manages to put sustainability at the core of economic activity on the European single market, it also has to offer a European perspective for reluctant sectors like the railways.

Section 1.2. The Challenges of European Railway Integration

This section introduces the challenges that the EGD is up against in the railway sector. Starting with the history of European railways, the section expands on the three major challenges of railway integration today: competitiveness in relation to other transport modes, lack of infrastructure, and lack of interoperability.

Railways are literally path-dependent networks. The reasons for their reluctance to integrate can be traced back to their beginnings. First utilized in 1825, railways were a groundbreaking new technology of the industrial revolution. They considerably accelerated transport and travel (Bibhash 2019, 257) and significantly contributed to economic growth, information flows, and state-building in the European empires of the 19th century (Schwartz 2021). The railways' strategic utility "which made mass armies practical" (Ropp 2000, 161), their need for coordination, and the possibility for additional revenue to the state budgets led to the nationalization of railways throughout Europe in the second half of the 19th and early 20th century (Fremdling and Knieps 1993). With heavy competition from the upcoming car industry and the growth of road networks (Anastasiadou 2007, 173), the consolidated size of the European railways peaked in 1940 (Martí-Henneberg 2021, 228) and was from then on almost exclusively operated by national monopolies (Martí-Henneberg 2013, 127).

In the 1980s, the development of High-Speed Rail (HSR) technologies that could compete with short-range flights brought new political and economic attention to railways (Fremdling 2003, 220). In 1985, the CJEU concluded the failure of the CTP in the railway sector. What followed mirrors Scharpf's (1995) insights on the domination of negative integration attempts. Instead of calling the member states to develop a common European railway policy, the CJEU ordered the Commission "to lay down the conditions under which non-resident carriers may operate transport services in a member state" (EUR-Lex 1985). Since then, the Commission has started a broad liberalization initiative to break up national structures and increase efficiency in the sector through the introduction of market mechanisms. In a process called unbundling, infrastructure managers and service operators were legally separated. Then, new operators were allowed to participate in competitive tenders. The strong connection between the incumbent companies and their national governments, that often are still part of their ownership structure (Dyrhauge 2013, 72–86), as well as transition costs for the infrastructure managers if operational rights are switched, leads to a situation that "may strongly favor incumbent railway undertakings" (Pellegrini and Rodriguez 2013, 66). Esposito et al. (2020, 610) find that countries tend to have higher market-entry barriers when governments own larger shares in the dominating rail transport companies. In addition, incumbents receive state aid in almost all member states, which further raises the hurdles for new market entries (Dyrhauge 2013, 102). De Francesco and Castro (2018) underpin that influence. More than 30 years after the start of EU railway liberalization and unbundling, former national railway companies are still by far the most dominant market actors. The passenger market in particular is still mainly operated by incumbent operators, to 90% in passenger rail, and to 58% in freight (European Commission 2021a).

While unbundling and the privatization of operations had limited success with introducing market-mechanisms into rail, it had near to no effect on increasing the modal share of railways.

Whether a completely privatized system would really enable more efficiency is also challenged. Holvad (2017) finds, that new operators and competitive tendering can decrease cost and increase efficiency in railway services. Zasiadko (2019) observes that new rail operators, which are less bound to national markets, tend to offer more cross-border HSR connections than incumbents. Finger (2022) on the other hand argues that more liberalization furthers the fragmentation of the sector, which increases the cost for coordination between the different actors. According to Finger "this is problematic to begin with because railways is ultimately a system which needs to be operated as such" (Finger 2022, 113).

Regarding competitiveness with other transport modes, efficiency is not the biggest problem of railways anyways. Prussi and Lonza (2018) consider HSR lines highly competitive to passenger aviation and prone to gain modal shares. Bacares et al. (2019, 134) show that in some cases airlines even decreased their flight services preventively when competing railway infrastructure was built. The major limitation to railways in Europe is the availability of sufficient infrastructure. Compared to air transport, where the capacity along routes mainly depends on the available aircraft and the inflow an airport can manage at the same time, the railway sector is limited by the physically available tracks between major hubs (Pellegrini and Rodriguez 2013, 73). In consequence, aviation is much more scalable and flexible in adapting to the market, whereas rail depends on thorough infrastructure planning around transport demands. A railway service can only be offered where the tracks lie on the ground.

While having positive macroeconomic effects, large-scale investments into railways do not necessarily pay off for the investors and have to be co-financed by government subsidies (Laperrouza and Finger 2009, 8). Member states, who often have at least partly ownership of

the infrastructure managers are therefore heavily involved in the financing and planning of new infrastructure and prefer investments into their own countries. A system that "centres around national network managers, is not conducive to cross-border services" (Serafimova, Finger, and Montero 2022, 64–65). Since public transport planning often operates with year-to-year funding and can be unstable in their long-term planning, infrastructure managers have to deal with a lot of insecurity for their investments (Dyrhauge 2013, 86–90). Political priorities also seem to benefit the competition; in the period 2000-2019, all but three of the EU-28 invested significantly more money into road than into rail. The EU's own instruments for transport investment, which were considerably less, followed the same prioritization between 2007 and 2020 (Schmidt 2021).

When infrastructure is available, cross-border services face another challenge. Decades of nationalized management did not only organizationally and geographically close off national monopolies, but they also resulted in the independent development of modern signaling systems, electrification standards, and HSR technologies. In consequence, the European railway system shows all kinds of technical and operational variations, resulting in a "patchwork of poorly interoperable networks" (Laperrouza and Finger 2009, 3). Interoperability, as summarized by an official of the European Union Agency for Railways (ERA) "is defined as the capability to operate on any stretch of the rail network without limitation" (Guido 2022). Operators that offer cross-border services have to switch between different technical standards which costs time and money. In addition to their liberalization policies, the European railway reforms have therefore been pushing for standardization of those differences. This includes positive integration to some degree, like the introduction of European standards for vehicles and authorization through the ERA, a common license for train drivers, and the introduction of the European Rail Traffic Management System (ERTMS) which subsumes common control, communication, and signaling systems (European Commission

2022a; European Union Agency for Railways 2018). On the example of the ERTMS Paye (2010) depicts the conflicting interests and broad variation of actors in the sector. While incumbent operators tried to stall the process of technological harmonization in order to protect their business advantages, infrastructure managers and smaller countries wanted a faster implementation, aiming for easier access to larger markets. To not favor anyone, the ERTMS had to be newly developed as an "European 'Esperanto'" (Paye 2010, 132), neutral from any existing standards. Furthermore, interoperability has similar funding problems as infrastructure. Its long return-of-invest period of around 20 years makes it additionally unattractive to private capital (Posaner 2019). More than 20 years after the development of the ERTMS, only Belgium's, Luxembourg's, and Slovenia's railway networks show more than 30 % ERTMS-conformity. The deployment can be, at the very most, described as "limited so far" (European Union Agency for Railways 2022, 54).

As Helene Dyrhauge rightfully points out, "EU railway policy is not a mainstream research topic in EU studies" (2022, 856). But to better understand the transformative potential of the EGD on European integration dynamics, the European railways are an insightful case to be considered. Not only is further integration of the railways necessary to reach the EGD's climate objectives, but the sector is also exemplary for failed integration attempts before the EGD. This thesis seeks to contribute to the understanding of the EGDs transformative potential by asking the question: How is the Green Deal influencing the conditions for European railway integration?

Chapter 2: Conceptual Framework

After establishing the EGD and the challenges of European railway integration, this chapter extends on Mattli's (1999) concepts of demand and supply. Section 2.2. then conceptualizes the challenges reviewed in Chapter 1 as supply problems.

Section 2.1. Supply and Demand

As mentioned in the introduction, Mattli defines two sets of conditions for integration to succeed: "demand" (Mattli 1999, 42) conditions and "supply" (Mattli 1999, 42) conditions. Demand conditions refer to the needs of economic actors. Standardization of regulations, the abolishment of trade restrictions, economic discrimination, and other local requirements all decrease the transaction costs of transnationally operating businesses. This enables the exploitation of comparative advantages, economic specialization, and market-induced efficiency in the integrating area. Demand exists when economic actors want to realize that potential in transnational trade and investment, and in consequence lobby their governments to integrate (Mattli 1999, 44–50).

When analyzing the EGD as a European transformation project, the supply conditions target the role of nation-states and their governments in integration. In Mattli's frame, the economic situation of a country is influencing the willingness of a government to integrate. Governments in economically stable environments do not normally gain from integration since it decreases their sovereignty and ability to manage their economy. Economic downturn on the other hand makes it more likely for governments to aim at an increase of the overall efficiency of the economy and makes them, in regard to integration, "more willing to accommodate demands by market players" (Mattli 2012, 781).

If governments are willing to integrate, Mattli sees two major problems and their handling as the decisive factor for success. Firstly, the weaker condition is needed when collective gains are threatened by possible individual gains arising from a violation of the

cooperation agreements. Then, so called "commitment institutions" (Mattli 1999, 54) have to be installed and equipped to uphold the cooperation agreements. In the European case, this role is filled by the Commission and the CJEU. Secondly, the strong condition for Mattli is the balancing of differences in the benefits member states gain from participating. Integration can cost more for some than for others, if a smaller state adapts the standards of a larger one for example. At the same time, some states can benefit much more from an integration process than others. To offset these differences, it needs a "paymaster" (Mattli 2012, 781), a strong state (like often Germany in the EU) that takes over "institutional leadership […] willing to ease distributional tensions through generous side payments" (Mattli 1999, 100). This last condition is pivotal, since large upfront integration costs can hinder very beneficial integration processes (Mattli 1999, 55–56).

Mattli analyses why integration projects succeed or fail. As such his approach can offer explanations for the integration that has already successfully taken place in the EU in a wide array of policy, economic, and physical areas. The EGD is not framed as an integration project per se, but an attempt to significantly change the economic foundations of the EU that requires and, as discussed in Section 1.1., might curtail further integration. Mattli's concepts of demand and supply conditions provide a comprehensive but straight-forward rationale of economic and state actors to play their part in the integration cycle. This thesis further explores if and how the transformative EGD changes the supply conditions for the railway sector. To that end, the next section explores how the major roadblocks for railway integration defined in Section 1.2. can be analyzed as supply problems.

Section 2.2. Supply Problems in European Railway Integration

Looking at European transport integration through Mattli's concepts of demand and supply conditions, the integrating European economy had a demand for integrated transport right from the start, which resulted in the CTP. On the supply side, transport of people and

goods on the road could be integrated by standardized driving rules, licenses, signs, and registration laws (Pernice 2022). The aviation sector has been unbundled and liberalized to create a common EU aviation market, the Single European Sky (European Commission 2015). Only the railway sector drags behind, which can be seen consequently to the complexity of supplying railway integration in comparison to the integration of other transport means.

The still predominantly nationalized structures and the individual national settings, after more than three decades of liberalization policy, show a lack of political will for the integration of the railways. The Commission and the CJEU, who reinitiated the railway integration process through its judgement in 1985, partly fulfill their role as commitment institutions. Since the judgement the Commission has achieved some legal harmonization, the unbundling of operators and infrastructure managers, as well as the introduction of new operators. Nonetheless, after more than 30 years the railway system is still organized along national structures and borders. After all, the railway sector lacks the necessary investments in infrastructure and interoperability. Neither Germany nor any other EU member state is so far showing signs to assume the role of "paymaster" (Mattli 2012, 781), willing to pay for missing cross-border infrastructure and technological harmonization. Instead, the Commission is trying to be the standard setter with projects like the ERTMS, but lacks the power and sufficient financial instruments to back it.

The EGD wants to transform the economic foundations of the EU and put the railways at the heart of a new sustainable transport system. Mattli's supply conditions offer a lens to evaluate what has gone wrong so far and to consider the EGD's plans and policies towards railway integration on a theoretical level. Chapter 3 introduces the method used to extract the necessary information from EGD documents and presents the analyzed documents.

Chapter 3: Methodology

This chapter explains the use of document analysis as method as well as the methods limitations. Then it conceptualizes the EGD and establishes the documents selected for analysis.

Section 3.1. Document Analysis

Designed around the case-study of European railway integration, this thesis examines the transformative potential that the EGD has on European integration dynamics. While Mattli's supply conditions offer a conceptual frame, document analysis serves as a tool to extract information on the design of the EGD. To this end, the analyzed documents are treated in a rationalist way as "sources" (Karppinen and Moe 2012, 9), meaning they are considered as "represent[ing] the facts of the policy process they refer to" (Karppinen and Moe 2012, 9). This differentiates it from more constructivist approaches that treat documents as "texts" (Karppinen and Moe 2012, 11) and focus on their discourse and the underlying power relations.

Bowen (2009) discusses the advantages and disadvantages of document analysis. Availability and cost-effectiveness are benefits of the method (Bowen 2009, 31) that comply with the scope of this thesis. However, the method is also selected because it matches with the current state of the analyzed object, the EGD. The EGD is not a single institution or document but rather can be understood as a broad collective term coined in 2019 to reform the EU's economy and reach the bloc's climate goals. These are the reduction of greenhouse gas (GHG) emissions by 55 % by 2030 (in comparison to 1990), climate neutrality by 2050, and the decoupling of "economic growth […] from resource use" (European Commission 2023a). To this end, the EGD subsumes various policy objectives and initiatives covering climate related policy fields. Whether those policies can successfully reach the EGDs goals is secondary for the question of this thesis; of primary concern are the structural changes in the design of EU railway policy resulting from the EGD, which calls for a narrow analysis of their functioning.

Since the EGD's policies are either in the planning stage or relatively new, their execution is only addressed where information is available.

The three disadvantages of document analysis that Bowen points out are the possibility of restricted access to the necessary documents, lack of relevant information in the documents since they are not written to contribute to the research of this paper, and a bias in selecting them (Bowen 2009, 31–32). All of those are valid limitations in the case of this thesis and have to be kept in mind. Although the framework of this thesis narrows the potential research objects in connection to the EGD, not all initiatives are publicly available at this time and therefore cannot be included. Railway integration itself is not an outspoken goal of the EGD, therefore few of the documents directly address the topic of this thesis. In consequence, the documents are pre-selected to account for the parts of the EGD that impact European railway integration. To achieve transparency on eventual personal biases in document selection, the selection process is outlined in the next section.

Section 3.2. Selected Materials

This section introduces the analyzed documents and provides a rational for their selection. All documents are analyzed in their English version and were downloaded from official European Union websites on the 26th of April, 2023. In some cases, further context and recent developments are also considered. To account for changes in supply conditions, the documents were searched for commitments, institutional changes, and financial frameworks that could relate to transport and railway policy. Table 1 provides an overview of the analyzed documents, drawing on the example given by Bowen (2009, 36).

Table 1: Overview of analyzed documents

Documents selected	**Content analyzed**	**Source**
Regulation (EU) 2021/1119 European Climate Law (ECL)	Goals and implications for transport policy	(EUR-Lex 2021b)
Sustainable and Smart Mobility Strategy (SSMS)	Strategies for rail, air, and road development	(European Commission 2020b)
Action plan to boost long distance and cross-border passenger rail	Commission instruments for railway integration	(European Commission 2021b)
EU-27 National energy and climate plans (NECPs)	National strategies for transport decarbonization	A list of all NECPs with a reference to the analyzed documents can be found in Annex 1.[1]
Connecting Europe Facility (CEF)	Design and prioritization of transport investments	(EUR-Lex 2021c)
Recovery and Resilience Facility (RRF)	Design and prioritization of transport investments	(EUR-Lex 2021a)

After being presented by the Commission in 2019, regulation (EU)2021/1119, also named the "European climate law" (ECL), institutionalized the goals of the EGD and provided a general overview of the strategies followed to achieve that goal (EUR-Lex 2021b). It now embodies the legal heart of the EGD and provides information on the ambitions, strategies, and other approaches of the EU to transform the single European market into a sustainable economy. For its general role in the EGD, the ECL was chosen as the starting point of the analysis in 4.1.

The ECL mentions the "Sustainable and Smart Mobility Strategy" (SSMS) of the Commission as a tool to fulfill the EGD's objectives. It was chosen because it further maps out

[1] A comprehensive list of the analyzed NECP documents can be found in Appendix 1 of this thesis: *Comprehensive List of country abbreviations and analyzed National Action and Climate Plans*.

the EU's strategy for the transport sector and lists 82 initiatives to decarbonize it (European Commission 2020b). Also, it contains and elaborates on all transport related issues touched in the first EGD communication (European Commission 2019). The analysis in 4.2. focuses on the parts of the SSMS that specifically concern railway integration.

The SSMS refers to the "Action plan to boost long distance and cross-border passenger rail", which specifically targets cross-border HSR connections (European Commission 2021b). This document is analyzed in 4.3. because it targets one of the main issues from Section 1.2. and addresses the instruments and actions of the Commission. Also, it is the most direct legal action resulting from the SMSS.

Making up a major part of the EU's financial instruments relating to transport investments, the designs of the Connecting Europe Facility (CEF) and the Recovery and Research Facility (RRF) are analyzed in 4.4. The CEF for 2021-2027 is part of the EU's long-term budget and the main financial instrument of the Commission to invest in transport and energy (EUR-Lex 2021c). The analysis is conducted on the most recent CEF adoption, Regulation (EU) 2021/1153. The 2021 Recovery and Resilience Facility (RRF) is the main part of NextGenerationEU, an additional financial instrument of the Commission. NextGenerationEU has the specificity that it is, for the first time ever, common EU debt guaranteed by all member states (European Commission 2023c). This thesis analyzes Regulation (EU) 2021/241 that established the RRF (EUR-Lex 2021a).

To bring in the individual take of the member states on the EGD, the 27 National energy and climate plans (NECPs), which outline the climate and energy strategy of the EU member states between 2021 and 2030, are analyzed. The NECPs were chosen because they contain the member states' strategies to decarbonize their transport sectors and represent the national interpretations of the EGD in a more or less standardized format. In that function, the NECPs offer insights into the willingness of member states to work towards significant modal shifts

and adopt railways and their integration as a substantial part of their sustainability strategies. They are systematically searched for national measures to promote rail, establish new (cross-border) infrastructure, and introduce the ERTMS. It has to be kept in mind that, although the standardized format, the grade of detail dedicated to railways differs from country to country.

Chapter 4: European Railway Integration and the European Green Deal

This chapter analyzes the documents introduced in Section 3.2. in the light of the research question. To determine how the EGD's transport policy changes supply conditions for European railway integration, Sections 4.1.-4.5 first present the findings and analyses of the individual documents, in the order they were presented in Table 1. Section 4.6. consolidates the analyses and discusses the findings vis-a-vis Mattli's supply conditions.

Section 4.1. European Climate Law

The ECL formulates the European Union's aspiration to realize climate protection and economic growth at the same time. In its function as fundamental goal setter, it stays relatively vague doing this. Neither does it address railways, or any sector specifics in general. The target of a 55 % emission reduction by 2030 (in comparison to 1990) (EUR-Lex 2021b, 5) and the final goal of climate neutrality by 2050 is depicted as "an opportunity for all sectors of the economy in the Union to help secure industry leadership in global innovation" (EUR-Lex 2021b, 2). In paragraph 7 of the preamble, the transport sector is mentioned as contributor to the decarbonization of the EU, and in paragraph 35 the ECL endorses the SSMS, which is analyzed in 4.2., as pivotal part of the EU's sustainability transformation (European Commission 2020b, 3).

Some implications for railways can be deducted from the document. Firstly, in Articles 5 and 7, the ECL highlights the role of the NECPs as tool for the Commission to monitor the member states' progress towards sustainability. Building on that, the Commission shall evaluate the national measures and their effectiveness every two years. The Commission then has the option to give recommendations to improve the respective member states' performance (EUR-Lex 2021b, 11–13). This monitoring mechanism constitutes a commitment institution in Mattli's sense by holding member states directly accountable for the EU's energy and climate

goals. This is especially relevant since the NECPs contain the decarbonization of the transport sector.

Secondly, the ECL does display some general principles for EGD action. Paragraph 34 of the preamble emphasizes the role of European thought action driven by ”fairness and solidarity across and within the member states” (EUR-Lex 2021b, 7). It also calls on the member states to pursue “cost-effectiveness and technological neutrality” (EUR-Lex 2021b, 7) on their paths to contribute to the EU’s climate neutrality. While the first statement appeals to European rather than nationally oriented solutions, the second statement emphasizes the rational utility of climate measures over existing preferences. Railways are a policy- and investment-wise disadvantaged, yet comparatively sustainable transport mode. As such, a change in the cost-benefit analysis toward climate-awareness benefits the railways.

In that context, the ECL stresses the role of the EU Emission Trading System (ETS) as a key tool for putting a price on and reducing GHG emissions (EUR-Lex 2021b, 3). The ETS raises the operational costs for inner-European aviation and therefore gives rail a competitive advantage over a direct competitor.[2] From 2027, the EU also plans to include emissions from road transport into the ETS (Council of the European Union 2022, 55), which would also strengthen the competitiveness of rail transport against the road.

In legalizing the fundamental goals of the EGD, the ECL stays vague on specifics. Implications for railway integration arise from the principles of technological neutrality and solidarity, and competitive advantages for railways as a result from the stronger role of GHG

[2] The ETS limits the amount of GHG certain sectors can emit. Up to a certain level emission rights can be bought and traded. As of 2023, inner-European aviation falls under the ETS (European Commission 2023b). Current findings suggest that the ETS limits the use of aviation in general, but especially when HSR is available on the same routes (Fageda and Teixidó 2022, 10–11).

emissions in the European economy of the future (e.g. through the ETS). Nonetheless, none of the supply conditions for railways are directly affected. The modal shift to rail is only implicated through the aim to decarbonize the transport sector and indirectly through the endorsement of the SSMS.

Section 4.2. Sustainable and Smart Mobility Strategy

The SSMS picks up the ECL's goals and develops a strategy to realize them for the transport sector. To achieve climate neutrality in the EU by 2050, the SSMS aims for a decrease of GHG emissions in transport by 90% until then.[3] At the same time, integrated interconnectivity should remain available throughout the EU (European Commission 2020b, 1). The goal is to double HSR traffic by 2030 and triple it by 2050 (European Commission 2020b, 2–3). Also, freight should be transported to 75% by rail and inland waterways, which would be a multiplication of the current modal share these transport means have (European Commission 2020b, 11). However, the SSMS does not have the legal character to directly prescribe a modal shift to the member states. Most of the strategy tries to steer the markets towards sustainability, following a similar logic as the ETS. The corresponding goals and measures include higher emission standards for cars (European Commission 2020b, 3–4), carbon neutral collective travel under 500 km by 2030, internalization of climate costs in all transport modes (among others through the ETS), the end of fossil fuel subsidies, a harmonized climate footprint information system, and others (European Commission 2020b, 11–14). These measures would make rail the superior transport mode, but they do not directly contribute to the construction of new railways.

[3] Since the EU plans to remove carbon from the atmosphere, emissions do not have to be reduced by 100% to achieve the EU's definition of climate neutrality (European Commission 2022c).

The SSMS acknowledges the need for substantive investment and that shifts to sustainable transport are only possible when it is available (European Commission 2020b, 7–8). As discussed in 2.2., Mattli's supply conditions for integration to succeed require a "paymaster" (Mattli 2012, 781) who initiates the necessary investments. But instead of referring to the role of the member states at this point, the SSMS highlights the instruments under the control of the Commission. For substantial new infrastructure investments, the SSMS estimates at least €300 billion over the next ten years. To realize these investment, it plans to utilize the CEF Transport and hopes for substantial additional resources from NextGenerationEU (European Commission 2020b, 15, 17–18), both instruments are analyzed in 4.4. It has to be noted that the €300 billion does not represent the available, but the required resources. The financing of the plans is not conclusively clarified in the SSMS.

Other specific railway measures include boosting rail freight transport by increased interoperability reached through "'quick wins' like train length, loading gauge and improved operational rules, alongside the completion of key missing links" (European Commission 2020b, 10–11). This practical approach is aimed at maximizing the use of existing capacity rather than developing new capacity. To reach the passenger rail goals, the SSMS endorses the development of an action plan to boost long distance and cross-border passenger rail (analyzed in 4.3.) and emphasizes the need to provide European legislative solutions to enable easier ticket access for cross border rail tickets (European Commission 2020b, 8–9).

Although promoting railways, the SSMS stays coherent with the ECL's principle of technological neutrality and aims to make all transport modes sustainable. To that end, the SSMS includes a broad range of policies and initiatives to achieve market-ready zero-emission vehicles by 2030 and zero-emission aircrafts by 2035. This is comprised of a stimulus for the sale of zero-emission vehicles, the roll-out of corresponding charging and renewable fueling infrastructure, several investment and adoption plans for different types of zero-emission road

vehicles, and an alliance to, among other things, decarbonize aviation (European Commission 2020b, 4–6). The measures, especially for road transport, are spelled out in more detail than the ones for railways. Although that might be a good message for transport flexibility, it is not for railway integration. The faster road and air transport become less polluting, the less important long-term investments into rail become to reach emissions reductions. Also, substantial public investment in other transport modes reduces the resources available for railway integration.

Mentionable are also the SSMS's plans to increase the user-friendliness of several transport modes on the same journey under the term multimodality. The considered streamlining of transport planning (European Commission 2020b, 9), ticketing systems (European Commission 2020b, 14), as well as passenger and worker rights across transport modes (European Commission 2020b, 20–21) represents a counterpoint to the market approach. Supplementary thought transport systems would go against the promotion of modal competition for the best sustainable transport solutions and call for more organization between these transport modes. Yet, the SSMS neither addresses this contradiction nor does it present decisive actions towards multimodality.

All in all, the Commission's SSMS strategy has three implications for railway integration that partly address its supply problems. Firstly, it uses climate targets and market regulation to achieve modal competition for the best sustainable transport solutions. In this logic, rail has a technological head start which would make it more attractive for member states to invest in. The Commission acts as a commitment institution for climate goals but does not plan to directly enforce railway integration. Secondly, it formulates the need for public investments in infrastructure and interoperability. Inconsequential, it does not point to sufficient funds for those investments and therefore is not able to plausibly solve initial investment problems for new railway infrastructure. In parallel, the SSMS announces investments in research and infrastructure to make road and air transport more sustainable, which takes away

from the competitive advantage for rail. Thirdly, the SSMS lays out plans for multimodality, which has the potential to serve as a vehicle to harmonize regulations in the railway sector but is not addressed in adequate detail. Interoperability between railway systems is not the subject of the SSMS at all. A more detailed account of the Commission's plans, at least for passenger rail, can be found in the action plan.

Section 4.3. Action Plan to Boost Long Distance and Cross-border Passenger Rail

The Action plan extends the SSMS with focus on passenger rail, aiming to make "cross-border rail transport […] much more attractive" (European Commission 2021b, 1). The plan wants to strengthen the market mechanisms in the railway sector, locates sources to finance new infrastructure, and strengthens the role of cross-border against national rail operations.

With the action plan, the Commission once more emphasizes the pre-EGD liberalization approach, which also reiterates the existing problems. By unbundling infrastructure and operation companies, the EU has created a system where operating companies pay the infrastructure managers for infrastructure access. The action plan now sees these costs as one of the major problems for high railway prices (European Commission 2021b, 11) which should not come as a surprise. Instead of rethinking this approach, the action plan wants the member states to provide their respective infrastructure manager with enough resources to lower the track access charges for operators to the level that new private investments are attracted (European Commission 2021b, 11–12), meaning that profits can be made by offering services. Furthermore, it considers EU-wide VAT exemptions for international rail tickets. Where services still can't be offered profitably, public service contracts are expected to fill the gap (European Commission 2021b, 14–16). Although this strategy might indeed attract private railway operating companies, it effectively privatizes the gains from profitable rail lines. At the same time this approach gives no reason for private operators to invest in infrastructure

themselves. Where operations are unprofitable, operators are either provided with a state-funded public service contract or the incumbent, often state-owned operator has to run the operational services. This practice increases the railway integration costs for member states and turns potential infrastructure investments into private capital, that might potentially be invested elsewhere.

In lack of a "paymaster" (Mattli 2012, 781) who offsets these additional costs, the action plan relies on the Commission's own instruments and resources. It points out that the CEF in the period 2014-2020 successfully invested into cross-border rail development but had too few resources to win over modal shares. For the 2021-2027 period, the CEF commitment is continued with rail as priority, defining key missing links for cross-border infrastructure and setting a minimum limit of 160 km/h for passenger lines on the core European railway network (European Commission 2021b, 6–7). The same counts for €50 billion of expected additional railway funds from the RRF, which present an "unprecedented opportunity for a renaissance in rail and new investments" (European Commission 2021b, 3). In addition, the plan emphasizes the Commission's cooperation with the European Investment Bank (EIB), which supports public and private rail investments with loans (European Commission 2021b, 7–8).

In terms of legal harmonization, the action plan contains various commitments to speed up the implementation of the railway packages. Concrete measures include a limiting of additional qualifications that train drivers need to possess to operate on foreign tracks, as well as the legal requirement to enable comprehensive tickets for rail journeys that include more than one operator, starting in mid-June 2023 (European Commission 2021b, 5–6, 9–10, 12–14). Most importantly, with the Timetabling and Capacity Redesign Programme (TTR), the action plan intends to prioritize cross-border rail in capacity and timetabling allocation and considers a coordinating "Union-level entity for overseeing the optimization of cross-border rail traffic" (European Commission 2021b, 11). On the one hand these measures, especially the TTR, shift

the emphasis of the railway network to cross-border connections and provide additional coordination capacities on the European level. On the other hand, they further undermine the logic of market liberalization by restricting the flexibility of private operators on the single railway market the Commission tries to build.

The action plan is in so far consistent with the SSMS that it wants to boost the competitiveness of railways, and at the same time increase public investment in infrastructure to expand the available lines railways can compete on. The structural element added by the action plan shows in the way the competitiveness of railways is aimed to be improved. Increasing the cost-advantage of sustainable transport (and in specific rail), the SSMS is raising emission costs of other transport modes. Together with public investment in the necessary infrastructure, this represents a coherent approach to raise the modal share of railways. The action plan on the other hand extends on the existing liberalization policy and aims to increase competition between railway companies by pushing open access wherever possible. In consequence, profitable lines operated by private companies profit from public infrastructure investments, whereas necessary non-profitable lines have to be operated under state-funded public service contracts. Furthermore, member states are instructed to provide their infrastructure managers with sufficient resources to offer operation contracts at prices allowing private companies to profitably operate. In consequence, the whole system depends on state-funded infrastructure that is not even managed cost-effectively, while profits from railway operations are privatized. Since the infrastructure managers are still in the hands of the state, these private profits are unlikely to be invested in new infrastructure. In other words, the action plan strengthens a complex model that subsidizes private railway operators and reduces the power of national incumbents. At the same time, it wastes resources available for upgrading the railway system's infrastructure and interoperability and increases integration costs for the member states. The success of such a system consequently depends on the available resources

which can be raised at the European level to support the member states' investments. To summarize, the action plan promotes a publicly funded and organized railway system that is complicated through additional private actors who make all the operational profits without significant impulses to reinvest them in railway infrastructure.

Section 4.4. Connecting Europe Facility and Recovery and Resilience Fund

The CEF and the RRF are the EU's main financial instruments when it comes to transport investment. The CEF is part of the Multiannual Financial Framework (MFF), the regular seven-year long EU budget that is funded by the member states. Currently, the CEF Transport envelopes €25.8 billion for the period 2021-2027 and its main task is, coherent with the action plan, "to accelerate investment in the field of trans-European networks" (EUR-Lex 2021c, 38, 52). For railways that means it is ought to support European railway integration by supplying funding to the building of cross-border railway infrastructure between member states, the ERTMS roll out, and other interoperability measures (EUR-Lex 2021c, 41, 57–58). Depending on the measures it provides financial support of up to 50% or even 85% of the project costs. Sourced relatively from the Gross National Income of the member states and mainly benefiting economically weaker countries, the CEF has a redistributive function. It could be assumed that, through the detour of MFF respectively the CEF, the net contributors (and especially Germany as the main net contributor) finance railway infrastructure and interoperability throughout the EU. However, this does not fulfill Mattli's "paymaster" (Mattli 2012, 781) condition for several reasons. Firstly, none of the net contributing countries assumes leadership, as observed in 4.5., Germany's railway strategy has a national focus. Secondly, the CEF is managed by the Commission and, with the ERTMS, promotes an original EU standard that is foreign to railways in all member states, rather than a national standard that would be adopted by the other member states against respective payoffs. Thirdly, the amount of the CEF

Transport is far from the sums needed for the targets set in the SSMS, and also has to be shared with investments in other transport modes.

The RRF presents a novelty in the EU's budget. Making up the main part of the NextGenerationEU Fund that adds to the MMF for 2021-2027, it is completely financed by common European debt guaranteed by the member states and managed by the Commission. It is the first common debt in European history, taken on to stimulate the EU's economic recovery from the Covid-19 pandemic and to boost the sustainability transformation in accordance with the EGD. Of the total amount of €338 billion paid to the member states in grants and €385.8 billion in optional retrievable loans (European Commission 2023c), at least 37% of the RRF should contribute to the EU's climate target (EUR-Lex 2021a, 36). To reach this 37% figure, the money has to be invested in 143 objectives defined by the RRF. Every objective has an assigned percentage grade to which they count as sustainable. From the transport objectives, only railways and urban transport objectives as well as alternative fuel infrastructure count 100% into the climate target. The railway objectives include investments into cross-border infrastructure, which has a target quote of 100%. and the ERTMS, with 40% (EUR-Lex 2021a, 67–69). In total, €70.7 billion will be invested into sustainable mobility (European Commission 2022b, 3) of which more than half is estimated to be invested into railways (Costa 2021). From a very optimistic perspective, this could roughly meet the €50 billion estimated in the action plan. The RRF multiplies the resources available for the EGD sustainable mobility objectives in the period 2021-2027, and it has a clear preference for investments into rail. Just like the CEF, by guiding investment and contributing necessary resources, the RRF shows similarities to the function of "paymaster" (Mattli 2012, 781), but also falls short of a leadership role. Additionally, in difference to the CEF, the money is not specifically targeted at integrative measures.

The EGD legislation and instruments on the European level influence the supply conditions for European railway integration. But before the question of this thesis is answered, the next section addresses the member states' EGD plannings on the national level.

Section 4.5. National Energy and Climate Plans

The NECPs of the EU-27 contain the individual climate measures of the EU member states to contribute to the blocs' overall climate goals. As such, they are not primarily designed to address railway integration, but they contain the member state's actions to decarbonize transport. Therefore, in the context of this thesis, they represent the member states national EGD strategies, comparable to the SSMS on the European level. At this point it should be noted again that, although the standardized formats, the member states' approaches in writing their NECPs differ in the way they present their respective transport decarbonization strategy as well as in the type and quality of presented data. Comparable information on planned railway investments for example cannot be included in the analysis, since some countries include EU investment or also subsume personnel cost and urban transportation systems under railway investments. The information presented below can therefore only show priorities and trends.

Table 2 lists the compiled goals and measures in the NECPs of the EU-27. The NECPs of Malta and Cyprus do not contain relevant information on railways and are therefore not represented in this table. Both islands have, if at all, very limited railway infrastructure. As a bigger island with a larger railway system, Ireland has respective measures in its NECP. Therefore, Ireland is included in Table 2 but not considered in the analysis, which only refers to the 24 physically connected EU member countries.

In 4.2 and 4.3., the EU's overall goals, strategies, and actions were discussed. On the EU level, the bloc shows a general willingness to increase the modal share of rail. In the considered NECPs, 16 out of 24 countries reciprocate that goal on the national level, expressing

their intention to work towards modal shifts from road and/or aviation to rail in freight and passenger transport. Though, in the case of Hungary and Slovakia that does not mirror with their own transport projections for the future, showing a faster growth of road than rail transport in Hungary (Ministry of Innovation and Technology 2020, 143–44) and a stagnation of rail transport levels in Slovakia for the next 30 years (Slovak Ministry of Economy 2019, 247). Nevertheless, the majority of EU member states wants to realize modal shifts to rail, including 8 out of the 10 biggest considered economies, and in each case 9 out of the 10 considered countries with the largest area and population (eurostat 2023). Although not directly indicating the willingness to increase railway integration, that shows a strong commitment to improve the role of rail in their respective countries and therefore in European transport in general.

Table 2: Goals and measures relating to railways in the NECPs of the EU-27

Goals in the NECPs	**Specific measures**	**Countries**
Shift of road and/or aviation to rail in freight and passenger transport		AT, BE, CZ, FI, FR, DE, IT, LT, LU, PL, RO, ES, GR, BG, HU, SK
Increase the attractivity of rail transport in comparison to other transport modes	Tax reform for sustainable development (fuel or electricity tax reductions for rail, VAT reduction for rail, cut of excise for rail etc.)	AT, BE, DE, IT, LV, SI, ES, SE
	Reducing energy costs for rail	BE, FR
	Investment in new rolling stock	BG, IE, IT, PT, RO, SK
	Energy efficiency measures for rail	FI, FR, PT, ES
	Reducing cost for rail freight transport	DE
	Free public transport use	LU
	Insourcing external costs for all transport modes	RO
	Reducing sustainable transport travel cost	SI
Modernization of old infrastructure to fit climate needs	Increase electrification of the railway network	BG, CZ, DK, EE, DE, GR, IT, LV, LT, NL, PT, SI, ES
	(Potentially) introduce efuels/biofuels/hybrid as potential alternative for rail	DE, IE, IT, PL, PT, SI

Investment in new Infrastructure (including infrastructure capacity increase on existing routes)		AT, DK, CZ, EE, FI, FR, DE, GR, IE, IT, LV, LU, PL, PT, RO, SI, ES
	Thereof explicit investment into transnational infrastructure	AT, EE, CZ, LV, LT, PT, SI
Implementation of existing EU directives and regulations	Adapt all regulations	FR
	Promotion of new operators	AT
	Introduction of neutral authority for rail freight	BE
	Shift of 30% of freight over 300 km to rail or inland waterways	BG, PL, RO, SK
	Increasing freight train length to European 740/750 m standard	DE, PT
	Adaption of technical regulations	LT
Improving multi-/intermodality		BE, HR, FR, IE, IT, LU, NL, PL, PT, RO, SK, SI, ES
Railway interoperability measures		PT, ES
	Including ERTMS	BE, PL
	Cross-border cooperation	HR

The ECL, the SSMS, and the action plan utilize market regulations to increase the attractivity of sustainable transport. 15 of the 24 considered countries list additional market measures to increase the attractiveness and lower the cost of railway operations in their countries. The measures include the promotion of sustainable transport in general but also measures specifically targeted at railways. There is a broad variation of measures in that category, with tax or excise reductions of some kind leading with 8 member states, followed by investments in new rolling stock (5 considered countries) and the promotion of energy efficiency in rail (4). On the one hand, the additional measures might increase the speed of modal shifts inside a country, on the other hand the wide variety of measures counteracts the harmonization of the legal environments for railways in the EU. In that regard, they are only conditionally positive for railway integration.

Many of the NECPs aim to reduce the climate impact of railways. 13 member states plan to further electrify their networks, 6 plan or consider transforming non-electrified railway tracks into hybrid, hydrogen, efuel, or biofuel operations. These measures might position railways better in the sustainable transport market of the future. But without harmonized electricity standards or a common strategy for hydrogen or alternatively fueled trains, this only worsens the wild compilation of European railway technologies.

As discussed throughout this thesis, efficiency gains and competitiveness can only bring railways so far. To really expand railway operations throughout Europe, new infrastructure is mandatory. In the NECPs, 16 out of 24 considered countries document their will to contribute to that expansion and to invest in new railway infrastructure. However, the problem of nationally focused investment persists. Only 7 of the countries that planned new railway infrastructure in their NECPs explicitly aim to expand cross-border infrastructure or close missing links to the networks of neighboring countries. All these 7 are small or medium-sized EU member states, which could be an indicator that Paye's argument reviewed in 1.4. holds consistent in the NECPs. Paye (2010) wrote that smaller states are more willing to push for railway integration, since they are more dependent on foreign market access than larger states. Considering the limited role of cross-border infrastructure in the NECPs of the larger countries, it does not seem like one of them assumes the role of "paymaster" (Mattli 2012, 781) in railway integration. The natural aspirant for that role, Germany, is at least one of the few countries that make measurable investment commitments. But in addition to not mentioning cross-border investment for railways at all, it is mainly committing the money to enhance existing infrastructure (Federal Ministry of Economic Affairs and Climate Action 2020, 81).

Looking at interoperability, the role of railway integration in the climate strategies of the EU member states looks even less important. Only 5 countries mention interoperability measures in connection to rail, the ERTMS is only mentioned in Belgium's and Poland's

sustainability strategies. 10 countries aim for further adaptation of EU rules, which is in most cases reduced to singular measures like running 30 % of freight transport under 300 kilometer by rail, a rule that was first suggested in a Commission whitepaper from 2011 (European Commission 2011, 9). The exception is France, which sees the adoption of all transport regulations as part of its sustainability strategy (French Republic 2020, 129). The restrained enthusiasm for interoperability and adoption of EU railway rules in the NECPs mirrors the reduced reference of these topics in the analyzed EU documents and hints once again to missing leadership in these questions. In comparison, the interoperability of electric vehicle charging stations is a topic in the SSMS as well as in almost all NECPs. Instead, intermodality is part of half of the analyzed NECPs.

Section 4.6. Consolidated Considerations

When Mattli considers the willingness of the integrating states as the prerequisite to his supply conditions, he argued that countries are more likely to integrate if the economic situation forces governments to strive for efficiency gains. The EGD translates this logic to the climate crisis: To reach the bloc's climate goals, the EU has to transform itself into a climate neutral economy. To that end, the Commission aims to cut 90% of transport emissions by 2050 and make railways the backbone of the sustainable single market of the future. These ambitious targets are shown in all the analyzed documents on the European level and are supported by a majority of the NECPs.

The Commission drives the EGD transformation with the instruments it has at hand. Being empowered by the ECL to monitor and enforce the climate targets but keep technological neutrality, it mirrors that approach in the SSMS and the action plan. The SSMS defines transport-specific sustainability goals to be fulfilled by the market, but notices that they will not be achieved without €300 billion necessary investments. The action plan aligns the available resources in the CEF and the additional resources in the RRF with the goals of the SSMS and

strengthens market mechanisms in the railway sector. In Mattli's sense, it is doing a good job as a commitment institution for the ECL, using all available instruments to pivot investment into rail. Unfortunately, the ECL does not account for the specific challenges of railways and reiterates a model that has failed to deliver significant progress in railway integration over the last 30 years. Instead, it further strengthens the privatization of revenues from transportation.

What railway integration under the EGD lacks, when observed through Mattli's frame, is a structuring entity, a "paymaster" (Mattli 2012, 781) that assumes institutional leadership on railway integration and throws its resources behind that goal. This is also evident in the NECPs. While the majority of member states expand their railway networks, only smaller states appear particularly willing to invest in interoperability and cross-border infrastructure. Additional individual measures to strengthen railways inside the national transport sector only increase the legislative patchwork. Potential new propulsion technologies for railways like hydrogen or alternative fuels are developed as national initiatives, which provides the breeding ground for the interoperability problems of the future.

To answer the question of this thesis, the EGD has changed two out of three of Mattli's supply conditions. The need for economic transformation has increased the willingness of the member states to work towards railway integration. With the ECL, the (for railway integration) ungrateful legal foundation of the CTP has been expanded by the EGDs mandate to make sustainable transport a necessity, which gives the Commission more instruments to further railway integration as a commitment institution. Only Mattli's most important condition, a "paymaster" (Mattli 2012, 781), has not arisen through the EGD.

Conclusion

Asking how the EGD changes the conditions for European railway integration, this thesis contributes firstly to the understanding of the EGD's transformative potential and secondly to the refinement of the problems European railway policy is facing. Rooted in the novelty of the EGD, only a few scholars have written on the intersection of European integration and the EGD so far. By engaging these voices with economic integration theory, the literature review shows that the EGD is expected to tie economic activity in the EU to the bloc's sustainability goals and defines that process as a motivator for positive integration in all policy fields.

The case study of European railways is rather interesting in this context since it is a key player in realizing the EGD's transport goals. Failing to integrate since 1957, the sector also presents an especially complicated integration challenge consisting of three interconnected problems: lack of competitiveness with other transport modes, lack of sufficient cross-border infrastructure, and lack of interoperability. The European railway policy of the last three decades did not manage to successfully address these problems and left the sector fragmented and structured through nationally planned and publicly funded infrastructure.

Conceptualizing these problems in the theoretical frame of *The logic of regional integration: Europe and Beyond* by Mattli (1999), the EGD's transport-related plans, instruments, and policies of the EGD are analyzed vis-à-vis their effect on Mattli's supply conditions for successful integration. These are namely the willingness of member states to integrate, supranational commitment institutions, and a member state that assumes the "paymaster" (Mattli 2012, 781) role by taking the lead on investment and standardization. The document analysis shows the first two conditions to be improved through the EGD. Railways enjoy general support as a key transportation technology for a sustainable future throughout the EU. The Commission is supporting that goal by increasing the importance of the railway's

sustainability strength in the transport sector and therefore making the technology more competitive against other transport modes. At the same time, the Commission steers EU investments into cross-border infrastructure and interoperability. Although throwing money at the problems of railway integration, the EGD is not able to change the underlying structure. It keeps the nationally organized system that relies on public investments untouched, while privatizing the profits of railway operations. Railway integration is still missing a "paymaster" (Mattli 2012, 781) that takes leadership in the initiative to legally, infrastructurally, and technically harmonize the European railways.

The results of this thesis question the framing of the EGD as a tool of positive integration. Analyzing the transformative potential that the EGD has on European railway integration through Mattli's supply conditions shows that the EGD is not a panacea for sustainability. While strengthening the bloc's will to transform into a sustainable economy and emphasizing the sustainability strengths of rail and turning them into competitive assets, the EGD does not automatically seem to resolve historically grown problems. The considerable resources the EGD is equipped with can offset that to some extent, but they are no substitute for targeted political solutions to specific integration problems.

Future research on European integration and the EGD needs to verify that limitation in other policy fields. However, when further integration is necessary to reach the EU's sustainability goals, this thesis implies that the EGD alone is not providing positive integration. Instead, the individual challenges of the respective sectors also have to be assessed by scholars and addressed by policy-makers.

Appendix 1: Comprehensive List of Country Abbreviations and Analyzed National Action and Climate Plans

Country	Abbreviation	Reference
Austria	AT	(Federal Ministry of Sustainability and Tourism 2019)
Belgium	BE	(CONCERE - la concertation entre l'Etat fédéral et les régions and Commission Nationale Climat 2019a; 2019b)
Bulgaria	BG	(Ministry of Energy and Ministry of Water, n.d.)
Croatia	HR	(Ministry of Environment and Energy 2019)
Cyprus	CY	(Republic of Cyprus 2020)
Czechia	CZ	(Czech Republic 2019)
Denmark	DK	(Danish Ministry of Climate, Energy and Utilities 2019)
Estonia	EE	(Majandus- ja Kommunikatsiooniministeerium 2019)
Finland	FI	(Ministry of Economic Affairs and Employment 2019)
France	FR	(French Republic 2020)
Germany	DE	(Federal Ministry of Economic Affairs and Climate Action 2020)
Greece	GR	(Ministry of the Environment and Energy 2019)
Hungary	HU	(Ministry of Innovation and Technology 2020)
Ireland	IE	(Department of Communications, Climate Action & Environment 2020)
Italy	IT	(Ministry of Economic Development, Ministry of the Environment and Protection of Natural Resources and the Sea, and Ministry of Infrastructure and Transport 2019)
Latvia	LV	(Cabinet of Ministers 2020)
Lithuania	LT	(Republic of Lithuania 2019)
Luxembourg	LU	(Ministere de l'Energie et de l'Amenagement du territoire and Ministere de l'Environment, du Climat et du Developpement durable 2018)
Malta	MT	(Republic of Malta 2019)
Netherlands	NL	(Ministry of Economic Affairs and Climate Policy 2019)
Poland	PL	(Ministry of National Assets 2019c; 2019a; 2019b)
Portugal	PT	(Portuguese Republic 2019)
Romania	RO	(Romania 2020)
Slovakia	SK	(Slovak Ministry of Economy 2019)
Slovenia	SI	(Republic of Slovenia 2020)
Spain	ES	(Kingdom of Spain 2020)
Sweden	SE	(The Ministry of Infrastructure 2020)

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