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The EU's Energy Policy and its economic impact on member states

A Comparative Analysis of Nordic and Southern European Countries

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Abstract

This thesis examines how EU energy policies around 2020 shaped economic and structural outcomes in Denmark, Netherlands, Italy, and Greece. Using a comparative multi-case study design, it analyses how governance capacity, institutional efficiency, and energy dependency influence national adaptation to EU directives. The results show that strong institutions and diversified energy systems enhance compliance, competitiveness, and resilience, while high energy dependency and weak governance hinder effective implementation. The study contributes to understanding how European integration affects national energy transitions and highlights the importance of institutional capacity for achieving sustainable and equitable policy outcomes.

Diese Masterarbeit untersucht, wie die Energiepolitik der Europäischen Union um 2020 wirtschaftliche und strukturelle Entwicklungen in Dänemark, Niederlande, Italien und Griechenland beeinflusst hat. Mittels eines vergleichenden Mehrfallstudiendesigns werden Regierungs- und Institutionseffizienz sowie Energieabhängigkeit analysiert. Die Ergebnisse zeigen, dass leistungsfähige Institutionen und diversifizierte Energiesysteme die Umsetzung, Wettbewerbsfähigkeit und Resilienz stärken, während hohe Energieabhängigkeit und schwache Steuerungsmechanismen die Umsetzung hemmen. Die Arbeit trägt zum Verständnis bei, wie europäische Integration nationale Energiewenden prägt, und unterstreicht die Bedeutung institutioneller Kapazitäten für nachhaltige Politikgestaltung.

“Europe will not be made all at once, or according to a single plan. It will be built through concrete achievements which first create a de facto solidarity.”

Schuman Declaration, May 1950

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List of Abbreviations

CBAM	Carbon Border Adjustment Mechanism
DEA	Danish Energy Agency
EU ETS	European Union Emissions Trading System
EC	European Commission
Fit for 55	EC's Legislative Package to Reduce Emissions by 55% by 2030
GDP	Gross Domestic Product
IEA	International Energy Agency
NECPs	National Energy and Climate Plans
OECD	Organisation for Economic Co-operation and Development
RED II	Renewable Energy Directive (Recast, 2018/2001/EU)
RED	Renewable Energy Directive
RED I	Directive 2009/28/EC Erste Version (2009)
RED II	Directive (EU) 2018/2001
RED III	Amendment durch Directive (EU) 2023/2413
REPowerEU	European Commission's Strategy to Reduce Energy Dependence on Russia
RES	Renewable Energy Sources
TEN-E	Trans-European Networks for Energy
TFEU	Treaty on the Functioning of the European Union

1. Introduction

1.1. Background and Significance

The European Union's (EU) energy policy has taken on renewed strategic weight with the launch of the European Green Deal (EGD), which the European Commission presents as a long-term growth strategy to turn the Union "into a modern, resource-efficient, and competitive economy" (European Commission, 2019). Alongside the Fit for 55 package, the EGD forms the backbone of the EU's path toward climate neutrality by 2050 and is already reshaping the economic and industrial balance within its member states. As Dupont and Oberthür (2020) point out, the implementation of these initiatives brings both opportunities and tensions, with results that differ sharply depending on national capacity, governance quality, and the degree of integration into the European energy market.

As illustrated in Figure 1, EU greenhouse gas emissions have followed a generally downward trajectory over the past decade, shaped by long-term policy efforts and short-term disruptions such as the COVID-19 pandemic.

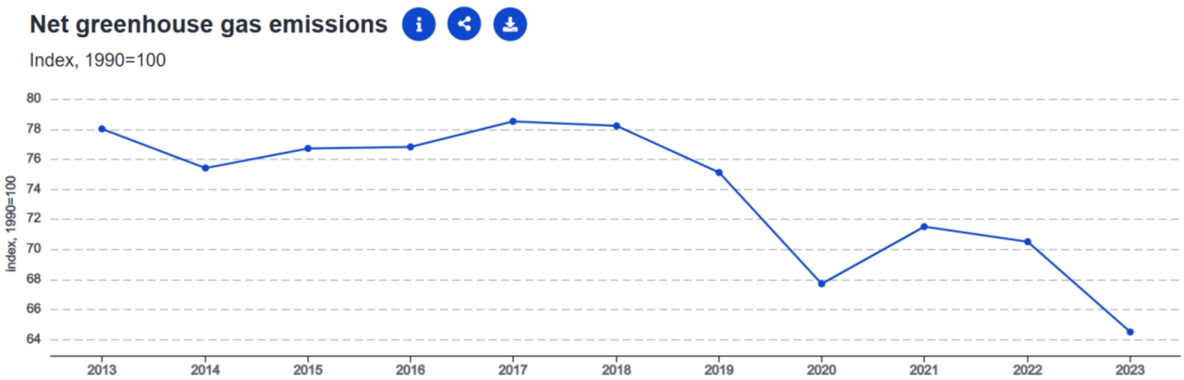

Figure 1: Net greenhouse gas emissions in the EU (Eurostat, 2023).

Launched in 2019, the Green Deal set ambitious targets, most notably a reduction of greenhouse gas emissions by at least 55 percent by 2030 and a substantial increase in the share of renewable energy (European Commission, 2019). These goals carry significant economic implications for the Union, whose member states differ widely in energy production capacity, import dependence, and industrial structure. In the North, Denmark and the Netherlands illustrate how strong institutional capacity and early investment in energy innovation can translate into economic advantage. Denmark, long regarded as a pioneer of wind energy, has built a globally competitive sector led by companies such as Vestas and Ørsted (IEA, 2019; Krohn et al., 2009:99). The Netherlands, has drawn on its substantial natural gas reserves while gradually expanding its renewable base (IEA, 2021). Both countries have integrated renewable energy into their economies in ways that strengthen energy security and cushion them against volatility in global energy markets.

In contrast, energy-importing countries such as Italy and Greece confront substantial obstacles stemming from their continued reliance on fossil fuel imports. As the International Energy Agency (IEA, 2022) notes, this dependence leaves them particularly exposed to external price shocks and heightens the difficulty of achieving a low-carbon transition, which demands far-reaching structural adjustments in both industry and infrastructure. Their vulnerability to global energy market fluctuations underscores how unevenly EU energy policies affect member states, pointing to the need for policy approaches that account for such economic and institutional asymmetries.

The timeliness of this study is reinforced by the ongoing transformation of energy markets, shaped both by the EU's climate ambitions and the global momentum toward renewable energy. As the European Parliament (2021) observes, the energy transition represents not only an environmental imperative but also an economic reconfiguration, influencing sectors such as industry, transport, and labour across Europe. The COVID-19 pandemic has added a further layer of complexity: it has accelerated certain aspects of decarbonisation while simultaneously exposing structural weaknesses in supply chains and the broader framework of energy security.

Against this backdrop, the study examines how EU energy policies shape economic outcomes across member states with differing levels of development, energy dependence, and market integration. By tracing these variations, it seeks to clarify the extent to which common policy frameworks support competitiveness and resilience – or, conversely, amplify existing disparities within the Union. Earlier research has shown that the implementation of EU energy policy entails both opportunities and constraints, as its effects are filtered through national institutional capacities, market structures, and resource dependencies (Dupont & Oberthür, 2012:229). Building on these insights, the analysis aims to identify the economic adjustments required in diverse national contexts and to suggest how EU policy design might be refined to promote a more balanced and effective transition across member states.

1.2. Economic Divergences in the EU Energy Transition

Although EU energy policy has been widely examined, there remains a notable gap in understanding how its economic impacts differ between energy-producing and energy-importing member states. Helm (2017) and Dupont and Oberthür (2012) highlight the Union's progress in integrating climate and energy objectives, yet Dupont and Oberthür also caution that "the level of climate policy integration remains insufficient to reach long-term climate policy objectives" (p. 229). Tagliapietra and Zachmann (2020) further stress that the benefits and burdens of the energy transition are distributed unevenly across member states, raising questions of equity and sustainability. These disparities call for closer examination of how national institutional capacity, resource endowments, and economic structures mediate the translation of EU energy policy into tangible economic outcomes.

This study addresses that gap by examining the economic effects of EU energy policies formulated around 2020, with particular attention to the European Green Deal and the early stages of the REPowerEU initiative. Using a comparative case study approach, it explores how energy-producing states such as Denmark and the Netherlands have been able to capitalise on their structural advantages, whereas energy-importing countries like Italy and Greece continue to face economic adjustment pressures and persistent energy-security challenges. In doing so, the analysis contributes to broader debates on energy justice and policy effectiveness, offering insights and practical recommendations for enhancing both the equity and the efficiency of EU energy governance.

1.3. Brief Summary of Existing Literature

The body of literature on EU energy policy and its economic implications is extensive, encompassing themes of market integration, sustainability, and national economic adjustment. Central to this scholarship is the European Green Deal, conceived as a framework for reducing greenhouse gas emissions and accelerating the adoption of renewable energy across the continent. Oberthür and Dupont (2021) highlight its far-reaching consequences for climate and energy governance, while Froggatt et al. (2021) draw attention to its potential to reshape the Union's energy landscape and to reveal persistent regional disparities. Taken together, these analyses underscore the Green Deal's dual nature – as both an ambitious integration project and a test of the EU's capacity to achieve equitable outcomes among its member states.

Scholars have documented extensively how EU policy has driven both market integration and decarbonisation across the continent. Helm (2014) analyses the development of the single energy market, showing how greater cross-border competition has strengthened supply security while also exposing persistent inefficiencies in market design. Likewise, Boersma and Jordaan (2017) emphasise the Union's leading role in advancing renewable technologies and asserting global climate leadership – achievements that nevertheless coexist with enduring concerns over energy security and policy coherence.

At the same time, the literature highlights that the economic consequences of EU energy policy are distributed unevenly across member states. The JRC and Ecologic Institute (2021) find that while renewable energy deployment generates substantial economic benefits in many regions, areas with economies still anchored in fossil fuel industries experience weaker growth and greater adjustment pressures. Similarly, Tagliapietra (2019) and Bommel (2021) note that countries such as Denmark have reaped considerable gains from the Union's renewable agenda – emerging as leaders in green technology and innovation – whereas others continue to face structural challenges and eroding competitiveness.

Jacobsson and Lauber (2006) argue that Germany's early commitment to renewable energy fostered not only technological leadership but also sustained economic growth, a dynamic further reinforced by Altenburg and Pegels (2012), who emphasise the emergence of new industries and employment opportunities within the green sector. By contrast, Szulecki (2017) observes that countries such as Poland and Bulgaria have faced significant hurdles in managing the economic transition, particularly in restructuring coal-dependent industries - challenges that have often translated into social disruption and regional economic decline.

Despite this extensive body of scholarship, an important gap remains in understanding the comparative economic effects of EU energy policies on member states that differ in energy dependency and levels of economic development. While the European Green Deal and its related frameworks are widely portrayed as beneficial for the Union as a whole, growing evidence suggests that the transition's economic trajectory is far from uniform. Tagliapietra and Zachmann (2020) again emphasise that the costs and benefits of the energy transition are unevenly distributed, potentially deepening existing economic asymmetries among member states. Similarly, Siddi (2020) presents the European Green Deal as a comprehensive roadmap for EU climate policy yet offers little assessment of its adequacy in addressing the structural constraints faced by lower-income or fossil-dependent economies.

Ongoing debates continue to question the equity and effectiveness of the EU's energy policy framework. Eikeland (2019) raises doubts about whether existing mechanisms are sufficient to guarantee a just transition, particularly for countries with less developed energy infrastructures. The broader literature similarly points to the need for more differentiated approaches that reflect the distinct economic circumstances of member states.

Responding to this gap, the present study analyses a selection of EU member states to examine how variations in economic development, energy dependency, and market integration influence the economic outcomes of EU energy policy. Building on the foundational work of scholars such as Froggatt, Quiggin, and Tagliapietra, it aims to contribute new insights into the economic asymmetries that emerge from the Union's energy transition and to identify policy adjustments capable of promoting a more equitable distribution of benefits across Europe.

1.4. Research Problem and Objectives

Building on the preceding review, this study seeks to examine the comparative economic impacts of EU energy policies on member states with contrasting energy profiles in the years surrounding 2020. The analysis focuses on two energy-producing countries – Denmark and the Netherlands – and two energy-importing countries – Italy and Greece – allowing for a structured comparison of how differing resource endowments and market positions shape economic outcomes. In addition, the research considers how these dynamics have evolved across major periods of disruption, including the 2008 financial crisis, the COVID-19 pandemic, and the geopolitical shocks following the war in Ukraine.

To fulfil these aims, the study pursues three core objectives. First, it evaluates how EU energy policy has shaped energy security in Denmark, the Netherlands, Italy, and Greece, with particular attention to the diversification of energy sources, the degree of import dependence, and the integration of renewables into national energy systems. Second, it analyses how these policies have influenced trade balances by tracing shifts in energy production and consumption patterns and their subsequent effects on import and export dynamics. Third, it investigates the impact of EU measures on the industrial competitiveness of energy-intensive sectors, focusing on how energy costs, carbon-pricing mechanisms, and regulatory frameworks have reshaped industrial performance.

Further objectives include examining the structural economic adjustments required in the selected countries to align with EU energy policy. This entails analysing investment patterns in renewable energy, improvements in energy efficiency, and the gradual transition away from fossil fuels. The study also seeks to identify the key economic determinants behind the varying effects of EU policy across member states, with particular emphasis on how differences in economic structure, development level, and energy dependency shape these outcomes. In addition, it aims to provide practical insights into the challenges and opportunities arising from the implementation of EU energy directives within diverse economic contexts.

1.5. Research Question and Hypothesis

The research questions and hypotheses developed in this section address key gaps in understanding the varied economic consequences of EU energy policy. Together, they aim to produce a nuanced account of how structural, infrastructural, and policy factors interact to shape national economic outcomes within the Union.

Research Question 1:

How have EU energy policies around the year 2020 influenced the economic outcomes of energy-producing and energy-importing member states, particularly with regard to energy-dependency reduction, industrial competitiveness, renewable-technology integration, and governance efficiency?

Sub-question 1.1: What specific economic benefits and challenges have energy-producing countries such as Denmark and the Netherlands experienced as a result of EU energy policy?

Hypothesis 1: EU energy policies introduced at the turn of the decade have generated overall positive economic effects for energy-producing states such as Denmark and the Netherlands. By leveraging advanced renewable-energy infrastructures, these countries have strengthened energy security, improved industrial competitiveness, and achieved more favourable trade balances.

Research Question 2:

How does the degree of national autonomy afforded under Article 194 of the Lisbon Treaty influence member states' economic outcomes under EU energy policy, particularly regarding their capacity to undertake structural change, attract infrastructure investment, and adapt to sector-specific challenges?

Sub-question 2.1: How do differing levels of reliance on fossil fuels versus renewable energy affect the economic stability and trade balances of EU member states operating under the current policy framework?

Hypothesis 2: Variations in energy dependency, institutional capacity, and economic structure significantly condition the impact of EU energy policy around 2020. Member states with higher fossil-fuel reliance and more limited fiscal flexibility face greater adjustment costs, a problem compounded by the constraints of centralised governance.

1.6. Goal and Structure

This study examines the economic effects of the European Union's energy policy on its member states, with a particular focus on the contrast between energy producers and importers. While the policy's objectives – market integration, energy security, and green transformation – are shared across the Union, their outcomes have differed markedly. These variations reflect each country's specific level of energy dependence, economic structure, and degree of integration into the EU energy market. The thesis explores how these differing energy profiles shape key economic factors such as energy security, trade balances, industrial competitiveness, and the structural adjustments required under the EU policy framework. By concentrating on these dimensions, it seeks to uncover how EU energy policies influence national economies in distinct ways and to offer insights into how policy design might be refined to ensure more equitable and effective outcomes across the Union.

1.7. Method

This research adopts a qualitative, multi-case study design guided by the methodological principles of Ghauri and Firth (2009), who emphasise the importance of context-rich inquiry and purposeful case selection in analysing complex policy processes. The study focuses on four EU member states selected to enable theoretical replication across contrasting economic and geopolitical contexts. Building on Ghauri and Firth's framework of analytical generalisation and structured comparison, the analysis combines detailed case studies with targeted policy analysis to examine national implementation of EU energy directives.

Relevant academic and policy literature was identified using databases such as u:search, ResearchGate and the EU's document repository. The search strategy employed thematic keywords including EU Energy Policy, Energy Governance, Energy Transition, Energy Security, Institutional Capacity, Economic Competitiveness, Energy Dependency, Intergovernmentalism, or European Integration. This approach aimed to capture the evolution of EU energy governance and the economic implications of major initiatives. Throughout the research and writing process, a range of digital and AI-assisted tools were used to support information retrieval, text organisation, and linguistic precision. These tools included online databases, search engines, and language-support applications. All analytical reasoning, interpretation of sources, and formulation of arguments were carried out independently by the author, in line with the University of Vienna's principles of academic integrity and transparency. Full methodological procedures and data specifications are presented in Chapter 3.

2. EU Energy Policy

The European Union's energy policy lies at the intersection of economic, environmental, and geopolitical priorities. Understanding its evolution and impact requires a theoretical framework that captures the dynamic balance between supranational coordination and national sovereignty. This chapter therefore adopts intergovernmentalism as its primary analytical lens, complemented by insights from institutional capacity theory and Europeanisation to explain the persistent variation in policy implementation and economic outcomes among member states.

EU energy governance operates under shared competence, requiring negotiated cooperation between the Union and its member states. This arrangement must reconcile ambitious EU-level objectives – such as decarbonisation and market integration – with diverse national interests, given that energy policy touches simultaneously on strategic, economic, and climate-related concerns. As Eikeland (2011) shows, EU energy governance operates as a negotiated system where supranational initiatives hinge on member-state consent and administrative capacity. Scholars describe the EU more broadly as a negotiated order (Elgström & Smith, 2000). In a similar vein, Bocquillon (2020) terms EU energy policy embedded intergovernmentalism, where national governments continue to protect core prerogatives even while participating in EU-level coordination and rulemaking.

2.1. The Role of Intergovernmentalism in EU Energy Policy

Intergovernmentalism offers a critical framework for analysing the dynamics of EU energy governance. Unlike supranationalist perspectives, which emphasise the central authority of EU institutions, intergovernmentalism underscores the continuing dominance of national governments in shaping collective policy outcomes. It posits that EU decisions arise primarily from bargaining among sovereign states, each pursuing domestic priorities while negotiating shared objectives at the European level. This perspective has proven especially relevant in the energy domain, where economic diversity, geopolitical exposure, and variations in resource endowments produce distinct national interests and strategic preferences (Keohane, 1984; Cameron, 2007; Buchan, 2009).

David Buchan's (2009) seminal analysis highlights that EU energy policy has evolved through an intergovernmental framework in which member states retain substantial authority over key decisions, including the composition of their energy mix and the security of supply. He argues that the energy domain epitomises the EU's broader attempt to balance integration with flexibility – enabling cooperation on common goals while preserving national sovereignty in strategic areas. This balance is codified in Article 194 of the Treaty on the Functioning of the European Union (TFEU), which empowers the Union to promote energy efficiency, renewable development, and market integration, yet explicitly safeguards each member state's right to determine its own energy sources and structure.

As Buchan (2015) observes, intergovernmentalism represents both a strength and a constraint within EU energy policy. On the one hand, it enables member states to pursue energy strategies tailored to their national priorities and resource endowments. On the other, it complicates the achievement of coherent and uniform implementation, particularly in policy areas such as decarbonisation and energy market liberalisation. These tensions became increasingly evident during the energy crisis following Russia's invasion of Ukraine in 2022, which laid bare the Union's dependence on external fossil fuel imports. The REPowerEU initiative, launched in response, exemplifies this enduring dilemma – seeking to reconcile the preservation of national sovereignty with the urgent need for collective action to diversify supply routes and accelerate the expansion of renewable energy across the EU (European Commission, 2022; Tagliapietra, 2022).

For instance, Denmark and the Netherlands have exercised their policy autonomy to integrate EU energy directives into pre-existing national frameworks for renewable development, achieving notable leadership in wind and bioenergy. In contrast, coal-dependent member states such as Poland and Greece have been more reluctant to adopt stringent decarbonisation measures, often invoking economic vulnerability and energy security concerns to justify a more gradual transition (Dupont & Oberthür, 2012).

The intergovernmentalist ethos of EU energy policy extends well beyond formal treaty provisions. As highlighted in the European Commission's Energy Union Review (2021), the uneven implementation of EU energy directives reflects the inherently negotiated nature of policy coordination within the Union. Although member states broadly endorse collective objectives such as sustainability, decarbonisation, and market integration, the diversity of governance models and institutional capacities continues to hinder the harmonisation of national strategies.

2.1.1. Institutional Capacity: Enabling Policy Implementation

The effectiveness of EU energy policy implementation depends heavily on the institutional capacity of member states – understood as the administrative, technical, and financial resources available for transposing and enforcing EU directives. Such capacity is particularly critical in policy areas like energy, which demand extensive coordination, sectoral expertise, and long-term investment (Treib, 2014; Börzel, 2003).

Drawing on North's (1990) institutional theory, effective implementation rests on the stability of formal rules, stakeholder engagement, and efficient administrative processes. In the EU context, Börzel and Risse (2019) and subsequent work by Börzel (2021) emphasise that institutional capacity – the financial, technical, and human resources available for implementation – determines how far member states can internalise and operationalise EU energy objectives.

Countries with robust governance systems tend to exhibit high compliance and adaptive capacity. Denmark, for instance, has achieved several of its renewable energy targets ahead of schedule through a decentralised governance model supported by well-funded regulatory agencies and strong inter-agency coordination (Nordic Council of Ministers, 2021, pp. 56 - 65).

By contrast, many Southern and Eastern member states face persistent barriers stemming from fragmented administrative structures, limited technical expertise, and fiscal constraints, which collectively slow the transposition of directives and impede the broader energy transition (Lenschow, 2002; Zhelyazkova et al., 2017).

Buchan (2009) underscores the pivotal role of institutional capacity in bridging the gap between EU ambition and national implementation. While EU energy policies establish an overarching framework for ambitious climate and market objectives, their success ultimately depends on the ability of member states to embed these directives within domestic institutional structures. Instruments such as the Just Transition Fund and the Recovery and Resilience Facility are designed to strengthen institutional capacity in regions lagging behind the transition, yet their effectiveness hinges on addressing deeper governance deficiencies. As Sedelmeier (2020) notes, reinforcing institutional frameworks in weaker administrative contexts is essential to achieving equitable outcomes across the Union.

The energy crisis following Russia's invasion of Ukraine has further amplified this need for targeted institutional support, particularly among member states heavily dependent on Russian gas imports. The REPowerEU plan responds to this challenge by allocating financial resources to accelerate renewable-energy infrastructure and improve energy system resilience in these regions, thereby reducing both economic and geopolitical vulnerabilities (European Commission, 2022; IEA, 2022).

2.1.2. Europeanisation in an Intergovernmentalistic Context

While intergovernmentalism highlights the primacy of member states in shaping EU policymaking, the concept of Europeanisation provides a complementary lens by examining how EU norms, rules, and policy objectives are internalised at the national level. Radaelli (2003) defines Europeanisation as the process through which EU directives and practices transform domestic political, administrative, and legal frameworks. This dynamic is particularly evident in the field of energy policy, where supranational goals such as decarbonisation, energy efficiency, and market integration require close alignment with national institutions and regulatory systems.

The degree of Europeanisation varies considerably across member states, reflecting differences in institutional capacity, administrative coherence, and governance traditions. Börzel and Risse (2012) argue that states with cohesive institutional frameworks and proactive engagement with EU institutions tend to integrate EU policies more effectively. The Netherlands, for instance, has closely aligned its national energy and climate goals with EU directives, enabling the smooth adoption of measures on energy efficiency and decarbonisation. By contrast, countries exhibiting significant institutional misfit often struggle to adapt EU requirements to domestic administrative and political realities. These divergences underscore the negotiated and uneven character of Europeanisation within an intergovernmental governance structure (Knill & Lenschow, 1998).

2.1.3. Intergovernmentalism and Compliance Challenges

The intergovernmentalist structure of EU energy governance not only preserves significant national autonomy but also exposes persistent challenges in ensuring consistent compliance with EU directives. Treib (2014) notes that the decentralised nature of policy implementation frequently produces uneven enforcement, shaped by variations in administrative capacity, political commitment, and socio-economic conditions across member states.

The 2022 energy crisis brought these disparities into sharp relief. States with strong institutional frameworks adapted swiftly to supply disruptions and accelerated renewable energy deployment. In contrast, some Southern member states, faced delays in implementing the measures outlined in the REPowerEU strategy, constrained by governance inefficiencies and fiscal limitations (Tagliapietra et al, 2022; European Commission, 2022).

This divergence is reflected more broadly in what Treib (2014) terms the implementation gap, the persistent distance between EU objectives and national outcomes. Countries like Denmark and the Netherlands consistently meet or exceed EU renewable energy targets due to well-coordinated governance systems, while Southern and Eastern states often struggle with fragmented administrative structures and limited technical capacity. Moreover, the principle of subsidiarity, intended to safeguard national sovereignty, can unintentionally widen these disparities by granting member states broad discretion over how to comply with EU directives. Consequently, collective EU ambitions remain shaped by the diversity of national political and administrative contexts, underscoring the negotiated character of cooperation within the intergovernmental framework.

Buchan's (2015) analysis adds nuance to the preceding discussion by highlighting the interaction between intergovernmentalism and Europeanisation in shaping the development of EU energy policy. He argues that while EU directives establish a framework for collective coordination, their implementation is continually mediated by domestic political dynamics, institutional capacity, and resource constraints. The REPowerEU plan exemplifies this tension: on one hand, it reflects the Europeanisation of national agendas by pushing member states toward more ambitious renewable energy commitments; on the other, its ultimate success depends on reconciling these EU-level objectives with diverse national interests and administrative realities.

2.2. Evolution of EU Energy Policy

The evolution of the European Union's energy policy has been a dynamic process shaped by economic, geopolitical, and environmental forces. From its post-war origins in resource cooperation to its present-day focus on sustainability and energy security, the EU's energy strategy illustrates the Union's capacity to adapt to shifting priorities and external pressures.

The roots of European energy governance lie in the post-war drive for peace and integration. The establishment of the European Coal and Steel Community (ECSC) in 1951 represented an early attempt to pool critical resources under supranational control, fostering economic recovery and reducing the potential for conflict among member states (Cini & Borragán, 2019). This was followed by the Euratom Treaty of 1957, which promoted cooperation in the development of nuclear energy for peaceful purposes – an early expression of the belief that shared management of strategic resources could underpin stability and prosperity (European Union, 2022).

The oil crises of the 1970s marked a decisive turning point, exposing the Community's dependence on imported fossil fuels and revealing the fragility of its energy security (Andersen et al., 2016). In response, the European Community began to pursue diversification of supply, greater energy efficiency, and reduced vulnerability to external shocks. At the same time, rising environmental awareness during this period laid the foundation for the later integration of climate objectives into energy policy (Lenschow, 2002).

The Single European Act (1986) reinvigorated the push for market integration by removing barriers to energy trade within the internal market. It signalled a shift toward liberalisation while acknowledging the need for harmonised regulation across member states (Cameron, 2007). Yet energy policy largely remained a national prerogative until the Maastricht Treaty (1992) recognised energy as an area of shared interest – though without conferring explicit competences on the EU (European Union, 1992).

A significant milestone came with the Lisbon Treaty (2009), which introduced a dedicated chapter on energy policy. Article 194 of the Treaty on the Functioning of the European Union (TFEU) set out key objectives: ensuring market functionality, securing energy supply, promoting energy efficiency and renewables, and developing interconnected energy networks. This legal foundation enabled deeper policy coordination and stronger collective responses to emerging challenges (European Parliament, 2020). However, it also institutionalised an intergovernmental framework: as Moravcsik (1998) argues, intergovernmentalism ensures that decision-making remains firmly in the hands of national governments, allowing them to balance domestic priorities with collective EU goals.

Cameron (2007) notes that EU energy law has long incorporated safeguards for national sovereignty over the energy mix, ensuring that common initiatives do not infringe on states' strategic autonomy – a principle later codified in Article 194 of the Treaty on the Functioning of the European Union (TFEU). This balance is evident in the diverse approaches taken by member states: Denmark has leveraged its renewable potential to surpass EU targets, while Poland has resisted stringent decarbonisation commitments due to its coal dependency. While this flexibility allows states to tailor strategies to their national contexts, it also complicates policy coherence. As Treib (2014) observes, the autonomy afforded to member states can result in uneven implementation, undermining the consistency and effectiveness of EU energy initiatives.

The principle of subsidiarity, embedded in Article 194, further complicates compliance. Knill and Lenschow (1998) argue that high levels of institutional misfit between EU policy frameworks and domestic governance structures often necessitate substantial adaptation, causing delays and partial implementation.

By the late 2000s, climate change had become the dominant driver of EU energy policy. The 20-20-20 targets, adopted in 2009, committed the EU to reducing greenhouse gas emissions by 20%, improving energy efficiency by 20%, and achieving a 20% share of renewables by 2020 (European Commission, 2010). These measures not only accelerated innovation in renewable technologies but also consolidated the EU's position as a leader in global climate governance (Dupont & Oberthür, 2012).

Building on this foundation, the European Green Deal (EGD) articulated even more ambitious objectives, including the pursuit of climate neutrality by 2050 (European Commission, 2019). This framework positioned renewable energy and decarbonisation at the heart of the EU's economic and environmental agenda. Yet disparities in institutional capacity and economic resources have produced highly uneven progress. Northern member states, equipped with established renewable sectors and stable governance, have advanced rapidly toward these goals (Nordic Council of Ministers, 2021), while Southern economies continue to face structural and fiscal constraints (Lenschow, 2002).

The Russian invasion of Ukraine in 2022 marked another critical inflection point. It forced the EU to reassess its energy security and its dependence on Russian gas, prompting renewed efforts to diversify supply and accelerate renewable deployment through the REPowerEU Plan. This crisis underscored the deep interconnection between energy, security, and geopolitics, while once again revealing the uneven resilience of member states.

Throughout its evolution, EU energy policy has reflected an ongoing attempt to balance market liberalisation, environmental sustainability, and energy security. The Union's multi-level governance framework has facilitated cooperation but has also exposed persistent regional disparities in policy implementation. As the EU advances its climate and energy objectives, the lessons of its historical trajectory remain vital for navigating emerging challenges. Yet these same policies have also revealed deep inequities in how member states experience and benefit from integration, highlighting the enduring tension between collective ambition and national diversity. The following sections explore these contemporary challenges, tracing how historical frameworks continue to shape the uneven impacts of EU energy policy across the Union.

2.3. Geopolitical Implications of EU Energy Policy

The European Union's energy policy carries significant geopolitical weight, shaped by the bloc's historical reliance on external energy supplies, its evolving role in global energy governance, and the shifting dynamics of the international energy landscape. As the EU deepens its commitment to sustainability and decarbonisation, the intersection between energy policy and geopolitics has become increasingly complex – revealing new dependencies, strategic vulnerabilities, and opportunities for global influence.

2.3.1 Energy Dependency and Supply Diversification

The European Union's dependence on external energy supplies has long represented a strategic vulnerability, with roughly 60 percent of total energy consumption met through imports (Eurostat, 2022). As shown in Figure 2, energy imports in the EU remain dominated by petroleum oils and natural gas, underscoring the Union's continuing reliance on external fossil fuel supplies. Prior to Russia's invasion of Ukraine, more than 40 percent of the EU's natural gas imports originated from Russia, an exposure that highlighted the geopolitical risks inherent in such concentrated supply relationships (IEA, 2022). The ensuing crisis has accelerated efforts to diversify energy sources, most notably through the REPowerEU plan, which prioritises renewable energy deployment, increased energy efficiency, and the development of alternative import routes (European Commission, 2022).

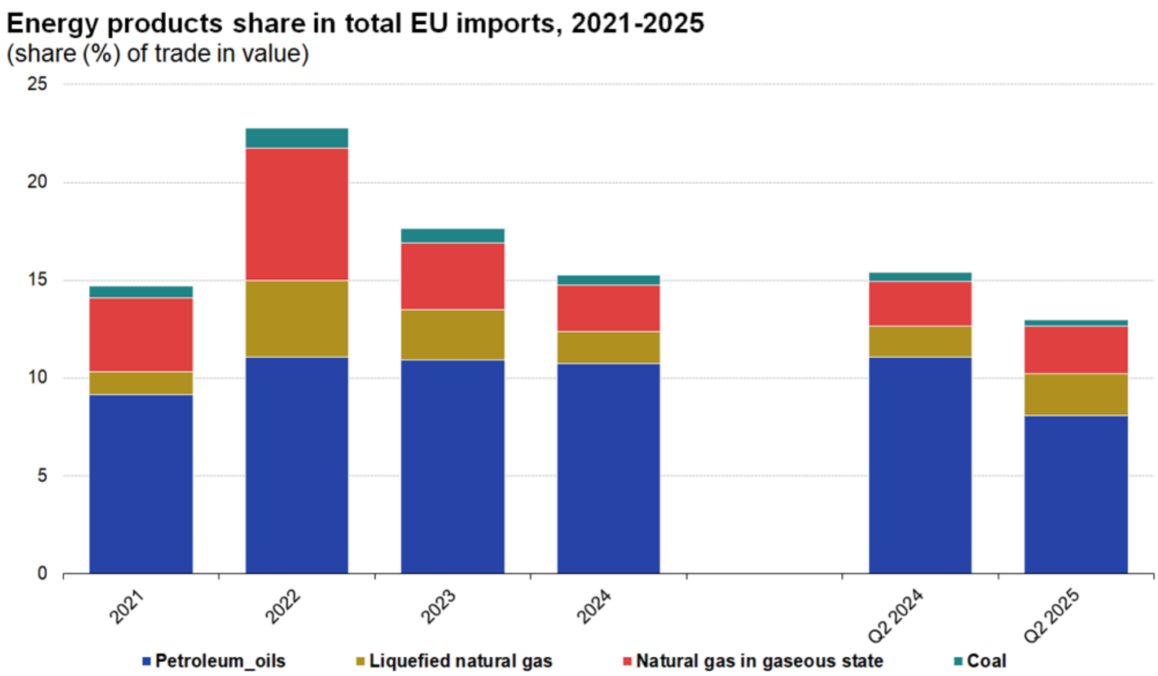

Figure 2: Energy products share in total EU imports, 2021-2025 (Eurostat 2025)

Yet reducing reliance on fossil fuels introduces new strategic dependencies. The transition toward renewable energy technologies heightens the EU's need for critical raw materials such as lithium, cobalt, and rare earth elements – resources that are predominantly extracted in politically sensitive regions, including China, the Democratic Republic of Congo, and South America (IEA, 2021). This emerging reliance on critical materials signals a shift rather than an elimination of vulnerability, redefining the geopolitical contours of the EU's energy transition.

2.3.2 The EU's Leadership in Global Energy Governance

As a leading advocate of climate action, the European Union has positioned itself as a global frontrunner in renewable energy deployment and decarbonisation strategies. Through the European Green Deal and related policy frameworks, the EU seeks to set international benchmarks for sustainability and energy efficiency, thereby shaping global norms of climate and energy governance (Dupont & Oberthür, 2012).

This leadership extends beyond domestic policy into trade and diplomacy. Environmental and renewable energy clauses are increasingly embedded in EU trade agreements, influencing partner countries' policy choices and reinforcing the Union's role as a normative power in global energy governance. Yet this influence is frequently constrained by the competing priorities of major economies such as the United States and China, as well as by resistance from fossil fuel–exporting states whose revenues depend on carbon-intensive industries (Siddi, 2020). Balancing these external pressures with ambitious internal climate objectives has thus become one of the EU's most delicate geopolitical challenges.

2.3.3. Intra-EU Disparities and Cross-Border Energy Cooperation

Regional disparities in energy resources, infrastructure, and investment capacity continue to shape the EU's internal energy landscape, complicating both policy implementation and geopolitical strategy. Northern member states have capitalised on their strong renewable energy bases – wind and bioenergy, respectively – to reduce fossil fuel dependence and meet EU climate objectives (European Commission, 2020). By contrast, Southern and Eastern member states, still face major challenges in the energy transition due to coal reliance, limited infrastructure, and fiscal constraints. These structural asymmetries contribute to what Tagliapietra and Zachmann (2020) describe as the implementation gap – the divergence between collective EU goals and national capacities to achieve them.

To address these imbalances, the EU has prioritised cross-border energy integration through the Trans-European Networks for Energy (TEN-E) initiative. Projects such as the North Sea Wind

Power Hub aim to enhance regional energy security, expand renewable capacity, and foster a more interconnected internal energy market. While these initiatives contribute to greater resilience and market efficiency, they also underscore the continuing need for equitable investment and resource allocation to ensure that all member states can participate meaningfully in, and benefit from, the ongoing energy transition (European Commission, 2021).

2.3.4. Critical Raw Materials and Supply Chain Challenges

The EU's renewable energy ambitions have redefined rather than eliminated geopolitical dependency, shifting it from fossil fuels to critical raw materials essential for technologies such as wind turbines, solar panels, and battery storage systems. China dominates the global supply chain for many of these inputs, accounting for more than 70 percent of rare-earth production and refining (IEA, 2021). This concentration of supply exposes the EU to potential disruptions and heightens strategic vulnerabilities.

To mitigate these risks, the EU has launched initiatives including the European Raw Materials Alliance and the Critical Raw Materials Action Plan. These strategies seek to diversify import sources, develop domestic production, and strengthen recycling and circular-economy practices (European Commission, 2020). However, implementing these measures demands careful management of environmental and social impacts associated with resource extraction and processing, illustrating the tension between sustainability ambitions and the material foundations of the energy transition.

2.3.5. Impacts on Energy Exporting Partners

The EU's shift away from fossil fuels carries profound implications for traditional energy-exporting partners. Russia, Norway, and the Gulf States, long dependent on European markets, face the need for structural economic adaptation as European demand for oil and gas declines. Norway has begun repositioning itself as a renewable-energy exporter, leveraging its offshore-wind potential, while others risk deeper fiscal pressures and slower diversification (Tagliapietra & Zachmann, 2020).

At the same time, the EU is pursuing new energy partnerships with neighbouring regions to secure diversified supplies and foster regional development. Projects such as the Southern Gas Corridor, which connects the Caspian region to European markets, exemplify the Union's effort to balance immediate energy-security concerns with longer-term decarbonisation goals (Siddi, 2020). These initiatives underscore the geopolitical complexity of the transition: as the EU reduces its carbon footprint, it must also renegotiate its economic and diplomatic relationships with key suppliers.

2.4. Policy Implementation and Compliance

The implementation and compliance of EU energy policy occur within the Union's multi-level governance system, characterised by decentralised enforcement and shared responsibility between EU institutions and member states. As Treib (2014) observes, this arrangement renders policy transposition both a technical and a political process, as directives must be translated into domestic law across highly diverse administrative systems. According to Falkner et al. (2005), the EU is only as strong as its weakest implementer, underscoring how the success of Union-wide policy depends on national administrative and political engagement.

The principle of subsidiarity, enshrined in Article 5 of the Treaty on European Union, allows member states a degree of discretion in adapting EU directives to domestic circumstances. While such flexibility enhances policy legitimacy and contextual relevance, it also contributes to uneven implementation across the Union. Member states with efficient bureaucracies and high administrative coherence tend to ensure timely transposition and enforcement, whereas those with more fragmented governance structures or limited institutional capacity frequently experience delays (Treib, 2014; Börzel, 2003).

Transposition, the initial stage of implementation, is particularly decisive yet often problematic. Studies highlight that administrative efficiency and the degree of institutional fit between EU directives and national frameworks are crucial determinants of compliance outcomes (Knill & Lenschow, 1998; Börzel, 2003). High levels of misfit, such as those observed in more centralised governance models like Greece, require substantial adaptation and often delay compliance. Conversely, Denmark's decentralised governance structure and strong inter-agency coordination enable more seamless alignment with EU directives (Treib, 2014).

At the supranational level, enforcement mechanisms, principally through the European Commission and the Court of Justice of the European Union (ECJ), are central to ensuring compliance. The Commission monitors transposition rates and can initiate infringement proceedings against lagging member states. However, as Tallberg (2002) notes, enforcement remains limited by "uneven monitoring capacities and political discretion," leading to persistent gaps between legal obligation and practical execution. ECJ rulings often provide interpretive clarity but, in states with constrained administrative capacity, can still result in delayed or partial implementation.

Financial and technical support mechanisms such as the Just Transition Mechanism and the Recovery and Resilience Facility have become essential tools for mitigating regional disparities. These instruments provide targeted assistance to member states facing socio-economic or infrastructural barriers, particularly in Southern and Eastern Europe, where institutional and fiscal constraints impede the energy transition (European Commission, 2021; Siddi, 2020). By linking funding to structural reforms, these mechanisms aim to strengthen national capacity and improve compliance with EU energy and climate objectives.

Political and societal dynamics also play a pivotal role in shaping implementation. Public opposition and government reluctance to liberalise domestic energy markets, especially under the Internal Energy Market (IEM) initiative, have slowed progress in several member states (Morata & Solorio, 2012). The tension between national sovereignty and supranational governance remains evident, as governments continue to guard control over energy resources and pricing, reflecting the enduring logic of intergovernmentalism within EU energy governance (Treib, 2014).

Despite these challenges, EU energy policy continues to evolve, with member states gradually adapting to its regulatory and institutional requirements. The interplay between supranational directives and domestic governance structures highlights the necessity of differentiated implementation strategies that account for national administrative, economic, and political conditions. As Börzel (2003) suggests, effective Europeanisation depends less on coercion and more on capacity and consensus. A more inclusive and flexible approach to policy implementation could therefore enhance compliance and support the EU's broader energy and climate ambitions.

2.5. Social Equity and Energy Justice

Social equity and energy justice have become central to the evolving discourse on the European Union's energy transition. As the EU pursues its ambitious decarbonisation goals under frameworks such as the EGD, ensuring that the benefits and burdens of the transition are distributed fairly across all regions and social groups represents one of its most pressing challenges. This section examines the three core dimensions of energy justice – distributive, procedural, and recognitional – while also considering the Union's global responsibilities and policy implications for promoting a just transition.

2.5.1. Distributive Justice: Fair Allocation of Benefits and Burdens

Distributive justice concerns the equitable allocation of energy resources, opportunities, and responsibilities across society. Within the EU, disparities in infrastructure, economic capacity, and energy dependency mean that the benefits and costs of energy policy are unevenly shared. Wealthier member states with advanced renewable sectors have captured both economic and environmental gains, while those with limited fiscal space or higher reliance on fossil fuels shoulder greater adjustment burdens (Tagliapietra & Zachmann, 2020; Bouzarovski et al., 2021).

Energy poverty is one of the clearest manifestations of distributive inequality. Defined as the inability to secure adequate energy services at an affordable cost, it affects roughly 35 million Europeans, disproportionately impacting low-income households, rural areas, and marginalised groups (European Commission, 2022). Bouzarovski and Simcock (2017) describe this condition as a structural injustice embedded within Europe's housing and energy systems, reflecting both material and systemic barriers to access. To mitigate these disparities, initiatives such as the Just Transition Fund and the Renovation Wave Strategy aim to channel investment toward energy efficiency improvements, low-carbon technologies, and social protection in vulnerable regions (European Commission, 2021).

2.5.2 Procedural Justice: Inclusive Governance and Decision-Making

Procedural justice emphasises fairness and inclusivity in energy governance – ensuring that diverse stakeholders have a genuine voice in decision-making processes. The EU's multi-level governance framework is designed to include actors ranging from local communities to transnational organisations (Hooghe & Marks, 2001). However, the degree of real participation varies widely across member states.

Community-led renewable energy cooperatives demonstrate how active citizen involvement can foster both legitimacy and social acceptance (Sovacool & Enevoldsen, 2015). Conversely, variations in institutional capacity and administrative coordination across member states can hinder consistent implementation of EU energy initiatives (Zhelyazkova et al., 2017).

To address these shortcomings, EU initiatives such as Citizens' Energy Communities, introduced under the Clean Energy for All Europeans package, seek to empower local actors to invest in and manage renewable energy projects. Yet as Jenkins et al. (2016) note, procedural equity must go beyond formal inclusion to ensure that marginalised voices are substantively heard. Barriers persist for rural populations, migrant groups, and lower-income households, which often lack the capacity or institutional access to participate meaningfully.

2.5.3 Recognitional Justice: Addressing Historical and Social Inequities

Recognitional justice entails acknowledging and addressing historical and structural inequities that shape the energy transition. Within the EU, this means recognising the differentiated vulnerabilities and capacities of regions and communities. Coal-dependent areas in Poland, Greece, and Bulgaria, for example, face acute socio-economic disruptions, including job losses and community displacement, as they move toward decarbonisation (Siddi, 2020)

The Just Transition Mechanism (JTM) seeks to operationalise recognitional justice by providing targeted financial and technical assistance to regions disproportionately affected by decarbonisation. However, Bouzarovski et al. (2021) caution that financial transfers alone cannot rectify deeper structural inequalities such as insufficient retraining programmes and weak social safety nets. Strengthening place-based strategies – including community-led retraining and region-specific industrial support – will be essential to ensuring that the principle of "leaving no one behind" becomes a lived reality rather than a policy slogan.

2.5.4. Energy Justice in the Global Context

The EU's commitment to energy justice also extends beyond its borders, reflecting the global interdependence of energy systems. Instruments such as the Carbon Border Adjustment Mechanism (CBAM) aim to prevent carbon leakage and incentivise cleaner production practices among trading partners. However, as Sovacool et al. (2017) warn, imposing stringent climate standards on less-developed economies risks reproducing global inequalities unless accompanied by capacity-building and equitable financing mechanisms.

Through initiatives like the Global Gateway and its participation in the Global Energy Alliance for People and Planet, the EU has sought to promote energy access and sustainable development in partner regions. Jenkins et al. (2016) argue that global energy justice requires not only clean energy for all but fair governance of the systems that deliver it. Expanding such partnerships could help bridge the energy access gap while ensuring that the EU's decarbonisation agenda does not come at the expense of developing nations' growth and stability.

2.5.5. Policy Implications for Social Equity and Energy Justice

Integrating energy justice into EU energy policy demands a comprehensive and multi-dimensional approach that embeds distributive, procedural, and recognitional principles into every stage of policymaking. Strengthening mechanisms such as the Just Transition Fund, promoting inclusive governance through participatory models, and providing targeted assistance for vulnerable regions are vital steps toward achieving a fair transition.

By explicitly linking social equity to the Union's broader objectives, sustainability, energy security, and market integration, the EU can position itself as a global leader in socially inclusive climate governance. As Jenkins et al. (2016) emphasise, justice in energy transitions is not peripheral but foundational to their legitimacy. Advancing this agenda will be essential not only to achieving the EU's decarbonisation goals but also to maintaining public trust, political cohesion, and solidarity across a diverse Union.

2.6. Intergovernmentalism in EU Energy Policy

The interplay between national sovereignty and supranational coordination remains at the heart of EU energy policy. As discussed earlier, guided by the principles of intergovernmentalism, the EU enables member states to retain substantial autonomy over their energy resources and national strategies while cooperating toward shared objectives such as sustainability, energy security, and market integration. This framework ensures that while the Union defines overarching goals, implementation is adapted to the political, economic, and infrastructural contexts of individual member states – striking a delicate balance between integration and flexibility.

The legal foundation of this balance lies in Article 194 of the Treaty on the Functioning of the European Union (TFEU), which provides the formal basis for EU energy policy. Article 194 authorises the Union to promote market functionality, energy efficiency, renewable energy, and supply security, while explicitly safeguarding each member state's right to determine its own energy mix, exploit national resources, and secure domestic supply. This duality encapsulates the essence of intergovernmentalism: national governments retain control over key decisions while pursuing collective aims through coordination at the EU level. The Energy Union Report (2022) underscores that such flexibility allows member states to tailor implementation to their national energy profiles, yet also leads to decentralised governance and uneven progress toward EU-wide goals (European Commission, 2022).

Intergovernmentalism has thus produced governance disparities among member states. Countries with advanced institutional frameworks – such as Denmark and the Netherlands – have aligned effectively with EU directives, leveraging strong governance systems and cohesive energy strategies to achieve high levels of renewable energy adoption. By contrast, Southern member states, including Italy and Greece, continue to face obstacles related to fragmented administrative structures and limited fiscal capacity, which delay implementation. The European Commission's Review of National Energy and Climate Plans (NECPs) notes that Nordic countries are able to capitalise on their institutional strengths, while Southern member states often encounter delays and inconsistencies in aligning their national strategies with EU goals (European Commission, 2021). These variations reveal the fundamental tension within intergovernmentalism: balancing collective ambition with national autonomy.

At the same time, intergovernmentalism can also enhance regional cooperation, particularly in areas that require coordinated investment. Initiatives such as the Trans-European Networks for Energy (TEN-E) facilitate cross-border infrastructure projects that strengthen the internal energy market. The North Sea Wind Power Hub, involving Denmark and neighbouring countries, exemplifies how intergovernmental collaboration can generate innovation and efficiency in renewable energy deployment. Nevertheless, the Energy Union Report (2022) observes that such projects face greater obstacles in less-developed regions, where administrative inefficiencies and funding shortages limit participation. Southern European states – more reliant on imported energy and less integrated into the Union's physical energy networks – struggle to access the full benefits of these initiatives, further widening the implementation gap.

A central challenge of intergovernmentalism, therefore, lies in balancing national autonomy with collective action. The REPowerEU Plan illustrates this tension by combining joint gas procurement and accelerated renewable deployment to strengthen supply security. While these measures promote solidarity, they also expose the limits of intergovernmental coordination: divergent national priorities can slow consensus-building and hinder implementation. The European Parliament's Energy Policy Review (2023) emphasises that advancing EU energy goals requires deepening multilateral cooperation while upholding national sovereignty. Strengthening negotiation mechanisms, expanding shared financing instruments, and incentivising cross-border collaboration remain crucial for aligning national interests with the Union's long-term energy and climate objectives.

2.6.1. Embedding Tenets into Treaty Provisions

Article 194 TFEU embeds the core principles of EU energy governance within a legal framework that balances collective ambition with national sovereignty. Two treaty-based doctrines are particularly relevant to this equilibrium: subsidiarity and proportionality.

The principle of subsidiarity ensures that action is taken at the EU level only when objectives cannot be effectively achieved by member states acting independently. Policies such as the Renewable Energy Directive operationalise this tenet by allowing governments to determine their own energy mix while still contributing to EU-wide targets. This approach upholds national discretion in politically sensitive domains such as energy security, echoing Moravcsik's (1993, 2018) argument that European integration advances most effectively when it reinforces – rather than replaces – domestic autonomy.

The principle of proportionality further refines this balance by requiring that EU measures do not exceed what is necessary to achieve shared objectives. The Energy Efficiency Directive, for instance, establishes Union-level goals but leaves the design of implementation mechanisms to member states, thereby ensuring that policies remain adaptable to national contexts. Together, subsidiarity and proportionality illustrate how the treaty architecture translates intergovernmentalist principles into concrete policy practice, combining EU-level coordination with national flexibility.

2.6.2. Balancing Flexibility and Uniformity

The EU's shared competence in energy policy enables the Union to set overarching goals while granting member states latitude in implementation. This arrangement allows national governments to align strategies with their institutional capacities, economic structures, and energy systems. States endowed with advanced governance frameworks and established renewable industries – such as Denmark and the Netherlands – can more readily meet ambitious decarbonisation objectives. Others, including Italy and Greece, face greater challenges due to fossil-fuel dependency, fiscal constraints, and weaker administrative coordination.

These divergences illustrate how structural and economic disparities shape the operation of shared competence within the Union (Tagliapietra & Zachmann, 2020). While flexibility enhances political feasibility and national ownership, it can also perpetuate uneven implementation and hinder collective progress toward EU-wide energy and climate goals. Striking a balance between adaptability and uniformity thus remains a defining challenge of intergovernmental governance in the European energy domain.

2.7. Economic Impact of EU Energy Policy

EU energy policy has generated profound economic transformations across the Union, reshaping sectors ranging from energy production to industrial manufacturing and transport.

The transition toward renewable energy has opened new avenues for growth and innovation while simultaneously exposing structural and regional disparities.

Renewable energy has become one of the most dynamic drivers of economic expansion within the EU. According to the European Commission (2022), the renewable energy sector employs over 1.3 million people, with wind and solar power accounting for the largest share of new jobs. These industries not only stimulate employment but also foster local development, technology transfer, and export competitiveness. Member states that have leveraged favourable resource endowments and strong institutional frameworks have positioned themselves as frontrunners in renewable energy production and green technology exports (Åhman & Nilsson, 2015).

However, the economic dividends of the energy transition remain unevenly distributed across the Union. States with weaker infrastructure, higher capital costs, or less diversified economies continue to face substantial barriers in moving away from fossil fuels (Andersen et al., 2016). The phasing out of coal, for example, has imposed disproportionate adjustment costs on regions heavily reliant on carbon-intensive industries, illustrating what Bouzarovski et al. (2021) describe as the uneven economic geography of decarbonisation. These disparities underscore how variations in industrial structure and fiscal capacity shape the distribution of benefits and burdens within the EU's evolving energy economy.

Market liberalisation – a cornerstone of EU energy policy since the Single European Act (1986) – has also produced far-reaching economic consequences. The creation of the Internal Energy Market (IEM) has, in many regions, contributed to lower energy prices and greater competitiveness through increased cross-border trade and efficiency (IEA, 2022). Yet liberalisation has also exposed smaller or less-integrated markets to new vulnerabilities, particularly during crises such as the 2022 energy price surge triggered by Russia's invasion of Ukraine. This episode highlighted the persistent tension between market openness and energy security, a defining feature of Europe's economic-energy nexus.

At the same time, innovation and investment in green technologies have become central to the EU's economic strategy. The European Green Deal (EGD) places strong emphasis on research and development in areas such as hydrogen energy, battery storage, and smart grids, promoting technological leadership and new industrial ecosystems (Dupont & Oberthür, 2012; European Commission, 2021). According to IRENA (2021), innovation in these fields could generate over 2 million additional jobs across Europe by 2030, provided that investment remains consistent and regionally inclusive. Achieving the Green Deal's ambitious targets, however, will require sustained financial commitment – particularly in structurally weaker regions – to close the gap between leading and lagging member states.

In sum, EU energy policy has yielded considerable economic benefits, driving employment, innovation, and competitiveness. Yet it has also exposed persistent structural weaknesses and regional divides. Building a just and sustainable energy economy will depend on targeted measures to reduce these disparities, ensuring that all member states and communities can participate fully in – and benefit equitably from – the European energy transition.

2.8. Governance Disparities and Institutional Capacity

As demonstrated throughout this chapter, the implementation of EU energy policy is profoundly influenced by the governance structures and institutional capacities of member states, which vary considerably across the Union. Differences in regulatory quality, administrative resources, and policy experience contribute to divergent levels of compliance and effectiveness (Knill & Tosun, 2015; Jordan & Adelle, 2013). These variations are particularly pronounced between energy-producing and energy-importing economies, where distinct resource endowments and governance traditions condition how EU directives are interpreted, transposed, and enforced (Tagliapietra & Zachmann, 2020; Biesenbender & Tosun, 2014).

This section examines the interplay between governance frameworks and institutional capacity, highlighting their decisive role in shaping the effectiveness of EU energy policy and influencing the trajectory of national energy transitions. Understanding these disparities provides crucial insight into why the same policy framework can yield markedly different outcomes across member states.

2.8.1. Governance Disparities and Their Impacts

Governance frameworks among EU member states vary substantially, reflecting differences in administrative organisation, decision-making processes, and stakeholder participation. Hooghe and Marks (2001) distinguish between Type I multi-level governance, characterised by hierarchical coordination and vertical integration, and Type II governance, marked by decentralisation and fragmented authority. These structural distinctions shape the coherence of policy implementation: states with cohesive institutional relationships tend to achieve smoother alignment with EU directives, whereas those with fragmented administrative systems often encounter coordination challenges and delays in compliance.

The principle of subsidiarity, embedded in EU treaties, grants member states discretion in transposing directives into national law. While this flexibility facilitates contextual adaptation, it can also exacerbate disparities. Knill and Lenschow (1998) conceptualise this tension as an institutional misfit, where incongruence between EU policy requirements and domestic governance traditions impedes effective implementation. Evidence from renewable energy policy illustrates that highly centralised systems often struggle to meet the decentralised governance demands of EU directives, whereas more adaptive institutional arrangements are better positioned to support proactive renewable deployment (Biesenbender & Tosun, 2014).

Addressing these disparities requires strategies that enhance both vertical and horizontal coordination, promote inclusive stakeholder engagement, and streamline administrative processes. As Jordan and Adelle (2013) argue, effective governance is not solely a matter of capacity but of coherence across levels of authority. Strengthening these linkages is essential to improving compliance and ensuring that all member states advance equitably toward the EU's energy and climate objectives.

2.8.2. Institutional Capacity and Administrative Efficiency

Institutional capacity is a central determinant of a member state's ability to implement and enforce EU energy policy effectively. Börzel and Risse (2000) emphasise that well-resourced and competent bureaucracies are more capable of managing the complex processes of policy transposition, compliance monitoring, and enforcement. Where administrative systems exhibit high technical expertise, clear divisions of responsibility, and strong institutional trust, compliance with EU directives tends to be both more efficient and more durable.

By contrast, states constrained by limited financial resources, overlapping administrative competences, or insufficient technical expertise often struggle with timely and accurate transposition of EU legislation (Zhelyazkova et al., 2016). These weaknesses are especially visible in policy domains that require specialised knowledge, such as renewable energy integration, grid modernisation, and emissions monitoring. Sedelmeier (2020) notes that weak institutional capacity not only delays the adoption of innovative energy solutions but also perpetuates dependency on outdated technologies, thereby heightening exposure to energy security risks.

Differences in institutional capacity are also reflected in the administration of EU financial and technical support instruments. Mechanisms such as the Cohesion Funds and the Just Transition Fund are designed to close developmental gaps between member states, yet their success largely depends on the administrative efficiency of national authorities in allocating and managing resources (Biesenbender & Tosun, 2014). Strengthening bureaucratic coordination, transparency, and absorptive capacity is therefore essential to ensure that EU financial assistance translates into tangible progress toward energy and climate goals.

2.8.3. Synergies Between Governance and Institutional Capacity

Governance structures and institutional capacity are mutually reinforcing elements that together determine the success of EU energy policy implementation. Effective governance provides the structural framework through which institutional capacity can operate, while robust administrative systems enhance the coherence, adaptability, and efficiency of governance processes. As Börzel and Risse (2012) observe, institutional efficiency amplifies the advantages of cohesive governance frameworks, transforming policy objectives into measurable outcomes.

Recognising these synergies underscores the need for integrated strategies that address both structural and resource-related dimensions of policy implementation. For energy-importing states and those characterised by fragmented governance, targeted investments in administrative capacity, combined with simplified regulatory procedures and improved inter-agency coordination, can significantly enhance compliance and accelerate the transition toward sustainable energy systems. Strengthening these links between governance and capacity not only reduces regional disparities but also reinforces the Union's collective ability to meet its energy and climate commitments.

2.9. Role of Technology in Policy Implementation

Technological innovation is a decisive factor in the implementation of EU energy policy, shaping both the pace and the effectiveness of the energy transition. By enabling large-scale renewable deployment, enhancing grid flexibility, and improving energy efficiency, technology provides the material foundation for achieving the Union's decarbonisation and sustainability goals (Sovacool et al., 2020; Kern & Rogge, 2016). The interaction between policy frameworks and technological development is therefore central: policy instruments create incentives for innovation and investment, while technological progress in turn opens new pathways for more ambitious climate and energy targets.

Wind energy illustrates how supportive governance and institutional capacity can translate technological potential into global leadership. Denmark's emergence as a hub of wind-energy innovation demonstrates the advantages of sustained R&D investment, robust public–private partnerships, and stable market instruments such as feed-in tariffs and power-purchase agreements (Åhman & Nilsson, 2015; Nordic Council of Ministers, 2021). This policy-technology nexus has fostered globally competitive firms – Vestas and Ørsted among them –

and positioned the country at the forefront of offshore-wind deployment. Comparable dynamics are evident in other member states with mature innovation ecosystems, where EU-level programmes such as Horizon 2020 and the Innovation Fund have reinforced national strategies (European Commission, 2021).

By contrast, the diffusion of solar photovoltaics (PV) in Southern Europe reveals both opportunities and structural barriers. Italy's Conto Energia scheme initially spurred rapid PV expansion, making Italy one of Europe's largest solar markets (IEA, 2020). Yet financial constraints, regulatory instability, and fragmented grid infrastructure curtailed sustained growth (Tagliapietra & Zachmann, 2020). In Greece, low R&D investment and outdated grid systems have similarly slowed the integration of distributed solar generation despite favourable climatic conditions (European Commission, 2021). These examples underline how institutional efficiency and infrastructural capacity determine the extent to which natural resource potential can be converted into technological deployment.

Differences in technological adoption across the Union thus stem less from geography than from the strength of national innovation systems. Member states with high institutional trust, stable regulatory frameworks, and well-funded research infrastructures are best positioned to harness EU funding and lead in emerging technologies such as offshore wind, hydrogen, and smart-grid solutions (Nordic Energy Research, 2021; Geels et al., 2017). Conversely, limited administrative capacity, investment gaps, and grid inefficiencies continue to constrain progress in other regions, even where renewable potential is significant.

Overcoming technological bottlenecks – particularly in grid modernisation and energy storage – remains a pressing challenge. The integration of decentralised energy systems requires widespread smart-grid deployment and major infrastructure upgrades. While EU mechanisms such as the Recovery and Resilience Facility are designed to accelerate these processes, their impact ultimately depends on national governance capacity to absorb funds and execute projects effectively (Sedelmeier, 2020; European Commission, 2021).

In sum, technology functions as both a driver and a test of EU energy policy implementation. Success stories such as wind energy highlight the value of aligning research, industrial policy, and EU-level support, whereas the uneven diffusion of solar power exposes persistent structural constraints. Addressing these disparities will require sustained investment, regulatory stability, and coordinated efforts to modernise Europe's energy infrastructure (Tagliapietra & Zachmann, 2020; Sovacool et al., 2020).

2.10. Setting the Stage for Case Study Analysis

This chapter has established the theoretical foundation for analysing the implementation and economic impacts of EU energy policy. By examining the interplay between intergovernmentalism, Europeanisation, and institutional capacity, it has identified the structural factors that underpin divergent policy outcomes across the Union. These insights form the analytical basis for the empirical chapters that follow, in which these frameworks are applied to the selected case studies of Denmark, the Netherlands, Italy, and Greece.

Given the complexity of EU energy governance, a context-sensitive and comparative approach is essential. Variations in governance arrangements, institutional capacity, and economic structure illustrate the need to move beyond generalisation and to examine policy implementation within specific national contexts. This calls for a methodological strategy capable of capturing both within-case dynamics and cross-case patterns.

A multiple case study design provides such a framework. As Ghauri and Firth (2009) argue, case studies are particularly suited to analysing complex social and institutional processes, allowing for in-depth contextual understanding while enabling meaningful comparison across cases. Their emphasis on balancing analytical depth with theoretical generalisation aligns closely with the objectives of this research. While Robert Yin's (2018) seminal contributions remain foundational to case study methodology, this thesis follows the pragmatic and comparative orientation articulated by Ghauri and Firth – particularly their focus on the interplay between context, process, and outcome.

The next chapter outlines the research design in detail. It presents the rationale for case selection, the analytical framework used for comparison, and the strategies employed to ensure validity and reliability. These methodological choices are directly informed by the theoretical perspectives developed in Chapter 2, ensuring a coherent transition from conceptual discussion to empirical investigation.

Drawing on the intergovernmentalist framework and its interaction with institutional capacity and Europeanisation, four analytical dimensions emerge as central to understanding the economic impact of EU energy policy: energy dependency, industrial competitiveness, renewable energy integration, and governance efficiency. These dimensions are not arbitrary; they derive from the policy asymmetries and institutional divergences identified throughout Sections 2.1 to 2.9.

- Energy dependency reflects the strategic vulnerabilities discussed in relation to supply diversification and geopolitical exposure (Section 2.3).
- Industrial competitiveness captures the economic consequences of policy implementation, particularly structural transformation and technology adoption (Sections 2.7 and 2.9).
- Renewable energy integration encompasses the technological and infrastructural dimensions of compliance, connecting innovation with resource availability.
- Governance efficiency relates directly to implementation capacity, administrative coherence, and the subsidiarity principle explored in Sections 2.4, 2.6, and 2.8.

Together, these four dimensions operationalise the key theoretical insights of this chapter, providing a structured comparative lens through which to evaluate national responses to the EU's energy transition agenda around 2020. They also establish the foundation for the empirical analysis that follows, linking theory to observation and ensuring analytical continuity across the remainder of this study.

3. The Case Study

3.1. Research Approach

Having established in Chapter 2 how intergovernmentalism, institutional capacity, and technological adaptation shape the governance and economic outcomes of EU energy policy, this chapter translates those conceptual insights into a comparative methodological framework. It outlines the research design and methodological approach used to assess the economic effects of EU energy policies around 2020 in Denmark, the Netherlands, Italy, and Greece. Although EU energy legislation applies uniformly across member states, national outcomes vary considerably due to differences in institutional capacity, sectoral structure, and energy systems. A comparative, interpretive case-study approach is therefore well suited to examining how these contextual factors shape economic impacts (Ghauri & Firth, 2009; Flyvbjerg, 2006).

Following Ghauri and Firth's interpretivist orientation, this study seeks contextual understanding and theory refinement through cross-case comparison, allowing causal mechanisms and patterns to emerge from the evidence rather than from fixed ex ante hypotheses. Yin's (2018) structured approach to case-study logic is acknowledged for its emphasis on systematic data collection and analytic rigor; however, the present study is anchored in Ghauri and Firth's more process-oriented and comparative framework.

The comparative dimensions – energy dependency, industrial competitiveness, governance efficiency, and renewable-energy integration – reflect the three-pillar logic of EU energy policy (sustainability, competitiveness, and security) identified by Schubert et al. (2016). They enable systematic exploration of how member states operationalise these objectives within their distinct economic and institutional contexts.

Case selection follows the principle of theoretical replication: the four cases were chosen because they are expected to differ systematically in governance capacity, industrial structure, energy dependency, and renewable-energy integration, thus providing instructive contrasts (George & Bennett, 2005; Ragin, 2014). Organising the analysis around shared analytical dimensions facilitates analytic rather than statistical generalisation, linking observed patterns to mid-range concepts and mechanisms (Gerring, 2007; Mahoney & Goertz, 2006; Hall, 1993).

This approach addresses the central research question:

How have EU energy policies around 2020 influenced the economic outcomes of energy-producing and energy-importing member states, particularly with regard to reductions in energy dependency, structural change and industrial competitiveness, renewable-technology integration, and governance efficiency?

The four countries were selected for their contrasting governance systems and economic profiles, ensuring that findings illuminate how a uniform EU policy framework produces diverse national outcomes (European Commission, 2022; Eurostat, 2023). The analytical dimensions: governance efficiency, structural economic change, industrial competitiveness, and renewable-energy integration – are grounded in established literature on EU energy governance and political economy (Börzel & Risse, 2012; Dupont & Oberthür, 2020; Hafner & Tagliapietra, 2020; Helm, 2014; Meadowcroft, 2005:28; Sovacool, 2016:203; Tagliapietra & Zachmann, 2020). Consistent with Ghauri and Firth (2009), the design privileges how- and why-type explanations, examining the interplay between governance capacity, institutional adaptation, and sectoral transformation (Geels, 2002; Jasanoff, 2018; Pierson, 2004; Scharpf, 1997). This orientation situates the research within broader debates on energy transitions and economic adjustment in Europe (Aklin, 2018; Haas, 2004; Unruh, 2000).

Case-Selection Criteria

To ensure meaningful comparison and theoretical replication, cases were selected according to four criteria derived from recent and authoritative datasets and assessments:

- Energy dependency: Denmark and the Netherlands exhibit relatively low import dependence and substantial domestic low-carbon resources, whereas Italy and Greece remain more reliant on imported fossil fuels (Eurostat, 2023).
- Governance efficiency: Northern European administrative systems display higher regulatory capacity and policy coordination, while Southern member states face coordination bottlenecks and slower transposition of EU directives (European Commission, 2022).
- Renewable-energy integration: Denmark leads in wind (particularly offshore) and the Netherlands in bioenergy; Italy and Greece have expanded solar capacity but continue to face grid and permitting challenges (IEA, 2021; REN21, 2022).
- Economic exposure to transition: The Netherlands' diversified industrial base has supported low-carbon upgrading, whereas Greece's reliance on fossil fuels heightens short-term adjustment pressures (OECD, 2020).

These contrasts provide informative variation for tracing how institutional capacity and structural conditions mediate the economic impacts of EU energy policy. The following sections detail the data-collection strategy, analytical procedures, and validity measures employed throughout the research process.

3.2. Why a Multi-Case Study Design: Advantages of the Approach

The comparative nature of this research requires a methodological framework capable of addressing both the complexity of EU energy governance and the diversity of national contexts. A multi-case study (MCS) design is particularly well suited to this purpose, as it enables systematic comparison across cases while preserving the contextual richness necessary for understanding national variation (Ghauri & Firth, 2009; Yin, 2018).

Following Ghauri and Firth's interpretive orientation, this study treats each case as a distinct analytical context in which institutional, economic, and political mechanisms interact. Cross-case comparison thus serves as an instrument for theoretical refinement rather than hypothesis testing. Within this interpretive logic, Yin's (2018) procedural principles – replication logic, structured data collection, and transparent documentation – are applied pragmatically to ensure methodological rigour and coherence.

Ghauri and Firth (2009) identify several complementary techniques for case study analysis, which together enable both narrative depth and analytical generalisation.

Table 3 summarises these techniques and their primary analytical purposes.

Techniques for case study analysis	Explanation
Chronologies	Narratives of the events that took place, organised by date
Coding	Sorting data according to concepts and themes
Clustering	Categorising cases according to common characteristics
Matrices	Explaining the interrelationship between identified factors
Decision tree modelling	Grounding a description of real-world decisions and actions coherently by using multiple cases
Pattern matching	Comparison between a predicted and an empirically based pattern

Figure 3: Case study analysis (Ghauri and Firth, 2009)

The multi-case approach offers three interrelated advantages that align closely with the objectives of this thesis:

1. Contextual depth. Each country is examined within its institutional and economic environment, ensuring that EU energy policy outcomes are interpreted in light of national governance structures and industrial characteristics (Flyvbjerg, 2006).

2. Comparative insight. The design's replication logic facilitates systematic cross-case comparison, enabling the identification of recurring patterns and critical divergences (Yin, 2018). Contrasting the Northern (Denmark and the Netherlands) and Southern (Italy and Greece) cases reveals how governance efficiency, administrative capacity, and energy dependency condition economic performance under a shared policy framework.

3. Theory development. The approach supports analytic generalisation – deriving conceptual insights applicable to similar contexts rather than statistical inference (George & Bennett, 2005; Gerring, 2007). This iterative process strengthens the explanatory framework by linking empirical findings to established theoretical models, including the "worlds of compliance" typology proposed by Falkner et al. (2005).

Applying this lens, Denmark and the Netherlands broadly align with a "world of law observance," characterised by high administrative capacity and proactive transposition of EU directives, while Italy and Greece correspond more closely to a "world of neglect," marked by limited institutional capacity and slower implementation (Falkner et al., 2005). These contrasts provide analytical leverage for exploring how institutional strength, policy coordination, and economic structure mediate national outcomes within the EU's energy transition.

Overall, the multi-case study design serves as the methodological backbone of this research. It synthesises Ghauri and Firth's (2009) interpretive, theory-building orientation with Yin's

(2018) structured comparative procedures, ensuring both contextual richness and analytical precision. This combination allows the study to identify and explain the causal mechanisms linking governance systems, institutional capacities, and energy dependencies to the economic impacts of EU energy policy. In doing so, it contributes to broader academic debates on governance, European integration, and energy-policy effectiveness (Börzel & Risse, 2012; Dupont & Oberthür, 2020; Sovacool et al., 2020).

3.3. Research Design

The selected cases represent distinct regional, institutional, and economic contexts, allowing for a comprehensive understanding of how EU energy policies shape national outcomes. This comparative research design strengthens analytical validity by enabling systematic cross-case comparison and the identification of recurring patterns and divergences. Through this approach, the study contributes to a deeper theoretical understanding of regional disparities in the implementation and economic effects of EU energy policies (Gerring, 2007; Yin, 2018).

Building on Ghauri and Firth's (2009) interpretive case-study framework, the research follows a structured, four-step process encompassing:

- the definition of research objectives;
- purposive case selection;
- data collection and analysis; and
- cross-case synthesis and theory development.

While Yin's (2018) multi-case study procedures inform the organisation of evidence and replication logic, the overall approach remains anchored in Ghauri and Firth's emphasis on contextual understanding and iterative theory building. This integration ensures methodological rigour while preserving the flexibility needed to capture the institutional and economic complexity of EU energy governance.

The four selected countries: Denmark, the Netherlands, Italy, and Greece – do represent a deliberate contrast in governance capacity, energy dependency, industrial structure, and renewable integration. Following the principle of theoretical replication (George & Bennett, 2005; Yin, 2018), this design enables the tracing of how national characteristics condition the translation of EU energy objectives into economic and structural outcomes.

Each case is examined through four analytical dimensions, drawn directly from the theoretical framework developed in Chapter 2:

- Energy dependency, capturing each country's exposure to external energy sources and progress in diversification;
- Industrial competitiveness, assessing how energy policies affect production costs, innovation, and trade performance;
- Renewable integration, analysing the scale and efficiency of renewable-energy deployment and infrastructural adaptation; and
- Governance efficiency, evaluating institutional capacity, administrative coherence, and compliance performance.

Together, these dimensions provide a coherent comparative lens for assessing the national economic impacts of EU energy policy around 2020. They also ensure that the analysis remains tightly linked to the conceptual foundations established earlier, bridging the gap between theoretical reasoning and empirical evidence.

3.3.1 Case Selection Framework

Case selection follows four guiding criteria, consistent with the comparative principles outlined by Ghauri and Firth (2009) and informed by the analytical dimensions developed in earlier sections. Each criterion captures a key mechanism through which EU energy policy interacts with national contexts:

- Institutional capacity – The ability of national administrations to implement EU directives effectively and coordinate across governance levels.
- Energy dependency – The degree of reliance on imported fossil fuels and exposure to external energy shocks.
- Economic structure – The extent to which industrial composition and export orientation support or constrain low-carbon transitions.
- Policy impact on trade balance and energy security – The measurable effects of EU energy policy on economic resilience and the security of supply.

Together, these criteria provide a structured framework for assessing how each case operationalises EU energy policy within its domestic constraints and opportunities (Dupont & Oberthür, 2020; Börzel & Risse, 2012). They also mirror the Union's own energy-policy triad of sustainability, competitiveness, and security, ensuring conceptual coherence between the theoretical framework and empirical design.

3.3.2 Institutional Capacity

Institutional capacity is a decisive factor in determining how effectively member states transpose and implement EU directives. It reflects not only bureaucratic competence but also the degree of coordination between ministries, regulatory agencies, and regional authorities.

Denmark and the Netherlands exhibit high administrative capability, policy coherence, and transparency (Nordic Council of Ministers, 2021). These institutional strengths have enabled proactive compliance, efficient resource allocation, and ambitious renewable-energy integration, placing both within what Falkner et al. (2005) describe as the "world of law observance."

By contrast, Italy and Greece contend with bureaucratic fragmentation, fiscal constraints, and regulatory bottlenecks that complicate transposition and enforcement (Börzel & Risse, 2012; Zhelyazkova et al., 2016). Their institutional profiles align more closely with Falkner et al.'s "world of neglect," illustrating how weak governance structures and limited administrative coordination can impede the effective implementation of EU energy policy.

3.3.3 Energy Dependency

Energy dependency directly shapes each member state's economic exposure to external shocks and its capacity to meet EU decarbonisation targets.

Denmark and the Netherlands maintain comparatively low import dependence due to long-term investments in domestic energy resources and renewables. Denmark generated approximately 47 percent of its electricity from wind in 2021 (Eurostat, 2022), while the Netherlands combines natural gas resources with expanding offshore wind capacity to bolster supply security (IEA, 2022).

In contrast, Italy and Greece remain heavily reliant on imported fossil fuels, making them more vulnerable to price volatility and supply disruptions (European Commission, 2021; IEA, 2022). These asymmetries underscore the strategic and economic challenges of implementing a uniform EU energy framework under diverse resource conditions. They also highlight the importance of diversification policies and infrastructural investment in reducing vulnerability and promoting resilience across the Union.

3.3.4 Economic Structure

Economic structure mediates how national industries respond to policy incentives and transition pressures. The composition of each country's industrial base, levels of innovation, and exposure to international competition determine its capacity to adjust to EU energy objectives and benefit from the low-carbon transition.

Denmark and the Netherlands maintain diversified, innovation-driven economies that leverage renewable-energy expertise to enhance competitiveness. Denmark's globally recognised wind-turbine industry exemplifies how sustained policy support and technological innovation have generated enduring economic advantages (Johansen, 2020).

The Netherlands, through its established energy-intensive industries and expanding clean-technology sector, demonstrates how a strong knowledge base and adaptive governance can facilitate low-carbon innovation without undermining industrial output (OECD, 2020).

In contrast, Italy and Greece face persistent trade deficits and higher production costs linked to their reliance on imported energy. These structural constraints limit industrial adaptation and dampen the economic benefits of decarbonisation, as higher input costs reduce competitiveness in export-oriented sectors (OECD, 2020). These divergences illustrate the feedback loop between structural economic conditions and energy-policy effectiveness, highlighting how domestic industrial characteristics mediate the economic impacts of EU energy transitions.

3.3.5 Policy Impact on Trade Balance and Energy Security

The combined perspective of trade balance and energy security provides a critical benchmark for assessing the economic consequences of EU energy policy.

In Denmark and the Netherlands, proactive renewable-energy deployment has reduced import expenditure, increased energy self-sufficiency, and created new export opportunities in clean-technology sectors. These developments have reinforced both macroeconomic stability and strategic resilience (European Commission, 2021; IEA, 2022). The alignment of industrial competitiveness with energy diversification has allowed these economies to turn climate policy into a source of comparative advantage.

Conversely, Italy and Greece experience a negative interaction between high import dependence, volatile fossil-fuel markets, and fiscal limitations. These conditions amplify trade deficits and heighten exposure to external energy shocks, constraining economic resilience (Tagliapietra & Zachmann, 2020). This divergence underscores the tension between ambitious policy objectives and uneven national capacities to finance and implement them—an issue that lies at the heart of the EU's broader energy and economic integration challenge.

3.3.6 Comparative Logic and Theoretical Contribution

The deliberate juxtaposition of Northern and Southern European cases enables meaningful comparison across contrasting governance, institutional, and economic settings. Denmark and the Netherlands illustrate how strong institutional capacity, administrative coherence, and renewable-energy expertise facilitate the alignment of EU objectives with domestic economic gains. In contrast, Italy and Greece exemplify the constraints imposed by weaker institutions, fiscal limitations, and import dependence, which hinder compliance and increase adjustment costs (Falkner et al., 2005; Zhelyazkova et al., 2016).

Applying the “worlds of compliance” framework (Falkner et al., 2005) to these cases provides theoretical leverage for interpreting patterns of convergence and divergence in policy outcomes. Denmark and the Netherlands approximate a “world of law observance,” characterised by high administrative capacity and proactive policy transposition, while Italy and Greece align more closely with a “world of neglect,” marked by slower implementation and institutional fragmentation. This typology underscores how variations in governance and institutional capacity condition the effectiveness of EU energy policy.

In line with Ghauri and Firth’s (2009) interpretive model, insights emerging from these cross-case comparisons contribute to analytic generalisation – refining understanding of how governance capacity mediates the economic effects of EU energy policy. Yin’s (2018) replication logic reinforces this process by ensuring that cross-case comparisons are systematic, transparent, and replicable.

3.3.7 Theoretical Contribution

The multi-case design developed in this chapter advances theoretical understanding of how governance structures, institutional capacities, and energy dependencies shape the economic consequences of EU policy. By juxtaposing member states from Northern and Southern Europe, the analysis highlights both structural asymmetries and institutional variation, refining conceptual explanations of policy performance within the Union’s multi-level governance framework.

The integration of Falkner et al.’s (2005) worlds of compliance framework with an interpretive, process-oriented methodology provides analytical depth in explaining variation across cases. Consistent with Ghauri and Firth’s (2009) theory-building orientation, the research moves beyond description toward comparative explanation, identifying mechanisms that clarify how national capacities mediate the translation of EU directives into economic and structural outcomes. Yin's (2018) replication logic further enhances reliability by ensuring that generalisations are grounded in systematic evidence rather than ad hoc inference.

Ultimately, this chapter establishes the methodological foundation that links comparative evidence to theoretical development. By combining empirical rigour with conceptual synthesis, it positions the study to contribute meaningfully to ongoing debates on European energy governance, policy implementation, and economic integration (Börzel & Risse, 2012; Dupont & Oberthür, 2020; Sovacool et al., 2020).

3.4. Data Collection Methods

The research employs a comparative multi-case design that combines structured evidence gathering with interpretive depth. Data collection followed Ghauri and Firth's (2009) principle of methodological triangulation, integrating multiple qualitative and quantitative sources to enhance both credibility and contextual understanding. This approach ensures consistent comparison across the four national cases – Denmark, the Netherlands, Italy, and Greece – while maintaining sensitivity to their distinct institutional and economic settings.

Evidence was drawn primarily from secondary and documentary sources, including:

- official communications and reports from the European Commission,
- statistical datasets from Eurostat,
- analytical studies by the International Energy Agency (IEA) and the Organisation for Economic Co-operation and Development (OECD), and
- national energy strategies and related policy documents.

Academic publications, independent policy evaluations, and sectoral analyses complemented these materials, providing a comprehensive view of both regulatory evolution and economic outcomes.

Within this interpretive framework, the study applied systematic document analysis to identify patterns of policy implementation and performance (Bowen, 2009). Elements of comparative historical analysis supported the evaluation of change over time and across institutional contexts (Eisenhardt, 1989). To strengthen dependability and cross-country comparability, findings from these diverse data streams were triangulated and cross-validated (Denzin, 2012).

Although the study draws on empirical statistics and policy indicators, its analytical orientation remains qualitative and explanatory rather than predictive. The integration of multiple documentary and institutional sources ensures that the analysis captures both the formal policy frameworks and the broader socio-economic contexts within which EU energy directives operate. By aligning data collection with the four analytical dimensions identified earlier – energy dependency, industrial competitiveness, renewable integration, and governance efficiency – the research maintains theoretical coherence and methodological rigour throughout.

3.4.1. Data Sources and Selection Criteria

A systematic assessment of policy adaptation, governance effectiveness, economic resilience, and structural transformation requires the integration of diverse and reliable data sources. The inclusion of these three data categories reflects a triangulated research strategy, where each type of evidence complements and validates the others.

Category	**Examples**	**Purpose in the Study**	**Why these criteria?**
Primary Policy Documents	EGD, REPowerEU, Fit for 55, National Energy and Climate Plans	Evaluate policy objectives, regulatory adaption, and national compliance with EU energy frameworks.	Theye documents represent the most authoritative sources of EU and national-level policy commitments, ensuring direct insight into legal, strategic and institutional frameworks guiding the energy transition.
Quantitative Economic Indicators	Eurostat, IEA, European Central Bank	Measure economic implications of policy implementation and structural change across member states.	These sources provide standardized longitudinal and comparable datasets, enabling cross-country analysis and robust empirical measurement of economic resilience and transformation.

Secondary Literature and Industry Reports	Peer-reviewed studies, think-tank analysis	Contextualise empirical findings and triangulate trends across governance economic and institutional domains.	Including scholarly and analytical sources ensures interpretive depth, helps validate quantitative findings, and situates the research within the current policy and academic discourse.

Table 1: Data sources and selection criteria (Own illustration)

As Ghauri and Firth (2009) argue, methodological triangulation enhances the robustness of multi-case research by ensuring that findings are grounded in both contextual understanding and empirical validation. Similarly, Yin (2018) and Denzin (2012) emphasise that combining policy documents, statistical indicators, and scholarly analysis strengthens the credibility, validity, and interpretive depth of case-study investigations. This multi-layered integration ensures that the analysis captures how EU energy policies shape economic adjustments, governance efficiency, and industrial competitiveness across diverse member states.

3.4.2 Case-Specific Data Selection and Clustering

To operationalise the comparative design, data were clustered by country, enabling consistent within-case analysis while preserving variation between Northern and Southern European contexts. This clustering captures differences in governance capacity, policy execution, and economic resilience, aligning with the study's four analytical dimensions: energy dependency, industrial competitiveness, renewable integration, and governance efficiency.

Denmark and the Netherlands (Northern Energy Producers)

- Focus on metrics of renewable expansion (wind, offshore wind, and bioenergy), export performance in clean-technology sectors, and the effectiveness of governance in market integration.
- Institutional capacity assessed through national energy strategies, European Commission compliance reviews, and OECD governance indicators, emphasising proactive policy coordination and high regulatory efficiency.

- Historical datasets from earlier directives – such as the Renewable Energy Directive (2009/28/EC) and its successor, RED II (2018/2001/EU) – trace policy continuity, investment patterns, and long-term adaptation trajectories.

Italy and Greece (Southern Energy Importers)

- Data emphasise fossil-fuel reliance, energy import ratios, and the impact of EU policy instruments on trade balances, fiscal stability, and energy affordability.
- Institutional governance analysed through official progress reports, academic evaluations of administrative efficiency, and studies addressing regulatory bottlenecks (Zhelyazkova et al., 2016).
- Comparative historical analysis evaluates structural economic adjustments and evolving energy-security conditions in response to EU energy and climate directives.

This country-specific clustering ensures that each case captures the interplay between governance capacity, policy adaptation, and economic transformation within the broader EU framework. By organising data along both temporal and institutional axes, the design preserves cross-case comparability while allowing for in-depth contextual interpretation of national trajectories.

3.4.3 Analytical Framework for Comparative Evaluation

The comparative evaluation follows a structured analytical framework derived from established methodologies in EU policy implementation and energy–economy research (Falkner et al., 2005; Treib, 2014; Helm, 2014).

Building on the four analytical dimensions developed earlier – institutional capacity, energy dependency, industrial competitiveness, and trade and energy security – the framework provides a systematic structure for assessing national variation in policy outcomes.

1. Institutional Capacity and Policy Compliance

- Examines how administrative efficiency, governance coherence, and regulatory quality shape the implementation of EU energy directives.
- Applies the “worlds of compliance” typology (Falkner et al., 2005), distinguishing between law observance, political contestation, neglect, and symbolic implementation.

- Integrates Treib's (2014) and Hooghe and Marks's (2001) analyses of multi-level governance, explaining how vertical coordination and decentralisation affect compliance outcomes across diverse administrative systems.

2. Energy Dependency and Market Structure

- Evaluates how EU energy policies influence national energy mixes and pathways toward renewable integration.
- Employs Unruh's (2000) concept of carbon lock-in to explain path dependence and institutional inertia in fossil-based systems.
- Incorporates Helm's (2014) work on market liberalisation and regulatory reform to assess how policy shifts reshape domestic energy systems and investment patterns.

3. Industrial Adaptation and Economic Competitiveness

- Investigates how EU energy directives affect energy-intensive industries, innovation capacity, and structural transformation.
- Draws on Tagliapietra and Zachmann (2020) to evaluate industrial adaptation to carbon pricing, renewable incentives, and funding mechanisms under the Green Deal framework.
- Considers foreign direct investment and technology exports as indicators of industrial resilience, contrasting the adaptation trajectories of Northern and Southern economies.

4. Policy Impact on Trade Balance and Energy Security

- Measures macroeconomic outcomes through data from Eurostat, IEA, and the European Central Bank (ECB), focusing on energy imports, exports, and cost structures.
- Builds on Helm (2014) and Tagliapietra and Zachmann (2020) to interpret how the energy transition alters external trade dependencies and national resilience.
- Assesses whether EU energy policies mitigate or exacerbate vulnerabilities in import-dependent economies, providing insight into the balance between economic efficiency and strategic security.

By structuring the comparative analysis around these four interlinked dimensions, the research isolates the mechanisms through which governance models, market structures, and industrial dynamics shape the differentiated economic outcomes of EU energy policies. This approach ensures conceptual consistency between the theoretical framework developed in Chapter 2 and the empirical evaluation undertaken in the following chapters.

3.4.4 Ensuring Data Accuracy and Methodological Rigor

To ensure methodological rigour and credibility, the research adheres to the trustworthiness criteria proposed by Guba and Lincoln (1985), adapted for qualitative comparative analysis.

- Credibility: Findings are triangulated across independent data sources, including EU reports, economic indicators, and peer-reviewed literature, to confirm consistency and validity.
- Transferability: Yin's (2018) replication logic enhances the applicability of findings to other governance contexts within the EU.
- Dependability: A consistent coding framework and transparent data-organisation process preserve analytical coherence and traceability.
- Confirmability: Each inference is grounded in explicit evidence, ensuring neutrality and accountability in interpretation.

These procedures reinforce the transparency and robustness of the analysis, aligning with Ghauri and Firth's (2009) emphasis on systematic yet flexible integration of data across multiple cases. Together, they ensure that the research maintains both empirical precision and theoretical integrity throughout the comparative evaluation.

3.5. Analytical Techniques

Building on the structured data-collection approach outlined in Section 3.4, the analysis combines interpretive comparison with systematic cross-case synthesis to uncover how governance capacity, compliance behaviour, and economic structure shape the outcomes of EU energy policies. This multi-method strategy aligns with established approaches to qualitative case research (Ghauri & Firth, 2009; Yin, 2018; Eisenhardt, 1989) and ensures that results are both empirically rigorous and theoretically grounded.

The analytical process proceeds in three interrelated stages – pattern matching, explanation building, and cross-case synthesis. Together, these techniques enable a consistent interpretation of national variations while preserving the contextual depth central to the interpretive case-study tradition (Ghauri & Firth, 2009).

3.5.1 Pattern Matching and Theoretical Alignment

Pattern matching tests whether observed outcomes fit prior theory (Yin, 2018). Drawing on Falkner et al. (2005), we expect states with strong administrative capacity and coordination to display proactive compliance—the "world of law observance"—while weaker or more centralised systems gravitate toward delayed or partial implementation—the "world of neglect." Complementary insights suggest that market design and cost structures steer renewable investment (Helm, 2014), and that expanding renewables improves trade balances by curbing fossil-fuel imports (Tagliapietra & Zachmann, 2020). Together, these expectations imply that higher administrative efficiency and deeper renewable integration should co-vary with stronger compliance and more favourable macroeconomic outcomes.

The comparative evidence aligns with these propositions. Denmark's consistent fulfilment of RED II obligations is underpinned by a capable institutional framework and a globally competitive wind sector, whereas Italy exhibits slower transposition and sustained import dependence (Eurostat, 2022; Zhelyazkova et al., 2016). These contrasts furnish the first link in a causal chain connecting governance quality to economic resilience via the channels of policy compliance, investment incentives, and reduced exposure to external energy shocks.

3.5.2 Explanation Building and Causal Pathways

Explanation building extends pattern matching by identifying why observed relationships occur, translating case-specific findings into broader causal insights (Ghauri & Firth, 2009; Yin, 2018). Iterative comparison of qualitative and quantitative evidence reveals how governance structures shape compliance and competitiveness. In Denmark, decentralised institutions, strong public–private partnerships, and sustained investment in renewables create a virtuous cycle of policy alignment and economic advantage (Madsen et al., 2010; IEA, 2022). Conversely, in Greece, centralised administration, fiscal constraints, and import dependence weaken policy uptake and implementation efficiency (Eurostat, 2023). These contrasts illustrate that institutional capacity and structural conditions jointly determine the effectiveness of EU energy governance, linking administrative strength to both compliance and long-term economic resilience.

3.5.3 Cross-Case Synthesis and Comparative Insight

Cross-case synthesis integrates individual case findings to identify recurring patterns and systematic divergences (Eisenhardt, 1989; Yin, 2018). By comparing cases along shared analytical dimensions – governance capacity, market structure, industrial adaptation, and trade & energy security – the synthesis generates analytic generalisations rather than statistical ones (Ghauri & Firth, 2009).

Dimension	Denmark	Netherlands	Italy	Greece
Governance & Policy Compliance	High efficiency and coordination, proactive compliance	High institutional capacity; effective but gradual transposition	Bureucratic delays and fragmented oversight	Weak enforcement capacity
Energy Market Structure	Global wind-export leader; extensive renewable share	Expanding offshore wind and gas transition system	Grid-modernisation challenges, heavy fossil reliance	Fossi-fuel dependence, limited diversification
Industrial Competitiveness	Diversified innovation-driven economy	Strong industrial base, increasing clean-tech exports	High energy costs limit competitiveness	Structural trade deficit, low innovation capacity
Trade Balance & Energy Security	Net energy exporter, secure supply	Declining import dependence, improving resilience	High import reliance, fiscal exposure	External vulnerability, price volatility

Table 2: Cross Case Synthesis explanation (Own Illustration)

The synthesis highlights a consistent relationship between institutional capacity, renewable integration, and economic resilience. Northern member states convert EU policy obligations into competitive advantage through effective governance and technological innovation, whereas Southern states experience slower adjustment and higher exposure to energy-market volatility. These findings provide the empirical foundation for the comparative discussion and policy interpretation presented in Chapter 4.

3.6. Ensuring Validity and Reliability

Ensuring methodological credibility is fundamental to a comparative, interpretive study of EU energy governance. The research design follows Ghauri and Firth's (2009) framework for interpretive multi-case studies, which emphasises contextual understanding, triangulation, and theory development through comparison. Selected procedural elements from Yin (2018) were integrated to support systematic evidence handling and replication logic, ensuring transparency without departing from the interpretivist orientation of the study.

Construct validity was achieved by operationalising key theoretical concepts – governance capacity, policy compliance, and energy dependency – through multiple, independent evidence streams. Triangulation verified data consistency across three domains: (1) policy and legal documents such as the European Green Deal, Fit for 55 Package, REPowerEU Plan, and National Energy and Climate Plans; (2) quantitative indicators from Eurostat, the IEA, ECB, and OECD capturing energy dependency, renewable integration, and macroeconomic outcomes; and (3) analytical literature providing interpretive context (e.g., Falkner et al., 2005; Tagliapietra & Zachmann, 2020). Cross-verification ensured that findings reflected underlying theoretical mechanisms rather than isolated or context-specific results.

Internal validity was reinforced through iterative comparison and explanation building, linking causal inference to established frameworks such as Falkner et al.'s (2005) "worlds of compliance." Competing interpretations were systematically considered to reduce confirmation bias. External validity, understood as analytic rather than statistical generalisation, was pursued through theoretical replication – contrasting high-capacity states (Denmark and the Netherlands) with lower-capacity states (Italy and Greece) to identify transferable mechanisms across EU governance contexts.

Reliability and consistency were maintained through detailed documentation of all analytical stages, including data sources, coding schemes, and synthesis procedures. A uniform coding framework ensured coherence and reduced researcher bias, in line with the dependability criterion of Lincoln and Guba (1985). Process tracing (George & Bennett, 2005) preserved a clear chain of evidence linking theoretical expectations to observed outcomes—for instance, proactive compliance and competitiveness in Denmark and the Netherlands (Johansen, 2020; IEA, 2022) versus slower adoption and persistent import dependence in Italy and Greece (Eurostat, 2023).

The comparative findings are situated within an intergovernmentalist framework (Moravcsik, 1998), recognising national decision-making as the central determinant of EU policy outcomes, while incorporating complementary insights from multi-level governance (Hooghe & Marks, 2001) and Europeanisation (Falkner et al., 2005). This theoretical integration enables a move from descriptive assessment to explanatory understanding of how institutional capacity and governance structures shape national adaptation to EU energy policy.

Through this combination of triangulation, theoretical replication, and transparent process documentation, the study meets the qualitative criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). The resulting framework ensures that the analysis remains both empirically rigorous and conceptually coherent, providing a robust methodological foundation for the comparative examination in Chapter 4.

3.7. Methodological Limitations

Despite a rigorous comparative design and consistent analytical procedures, this research inevitably faces certain methodological constraints. Recognising these limitations enhances transparency and strengthens credibility by demonstrating awareness of potential weaknesses and the measures adopted to mitigate them.

The principal challenges arise from data availability, contextual variability, and reliance on secondary material. This section discusses these limitations and the strategies implemented to reduce their impact, followed by reflections on the broader implications for comparative energy-policy research.

3.7.1 Data Gaps and Contextual Variability

A central challenge concerns the uneven availability and quality of national data on energy performance, policy compliance, and economic effects. Although Eurostat and the International Energy Agency (IEA) provide extensive datasets, member states apply different reporting standards, temporal coverage, and sectoral definitions, complicating direct cross-country comparison (Gerring, 2007).

For example, Denmark and the Netherlands maintain advanced statistical systems and detailed renewable-energy records, while Greece often reports with less granularity or time lag in subnational energy programmes. Italy's data coverage has improved since the implementation of the Integrated National Energy and Climate Plan (INECP), but inconsistencies remain in linking policy outputs to economic performance indicators.

Post-2020 data present a particular difficulty: the effects of the European Green Deal and REPowerEU Plan are still emerging, and longitudinal datasets remain incomplete. Consequently, while this study captures important short-term trends, it cannot fully evaluate the long-term structural impacts of the latest policy cycle.

Contextual variability also constrains generalisation. Northern European states operate within decentralised, consensus-oriented governance systems (Lijphart, 1999; Pierre & Peters, 2000), whereas Southern European systems are typically more centralised and fragmented (Featherstone & Papadimitriou, 2008). These institutional differences enrich comparative analysis but complicate the identification of causal mechanisms applicable across all member states.

Economic structures further diverge: Denmark's export-oriented renewable economy contrasts with Greece's high import dependency (Eurostat, 2021; Schmidt, 2008). Such disparities underscore the limits of one-size-fits-all interpretations of EU policy outcomes and highlight the importance of maintaining a context-sensitive approach to comparative analysis.

3.7.2 Dependence on Secondary Sources

Because the study relies primarily on documentary and statistical material, several interpretive challenges arise.

- Selective reporting: Official policy documents may highlight achievements while downplaying implementation difficulties or political resistance (Schimmelfennig & Sedelmeier, 2005).
- Temporal distance: Secondary data seldom capture the immediacy or contextual nuance obtainable through fieldwork, interviews, or participant observation (Bryman, 2012).
- Embedded interpretation: Scholarly and institutional analyses inevitably reflect their authors' theoretical orientations and methodological assumptions (Gerring, 2007).

These challenges are common in comparative policy research but require careful evaluation of each source's origin, intent, and methodological transparency. To mitigate these risks, priority was given to peer-reviewed literature, official EU and IEA publications, and reports from recognised international institutions such as the OECD and Eurostat, whose procedures ensure data reliability and replicability.

Cross-verifying findings across multiple independent sources and ensuring alignment with established analytical frameworks further enhanced the credibility of the evidence base. This triangulated use of secondary materials thus supports both empirical robustness and conceptual consistency, consistent with Ghauri and Firth's (2009) interpretive standards for multi-case research.

3.7.3 Mitigation and Validation Strategies

Several measures were adopted to minimise methodological limitations and safeguard the integrity of the research process. These strategies ensure that, despite the constraints inherent in comparative and secondary-data research, the analysis remains both credible and robust.

Triangulation.

Cross-checking data across independent domains compensates for single-source weaknesses (Denzin, 2012). For example, Eurostat statistics on renewable generation were verified against national compliance reports, while earlier Renewable Energy Directive (2009/28/EC) data were used to contextualise RED II (2018/2001/EU) trends. The combination of quantitative indicators with qualitative assessments ensured a multidimensional understanding of policy effects and enhanced the interpretive depth of the analysis.

Systematic analysis.

Uniform coding procedures and thematic clustering were applied consistently across all four cases to maintain comparability. Pattern matching tested whether observed results aligned with theoretical expectations – for instance, examining whether decentralised governance structures correlate with proactive compliance outcomes (Falkner et al., 2005). These structured analytical procedures reduce subjectivity while preserving the flexibility needed for interpretive insight.

Critical evaluation of data sources.

Each dataset and document was assessed for methodological clarity, reliability, and alignment with the study's analytical dimensions (Bryman, 2012). Discrepancies in reporting standards were recorded and considered during interpretation, while both supportive and critical perspectives were incorporated to ensure balanced representation (Featherstone & Radaelli, 2003; Schmidt, 2008). This evaluative process strengthened the credibility and neutrality of the evidence base.

Transparency in documentation.

Comprehensive records of data sources, coding decisions, and analytical steps were maintained to establish an audit trail enabling verification or replication (Yin, 2018). Clear documentation of analytical assumptions and interpretive reasoning contributes to methodological accountability and reinforces the transparency of findings.

3.7.4 Broader Implications and Future Research

The limitations identified in this study also highlight broader structural and methodological challenges within EU energy-policy research. First, inconsistent national reporting underscores the need for harmonised data frameworks across member states to facilitate reliable cross-country comparison (Eurostat, 2021). Second, the diversity of governance and economic structures observed across cases suggests that EU energy policy should become more adaptive to national contexts rather than relying on uniform, target-driven approaches (Featherstone & Radaelli, 2003; Schmidt, 2008).

Finally, the reliance on secondary sources points to the value of integrating primary research – such as elite interviews, stakeholder workshops, or project-level field studies – in future work. These methods would capture the real-time dynamics of policy implementation and provide richer insight into the interaction between institutional capacity and economic adaptation (Bryman, 2012). By addressing these issues, future research can build on this study's findings to further refine theoretical models of intergovernmental energy governance and comparative economic adjustment. Such complementary approaches would deepen understanding of how institutional capacity, national interests, and policy design jointly mediate the outcomes of European energy integration, an agenda explored further in the empirical analysis of Chapter 4.

3.8. Integration into the Research

This chapter has established the methodological foundation for analysing how EU energy policies influence the economic and structural performance of four member states – Denmark, the Netherlands, Italy, and Greece. The comparative, interpretive design developed here combines the structured discipline of multi-case study logic with the contextual depth of qualitative inquiry. Through clearly defined procedures for case selection, data collection, and cross-case analysis, the study links theoretical expectations about governance capacity and policy compliance to measurable economic outcomes.

Key components of this approach include: a systematic strategy for data triangulation, integrating policy documents, statistical indicators, and scholarly analyses; a transparent and consistent coding framework applied across cases; and analytical techniques such as pattern matching, explanation building, and cross-case synthesis.

Together, these tools enable the identification of causal mechanisms and recurring patterns while maintaining sensitivity to national differences in governance structures, energy systems, and market conditions. The discussion of validity, reliability, and methodological limitations demonstrated how challenges such as incomplete datasets, contextual variability, and reliance on secondary materials were mitigated through triangulation, documentation, and critical evaluation. These safeguards collectively reinforce the methodological credibility of the study and ensure the transparency of its analytical process. Here in the following a short summary of Validation Measures:

Potential Bias or Issue	Validation Strategy	Illustrative Example
Selection bias (cases over-representing success or failure)	Theoretical replication – cases chosen to contrast institutional capacity and economic structure	Denmark & the Netherlands (high capacity) vs. Italy & Greece (governance inefficiencies)
Single-source dependence	Data triangulation – cross referencing policy documents, empirical datasets, and independent evaluations	EU Renewable-Energy Directives vs. OECD energy-security reports
Political or institutional bias in official reporting	Comparison of policy claims with empirical outcomes	Italy's Conto Energia solarprogramme projections vs. actual installed capacity (Eurostat)
Short-term vs. long term effects	Historical policy analysis distinguishing structural trends from temporary shocks	Greece's lignite phase-out traced to pre-2020 dependency patterns
Inconsistent national reporting standards	Benchmarking implementation using harmonised metrics	The Netherlands' offshore-wind strategy compared with Italy's solar-expansion record
Absence of primary data	Use of multiple high-quality secondary sources; proposal for future interviews	Expert interviews recommended for subsequent research
Limited generalisability	Addressed through theoretical replication and explicit scope acknowledgment	Suggestion to extend analysis to additional EU regions

Table 3: Validation Measures (Own Illustration)

4. Implementation: Theory to examples

4.1. Case Study Introduction: Why These Countries Were Selected

Building on the theoretical and methodological foundations developed in the previous chapters, this chapter applies the comparative framework to assess how EU energy policies around 2020 have shaped national economic and structural outcomes. The analysis focuses on four member states – Denmark, the Netherlands, Italy, and Greece – whose contrasting energy profiles, governance systems, and industrial structures reveal the differentiated impact of EU directives across the Union.

Before turning to the national cases, it is useful to recall that EU energy policy, as Schubert et al. (2016) note, rests on the interrelated objectives of sustainability, affordability, and security of supply. These aims often overlap or conflict, influencing the variety of national implementation paths examined below.

As outlined in Chapter 3, the selection of these four cases is guided by their divergence across the four analytical dimensions that underpin this study: energy dependency, industrial competitiveness, renewable-energy integration, and governance efficiency.

Denmark and the Netherlands represent energy-producing states characterised by relatively low import dependence, strong governance capacity, and high levels of renewable integration. Denmark's leadership in wind energy and the Netherlands' expanding offshore wind and bioenergy sectors illustrate how technological innovation and institutional coherence can translate EU objectives into economic advantage.

Italy and Greece, in contrast, exemplify energy-importing economies with persistent reliance on fossil fuels, fiscal and infrastructural constraints, and slower administrative adaptation to EU directives. These cases highlight the barriers to achieving energy independence and industrial competitiveness in contexts marked by governance fragmentation and limited institutional capacity. By analysing these four member states, the study explores how governance efficiency, economic structure, and policy adaptation shape the effectiveness of EU energy directives and what lessons can be drawn for more equitable and harmonised policy implementation across the Union.

Following the methodological framework established in Chapter 3, this chapter employs a comparative multi-case study approach to evaluate the economic implications of EU energy policies. The analysis proceeds along the four key dimensions – energy dependency reduction, structural economic adjustment, industrial competitiveness, and governance efficiency – linking them to the broader goals of sustainability and energy security.

The implementation of EU energy policy is inherently complex, shaped by institutional capacity, political coordination, and national economic priorities. Accordingly, this chapter provides a detailed examination of how each selected member state translates EU directives into domestic strategies. Each case study reviews the national policy framework, administrative structures, economic transformations, and the principal success factors and challenges encountered in adapting to EU energy goals.

To systematically assess the effects of EU energy policies, this chapter addresses the following interrelated questions:

Governance and Policy Implementation: *How do Northern and Southern European countries differ in implementing EU energy policies, particularly with respect to administrative coordination, institutional capacity, and compliance behaviour?*

Economic Outcomes and Trade Balances: *What are the economic consequences of EU energy policies for the selected countries, especially regarding energy-market performance, trade balances, and industrial competitiveness?*

Structural and Industrial Adjustments: *How do technological innovation and the energy transition influence compliance and industrial transformation in member states?*

Policy Harmonisation and Social Equity: *How effectively do EU energy policies address regional disparities and promote a fair and inclusive transition across different economic contexts?*

By structuring the analysis around these four themes, the study offers a comprehensive evaluation of the economic and structural transformations driven by EU energy policy. The results will also provide insights for refining EU policy frameworks, particularly in balancing regional disparities and ensuring an equitable transition toward sustainability.

Following the individual case analyses, a cross-case synthesis will identify and compare:

- Recurring patterns in governance efficiency, economic impacts, and policy success factors;
- Key divergences linked to institutional capacity, structural adaptability, and energy dependency; and
- Lessons for improving policy harmonisation and enhancing implementation across diverse member-state contexts.

Organised in this manner, the chapter remains closely aligned with the overarching objective of this thesis: to understand how EU energy policies around 2020 shape economic trajectories, industrial transformations, and governance performance across differing institutional and market structures.

Policy Implementation and Adaptation Strategies

Policy implementation within the European Union follows a three-phase process – transposition, application, and enforcement – which collectively determine how effectively EU directives are adopted and operationalised at the national level (Treib, 2014). While these stages provide a formal structure for ensuring compliance, the principle of subsidiarity grants member states considerable discretion to adapt EU legislation to their domestic contexts. This flexibility, while fostering national ownership, often results in significant variation in implementation quality and policy outcomes (Knill & Lenschow, 1998).

Within this framework, institutional capacity and governance efficiency become decisive factors in shaping national adaptation strategies. States with coherent administrative coordination and sufficient technical expertise tend to achieve earlier and more comprehensive transposition, whereas those with fragmented bureaucracies or fiscal constraints face delays and partial implementation.

The following analysis examines how Denmark, the Netherlands, Italy, and Greece navigate these phases of policy implementation and how the subsidiarity principle influences their respective approaches to adapting EU energy directives. By linking formal legal processes to practical administrative performance, this section highlights how governance structures mediate the translation of supranational objectives into national energy strategies.

Procedure of this Chapter

Each case study follows a consistent four-step analytical framework designed to ensure comparability across national contexts and coherence with the theoretical model developed in earlier chapters. The analysis proceeds through the following stages:

Energy Mix and Dependency Profile: *Examining each country's energy mix and import dependence to assess vulnerability and resilience to external supply shocks.*

Industrial and Economic Transformation: *Evaluating how EU energy policies have influenced industrial structure and competitiveness, particularly in energy-intensive sectors.*

Technological and Infrastructural Development: *Analysing the growth of renewable-energy technologies, innovation dynamics, and grid modernisation as indicators of structural adaptation.*

Governance and Policy Implementation: *Assessing institutional effectiveness in implementing EU directives, with attention to regulatory efficiency, inter-agency coordination, and political constraints.*

By structuring each case study through this lens, the chapter – and, by extension, the entire thesis – identifies patterns and divergences in how EU energy policies are adapted across varying economic and institutional settings.

The evaluation integrates key metrics aligned with the four analytical dimensions: energy dependency reduction, industrial competitiveness, renewable technology integration, and governance efficiency.

Together, these indicators address the core research questions concerning how EU energy policies have reshaped economic structures across different member states, and how national autonomy and institutional capacity have influenced adaptation outcomes.

Each case study is therefore structured to systematically assess these dimensions, culminating in a comparative synthesis that connects empirical findings to the theoretical expectations developed in Chapters 2 and 3. This approach ensures analytical continuity and provides a solid foundation for the cross-case discussion that follows.

4.2. Case 1: Denmark: A Leader in Wind Energy and Market Integration

Denmark stands out within the European Union as a paradigmatic case of successful energy transition, combining environmental ambition with industrial strategy, governance innovation, and societal support. Its energy transformation journey began during the 1970s oil crises, catalysing a strategic pivot away from fossil fuel dependency towards domestic, renewable energy production (Lund, 2007).

By 2022, Denmark's renewable energy share reached 44% of electricity generation from wind alone, one of the highest globally (IEA, 2023). When accounting for total renewables, including biomass and solar, the share climbs above 75% (Eurostat, 2023). Legally binding national targets, including 100% renewable electricity by 2030 and net-zero emissions by 2050, align closely with the European Green Deal and the Fit-for-55 legislative package (Danish Ministry of Climate, Energy, and Utilities, 2022).

Crucially, Denmark’s energy import dependency has dropped to just 28.2%, far below the EU average of 55% (Eurostat, 2023). This structural resilience shielded Denmark from the worst impacts of the 2021–2022 European energy crisis triggered by Russia’s invasion of Ukraine, as documented by the International Energy Agency (IEA, 2022).

Furthermore, Denmark's ambitious offshore wind strategy, particularly the groundbreaking Energy Island project, intends to generate 10 GW of renewable energy by 2030, a volume surpassing domestic electricity needs and supporting regional energy security through cross-border integration (Danish Energy Agency, 2022). These projects demonstrate Denmark’s transition from a fossil fuel importer to a net energy exporter, consistent with Hafner and Tagliapietra's (2020) conception of energy geopolitics in a decarbonized Europe.

Yet, Denmark's decarbonization model is not without criticism. Schreurs (2020) and Ørsted’s (2022) reports highlight Denmark's reliance on imported biomass (wood pellets) from outside the EU, raising concerns about indirect environmental impacts and undermining the narrative of complete energy sovereignty.

Thus, while Denmark offers a robust model of resilient energy governance, it simultaneously illustrates the emerging complexities of "green dependency" in a globalized resource economy.

4.2.1 Governance and Policy Implementation

Denmark’s implementation of EU energy directives in the last years exemplifies high administrative capacity, regulatory coherence, and multilevel coordination – factors central to successful policy delivery in the European Union. In the context of this part of the chapter, Denmark serves as a benchmark case of institutional efficiency within the EU's differentiated energy governance landscape. Its trajectory illustrates how domestic political structures and policy cultures can shape the national adaptation of supranational directives.

Following the common analytical framework used in EU compliance research (Falkner et al., 2005; Haverland & Romeijn, 2007), this study evaluates implementation across three interrelated phases: transposition (legal incorporation), application (administrative execution), and enforcement (monitoring and regulatory follow-up). These phases align with Oliver Treib’s (2014) emphasis on the importance of institutional filtering mechanisms, which determine how EU governance outputs are translated, reinterpreted, or resisted at the domestic level. In Denmark’s case, this filtering effect operates primarily to amplify EU ambitions, rather than dilute them.

The legal transposition of EU directives has been swift and ambitious. The 2020 Danish Climate Act codified a national emissions reduction target of 70% by 2030, substantially exceeding the EU's Fit-for-55 objective. This law established mandatory annual reporting and created an independent Council on Climate Change to assess government performance and recommend course corrections (Ministry of Climate, Energy and Utilities, 2022). According to the European Commission's 2023 Country Report, Denmark fully complies with the updated Renewable Energy Directive (RED II), and its strategy is in line with the REPowerEU Plan, particularly in terms of renewables integration and energy system flexibility (European Commission, WORKPLAN;2023a).

Denmark's strong administrative match with EU governance outputs is not merely a product of recent institutional design. Rather, it is the result of decades of anticipatory policy planning and civic engagement around energy transitions. As Meyer (2004) outlines, Denmark's shift toward renewable energy began in the 1970s through a unique alliance of independent experts, civil society organizations, and municipal planners, notably during the anti-nuclear mobilizations and early wind power experiments. By the mid-1990s, more than 150,000 households were co-owners of wind turbines, supported by local cooperatives, government planning, and credible certification systems. This bottom-up legitimacy helped entrench a norm of proactive implementation, in which policy ambition was politically sustainable even before EU mandates emerged. The historical depth of this governance model explains why Denmark is often able to amplify EU ambitions, rather than merely transpose them, a dynamic that continues to distinguish its performance under RED II and REPowerEU.

Application is managed through Denmark's well-integrated administrative structure, where national ministries, municipalities, and semi-autonomous agencies operate in close coordination. The Danish Energy Agency (DEA) functions as a central implementing body, responsible for allocating EU Recovery and Resilience Facility (RRF) funds, managing spatial planning for renewables, and liaising with regional actors. Notably, in response to REPowerEU's permitting acceleration provisions, the DEA launched a digital permitting platform in 2021 to streamline administrative approval for onshore and offshore projects (DEA, 2023). Treib (2014) argues that the quality of EU policy implementation is closely tied to the administrative match between EU governance outputs and national institutional structures. Denmark demonstrates a high degree of such match, owing to its longstanding corporatist governance style, high public trust, and professionalized bureaucracy.

The Energy Island project in the North Sea – a €28 billion initiative to deliver 10 GW of offshore wind capacity – is emblematic of Denmark's capacity for cross-border, EU-integrated policy execution. The project is coordinated through the North Sea Energy Cooperation under the REPowerEU framework and includes Germany, the Netherlands, and Belgium as strategic partners (European Commission, 2022; DEA, 2022). This level of multilateral coordination does reflects Denmark's leadership role in shaping – not merely following – EU energy integration.

Enforcement mechanisms in Denmark are particularly robust, combining independent expert review, legally binding targets, and transparent public reporting. The Climate Council's 2023 annual report acknowledged Denmark's continued progress but highlighted shortfalls in agricultural and transport sectors, prompting new policy adjustments, including expanded carbon pricing and targeted R&D support (Danish Council on Climate Change, 2023). These dynamics reflect what Treib (2014) characterizes as a form of adaptive compliance – not simply formal adherence, but iterative, responsive alignment with policy goals as conditions evolve.

Importantly, Denmark's governance model illustrates how the principle of subsidiarity, enshrined in Article 194 TFEU, can function as a catalyst for ambitious implementation rather than as an obstacle to harmonization. While the EU provides overarching targets and mechanisms (e.g., RED II, REPowerEU), Denmark exercises considerable autonomy in tailoring these policies to fit its national infrastructure, political culture, and societal priorities. The result is a synergistic governance model that not only meets EU expectations but actively raises the Union's collective ambition.

In the context of this chapter, Denmark serves as a functional reference point for how implementation can be maximized when institutional capacity, political will, and policy design are as outlined this well-aligned. It also demonstrates the value of proactive governance in a policy environment where other member states may struggle with legal fragmentation, administrative bottlenecks, or political resistance.

4.2.2 Economic Outcomes and Trade Balances

The economic consequences of EU energy policies for Denmark have been broadly positive, reinforcing the view that climate ambition and industrial competitiveness can be mutually reinforcing. The country has effectively used policy frameworks from the 2020s, notably the European Green Deal, Fit-for-55, and REPowerEU, to support green sector growth, stabilize its energy trade balance, and expand high-value industrial exports. Unlike many other EU member states where policy compliance has been associated with short-term economic adjustment costs, Denmark has turned the energy transition into a driver of national competitiveness.

The economic dividends are particularly visible in the offshore wind sector, where Denmark leads not only in capacity deployment but in technology exports and global market share. Companies such as Vestas, the world's largest wind turbine manufacturer, and Ørsted, a major offshore wind developer, have become emblematic of Denmark's export-oriented green economy. In 2022, Vestas exported wind turbines worth over €10 billion, consolidating Denmark's role as a key industrial actor in the EU's decarbonization strategy (IRENA, 2022).

Public investment programs such as the Energy Technology Development and Demonstration Program (EUDP) and the Recovery and Resilience Facility (RRF) have been strategically used to support green industrialization. Over 59% of Denmark's RRF allocation, well above the EU minimum, was earmarked for green investment, with a focus on power-to-X technologies, industrial electrification, and green fuels for heavy transport and shipping (European Commission, 2023a; DEA, 2023). These investments align with REPowerEU's priorities for energy system diversification and climate-resilient growth.

Employment data further supports the economic benefit of energy transition policies. According to the Danish Ministry of Climate, Energy and Utilities (2022), more than 70,000 jobs are now directly or indirectly linked to the green energy sector, with many concentrated in high-skill areas such as engineering, logistics, and digital infrastructure. The offshore sector alone accounts for over 10% of Danish industrial R&D spending, reflecting the strategic importance of renewables for technological innovation and human capital development (OECD, 2023).

Fiscal policy has also demonstrated resilience under EU climate constraints. During the 2022 energy price crisis, Denmark was able to introduce a €1.3 billion household support package without reducing its green subsidy levels or reallocating climate investment – a contrast to countries that temporarily reversed or paused decarbonization programs (European Commission, 2023b). This reflects both long-term investment planning and low carbon lock-in, two factors that have enabled Denmark to meet both its fiscal and climate targets concurrently.

However, as noted by the Climate Council (2023), Denmark's success is partially rooted in institutional and historical advantages. Early liberalization of energy markets, corporatist traditions of policymaking, and broad societal consensus have all facilitated policy stability and investment continuity. While these conditions are not easily replicable, they illustrate the importance of aligning institutional capacity, market design, and climate ambition to unlock the full economic potential of EU energy policy.

In the broader comparative context, Denmark's experience highlights a positive feedback loop: early and coherent alignment with EU climate goals has yielded material trade, employment, and innovation benefits – positioning the country not only as a policy follower but as a climate-industrial leader within the Union.

4.2.3. Structural and Industrial Adjustments

Denmark's structural transformation introduces in the early 2020s reflects a highly coordinated model of technological adaptation and institutional capacity-building in response to EU energy governance. Its progress toward major European sustainability objectives is grounded not only in legal compliance but in systemic transformations across energy infrastructure, industrial activity, and innovation ecosystems.

At the core of this transformation lies Denmark's advanced renewable integration and grid modernization strategy. As mentioned in the previous subchapter – by 2022, over 75% of electricity generation came from renewable sources, primarily wind and biomass, with wind alone contributing approximately 44%, the highest share among EU member states (Eurostat, 2023). This outcome is underpinned by systemic investments in smart grids, automated demand-side management, and digital energy platforms, allowing for dynamic balancing and real-time grid responsiveness (DEA, 2023a; Lund et al., 2022). These innovations are essential for maintaining grid reliability as the energy mix shifts toward variable renewables.

Denmark's flagship infrastructure project is the Energy Island in the North Sea which also illustrates its move from national to regional energy integration, enabling multi-country balancing and load-sharing consistent with REPowerEU's emphasis on cross-border energy security (DEA, 2022; European Commission, 2022). This development reflects principles from the Strategic Niche Management framework (Kemp, Schot & Hoogma, 1998), where institutionalized experimentation, multilevel partnerships, and technology scaling converge to enable long-term structural change. As Meadowcroft (2005) argues, such transformations are deeply shaped by political institutions and governance processes, which condition how innovations like the Energy Island evolve and embed within broader socio-technical systems.

In industrial terms, Denmark has positioned itself as a leader in green fuel innovation and electrolyzer deployment. The Green Fuels for Denmark initiative – a cross-sectoral alliance launched in 2021 – targets the production of hydrogen and e-fuels for shipping, aviation, and heavy industry. The program builds on Denmark's strong innovation system, characterized by high public R&D investment, cross-sectoral coordination, and regional innovation hubs (OECD, 2023; Andersen & Gulbrandsen, 2022). It also mirrors the EU's Fit-for-55 industrial decarbonization targets, particularly in its emphasis on power-to-X technologies.

Wind turbine manufacturing, electrolyzer assembly, and smart grid services have clustered in Jutland and Zealand, generating export-oriented employment and contributing to Denmark's green trade surplus (IRENA, 2022; Tödtling & Trippl, 2021). These developments reflect institutional complementarities between innovation policy, labour market systems, and climate regulation, conditions that scholars identify as central to high-capacity green transitions (Pianta & Lucchese, 2020).

These structural advantages did not emerge spontaneously. As Gavard (2016) demonstrates, Denmark's early support schemes, particularly feed-in tariffs in the 2000s, played a critical role in triggering large-scale wind deployment. Her econometric analysis finds that under premium-based systems, a support level of 23€/MWh was needed to achieve a 50% probability of new investment, equivalent to a carbon price of 27–48€/tCO_2. These figures underline how investor certainty and regulatory clarity were key enablers of early structural build-out foundations on which Denmark's later industrial and export capacities would rest.

Further, Denmark's reliance on imported raw materials for green tech (e.g., rare earths for wind turbines, platinum group metals for electrolysis) exposes new forms of geopolitical dependency, despite gains in energy autonomy. This has led Danish policymakers to advocate for tighter integration with the EU's emerging Net-Zero Industry Act and raw materials strategies to mitigate supply chain risks and protect competitiveness (European Commission, 2023a; Tagliapietra & Veugelers, 2021).

In sum, Denmark illustrates how technological innovation and industrial transformation can serve as enablers of policy compliance, not merely as implementation challenges. Structural adjustments have been central to Denmark's ability to deliver on EU energy directives while preserving economic competitiveness and institutional coherence. This dynamic is exemplified by the Smart Energy Denmark 2045 strategy developed by Lund et al. (2022), which models a cost-neutral pathway to full decarbonization by 2045 based on sector coupling, smart grid integration, and coordinated deployment of renewables, heat pumps, electrolysis, and carbon capture. The scenario includes a planned expansion to 14 GW of offshore wind, 10 GW of solar

PV, and electrolysis capacity with 4 days of hydrogen storage, while phasing out fossil fuels entirely and limiting biomass use to globally sustainable levels. These projections are not merely technological: they rely on anticipatory governance, spatial planning, and economic steering that exemplify Denmark's integrated model of implementation. The case supports Treib's (2014: 5ff) argument that implementation quality is closely tied to domestic institutional alignment, where national capabilities and sectoral ecosystems filter, adapt, and amplify EU governance outputs.

4.2.4 Policy Harmonization and Social Equity

Denmark is widely regarded as a best-practice case in EU energy transition policy. However, a closer analysis through the lens of social equity and policy harmonization reveals a more complex picture. While Denmark demonstrates strong procedural inclusivity and effective local governance, recent developments also expose emerging challenges around distributive justice, regional equity, and structural representation, particularly in the context of the EU's 2020 policy frameworks.

A defining strength of the Danish model is its emphasis on participatory governance and community ownership, particularly in the renewable energy sector. Since the 1990s, policy frameworks have incentivized local ownership, with over 80% of onshore wind capacity still owned by cooperatives, municipalities, or private individuals (Sovacool & Enevoldsen, 2015; Hvelplund et al., 2021). This has enabled what scholars describe as procedural justice meaning citizens are not merely policy recipients but active co-creators of the transition (Jenkins et al., 2016; Simcock et al., 2021). This participatory model aligns well with EU priorities around multi-level governance, as outlined in Article 5 of the Treaty on European Union and operationalized through the subsidiarity principle in Article 194 TFEU.

Denmark's local energy planning system illustrates how subsidiarity can enhance both compliance and legitimacy. Municipalities are responsible for local heat planning and spatial zoning of renewables – an institutional arrangement that allows for tailored implementation of EU directives in line with community values and capacities (Danish Energy Agency, 2023; Lund, 2022). This structural empowerment of subnational actors' contrasts with the more centralized or fragmented models seen in other member states, where subsidiarity often lacks meaningful institutional expression (Treib, 2014).

Distributionally, Denmark has benefited from early transition investments that have minimized regressive impacts. As mentioned above, during the 2022 energy crisis, the Danish government introduced a €1.3 billion energy relief package, focusing on vulnerable households without undermining climate investment trajectories (Ministry of Finance, 2022). This stands in contrast to member states that diverted green funding to support fossil energy subsidies, temporarily derailing decarbonization efforts (European Commission, 2023). According to Sovacool et al. (2017), achieving energy justice requires policies that protect vulnerable populations while advancing decarbonization – suggesting that fiscal capacity and long-term planning, as seen in Denmark, can help create resilient and socially fair transitions.

Yet recent analyses also highlight limits to Denmark's equity performance. The Danish Council on Climate Change (2023) has warned of asymmetric burden-sharing across municipalities, especially in rural and low-density areas that host a disproportionate share of wind turbines and grid infrastructure. While these regions are essential to national decarbonization targets, they often lack access to the high-value job creation and innovation benefits clustered around Copenhagen and Aarhus (Koch et al., 2021; Refsgaard & Jacobsen, 2023). This emerging urban-rural divide raises concerns about territorial cohesion within what appears at first glance to be a uniformly successful transition.

In addition, Denmark's exclusion from the EU Just Transition Fund (JTF) – due to its high climate governance baseline – reveals deeper tensions within the EU's equity logic. Analysts have noted that the JTF's allocation criteria prioritize carbon intensity and GDP per capita at the regional level, but may overlook intra-state inequalities and localized infrastructural burdens in wealthier member states. This points to a need for more granular territorial indicators and broader interpretations of vulnerability within EU cohesion policy (e.g., European Court of Auditors, 2020; Baranowski & Wendel, 2021).

Another underexamined equity dimension in Denmark is energy affordability. Despite high average incomes, Danish households face some of the highest electricity prices in the EU, largely due to green taxes and grid levies (Eurostat, 2023). While tax revenues are often reinvested into climate or welfare programs, the lack of a dedicated energy poverty strategy has led to critiques of blind spots in national equity frameworks (Bouzarovski & Thomson, 2020). Moreover, migrant and elderly populations – often underrepresented in climate policymaking – face unique barriers to participation and affordability that remain insufficiently addressed (Hansen et al., 2022)

Overall, Denmark's implementation of EU energy policy reveals a high-functioning system with clear normative alignment to Union-wide justice principles. However, distributional blind spots, spatial asymmetries, and structural representation gaps persist beneath aggregate success. Addressing these challenges will require not only refined domestic policy instruments but also an evolution in how EU cohesion mechanisms conceptualize vulnerability, justice, and regional diversity within the bloc. In this regard, Denmark offers not only a success story but a cautionary tale for equitable transition governance in high-capacity states.

The following case of the Netherlands explores a similar high-capacity governance environment but within a distinct structural context – one shaped by a legacy of natural-gas dependence, spatial constraints, and rapid offshore-wind industrialisation.

4.3. Case 2: The Netherlands: Managing a Gas Legacy while Scaling Offshore Wind

The Netherlands occupies a distinctive position within the EU energy transition. Its historically gas-centric system, centred on the Groningen field and extensive gas infrastructure, is now undergoing a profound shift toward offshore wind, hydrogen, and electrification. Compared with Denmark's early wind leadership, the Dutch strategy emphasises the acceleration of large-scale offshore wind deployment, leveraging port-industrial clusters such as Rotterdam and Eemshaven and dense grid interconnections to maintain system reliability during rapid decarbonisation. Nuclear energy remains on the policy agenda, with lifetime extensions and new-build projects under discussion, while coal capacity is being phased down and partially decarbonised through carbon capture and storage (CCS) as an interim measure. Overall carbon intensity has declined in recent years; however, grid congestion, complex permitting procedures, and nitrogen-emission constraints continue to create frictions at the project level (International Energy Agency [IEA], 2023; European Commission, 2023; Organisation for Economic Cooperation and Development [OECD], 2023).

4.3.1 Governance and Policy Implementation

Dutch implementation of EU energy and climate legislation demonstrates a combination of high administrative capacity, institutionalised coordination, and regionalised delivery mechanisms. Governance is anchored in the Climate Act and Climate Agreement, which provide legally binding national targets and cross-sectoral coordination. The SDE++ scheme functions as the principal market-based instrument, supporting cost-effective emission reductions across technologies including renewables, CCS, hydrogen, and industrial electrification. Oversight of markets and networks is exercised by the Authority for Consumers and Markets (ACM), while the transmission system operator TenneT manages and plans the national high-voltage grid.

Applying the three-phase EU implementation lens – transposition, application, and enforcement (Treib, 2014; Falkner et al., 2005) – reveals both strengths and structural tensions in Dutch energy governance.

Transposition: The Netherlands has consistently demonstrated timely and comprehensive transposition of key EU directives (e.g., RED II/III, ETS/ETS2, EED, and electricity market design). These instruments have been embedded through the Climate Act, sectoral legislation, and the updated National Energy and Climate Plan (NECP). Strategic frameworks such as the Multi-Year Offshore Wind Roadmap and the North Sea Energy Outlook further align domestic targets with European corridors under the TEN-E Regulation and the REPowerEU agenda.

Application: Policy delivery is coordinated yet differentiated across sectors. Offshore wind development benefits from long-term spatial planning, state-led offshore grid connections, and predictable tendering procedures, resulting in internationally competitive levelised costs. Conversely, onshore renewables face delays linked to permitting workloads, nitrogen-emission constraints (Natura 2000), and congestion in distribution networks that impede the rollout of photovoltaics, EV-charging infrastructure, and heat pumps. The Regional Energy Strategies (RES) have strengthened procedural legitimacy and local ownership, but uneven municipal capacity and limited spatial availability continue to generate variation in implementation outcomes across provinces.

Enforcement: Central monitoring and compliance mechanisms are comparatively strong. Annual Climate Memoranda and assessments by the Netherlands Environmental Assessment Agency (PBL) provide systematic tracking of progress. Nonetheless, enforcement bottlenecks persist where planning law, environmental assessments, and judicial appeals extend project timelines. Recent legislative amendments introducing streamlined permitting and congestion management instruments seek to address these barriers while remaining consistent with EU environmental acquis.

Overall, subsidiarity functions both as an asset – enhancing local legitimacy through RES governance and municipal heat planning – and as a constraint, diffusing accountability when national acceleration targets intersect with local spatial or environmental limits. In intergovernmentalist terms, the Dutch case exemplifies a system of high formal capacity but coordination frictions at the subnational interface, illustrating the type of implementation gap identified in the analytical framework.

4.3.2 Economic Outcomes and Trade Balances

Economically, the Netherlands is shifting from gas-anchored advantages toward an offshore-wind-plus-hydrogen growth model while trying to preserve its role as a North-West European energy hub. Key patterns:

Trade and security: The gradual phase-out of Groningen and diversification of gas supply (notably LNG expansion in Eemshaven/Rotterdam) reduced seismic risk and Russian exposure, while offshore wind and interconnection enhance resilience. Import dependence for fossil fuels still matters, but renewables plus cross-border power trade cushion price shocks more than in highly import-dependent Southern cases.

Industrial competitiveness: Dutch industry (chemicals, refining, fertilisers, metals, food) is energy-intensive yet innovation-active. EU instruments (ETS, CBAM, Innovation Fund), national carbon floor, and SDE++ support are pushing electrification, CCS (e.g., Porthos in Rotterdam), and green hydrogen pilots tied to offshore wind. The Port of Rotterdam's ecosystem (electrolysers, import terminals, pipeline backbones) underpins competitive positioning in future hydrogen/ammonia corridors.

Costs and congestion: Short-term headwinds include high electricity prices during 2021–2022, network tariffs, and – critically – grid congestion that imposes curtailment risks and connection queues, especially in PV-heavy regions. These factors pressure SMEs more than multinationals (who can access tailored contracts and exemptions), echoing your equity lens inside an otherwise strong macro picture.

Net result: relative to Italy and Greece, the Netherlands converts EU policy into exportable capability (offshore wind, ports, system integration, hydrogen/CCS services). Relative to Denmark, it scales faster in industrial decarbonisation hubs but faces tighter spatial and legal constraints onshore. The trade balance improves as imported fossil exposure declines and clean-tech value chains deepen – conditional on easing grid bottlenecks (IEA 2023, European Commission, OECD 2023)

4.3.3 Structural and Industrial Adjustments

Dutch structural adjustment focuses on system integration, linking large-scale offshore wind capacity with onshore grids, industrial clusters, storage, and cross-border interconnectors (IEA, 2023; European Commission, 2023). Multi-gigawatt offshore wind zones and TenneT's offshore grid – featuring standardised platforms and planned hybrid interconnectors – anchor the supply side (TenneT, 2024). Onshore, transmission and distribution upgrades, together with digital congestion-management tools, are essential to enable electrification across transport, heating, and industry (ACM, 2023; TenneT, 2024).

The Hydrogen Backbone, electrolysers at Maasvlakte and Eemshaven, and import terminals for ammonia and LOHC are designed to serve refineries, chemical plants, and steel production (Port of Rotterdam Authority, 2024; European Commission, 2023). The Porthos CCS project offers short-term abatement for process emissions while green hydrogen capacity scales up – consistent with the SDE++ principle of achieving "the most CO_2 reduction per euro invested" (RVO, 2023).

In the built environment, the expansion of heat pumps, district heating, and local heat-transition plans reflects EU building-efficiency directives, though progress is constrained by installer shortages and ownership barriers (OECD, 2023; PBL, 2023). The main bottleneck remains netcongestie: despite record investment plans, grid expansion is slowed by permitting and nitrogen rulings (TenneT, 2024; ACM, 2023). The state has introduced priority rules, curtailment contracts, and accelerated procedures for critical projects (Ministry of Economic Affairs and Climate Policy, 2024). Overall, the Netherlands illustrates a cluster-based decarbonisation strategy – concentrating infrastructure where industrial scale and port access coincide, thereby translating institutional capacity into compliance and competitiveness.

4.3.4 Policy Harmonisation and Social Equity

In terms of equity, the Dutch approach performs well on procedural transparency, predictable policy instruments such as SDE++, and targeted compensation schemes, yet it also reveals distributional and territorial frictions typical of dense, high-cost energy systems.

Procedural and territorial equity. The Regional Energy Strategies (RES) process gives municipalities and regions a formal role in renewable siting decisions, enhancing procedural legitimacy but leading to uneven outcomes where local administrative capacity, civic preferences, or spatial constraints are binding. Ports and industrial regions benefit from accelerated infrastructure delivery, whereas rural and suburban areas face longer grid-connection queues, an intra-state disparity relevant to the EU's cohesion and just transition objectives (European Commission, 2023; PBL, 2023).

Affordability and energy poverty. Temporary household rebates, lower energy taxes for low-consumption brackets, and energy-efficiency subsidies cushioned households during the 2021–2022 energy price spike (OECD, 2023; IEA, 2023). Nonetheless, renters and low-income households in poorly insulated dwellings continue to face higher energy burdens due to split incentives and high upfront renovation costs. National retrofitting programmes exist but must scale more rapidly to align with the intent of the EU Social Climate Fund and the Energy Performance of Buildings Directive revisions (European Commission, 2023).

Just transition for industry and labour. Industrial decarbonisation in clusters such as Rotterdam, Moerdijk, and Zeeland can safeguard high-value employment if transition financing, network investments, and skills programmes evolve in step. However, small and medium-sized suppliers remain vulnerable to margin pressures arising from high electricity prices and grid delays (OECD, 2023; Port of Rotterdam Authority, 2024). In this context, equity depends on sequencing: building networks and flexibility mechanisms first, and tightening performance mandates only once the enabling infrastructure is in place.

EU harmonisation: Dutch alignment with REPowerEU is strong, particularly regarding offshore wind acceleration, hydrogen corridors, and permitting reform. Remaining bottlenecks are primarily administrative (permitting throughput) and physical (grid capacity). Bridging instruments such as priority permitting, one-stop shops, standardised technical designs, and flexibility markets appear most effective in aligning national implementation with EU objectives while maintaining local legitimacy (European Commission, 2023; ACM, 2023; TenneT, 2024).

The Netherlands illustrates how a high-capacity, industry-dense member state can translate EU policy frameworks into scalable clean-energy infrastructure and competitive industrial pathways, provided the state continues to address grid congestion, permitting delays, and distributional pressures. This case complements Denmark's early-mover trajectory and contrasts with Italy's and Greece's import-dependence profiles – directly reinforcing this study's comparative hypothesis on institutional capacity as a mediator of policy outcomes.

4.4. Case 3 Italy: Potential in Solar Energy, but Facing Structural Barriers

Italy's experience with the European energy transition reveals both progress and persistent vulnerabilities. While the country has made notable strides in expanding solar photovoltaic (PV) capacity and embracing elements of the European Green Deal, its structural energy dependence, high electricity costs, and fragmented governance continue to pose major challenges.

Unlike Denmark and Sweden, whose transitions were built upon early investments in domestic renewable resources, Italy remains one of the most fossil fuel-dependent economies in the EU, importing over 75% of its energy needs as of 2022 (IEA, 2023). The country's reliance on imported natural gas, particularly from Russia, Algeria, and Libya, left it acutely vulnerable during the 2021–2022 energy crisis (European Commission, 2023).

While Italy's solar energy sector has grown significantly, systemic barriers – particularly related to grid infrastructure, permitting complexity, and regulatory instability – have constrained the country's ability to fully capitalize on its renewable energy potential.

4.4.1. Governance and Policy Implementation

Italy's energy governance exemplifies the challenges of implementing ambitious EU energy policy in a context of fragmented institutions, political instability, and regional asymmetries. While Italy formally aligns with the European Green Deal, Fit-for-55, and REPowerEU, the pathway from legal transposition to effective implementation remains inconsistent and uneven across the country's multilevel governance system.

Using Treib's (2014) three-stage framework of policy transposition, application, and enforcement, Italy demonstrates chronic slippage between formal compliance and substantive delivery. The country has transposed major EU directives, such as RED II and the Governance Regulation, into national legislation, primarily through the National Energy and Climate Plan (PNIEC) and recent updates from the Ministry for the Environment and Energy Security. However, frequent legal amendments, bureaucratic reshuffling, and retroactive regulatory changes have weakened legal certainty. The earlier rollback of solar PV feed-in tariffs under the Conto Energia scheme continues to cast a shadow over investor confidence (Tagliapietra & Zachmann, 2022; European Commission, 2023a).

In application, Italy suffers from significant regional disparity. National ministries and regulatory agencies share implementation responsibilities with 20 regions, each with varying administrative capacity. While advanced regions like Emilia-Romagna have embraced decarbonization with structured permitting and planning frameworks, southern and island regions continue to face delays due to overlapping competencies, unclear timelines, and chronic under-resourcing (Garrone et al., 2021; Court of Auditors, 2023). The resulting administrative backlog has led to stalled renewable energy projects: as of 2022, over 50% of permitted solar PV capacity remained unconnected to the grid (IEA, 2023).

Enforcement mechanisms are similarly strained. Regulatory oversight is spread across ARERA (the national regulator), Terna (the transmission operator), and regional permitting bodies, but inter-agency coordination remains weak. Institutional turnover, six different governments since

2016, has also hampered continuity in climate and energy strategy, leaving core transition mechanisms vulnerable to politicization and delay (OECD, 2023; Simonetti, 2022).

Italy's governance architecture is formally compatible with the subsidiarity principle enshrined in Article 194 TFEU. Yet unlike Denmark or Sweden – where subsidiarity is supported by coherent coordination structures and strong subnational administrative capacity – Italy's decentralization tends to exacerbate territorial inequality. Regional autonomy over energy planning has enabled pockets of innovation, but in the absence of a strong national coordination mechanism, it often leads to policy fragmentation and inconsistent implementation. Research on policy coherence highlights how Italy's fragmented multilevel governance undermines integration across sectors and scales (Candel & Biesbroek, 2016). Moreover, the European Environment Agency (2022) reports substantial regional disparities in energy efficiency, infrastructure, and implementation of the Green Deal, particularly between North and South, which further limits Italy's ability to meet EU targets on resilience, renewables, and cohesion.

Italy's implementation challenges are thus not rooted in outright resistance to EU climate goals, but in a failure to align institutional complexity with the speed and scale of the green transition. Without deeper integration between central and regional governance structures, Italy risks falling further behind on key EU benchmarks, despite having the formal legal and policy frameworks in place.

Recent scholarship highlights that Italy is not merely a case of sluggish implementation but also of active policy retrenchment. Prontera (2021) shows that Italy, once among the EU's leading countries in renewable capacity – especially solar PV – underwent a systematic dismantling of its RES-E support schemes between 2010 and 2014. This reversal was driven by a combination of flawed policy design, unanticipated financial burdens, political framing, and macroeconomic stressors. Overgenerous feed-in tariffs, poor cost control, and a surge in PV investments led to a political backlash, culminating in retroactive cuts and weakened investor confidence. The dismantling process was further enabled by changing political coalitions, framing of renewables as costly burdens during the economic crisis, and limited institutional resistance. These dynamics underscore the role of policy feedback and self-undermining mechanisms in eroding political support for the green transition – despite formal legal compliance with EU targets.

Italy's limited progress in energy policy implementation is not simply the result of weak institutions or political resistance. As Capano & Lippi (2021) argue, policy failure in Italy often arises from a surplus of institutions without clear functional coordination. Their analysis shows that even when individual subsystems (e.g., energy, environment, planning) possess high administrative capacity, they frequently operate in silos, with weak horizontal integration and limited political steering. This "fragmented complexity" leads to inconsistent goal-setting, overlapping mandates, and delays in execution – particularly visible in multi-level governance contexts like the implementation of EU energy directives. In the energy transition space, this results in a paradox: the formal capacity to comply exists, but the design coherence necessary to deliver is lacking.

These institutional challenges are mirrored in Italy's energy policy discourse and public engagement practices. Sarrica et al. (2017) analyse national parliamentary debates, regional energy planning documents, and municipal energy strategies, revealing a fragmented and often top-down vision of sustainability transitions. Their findings show that at the national level, citizens are frequently framed as passive or uninformed, which undermines opportunities for participatory governance. Regional energy plans (PEARs) vary significantly in scope and coherence, reflecting uneven capacity and ambition. At the local level, however, municipalities such as Narni (Umbria) demonstrate more inclusive and context-sensitive approaches, with greater integration of social values into energy planning. This dissonance between national rhetoric and local practice highlights a form of discursive misalignment – where formal climate ambitions coexist with limited structural support for democratic engagement. Such dynamics reinforce the argument that Italy's governance model is constrained not only by institutional fragmentation but also by weak frameworks for social inclusion in the implementation of EU energy directives.

4.4.2. Economic Outcomes and Trade Balances

Italy's economic response to EU energy policies reflects a complex mix of underutilized potential and structural constraints. While the country has made notable gains in renewable energy capacity, particularly in solar photovoltaics (PV), these advances have not yet translated into broader industrial competitiveness or trade resilience. The disconnect between installed capacity, industrial upgrading, and macroeconomic benefit underscores Italy's deeper challenges in aligning climate ambition with long-term economic strategy.

The energy trade balance remains a major vulnerability. As of 2022, Italy imported over 75% of its primary energy, spending an estimated €30 billion on fossil fuels (European Commission, 2023a). This high dependency exposes the economy to global energy price shocks, a risk made explicit during the energy crisis triggered by Russia's invasion of Ukraine. Despite its renewable potential, Italy's inability to significantly reduce fossil fuel imports indicates limited progress in energy sovereignty compared to peers like Denmark or Sweden (IEA, 2023).

Italy has made substantial progress in solar deployment: with over 25 GW of installed photovoltaic (PV) capacity by 2022, it ranks among the top EU member states (Eurostat, 2023). However, this expansion has not been matched by the development of a competitive domestic manufacturing base or renewable technology export sector. The early momentum generated by the Conto Energia incentive scheme (2005–2013) was undermined by abrupt policy reversals and retroactive feed-in tariff reductions, which severely curtailed investor confidence in solar manufacturing and R&D (Tagliapietra & Zachmann, 2022; Lucchese & Pianta, 2020).

As a result, Italy's renewable sector remains heavily dependent on foreign technology suppliers and project developers, with limited domestic value creation. According to Legambiente (2023), over 70% of PV installations in 2022 relied on imported panels and inverters, highlighting the structural weakness of Italy's green industrial strategy. This stands in contrast to countries such as Germany and Denmark, where the energy transition has spurred export growth, technological specialization, and the development of robust clean-tech ecosystems.

Moreover, high electricity costs remain a persistent drag on Italy's industrial competitiveness. As of 2023, Italian industrial electricity prices were among the highest in Europe, particularly for small and medium enterprises (SMEs) in energy-intensive sectors such as steel, chemicals, and ceramics (OECD, 2023; ARERA, 2023). Although some firms benefit from partial exemptions, the overall energy cost burden has constrained green reindustrialization and reduced the attractiveness of Italy as a destination for clean tech investment.

Recent efforts under the REPowerEU framework and the National Recovery and Resilience Plan (PNRR) have begun to target these economic bottlenecks. Approximately €23 billion in PNRR funding has been earmarked for energy transition projects, including support for grid modernization, green hydrogen, and offshore wind development (European Commission, 2023b). However, implementation delays and administrative bottlenecks have slowed the macroeconomic impact of these investments.

The green hydrogen sector is one area with significant potential. Italy's national hydrogen strategy, updated in 2022, targets 5 GW of electrolysis capacity by 2030, with early projects in Sardinia, Sicily, and Apulia. Yet analysts caution that without stable regulatory frameworks and clear market incentives, the sector risks underperforming (Cagnin et al., 2023).

Overall, Italy's economic outcomes under EU energy policy remain mixed. While renewable deployment has accelerated, industrial transformation and trade resilience have lagged. The country's experience illustrates the limits of capacity expansion without parallel investment in industrial strategy, supply chain localization, and energy cost reform. Unless these dimensions are addressed through coordinated national and EU-level interventions, Italy risks remaining a consumer rather than a producer in the European green economy.

4.4.3. Structural and Industrial Adjustments

Italy's structural transformation under EU energy policy has combined ambitious planning with persistent implementation barriers. Although the country benefits from exceptional solar resources and a rapidly expanding pipeline of renewable projects, these advantages are undermined by constraints in grid infrastructure, permitting, and industrial capacity. As a result, Italy continues to face difficulties in translating EU directives into a deep and systemic energy transition.

Renewable deployment has accelerated in recent years – particularly in solar photovoltaics (Eurostat, 2023) – yet integration into the national energy system remains inefficient. The transmission network, operated by Terna, is characterised by aging infrastructure, regional imbalances, and limited interconnection between northern demand centres and southern generation zones. This mismatch results in frequent curtailment during peak production periods in the south, where solar potential is highest but grid capacity weakest (IEA, 2023).

Permitting and administrative barriers further weaken structural adaptation. Large onshore-wind and utility-scale solar projects often face delays of three to five years due to complex multi-level approval chains involving environmental, regional, and municipal authorities (European Commission, 2023). The absence of a unified digital permitting portal compounds fragmentation. Although the REPowerEU package and Italy's updated Piano Nazionale Integrato per l'Energia e il Clima (PNIEC) aim to streamline approval procedures, legislative simplifications have not yet translated into consistent on-the-ground reform.

Industrial adjustment has likewise been uneven. Italy's manufacturing sector hosts leading firms in power electronics, energy storage, and smart-grid technologies, mainly in the north, but these capacities remain weakly connected to national renewable expansion. The solar supply chain, for example, remains fragmented, with over 70 percent of components imported and limited vertical integration or domestic module production (Legambiente, 2023). Efforts to relaunch solar manufacturing under the EU's Important Projects of Common European Interest

(IPCEI) initiative, announced in 2021, have so far been underfunded and administratively stalled.

The gas sector remains structurally dominant. Italy's extensive fossil infrastructure – LNG terminals, pipelines, and gas-distribution networks – continues to attract investment, reinforcing carbon-lock-in risks. While diversification away from Russian gas under REPowerEU has prompted new LNG capacity, long-term investment in fossil infrastructure risks diverting resources from electrification and renewable integration (Cagnin et al., 2023).

Emerging sectors such as green hydrogen show potential but remain at an early stage. Italy's Hydrogen Strategy (2022) sets a goal of 5 GW of electrolysis by 2030; however, the lack of industrial clusters, skilled labour, and domestic electrolyser production renders this target highly ambitious. Pilot projects in Apulia and Sardinia, financed through PNRR funds, provide valuable demonstrations but remain small-scale and disconnected from broader industrial strategies (ENEA, 2023).

Digitalisation and smart-grid deployment have progressed moderately. Italy's smart-meter penetration ranks among the highest in the EU, yet second-generation installations remain uneven, and the potential for demand-side flexibility and dynamic pricing is largely untapped (ARERA, 2023). Planned grid-modernisation investments under the PNRR could strengthen system resilience, though administrative backlogs have delayed implementation – especially in the southern regions.

Overall, Italy's energy transition remains constrained by a lack of alignment between national planning, local execution, and industrial policy. The focus on quantitative capacity targets in both national and EU strategies has not been matched by structural reforms or domestic supply-chain development. Without accelerated investment in grid modernisation, streamlined permitting, and deeper technology integration, Italy risks remaining structurally constrained in achieving its climate commitments and broader economic-modernisation goals.

4.4.4. Policy Harmonization and Social Equity

Italy's energy transition presents a stark case of structural imbalances in policy harmonization and social equity. While the country formally supports the EU's vision of a just and inclusive green transition, its implementation reflects persistent regional inequalities, weak support mechanisms for vulnerable groups, and a fragmented social governance model. These challenges complicate the alignment between Italy's national energy strategy and the EU's cohesion and equity principles, particularly as codified under the European Green Deal and the Just Transition Mechanism.

Territorial disparities remain a defining feature of Italy's transition: Northern regions, such as Lombardy and Emilia-Romagna, possess stronger administrative capacity, more mature renewable markets, and higher public investment absorption rates. In contrast, the Mezzogiorno continues to face structural economic disadvantages and lacks the administrative infrastructure needed to deploy EU funds effectively. According to the Italian Court of Auditors (2023), less than 40% of allocated green investment funds from the Recovery and Resilience Plan (PNRR) had been committed in southern regions as of mid-2023. This uneven absorption exacerbates long-standing gaps in public service delivery, infrastructure, and energy access.

Social equity concerns also emerge in the domain of energy poverty: Italy has one of the highest rates of energy poverty in Western Europe, affecting approximately 9–11% of households, especially in the south and among renters, elderly populations, and the unemployed (Bank of Italy, 2023). Yet Italy lacks a coordinated national strategy to address energy poverty. Measures such as the social bonus for electricity and gas bills have been reactive and limited in scope, failing to address structural causes such as housing inefficiency, inadequate insulation, and lack of access to renewables (Bouzarovski & Thomson, 2021).

Although Italy is a major beneficiary of the EU's Just Transition Fund, the targeting of funds has been primarily driven by emissions data rather than vulnerability metrics. This has raised concerns about whether the allocation mechanism sufficiently considers intra-regional inequalities and local absorptive capacity. Projects in coal-phase-out regions such as Sulcis Iglesiente and Taranto aim to address employment impacts, but face delayed implementation, limited stakeholder involvement, and unclear exit strategies for affected workers (ENEL Foundation, 2022; European Commission, 2023).

Public engagement and procedural justice also reveal important gaps: While some urban areas have advanced participatory planning mechanisms, national climate policy remains largely technocratic, with limited civil society consultation. Italy's National Energy and Climate Plan (PNIEC) update process has been criticized for insufficient transparency and lack of inclusive dialogue with trade unions, local governments, and environmental justice groups (Euractiv, 2023). In this context, the principle of subsidiarity, intended to tailor EU goals to local realities, has not been adequately translated into meaningful participation or community empowerment.

Furthermore, regional resistance to renewable energy infrastructure, particularly wind farms and transmission lines, reflects growing tensions around land use, distribution of benefits, and local consent. In some areas, municipalities have blocked renewable projects due to perceived external control and lack of financial returns for local communities. This indicates a broader failure to design equitable benefit-sharing mechanisms that could foster social license and local ownership, as seen in Denmark's cooperative wind model.

Ultimately, Italy's experience highlights that legal compliance with EU energy policy is insufficient to guarantee social equity. Without a strategic framework to tackle energy poverty, boost regional coordination, and promote inclusive governance, the energy transition risks deepening rather than correcting existing inequalities. For Italy to align with the EU's fair transition agenda, equity must become a structural dimension of energy policy, integrated into investment design, institutional reform, and community participation at every level of governance.

4.5. Case 4: Greece: Structural Constraints and the Challenges of Energy Transition

Greece's path toward energy transition unfolds within a context of persistent structural vulnerabilities, economic fragility, and institutional constraints. Despite significant renewable energy potential, particularly in solar and wind, Greece remains heavily reliant on fossil fuel imports, predominantly natural gas and oil. The legacy of the 2009–2015 financial crisis, combined with weak administrative capacity and inconsistent regulatory frameworks, has severely slowed Greece's alignment with EU energy policy objectives (IEA 2023).

While recent initiatives, including the National Energy and Climate Plan (NECP 2019) and Recovery and Resilience Facility (RRF) projects, aim to accelerate decarbonization, Greece continues to lag behind more advanced member states such as Denmark and Sweden in renewable energy integration, policy implementation efficiency, and industrial competitiveness

4.5.1 Governance and Policy Implementation

Greece's governance capacity in implementing EU energy policy is shaped by institutional fragmentation, political volatility, and chronically low administrative bandwidth. Despite aligning on paper with major EU climate frameworks, such as the European Green Deal and Fit-for-55, Greece has struggled to deliver consistent, timely, and credible policy execution. This gap between formal compliance and functional governance highlights the country's broader difficulties in translating EU directives into effective national outcomes.

Applying Treib's (2014) three-phase model of implementation, transposition, application, and enforcement; Greece has shown recurring delays and inefficiencies at each stage. Transposition of key directives, such as the Renewable Energy Directive II (RED II), was not completed until 2022, well past the initial EU deadline. This delay placed Greece among the lowest-performing member states in legal compliance, despite having publicly committed to ambitious targets under its National Energy and Climate Plan (NECP) and the Recovery and Resilience Facility (European Commission, 2023).

In the application phase, Greece faces systemic obstacles. The coordination between national ministries, the Regulatory Authority for Energy (RAE), regional governments, and independent agencies is weak and inconsistent. Project permitting for renewable energy, especially large-scale solar and wind, remains among the slowest in the EU, with average approval times of five to six years (IEA, 2023). These delays stem from overlapping jurisdictions, insufficient digitalization, and limited staff capacity within regional administrations. Although recent efforts under the REPowerEU framework aim to simplify permitting, their implementation has so far lacked clear timetables and institutional accountability.

Enforcement is similarly undermined by fluctuating political will and an under-resourced regulatory apparatus. Greece has faced multiple infringement proceedings for failing to meet EU energy efficiency and environmental performance benchmarks, including under the Effort Sharing Regulation. The enforcement deficit is not limited to legal compliance but extends to a broader inability to ensure effective fund allocation, project monitoring, and policy continuity (European Commission, 2023). These issues have been compounded by frequent government turnover and institutional resets, which disrupt long-term planning and deter private investment (OECD, 2023).

Although the subsidiarity principle theoretically allows member states to tailor EU objectives to national contexts, its practical application in Greece has proven problematic. Governance remains formally centralized, yet the operational execution of energy and climate policy is fragmented and inconsistently coordinated. This mismatch has led to regional disparities in renewable deployment and limited participation of local governments in energy planning. In contrast to Denmark's decentralized but coherent system, Greece's fragmented governance model creates delays and duplication rather than flexibility (Knill & Lenschow, 1998; EEA, 2022).

Furthermore, the legacy of the financial crisis has left Greece with diminished state capacity, ongoing austerity constraints, and low public trust in institutional leadership – factors that continue to erode the legitimacy and efficacy of energy transition policies. While the NECP targets a 70% renewable electricity share by 2030, without deeper administrative reforms and intergovernmental coordination, these ambitions risk remaining aspirational rather than operational.

Greece's case illustrates a broader lesson for EU policy: institutional coherence and administrative depth are as vital to the success of the energy transition as the technical or financial inputs. Without resolving internal governance bottlenecks, even the most promising resource base or funding package may fail to deliver equitable or sustainable outcomes.

4.5.2. Economic Outcomes and Trade Balances

Greece's economic trajectory under EU energy policy remains constrained by high energy import dependency, limited industrial upgrading, and structural imbalances in trade. While recent EU funding instruments have sought to support decarbonization and resilience, their economic impacts have so far been uneven and largely unrealized. These conditions expose the disconnect between climate ambition and national economic transformation in structurally weaker member states.

Greece's energy import dependency exceeds 80%, among the highest in the EU, and remains a persistent source of macroeconomic vulnerability. In 2022, fossil fuel imports accounted for more than 15% of Greece's total imports, contributing significantly to the trade deficit (Bank of Greece, 2023; Eurostat, 2023). This exposure to volatile international markets, particularly gas imports from Russia and LNG from Algeria and the US, intensified during the 2021–2022 energy crisis, putting acute pressure on public finances and energy-intensive firms (IEA, 2023).

While renewable energy deployment has increased, especially solar PV and onshore wind – Greece has not leveraged this expansion to strengthen its industrial base. The domestic renewable sector remains highly dependent on imported technology, foreign developers, and limited economies of scale. According to the Hellenic Association of Photovoltaic Companies (HELAPCO, 2023), more than 80% of installed solar equipment is imported, with minimal local manufacturing or integration into high-value supply chains. This has limited the capacity of the green transition to generate sustained industrial growth, employment, or export competitiveness.

Electricity prices in Greece remain among the highest in the EU for both households and industrial consumers, despite modest government subsidies and EU crisis support mechanisms. High energy costs reduce the competitiveness of Greece's manufacturing sector, particularly in chemicals, basic metals, and food processing, where energy intensity is high and profit margins are low (OECD, 2023). Even before the energy crisis, industrial users in Greece faced electricity costs up to 25% higher than the EU average, a gap that has only partially narrowed with the introduction of temporary compensatory schemes.

The Recovery and Resilience Facility (RRF), part of Greece's National Recovery Plan "Greece 2.0," earmarks €6.2 billion for green transition objectives, including investments in grid upgrades, storage, building retrofits, and smart infrastructure (European Commission, 2023). However, by late 2023, less than one-third of this funding had been contracted, and actual disbursement was significantly delayed due to administrative inefficiencies and legal uncertainty in procurement procedures (Court of Auditors, 2023). The economic multiplier effects of these funds, such as job creation and SME participation, have thus remained modest.

Some initiatives offer cautious optimism. Investment interest in green hydrogen production, especially in Western Macedonia and Thrace, both designated Just Transition Fund regions, has increased. Projects like "White Dragon," which proposes the creation of hydrogen hubs linked to lignite phase-out regions, aim to stimulate new industrial ecosystems. Yet most projects remain in the feasibility stage, and Greece lacks the technological and financial ecosystems to scale hydrogen production competitively (Poulou & Gemenetzi, 2023).

Overall, Greece's economic outcomes under the EU energy transition are defined more by missed opportunities than transformative gains. High import dependency, weak industrial policy, and delayed fund absorption have limited the ability of EU policy to generate lasting economic competitiveness. While Greece has avoided the worst-case scenarios of energy supply disruption, its structural reliance on external energy and capital continues to constrain a truly endogenous green growth path. Without a coordinated industrial strategy, energy cost reform, and regional supply chain integration, the country's energy transition will struggle to deliver the promised economic dividends of the EGD.

4.5.3. Structural and Industrial Adjustments

Greece's structural capacity to implement EU energy policy is limited by legacy infrastructural deficits, administrative underdevelopment, and a fragile industrial base. Despite its abundant solar and wind potential, the country's energy system remains ill-equipped to support large-scale decarbonization, with uneven deployment of renewable technologies and systemic delays in grid modernization. These constraints hinder not only national implementation of Fit-for-55 and REPowerEU objectives, but also Greece's broader ability to structurally adapt to a low-carbon economy.

Solar and wind energy growth has been notable in headline terms: By 2022, solar PV accounted for approximately 9% of electricity generation, and wind for roughly 20% (Eurostat, 2023). However, structural bottlenecks persist in the integration of these technologies into the national grid. In many cases, variable renewable energy sources are curtailed due to transmission congestion, particularly in rural and insular areas such as the Aegean Islands and Western Macedonia (IEA 2023). These curtailments are symptomatic of aging and insufficiently digitized grid infrastructure.

The Greek Independent Power Transmission Operator (IPTO/ADMIE) initiated a National Grid Expansion and Digitalization Strategy in 2022, supported by the Recovery and Resilience Facility and EU Cohesion Funds. Yet implementation has been slow, constrained by procurement bottlenecks, lack of skilled labor, and local opposition to new substations and overhead lines (European Commission, 2023; IPTO, 2023). As of early 2024, grid investments remained significantly behind schedule, raising concerns about the feasibility of the country's 2030 electrification targets.

Structural adjustments are further constrained by the underdevelopment of domestic supply chains. Greece lacks significant production capacity for wind turbine components, PV panels, battery storage systems, or smart grid technologies. Instead, the energy transition has relied heavily on imported technologies and foreign developers, with limited industrial spillovers or opportunities for local SMEs (HELAPCO, 2023). This has inhibited the emergence of green clusters or innovation ecosystems comparable to those in Northern Europe.

The lignite phase-out, while central to Greece's decarbonization strategy, has introduced deep structural disruptions in regions historically dependent on coal, notably Western Macedonia and Megalopolis. Ziouzios et al. (2021) show that the strategy, launched in 2019, relied heavily on large-scale solar PV and natural gas as replacement technologies, but lacked integration with regional industrial development or job-creation strategies. Many planned investments remain disconnected from local supply chains, and the rollout of support measures under the Just Transition Development Plankaramouziss (JTDPs) has been slow and uneven. Community engagement has been limited, and there is growing concern that the transition will replace one form of economic dependency (on lignite) with another (on imported technologies and centralized infrastructure). These dynamics reflect broader concerns about temporal mismatches, limited institutional coordination, and weak absorptive capacity in lignite regions. Despite the availability of EU Just Transition Funds, the structural shift remains incomplete and risks exacerbating regional inequality if not paired with robust socio-economic planning and capacity-building.

Energy efficiency in buildings and transport remains another weak link: Greece's building stock is among the oldest and least efficient in the EU, yet large-scale retrofitting remains elusive due to fragmented policy instruments, administrative overload, and insufficient incentives for lower-income households (Bank of Greece, 2023). The "Exoikonomo" program, a flagship energy efficiency scheme, has experienced repeated delays in fund disbursement, raising doubts about its ability to deliver structural improvements at scale.

Digital and smart infrastructure development is at an early stage: While the rollout of smart meters is underway through the Hellenic Electricity Distribution Network Operator (HEDNO), progress has lagged behind EU benchmarks, particularly in rural and island regions. As a result, demand-side flexibility, grid balancing, and data-driven energy management remain underdeveloped, further limiting system adaptability.

Beyond infrastructural and supply chain constraints, Greece's renewable energy transition has also been shaped by persistent financial and policy risks, which raise the cost of clean energy deployment. Angelopoulos et al. (2017) show that the weighted average cost of capital (WACC) for wind and solar investments in Greece ranged between 12–13.5% in the mid-2010s – among the highest in the EU. This elevated risk was attributed to unstable remuneration schemes, retroactive policy changes (such as tariff revisions), and macroeconomic volatility. Although recent years have seen a shift toward competitive auctions and feed-in premiums, investor concerns around regulatory reliability and long-term bankability remain. Compared to Northern and Western European countries with more predictable frameworks, Greece's investment environment imposes a structural premium on renewables – slowing adoption and compounding the country's broader industrial and infrastructural challenges.

In sum, Greece's structural and industrial adjustments remain in a formative phase. Although political commitments and funding flows are in place, the country's transition infrastructure and industrial ecosystem remain insufficiently prepared to deliver systemic change. Without accelerated grid modernization, localized supply chain development, and targeted investment in affected regions, Greece's structural readiness to meet EU decarbonization targets will remain fundamentally constrained.

4.5.4. Policy Harmonization and Social Equity

Greece's path toward energy transition underscores the complexities of achieving policy harmonization and social equity within the European Union's decarbonization agenda. While formally aligned with EU objectives on fairness and cohesion, the national implementation of just transition principles has so far failed to adequately address regional disparities, procedural justice, and energy vulnerability. As a result, Greece illustrates the challenges of embedding equity not only in goals, but in governance and practice.

The transition away from lignite has had profound social consequences, particularly in regions like Western Macedonia and Arcadia, where coal-based economies have supported employment and local identity for decades. Although Greece receives significant support through the EU's Just Transition Fund, disbursement has been uneven, with project pipelines often poorly defined, lacking community participation, and marked by administrative fragmentation (ENEL Foundation, 2022; European Commission, 2023). Civil society groups and local stakeholders have criticized the top-down nature of the Just Transition Development Plans (JTDPs), warning that without stronger participatory mechanisms and capacity-building, regional distrust and resistance may intensify (Bruegel, 2020).

Energy poverty represents another critical area where social equity remains under-addressed. Greece consistently ranks among the EU countries with the highest levels of energy poverty, with over 15% of households unable to adequately heat their homes in winter or cool them in summer (Eurostat, 2023; Bank of Greece, 2023). This condition disproportionately affects rural residents, low-income renters, and pensioners, especially in areas with poor housing insulation and limited access to district heating or renewables. While targeted subsidies and electricity rebates have been introduced, they function as temporary relief rather than structural solutions. Greece lacks a comprehensive national energy poverty strategy, and its fragmented welfare administration hampers the consistent delivery of support.

These systemic shortcomings are underscored by national-level empirical research. Papada & Kaliampakos (2016), based on the first large-scale household energy poverty survey in Greece, found that 58% of households were energy poor in 2015–2016, and 75% reported reducing other basic needs to pay for energy. The study highlighted strong geographic and climatic disparities: households in mountainous and colder regions, as well as those living in detached homes, faced disproportionately high energy burdens. Despite the introduction of heating oil subsidies during the financial crisis, the authors argue that Greece's policy approach remained short-term and compensatory, lacking structural solutions related to building efficiency, clean heating access, or income stabilization. These findings reinforce the argument that energy poverty in Greece is not simply a temporary hardship, but a structurally embedded condition that requires more than subsidy-based responses.

The principle of policy harmonization has also been tested by regional implementation gaps. Urban areas like Athens and Thessaloniki have received a disproportionate share of energy transition resources, benefiting from stronger institutional capacity and easier access to funding mechanisms. In contrast, islands and mountainous regions, despite their high renewable potential, face persistent delays in infrastructure upgrades, digital connectivity, and public service delivery. This geographic imbalance runs counter to the cohesion goals embedded in EU climate policy and highlights the need for more territorially differentiated policy design.

Procedural justice has similarly suffered from weak public engagement in the planning and execution of energy projects. Environmental impact assessments and permitting procedures are often opaque, and community consent for large-scale wind farms has been limited or superficial. Several municipalities and residents' associations have opposed renewable developments due to concerns about land rights, visual intrusion, and lack of local economic benefits (Karyotis & Skleparis, 2022). These tensions reflect a deeper failure to incorporate mechanisms for fair benefit-sharing, revenue redistribution, or co-ownership, tools that have proven effective in fostering public support in other EU countries such as Denmark or Germany.

While the Greek government has made equity-related commitments in its National Energy and Climate Plan (NECP) and Recovery and Resilience Plan (RRP), actual implementation remains hindered by institutional inertia and fiscal constraints. Strategic alignment with EU goals has not been matched by national coordination across ministries, nor by strong monitoring and evaluation frameworks to assess the social impacts of energy policies. Without significant improvements in these areas, Greece risks entrenching existing inequalities even as it nominally progresses toward its climate targets.

In conclusion, Greece's energy transition reflects the urgent need to integrate social equity not only rhetorically but structurally into national climate governance. Bridging regional disparities, addressing energy poverty, and ensuring participatory governance are essential conditions for the credibility and sustainability of the transition. For Greece, and for the EU more broadly, policy harmonization must go beyond compliance to become a multidimensional framework for equitable transformation.

4.6. Comparative Findings & Discussion: Lessons for EU Policy Harmonization

This section responds directly to the central research question: How have EU energy policies around 2020 influenced the economic outcomes of energy-producing and energy-importing member states? By comparing Denmark, the Netherlands, Italy, and Greece across the four analytical dimensions defined in Chapter 3 – governance and policy implementation, economic outcomes and trade balances, structural and industrial adjustment, and policy harmonization and social equity – this chapter identifies the mechanisms that explain cross-national variation and assesses their implications for EU energy governance.

Across the four cases, Denmark and the Netherlands emerge as consistent frontrunners in translating EU energy policy into measurable economic and institutional success, while Italy and Greece illustrate the persistent challenges of fragmented governance and structural dependency. According to Eurostat (2023), renewables accounted for approximately 45 percent of Denmark’s gross final energy consumption and around 77 percent of its electricity generation in 2022, driven primarily by onshore and offshore wind. The country’s energy-import dependency of roughly 28 percent is one of the lowest in the Union, reflecting long-term investment in domestic renewables and high administrative coordination. Denmark’s participatory energy cooperatives, transparent regulation, and integrated tax framework enable it to convert EU decarbonisation goals into sustained competitiveness, technological leadership, and social legitimacy.

The Netherlands also demonstrates strong institutional capacity and adaptive industrial policy, though from a more fossil-intensive base. With around 19 percent renewables in gross final energy consumption and an import dependency of about 56 percent (Eurostat, 2023), it has rapidly expanded offshore wind, bioenergy, and emerging hydrogen corridors under the REPowerEU initiative. A corporatist and consensus-oriented governance model ensures efficient policy coordination and investment alignment across government, industry, and research institutions. The Port of Rotterdam has become a central node for hydrogen and carbon-capture infrastructure, illustrating how a late but concentrated transition strategy can reinforce competitiveness. Nonetheless, spatial planning limits and grid congestion remain key implementation challenges, signalling that even high-capacity states must balance policy ambition with infrastructural feasibility.

By contrast, Italy and Greece continue to face structural and institutional constraints. Italy's renewable share of about 20 percent and energy-import dependency exceeding 73 percent, and Greece's 23 percent renewables with approximately 81 percent import dependency (Eurostat; IEA, 2023), indicate persistent vulnerability to external energy shocks and price volatility. Both countries have expanded solar capacity – Italy through the Conto Energia incentive scheme and Greece via EU-funded grid modernisation – but remain hindered by administrative fragmentation, fiscal limitations, and delayed transposition of EU directives. These weaknesses reduce the effectiveness of national policy instruments and restrict the translation of EU targets into domestic economic gains. Industrial competitiveness in both cases remains constrained by high energy costs, limited innovation capacity, and dependence on imported technologies.

Patterns of social and territorial equity mirror these governance divides. Denmark demonstrates robust distributive and procedural justice through local ownership and redistributive energy taxation. The Netherlands ensures moderate inclusion via its Regional Energy Strategies, though affordability challenges for low-income households persist. Italy and Greece continue to grapple with energy poverty, uneven regional investment, and difficulties in absorbing Just Transition and Recovery Fund allocations. These disparities highlight that formal policy alignment does not automatically produce equitable outcomes; administrative capacity and deliberate redistributive design are essential to operationalise the EU's commitment to a fair and inclusive transition.

Four overarching lessons emerge from the comparative evidence.

First, governance quality remains the decisive determinant of policy success: decentralised and coordinated systems (Denmark, Netherlands) achieve consistent compliance, whereas fragmented or overly centralised administrations (Italy, Greece) struggle to implement complex directives.

Second, economic resilience relies on strategic industrial policy: countries that align renewable expansion with export-oriented innovation – particularly in wind, hydrogen, and clean-technology manufacturing – generate tangible trade and employment benefits.

Third, technological and infrastructural readiness conditions compliance: grid digitalisation, interconnection capacity, and permitting efficiency determine whether EU objectives translate into real progress.

Fourth, equity requires deliberate policy design: inclusive participation, targeted redistribution, and social-protection mechanisms are essential to maintain public legitimacy and political cohesion during the energy transition.

These findings align closely with theoretical expectations from intergovernmentalism and Europeanisation. As Moravcsik (1998) argues, national administrative autonomy and preference formation remain central to EU policy outcomes, while the worlds of compliance framework (Falkner et al., 2005) explains the divergence between Northern law-observant states and Southern "neglect" cases. The comparative results thus reaffirm that institutional capacity and policy coordination, rather than formal legislative uniformity, are the key determinants of effective Europeanisation in the energy sector.

At the policy level, the analysis suggests that uniform EU targets alone are insufficient to deliver cohesive outcomes. Differentiated implementation support is essential. For high-capacity member states such as Denmark and the Netherlands, EU efforts should prioritise cross-border energy integration, innovation scaling, and long-term market coupling. For more constrained states such as Italy and Greece, emphasis must shift toward administrative strengthening, grid investment, and social-protection frameworks that mitigate transition costs. Achieving the European Green Deal's dual goals – decarbonisation and cohesion – requires combining technical governance instruments with equity-oriented mechanisms that address uneven capacities across the Union.

While these conclusions are based on robust comparative evidence, they remain subject to the limitations inherent in available data and secondary-source dependence. Variations in national reporting standards, particularly regarding social indicators and post-2020 investment impacts, restrict precise cross-country quantification. Nevertheless, triangulation across Eurostat, IEA, OECD, and national policy sources ensures that the identified trends are empirically grounded and theoretically consistent.

In summary, the comparative analysis demonstrates that the effectiveness of EU energy policy depends less on legal uniformity than on the interaction between governance capacity, industrial adaptability, and social inclusion. Countries with resilient institutions and coordinated policy frameworks – Denmark and the Netherlands – translate EU energy objectives into economic opportunity and social stability, while those with weaker structures – Italy and Greece – face higher adjustment costs and slower progress. Strengthening policy harmonisation across the Union therefore requires a dual strategy: reinforcing administrative and technological capacity while embedding distributive justice at the heart of the European energy transition. These insights provide the foundation for the concluding synthesis in Chapter 5, which evaluates their implications for the future design of EU energy governance.

5. Synthesis and Conclusion

This chapter integrates the findings of the comparative analysis and evaluates them in light of the research question and theoretical framework. It shows that while EU energy policy has influenced national economic and structural trajectories, its effects have been profoundly mediated by domestic governance capacity, industrial structure, and institutional coherence. Where these align, EU policy becomes a catalyst for competitiveness and innovation; where they diverge, it risks entrenching dependency and uneven development. The evidence confirms the study's hypotheses and underscores a broader insight: Europe's energy transition hinges not on uniform regulation, but on adaptive, capacity-based integration.

5.1 Revisiting the Research Problem and Approach

Research Question:

How have EU energy policies at the turn of the decade influenced the economic outcomes of energy-producing and energy-importing countries within the EU, particularly regarding energy-dependency reduction, structural change, industrial competitiveness, renewable-technology integration, and governance efficiency?

The comparative analysis of Denmark, the Netherlands, Italy, and Greece demonstrates that EU energy policies have indeed shaped national outcomes – but the scale and quality of these impacts depend on domestic institutional capacity and governance coherence.

Both hypotheses are validated:

H1: High-capacity states with mature renewable infrastructures (Denmark, Netherlands) translate EU energy frameworks into economic and structural gains.

H2: Fossil-fuel-dependent states with weaker, less adaptive governance (Italy, Greece) face slower compliance, higher transition costs, and limited industrial transformation.

The study combined Ghauri & Firth's (2009) interpretive, multi-case approach with Yin's (2018) comparative design, guided by Falkner et al.'s (2005) worlds-of-compliance and Europeanisation theory (Börzel & Risse, 2012; Knill & Lenschow, 1998). This design sought not statistical generalisation but contextual understanding: to explain how EU policy outcomes emerge from the interaction between supranational ambition and national institutional realities.

5.2 Comparative Synthesis and Core Findings

Following the interpretive framework, which emphasises theory refinement through cross-case comparison, the analysis integrates results across the four analytical dimensions introduced in Chapter 3:

(1) Governance and Policy Implementation

Governance capacity proved decisive: Denmark and the Netherlands exemplify Falkner et al.'s "world of law observance": professional bureaucracies, coordinated multilevel planning, and high administrative trust ensure rapid transposition and effective enforcement (Sovacool & Enevoldsen, 2015; PBL, 2023).

Italy and Greece correspond to the "world of neglect": overlapping jurisdictions, frequent regulatory changes, and limited administrative bandwidth delay compliance (Treib, 2014; European Commission, 2023). The subsidiarity principle enhances adaptability in coherent systems but magnifies fragmentation where coordination is weak – confirming that policy uniformity cannot substitute for governance quality.

(2) Economic Outcomes and Trade Balances

Economic resilience mirrors governance strength.

Denmark's alignment of climate and industrial policy has produced a globally competitive wind sector generating major export and employment gains (IRENA, 2022). The Netherlands leverages its port-industrial clusters (Rotterdam, Eemshaven) to integrate offshore wind, hydrogen, and CCS into an export-oriented decarbonisation model (OECD, 2023). Italy's unstable incentive regimes under Conto Energia and Greece's dependence on imported technology curtailed domestic value creation (Tagliapietra & Zachmann, 2020). As Helm (2014) argues, stable, coherent frameworks – not resource endowments – explain who turns transition into competitiveness.

(3) Structural and Industrial Adjustments

Denmark demonstrates deep structural transformation: renewables supply most of its electricity, and projects such as the North Sea Energy Island illustrate overcapacity leveraged for regional export and resilience (Danish Energy Agency, 2022). The Netherlands follows a cluster-integration model linking offshore zones, industrial hubs, and hydrogen corridors, though grid congestion and nitrogen-related permitting still constrain pace (IEA, 2023). Italy and Greece remain hampered by outdated grids, limited storage, and fragmented planning, particularly in southern and island regions (European Commission, 2023; Siddi, 2020). These contrasts reveal that structural convergence at EU level requires not only legal alignment but infrastructural readiness and coordinated investment.

(4) Policy Harmonisation and Social Equity

Denmark embeds distributive and procedural justice through community co-ownership and redistributive taxation, ensuring legitimacy and public trust (Hvelplund et al., 2021).

The Netherlands institutionalises participation via its Regional Energy Strategies but faces equity gaps from grid congestion and higher costs for small consumers (Bouzarovski et al., 2021). Italy and Greece display higher energy poverty and regional inequality; limited absorptive capacity undermines equitable fund allocation (European Commission, 2023). Thus, technological ambition alone cannot secure a just transition – fairness and inclusion must be built into implementation mechanisms.

Cross-cutting synthesis: Across all four dimensions, institutional capacity and contextual alignment emerge as the main mediators of policy success. Denmark and the Netherlands convert EU directives into engines of resilience; Italy and Greece expose how fragmentation and fiscal weakness limit the benefits of integration. Effective Europeanisation therefore demands differentiated pathways tailored to national realities.

5.3 Theoretical and Policy Implications: Intergovernmentalism and Europeanisation Reconsidered

The evidence reaffirms Buchan's (2015) view that EU energy governance remains structurally intergovernmental under Article 194 TFEU. Implementation continues to depend on national governments, but outcomes vary with domestic capacity. In high-performing systems, flexibility supports innovation; in weaker systems, it amplifies asymmetry. Intergovernmentalism thus functions as a conditional framework shaped by institutional maturity.

This extends Europeanisation theory by showing that adaptation depends not merely on EU incentives but on administrative coherence and political inclusion (Börzel & Risse, 2012; Falkner et al., 2005).

From Compliance to Capacity-Based Integration

A uniform policy architecture cannot ensure equitable transitions. The findings call for a shift from compliance-based governance toward capacity-based integration, aligning ambition with feasibility through:

- Targeted administrative capacity-building, using EU instruments such as the RRF and Just Transition Mechanism for regulatory training and institutional mentoring (Zhelyazkova et al., 2016);
- Differentiated timelines and obligations, reflecting asymmetric readiness while preserving common goals (Schimmelfennig & Winzen, 2020);
- Accelerated infrastructure and innovation investment in Southern Europe, linking EU funding to local industrial development;
- Embedded energy-justice measures, including social tariffs, retraining schemes, and participatory ownership models (Bouzarovski & Simcock, 2017).

These steps would realign the Energy Union around adaptive solidarity – anchoring cohesion in capacity and fairness rather than uniformity.

Final Synthesis: Adaptive Solidarity and the EU's Green Future

The 2020s represent a decisive decade for the European Union. The European Green Deal and REPowerEU have consolidated a shared decarbonisation vision, yet persistent asymmetries between North and South, producers and importers, innovators and laggards reveal the limits of uniform design. Denmark and the Netherlands illustrate amplification, where EU ambition and domestic capacity reinforce each other; Italy and Greece exemplify inertia, where institutional misfit hinders transformation.

To maintain cohesion while advancing energy sovereignty, the Union must evolve from rule-maker to enabler – through investing in governance quality, more innovation, and embedding social fairness. The resilience of the Energy Union will be measured not by the uniformity of its directives but by the adaptability of its institutions. A model of adaptive solidarity, balancing unity of purpose with diversity of capacity, offers the most credible path toward a just, competitive, and sustainable European energy future.

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