

# The Energy Transition and EU Energy Markets

A comparative examination of the phase-down of fossil fuels and its effect on European energy markets



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## Table of Contents

<b>Chapter 1: Introduction</b> .....	<b>5</b>
<b>1.1 Background:</b> .....	<b>5</b>
1.1.1 <i>The energy transition</i> .....	8
<b>1.2 Methodology</b> .....	<b>11</b>
1.2.1 <i>Structure of the thesis</i> .....	12
<b>1.4 EU climate law</b> .....	<b>13</b>
<b>Chapter 2: What are the current levels of dependency on fossil fuels in the European energy markets, both in terms of supply and consumption?</b> .....	<b>17</b>
<b>2.1 Introduction</b> .....	<b>17</b>
2.1.1 <i>Legal implementation of fossil fuel dependency and climate neutrality (net zero)</i> .....	18
2.1.1.1 <i>The European Green Deal</i> .....	20
<b>2.2 Supply of fossil fuels</b> .....	<b>21</b>
2.2.1 <i>Oil supply</i> .....	22
2.2.2 <i>Gas supply</i> .....	22
2.2.3 <i>Coal supply</i> .....	24
<b>2.3 Export and import of fossil fuels</b> .....	<b>24</b>
<b>2.4 Consumption of fossil fuels</b> .....	<b>26</b>
<b>Chapter 3: How has the phase-down of fossil fuels been implemented or planned in Germany, what specific policies are driving this transition and how does Germany's approach differ from France's?</b> .....	<b>29</b>
<b>3.1 Introduction</b> .....	<b>29</b>
<b>3.2 Attempting to crowd out of fossil fuels</b> .....	<b>30</b>
3.2.1 <i>The Renewable Energy law (EEG)</i> .....	30
3.2.2 <i>Building Energy Law (GEG)</i> .....	31
3.2.3 <i>Climate law (Klimaschutzgesetz)</i> .....	32
3.2.4 <i>National Hydrogen Strategy</i> .....	32
3.2.5 <i>German Easter Package: the action package for energy</i> .....	33
<b>3.3 The cessation of fossil fuels in domestic law</b> .....	<b>34</b>
<b>3.4 How does Germany's approach differ from France's approach in terms of facilitating a greener transition?</b> .....	<b>35</b>
<b>Chapter 4: How will the changes impact the sector overall and what opportunities and challenges might arise, given the volatility of the current landscape of energy markets?...</b>	<b>38</b>
<b>4.1 Introduction</b> .....	<b>38</b>
<b>4.2 Opportunities</b> .....	<b>38</b>
<b>4.3 Challenges</b> .....	<b>39</b>
4.3.1 <i>A unison energy law: one-size does not fit all</i> .....	39
4.3.2 <i>There are no such things as free lunches</i> .....	40
4.3.3 <i>Can fossil fuels be replaced long-term?</i> .....	41
<b>4.4 The end of the fossil fuel age?</b> .....	<b>42</b>
<b>References</b> .....	<b>44</b>

## **ABBREVIATIONS**

CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilization
CCUS	Carbon Capture, Utilization and Storage
COPs	Conference of Parties
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> eq	Carbon dioxide equivalent
EMD	Electricity Market Design
EU	European Union
ESR	Effort Sharing Regulation
EU ETS	European Union Emissions Trading System
GHG	Greenhouse gas emissions
G7	The Group of Seven (intergovernmental forum)
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
LNG	Liquid Natural Gas
LULUCF	EU rules on land use, land use change and forestry
Mb/d	Million barrels per day
NDCs	National Determined Contributions
NZE	Net-Zero Emissions by 2050
PPA	Power Purchase Agreement
RES	Renewable energy sources
TWh	Terawatt hours
UNFCCC	United Nations Framework Convention on Climate Change

# Chapter 1: Introduction

## 1.1 Background:

Climate change represents a significant global challenge, manifesting its consequences across various dimensions of human life and the natural environment. It has become increasingly apparent that the issues prompted by climate change are not confined to the future but are a pressing concern of the present. Rising sea levels, the melting of polar ice caps, and the occurrence of extreme droughts and heatwaves in certain regions, all underscore the critical need for immediate climate action.<sup>1</sup> Amid growing public concern and ongoing demonstrations, the responsibility for addressing these urgent issues now rests with world leaders and policymakers.

In Paris, France, on the 12 December 2015, 196 parties of the 21<sup>st</sup> UN Climate Change Conference (COP21) agreed to the overarching goal to achieve a global average temperature below 2 degrees Celsius<sup>2</sup>, and to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels.<sup>3</sup> It was during this COP that a legally binding treaty on climate change was presented, the Paris Agreement.

The next three COPs remained focused on establishing the “rulebook” for the Paris Agreement. In COP26, the conclusion of the Glasgow Climate Pact was signed, including a final agreement on this Paris Rulebook and commitments to end “inefficient” fossil fuel subsidies, as well as phasing out of coal usage.<sup>4</sup> The discussion on compensation funds for the countries most affected by the climate change was welcomed into consideration at the COP27, and would be discussed in further detail at COP28.<sup>5</sup>

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<sup>1</sup> European Environment Agency. *Climate change impacts, risks and adaptation*. (03.05.2024). From: <https://www.eea.europa.eu/en/topics/in-depth/climate-change-impacts-risks-and-adaptation>

<sup>2</sup> United Nations Framework Convention on Climate Change (2015) Adoption of the Paris Agreement. FCCC/CP/2015/10/Add 1. From: <https://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf#page=2>, page 2

<sup>3</sup> United Nations, *Paris Agreement* (2015) United Nations Framework Convention on Climate Change, From: [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf), article 2 (1) letter a

<sup>4</sup> United Nations Framework Convention on Climate Change. Glasgow Climate Pact (2021). UNFCCC, From: [https://unfccc.int/sites/default/files/resource/cop26\\_auv\\_2f\\_cover\\_decision.pdf](https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf), page 3

<sup>5</sup> United Nations Framework Convention on Climate Change. *Sharm el-Sheikh Implementation Plan* (2022). UNFCCC, From: [https://unfccc.int/sites/default/files/resource/cop27\\_auv\\_2\\_cover%20decision.pdf](https://unfccc.int/sites/default/files/resource/cop27_auv_2_cover%20decision.pdf), page 5 & ClimatePartner (06.11.2023). *From pledges to binding commitments- a review of key milestones in previous COP conference*. ClimatePartner. From: <https://www.climatepartner.com/en/knowledge/insights/complete-review-of-key-milestones-from-previous-cop-conferences>

At the end of COP28, it was agreed that the transition away from fossil fuels could be achieved through a phase-down process. This meant that a shift in the energy markets was needed in order to reach the climate goals and targets set forth in the Paris Agreement.<sup>6</sup> Fossil fuels have been the main energy source for many countries ever since the industrial revolution in the 1960s making it the most consumed energy source worldwide, but also the reason why emissions are high, and the climate goals have not yet been reached.

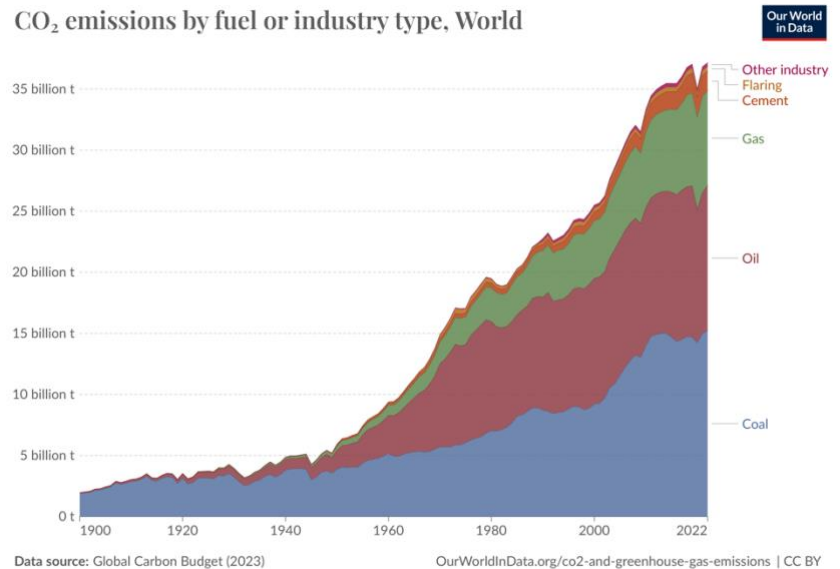


Figure 1: Total emissions from fossil fuels

Fossil fuels have been a key driver behind the industrialisation, but as this industrialisation process improved the quality of life for many, conversely it resulted in environmental degradation. As a result of the damage to the environment and climate, a transition away from fossil fuels became a necessity. In 2023 global CO2 emissions reached a new high, highlighting the need to lower the greenhouse-gas emissions to improve air quality and reduce the severe effect on nature like heatwaves and wildfires.

The Intergovernmental Panel on Climate Change (IPCC) has found that emissions from fossil fuels are the dominant factor of global warming and climate change.<sup>7</sup> Human activities, land use and burning fossil fuels release Greenhouse gases (GHGs) that trap heat in the atmosphere.<sup>8</sup> In recent years fossil fuel consumption has accounted for approximately 85% of

<sup>6</sup> United nations (2023). *COP28 ends with a call to “transition away” from fossil fuels: UN’s Guterres says phaseout is inevitable.* <https://news.un.org/en/story/2023/12/1144742>

<sup>7</sup> ClientEarth Communications (18.02.2022). *Fossil fuels and climate change; the facts.* ClientEarth. From: <https://www.clientearth.org/latest/news/fossil-fuels-and-climate-change-the-facts/>

<sup>8</sup> Intergovernmental Panel on Climate Change (2021). *Climate Change 2021: The Physical Science Basis.* IPCC. From: [https://report.ipcc.ch/ar6/wg1/IPCC\\_AR6\\_WGI\\_FullReport.pdf](https://report.ipcc.ch/ar6/wg1/IPCC_AR6_WGI_FullReport.pdf) page 85

the total of man-made emissions.<sup>9</sup> When fossil fuels are burned from industrial combustion processes, they release large amounts of GHG, in particular CO<sub>2</sub>, into the air.<sup>10</sup>

Different efforts have been made in order to track the damage to our climate. In 2023, a team of scientist quantified the nine processes that regulate the resilience and stability of the Earth’s safe operating space. If one where to cross the boundaries of the safe operating space, it would increase the risk of generating drastic and abrupt environmental changes. As figure 2 shows, six out of nine boundaries are exceeded, indicating that the Earth is well beyond the safe operating space for humanity.<sup>11</sup> As our planet is well beyond the safe operating space for humanity, the pressure is on the policy makers to create policies with the main objective to reduce GHG emissions and reach the climate targets.

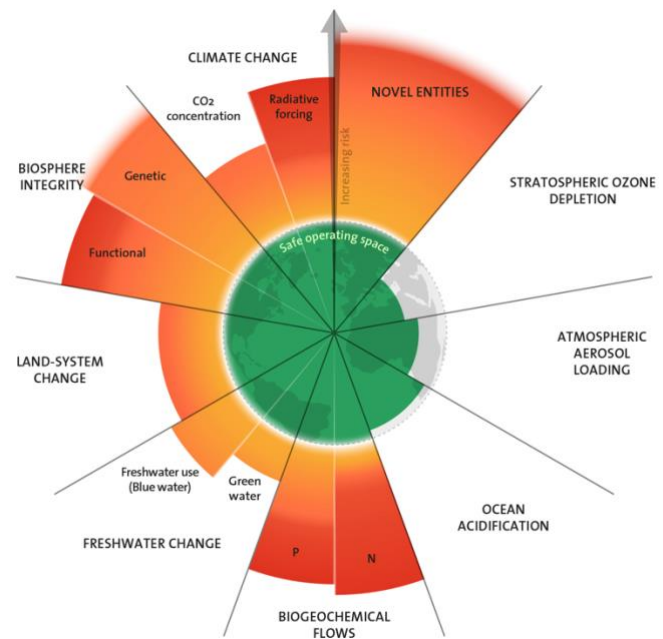


Figure 2: Planetary boundaries (updated 2023)

32 years following the creation of United Nations Framework Convention on Climate Change (UNFCCC) and 28 (soon to be 29) Conference of the Parties (COPs) later, reducing climate emissions have been at the forefront of public debate. Despite countless pledges and efforts by governments to tackle global warming, CO<sub>2</sub> emissions from the energy sector have increased by 60% since the UNFCCC was signed in 1992.<sup>12</sup> Still, there is little to no progress in the energy sector.

<sup>9</sup> Equinor (2022). *Energy Perspectives: Global macroeconomic and energy market outlook*, Equinor, <https://cdn.equinor.com/files/h61q9gi9/global/530bfce8bfbae0762ed3e99317126cc16a272f7d.pdf?energy-perspectives-2022-final-2.pdf> , page 51

<sup>10</sup> ClientEarth Communications (18.02.2022). *Fossil fuels and climate change; the facts*. ClientEarth. From: <https://www.clientearth.org/latest/news/fossil-fuels-and-climate-change-the-facts/>

<sup>11</sup> Bala G, Bendsten J, Cornell S.E, Donges J.F and others (13.09.2023) *Earth beyond six of nine planetary boundaries*. (Vol 9, Issue 37), ScienceAdvances, From: <https://www.science.org/doi/10.1126/sciadv.adh2458>

<sup>12</sup> International Energy Agency (2021) *Net Zero by 2050*, IEA. From: <https://www.iea.org/reports/net-zero-by-2050>

### 1.1.1 The energy transition

The energy transition is a “*continuing process requiring long-term energy strategies and planning, with a country-tailored focus on applying appropriated energy technologies to reach net-zero emissions*”.<sup>13</sup> Global energy-related CO<sub>2</sub> emissions reach a record high in 2023. Emissions from coal alone accounted for more than 65% of the increase in 2023.<sup>14</sup> The emissions are nowhere near decreasing rapidly enough to meet the global climate goals set out in the Paris Agreement.

However, clean energy is now measurably making a difference, causing a slowdown in emissions.<sup>15</sup> Wind and solar capacity reached a record high in 2023, increasing by 75% compared to the capacity levels of 2022, which has a significant impact on the trajectory of global CO<sub>2</sub> emissions. The International Energy Agency (IEA) presumes that without the growth in the deployment of clean energy technologies, such as solar and wind, the emissions would have been three times larger.<sup>16</sup> The more GHG emitted into the atmosphere, the more solar radiation will “stay” at the earth’s surface and, consequently, heat it up. The most significant GHG is CO<sub>2</sub>, which typically arises from burning fossil fuels such as coal and oil to produce “industrial goods” to generate energy. Our modern lifestyle and the global emissions are closely connected.<sup>17</sup>

Building on these advancements in clean energy, adopting a circular economy practice could further enhance the efforts towards a greener and more efficient transition. The circular economy is a “*model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible*”.<sup>18</sup> This results in an extension of the life cycle of products. A combination of

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<sup>13</sup> S&P Global (24.02.2020). *What is Energy Transition?* S&P Global, From:

<https://www.spglobal.com/en/research-insights/market-insights/what-is-energy-transition>

<sup>14</sup> International Energy Agency (2024), *CO<sub>2</sub> Emissions in 2023: Executive summary*, IEA,

<https://www.iea.org/reports/co2-emissions-in-2023/executive-summary>

<sup>15</sup> International Energy Agency (2024) *CO<sub>2</sub> emissions in 2023: A new record high, but is there light at the end of the tunnel?* IEA, From: <https://iea.blob.core.windows.net/assets/33e2badc-b839-4c18-84ce-f6387b3c008f/CO2Emissionsin2023.pdf>, page 6

<sup>16</sup> International Energy Agency (2024), *CO<sub>2</sub> Emissions in 2023: Emissions grew in 2023, but clean energy is limiting the growth*, IEA, <https://www.iea.org/reports/co2-emissions-in-2023/emissions-grew-in-2023-but-clean-energy-is-limiting-the-growth#abstract>

<sup>17</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited 2021), page 42.

<sup>18</sup> European Parliament (24.05.2023). *Circular economy: definition, importance and benefits*. European Parliament. From: <https://www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits>



circular economy, structural changes, and greater efficiency in the use of energy and materials, can maintain the same level of industrial energy consumption, despite accelerated growth in for example cement production.<sup>19</sup> By using circular economy practices, one can avoid unnecessary adverse environmental impacts, and improve the energy efficiency.

The phase-down of fossil fuels will provide opportunities, to continue to develop clean-energy technologies as a way to substitute fossil fuels, and this in turn will contribute to lowering the global CO<sub>2</sub> emissions. By expanding industries, such as solar and wind, the cessation of fossil fuels may create new jobs, as well as diversify the energy mix. When the world leaders agreed to a worldwide phase-down of fossil fuels, people started questioning what the effects of this would be. The dependency on fossil fuels within the European energy markets- covering supply, export, import, and consumption-has been an ongoing debate, particularly regarding the feasibility of such a phase-down.<sup>20</sup> Central to this debate is the challenge of finding alternative energy sources capable of effectively replacing the energy derived from fossil fuels.

As a regional union, the European Union (EU) has a responsibility to create laws and policies which ensure energy security, reduce reliance on external suppliers, enhance energy efficiency, establish a just and stable regulatory framework and energy markets across all of its member states. EU climate law requires implementation at a national level in order to be applicable domestically. This means that any programme from the EU regarding, for example, the encouragement to consume more renewable energy, or to increase its energy efficiency, are developed and implemented by the member states into their national law.<sup>21</sup> The EU wants its member states cut greenhouse gas emissions by at least 55% by 2030, in order to reach their main goal which is to make EU climate neutral by 2050. EU implemented these demands into the European Green Deal, which is a “*growth strategy that aims to transform the EU into a fair and prosperous society with a modern, resource-efficient and competitive*

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<sup>19</sup> International Renewable Energy Agency (2022). *World Energy Transitions Outlook 2022: 1,5 ° C pathway*. IRENA, From: <https://www.irena.org/Energy-Transition/Policy/Circular-economy> ,page 80

<sup>20</sup> Dr. Quiggin D. (12.12.2023). *To phase out or phase down? Why the debate on fossil fuels misses key point*. Chatham House, From: <https://www.chathamhouse.org/2023/12/phase-out-or-phase-down-why-debate-fossil-fuels-misses-key-point>

<sup>21</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited 2021), page 242

*economy where there are no net emissions of greenhouse gases in 2050 where economic growth is decoupled from resource use”.*<sup>22</sup>

Notably, within the EU, countries like France and Germany play a pivotal role due to their economic and political influence.<sup>23</sup> However, they differ in their approaches to addressing issues like energy efficiency and the energy transition. When confronted with the energy crisis of 2022, France chose to invest in nuclear power, while Germany chose to reinvest in coal. This diversity in approach highlights the complexities of addressing the energy transition within the EU.<sup>24</sup>

Germany has called their effort to reduce climate-damaging greenhouse gas emissions for “Energiewende”, which is the energy transition.<sup>25</sup> Their goals for reducing greenhouse gas emissions are ambitious, but there is little to no mention of phasing down of fossil fuels other than coal. As a result of Germany’s substantial reliance on fossil fuels to fulfil its energy requirement, phasing down of fossil fuel usage has emerged as politically sensitive. However, this endeavour is potentially challenging due to the limited availability of viable alternatives to fossil fuels not only within Germany but also across Europe. With the phase-down of fossil fuels being one of the main initiatives to reduce greenhouse gas emissions, implementing this into national law is vital to ensure that every country contributes to the phase-down.

As a result of this the main research question which will be answered in this dissertation is: **What effect will the phase-down of fossil fuels have on the European energy markets?** In addition to the main research question, the dissertation will also examine the following sub-research questions:

1. What environmental effects/benefits are expected as a result of the phase down of fossil fuels in the European energy markets?

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<sup>22</sup> European Commission. *The European Green Deal* (11.12.2019). European Commission. From: [https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF) page 2

<sup>23</sup> Lafrance C & Wehrmann B (03.07.2023). *How energy systems and policies of Germany and France compare*. Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/how-energy-systems-and-policies-germany-and-france-compare>

<sup>24</sup> Lafrance C. (23.06.2023). *France and Germany “agree on 90 percent” of energy issues, must close ranks-researcher*. Clean Energy Wire, From: <https://www.cleanenergywire.org/news/france-and-germany-agree-90-percent-energy-issues-must-close-ranks-researcher>

<sup>25</sup> Federal Ministry for Economic Affairs and Climate Action (2024). *The Energy Transition: Switch to the future*. Federal Ministry for Economic Affairs and Climate Action, <https://www.bmwk-energiewende.de/EWD/Redaktion/EN/Newsletter/2015/01/Meldung/topthema-the-energy-transition.html>

2. What are the current levels of dependency on fossil fuels in the European energy markets, both in terms of supply and consumption?
3. How has the phase-down of fossil fuels been implemented or planned in Germany, what specific policies are driving this transition, and how does Germany's approach differ from France's approach in terms of facilitating a cleaner energy transition?
4. How will the changes impact the sector overall and what opportunities and challenges might arise, given the volatility of the current landscape of energy markets?

## **1.2 Methodology**

The legal doctrine serves as the core of many academic tools in developing a legal methodology. Criticized for its reactive nature in legal research, doctrinal method is a traditional staple of law and legal scholarship. This thesis begins by employing the doctrinal method for legal analysis, specifically analysing international frameworks and policies regarding the phase-down of fossil fuels. The aim is to offer a practical problem-solving solution that are not too theoretical nor philosophical, highlighting the practical benefits of using legal doctrine.

This thesis will base its research on both national and international sources, primarily EU law and policies. As the topic is fairly new, and relates a dynamic law field, different reports and articles will be used to support statements and deductions from policies and both national and international law. Chapter one regarding the first sub-research question will lay out the framework for how the law has facilitated the phase-down of fossil fuels into the market conditions. It will serve as a background for why the phase-down is necessary to meet the climate goals set out in these frameworks.

Chapter two relates to the second sub-research question about the current levels of dependency on fossil fuels in the European energy markets. In this chapter the framework laid out in chapter one will be applied and compared as to how the law has facilitated the dependency on fossil fuels in the markets. I will be using some graphs in order to visualise the global impact fossil fuels have had in terms of supply and consumption, but also to show how much of the European energy mix fossil fuels accounts for.

In regard to sub-research question number 3, this establishes the current energy situation and legal frameworks and/or policies, either planned or already implemented in Germany and its

domestic law. The chapter will use European legal source doctrine in that a feature-by-feature examination will take place concerning the European legal sources and Germany's domestic laws. Furthermore, this chapter will have a comparative examination regarding France's and Germany's different approach in terms of facilitating a cleaner energy transition. The last chapter serves as a conclusion and aims to bring the thesis together. In this section, opportunities and challenges that come with the phase-down will be discussed in line with the volatility of the energy sector.

It is a small methodological challenge that the field of energy law is dynamic, meaning that it is constantly evolving and adapting to the current energy situation. As a result of this, there is no overarching law for energy, meaning that the law itself is build up by both domestic and international policies, being influenced by agreements from COPs as well as other conventions and treaties/organisations. Many of the sources mentioning a phase-down of fossil fuels are either reports with possible scenarios or results of the phase-down, or policies and frameworks that have just been enforced, or planned.

### ***1.2.1 Structure of the thesis***

The thesis is divided into four main chapters, each relating to a corresponding research question. The first chapter relates to research question one regarding what environmental effects are expected as a result of the phase-down of fossil fuels in the European energy markets. This section reflects on the contextual background to the dissertation, reflecting upon climate change and how the green energy transition is a vital part in reducing GHG emissions.

In the second chapter, the research question that will be discussed is what the current trends of dependency on fossil fuels in the European energy markets are, both in terms of supply, export, and import, and lastly consumption. This chapter will discuss the current level of dependency on fossil fuels with to supply, import and export, and especially energy consumption.

In the third chapter the third research question regarding the implementation and planning of the phase-down of fossil fuels in Germany will be discussed, as well as what specific policies and legal frameworks are driving this transition. In this section both national and

international, particularly EU, policies and conventions will be analysed to connect the national and international sources providing context. A comparison will be made between the energy situation in Germany and France, relating to the facilitation of the energy transition. The focus in this section will be on how Germany and France are currently dealing with, but also how they are planning to deal with, the phase-down of fossil fuels, as well as their different approaches when it comes to the substitution of fossil fuels.

The fourth chapter provides final discussions on the fourth and last research question on how the changes will impact the sector overall and what opportunities and challenges might arise, given the volatility of the current landscape of energy markets. In this final chapter, the challenges, and opportunities of the phase-down will be presented and analysed in context with the energy crisis today versus the pressure to reach the climate goals in time.

In summary, the thesis will analyse, discuss, and highlight the effect the phase-down of fossil fuels will have on the European energy markets in terms of legal frameworks and policies, environmental emissions, dependency on fossil fuels in terms of supply, export and import, and consumption. It will further discuss how countries, including France and Germany, have taken different approaches to end their reliance on, and consumption of, fossil fuels. Lastly, an analysis of the opportunities and challenges prompted by the ongoing energy transition will be presented, thus bringing the thesis together.

#### **1.4 EU climate law**

The main purpose of energy policymaking is to use the tools of government including international treaties, national legislation and other public policy elements in order to find both an acceptable, but also sustainable compromise, between competitive priorities. This is more commonly known as the Energy Trilemma, which consists of these three criteria: energy affordability, energy security and energy decarbonisation.<sup>26</sup>

The EU climate policy, outlined in the 2030 Climate Energy Framework, aims to achieve two primary objectives to combat climate change: reducing GHG emissions and securing energy supply. In order to reduce GHG emissions, binding emission reduction targets for all sectors should be able to mitigate the level of emissions and thereby fight the climate change.

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<sup>26</sup> Will be discussed in 2.1.1

Furthermore, the EU plans to secure its energy supply by increasing the shares of renewable energy sources (RES) in the energy mix to reduce dependency on fossil fuels.<sup>27</sup>

Although progress has been made since the signing of the Paris Agreement in 2015 it is expected that GHG in 2030, based on the policies in place today, will increase by 16 per cent at the time of the agreement's adoption.<sup>28</sup> In order to meet the 1.5-goal set in the Paris Agreement, greenhouse gas emissions must fall by 28-42 per cent, compared to current policy scenarios.<sup>29</sup>

To meet the 2030 climate targets, the EU legislation relies on three pillars: the EU Emissions Trading Systems (EU ETS), Effort Sharing Regulation (ESR) and lastly the EU rules on land use, land use change and forestry (LULUCF). The EU ETS is the cornerstone of the EU's policy to fight climate change and its key tool to reduce GHG cost-effectively. It is the first major carbon market in the world and remains the largest one.<sup>30</sup>

Operating on a "cap and trade" principle, the EU ETS sets a limit on the total amount of GHG that can be emitted by aircraft operators and installations covered by the system. This cap is reduced annually in line with EU's climate targets, thereby ensuring that emissions decrease over time. Since 2005, this instrument has helped reduce the total emissions from power and industry plants by 37%.<sup>31</sup>

Emissions allowances express the cap, where one allowance grants the right to emit one tonne of carbon dioxide equivalent (CO<sub>2</sub>eq). In principle, this means that the sectors covered

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<sup>27</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited), page 15

<sup>28</sup> UN environment programme (2023). *Broken record- Temperatures hit new highs, yet world fails to cut emissions (again)*. UN, <https://wedocs.unep.org/bitstream/handle/20.500.11822/43922/EGR2023.pdf?sequence=3&isAllowed=y>, page XV (foreword)

<sup>29</sup> UN environment programme (2023), *Broken record- Temperatures hit new highs, yet world fails to cut emissions (again)*, UN, From: <https://wedocs.unep.org/bitstream/handle/20.500.11822/43922/EGR2023.pdf?sequence=3&isAllowed=y> page 1

<sup>30</sup> European Parliament (October 2023). *The EU Emissions Trading System: Method and Effects of Free Allowance Allocation*. European Parliament, From: [https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL\\_IDA\(2023\)755098\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL_IDA(2023)755098_EN.pdf), page 7 & Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). Edward Elgar Publishing Limited, UK, page 30

<sup>31</sup> European Parliament (October 2023). *The EU Emissions Trading System: Method and Effects of Free Allowance Allocation*. European Parliament, From: [https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL\\_IDA\(2023\)755098\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL_IDA(2023)755098_EN.pdf), page 9

by the EU ETS are not allowed to release more CO<sub>2</sub>eq than scheduled.<sup>32</sup> For each year, the companies must surrender enough allowances to cover their emissions completely, or they will be imposed heavy fines. These allowances can be traded with each other as needed, and if an operator or installation reduces their emissions, the spare allowances can either be kept, used, or sold.<sup>33</sup> By putting a price on carbon, fossil fuel- based energy will become more expensive and thereby less competitive compared to renewable energy sources.

Whereas the EU ETS has been a part of the EU's legislative framework for a while and is widely known, the regulatory obligations concerning the LULUCF Regulation have thus far been less known. The aim of the regulation is to preserve plant stocks that serves as CO<sub>2</sub> sinks, as well as to preserve forest. Central to its commitment is the “no debit rule” which entails that the total amount of GHG emissions from land-use change, land use and forestry sub-sectors shall not exceed the total amounts of soil, plants, and trees removals in the period between 2021-2025 and 2026-2030.<sup>34</sup> This would mean that any deforestation to create land for an infrastructure project as an example, needs to be compensated by an afforestation effort equivalent to the deforestation. The LULUCF sector would thereby remove more emissions from the atmosphere than it would emit.<sup>35</sup>

Regarding the “no debit rule”, this regulation provides the member states flexibility whereas these flexibility mechanisms could help the member states achieve a certain reduction in emissions in the most cost-efficient manner. If the emissions removed from the atmosphere are greater than what the rules on land use, land use change and forestry sector (LULUCF) has emitted during the period of 2021-2025, the member states will have the opportunity to transfer the net reduction in GHG to the period of 2026-2030. To ensure compliance with the rules set out in the LULUCF Regulation, article 14 imposes reporting obligations on the

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<sup>32</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited), page 30

<sup>33</sup> European Parliament (October 2023). *The EU Emissions Trading System: Method and Effects of Free Allowance Allocation*. European Parliament, From: [https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL\\_IDA\(2023\)755098\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL_IDA(2023)755098_EN.pdf), page 9

<sup>34</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited), page 31 & Regulation (EU) 2023/839. *Rules on land use, land use change and forestry*. European Parliament and Council, article 4

<sup>35</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited), page 31

Member state toward the Commission. It remains to be seen whether the benefits of this flexibility mechanism outweigh its administrative burden.<sup>36</sup>

While the EU ETS is applicable to all sectors subject to emissions trading, and the LULUCF Regulation concerns land use, land use change and forestry, the ESR concerns all sectors that are subject to neither the LULUCF nor the EU ETS. The ESR lay out national targets for emission reductions from waste management, small industrial installations, road transport, agriculture and heating of buildings, sectors which all accounts for approximately 60% of GHG emissions. To meet the emission targets laid out by EU climate law, the Commission proposed to reduce the emissions under the ESR by 40% compared to the levels in 2005.<sup>37</sup> To ensure that all EU member states contribute to a just and fair climate action, the ESR distributes national efforts by assigning Member states with higher gross domestic product (GDP)<sup>38</sup> per capita, higher emission reduction targets. The ESR includes various flexibilities, which enable the Member States to reach their targets in a manner which secures cost efficiency.

There is a clear trend in the EU towards harmonising legislation as well as to integrate energy and climate policies. This trend has been heavily influenced by several international agreements, including the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC). Since the beginning, the EU has considered itself a leading example in the international climate action, which is reflected in EU's climate laws, as well as its strive towards climate neutrality. However, its implementation must enhance energy security, ensure the achievement of the climate targets, all while considering cost-efficiency and EU's inter-European solidarity.<sup>39</sup> With the aspirational goal to phase down from fossil fuels, questions arose from the energy sector on whether it was feasible at all and how dependent the European energy markets is on fossil fuels.

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<sup>36</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited), page 32

<sup>37</sup> European Commission (14.07.2021). *Questions and Answers- The Effort Sharing Regulation and Land, Forestry and Agriculture Regulation*. EU, From: [https://ec.europa.eu/commission/presscorner/detail/en/qanda\\_21\\_3543](https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3543)

<sup>38</sup> Indicator of a country's economic performance and strength and is used to describe the standard of living, O'Neill A (10.04.2024). *The 20 countries with the largest gross domestic product (GDP) per capita in 2022*. Statista, From: <https://www.statista.com/statistics/270180/countries-with-the-largest-gross-domestic-product-gdp-per-capita/>

<sup>39</sup> Holwerda M, Roggenkamp M & Woerdman E (2021). *Essential EU Climate Law* (2<sup>nd</sup> edition). (UK: Edward Elgar Publishing Limited), page 41



# Chapter 2: What are the current levels of dependency on fossil fuels in the European energy markets, both in terms of supply and consumption?

## 2.1 Introduction

Through history, humanity, and its ability to create and harness energy, has played an important part in the development of civilisation.<sup>40</sup> Spurred by the use of combustion

processes, fossil fuels became a fundamental driver of the world's economic, social, and technological development.<sup>41</sup> Schumacher noted in 1982 that energy is “*not just another commodity, but the precondition of all commodities, a basic factor equal with air, water and earth*”.<sup>42</sup> Humanity has been dependent on the proliferation of fossil fuels as the driver behind the

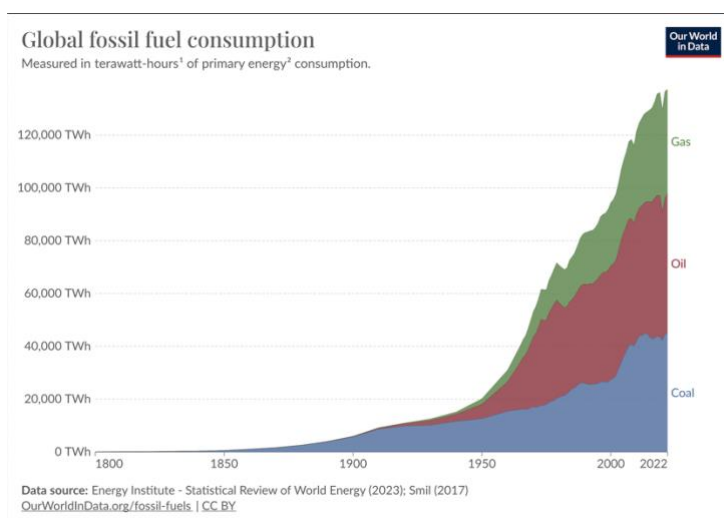


Figure 3: Global fossil fuel consumption from the 1800s to 2022

global energy sector, both in terms of supply and export.<sup>43</sup> Though there was a temporary dip due to the corona virus pandemic. Consumption levels reached their peak in 2022, and the dependency of fossil fuels in both supply and export have increased significantly. If energy consumption levels continue to rise it will be more difficult to decarbonise the economy by shifting to renewable energy sources or at least to decarbonised energy sources.<sup>44</sup>

Over the course of the past two decades, production and consumption of renewable energy sources such as solar power have increased rapidly across the EU as a response to dedicated

<sup>40</sup> Scherbakova O. (04.07.2014). *Role of energy in the development of civilization*. From: <https://www.linkedin.com/pulse/20140704163032-299766139-role-of-energy-in-the-development-of-civilization/>

<sup>41</sup> Ritchie H & Rosado P. (October 2022, last revised in January 2024). *Fossil fuels*. Our World in Data, From: <https://ourworldindata.org/fossil-fuels#article-citation>

<sup>42</sup> Schumacher EF (1992) *Schumacher on energy: speeches and writing of E.F. Schumacher*. Cape, London

<sup>43</sup> Ever since the start of the 1900-century fossil fuels have become the primary energy consumption of the world peaking at over 120 000 TWh in 2022, cf Figure 3. Terawatt hours is a unit of energy that represents one trillion-watt hours.

<sup>44</sup> Mauger, R. *Reshaping EU Energy Law: Towards Degrowth*. In R. Fleming, K. de Graaf, L. Hancher, & E. Woerdman (Eds.), *A Force of Energy: Essays in Energy Law in Honour of Professor Martha Roggenkamp* (pp. 3-12). (University of Groningen Press, 2022), page 6

policies and measures and are facilitated by the technological process in the energy sector. As a result of this the greenhouse gas emissions across the EU energy sector have decreased steadily, enabling the EU to reach its 20% renewable energy target in 2020. In 2022 renewable energy generated 22,5 % of the energy consumed in the EU.<sup>45</sup>

### ***2.1.1 Legal implementation of fossil fuel dependency and climate neutrality (net zero)***

In order to achieve a sustainable change within the energy sector, integrated policies which enhance energy security, affordability and decarbonisation- the three pillars of the energy trilemma- is necessary. Energy affordability is that the consumers' needs for heating, cooling and other energy services should be met without compromising their ability to meet other basic needs. The second criterium is energy security which is that the energy supply shall always be available in sufficient amounts and be robust against natural disasters and/or geopolitical instability. With energy decarbonisation the energy services provided and consumed shall not endanger future supply or negatively impact the climate, nor shall it be a disadvantage to the future generations.<sup>46</sup>

When Russia invaded Ukraine in 2022, energy security became the main priority for the policy makers when the public started to question how secure the energy truly was. With the energy crisis in Europe, the energy prices went up, causing many countries to put energy affordability at the top of their agenda, and many European countries returned to fossil fuels in order to meet the energy demand of its people, but also create cheaper and more accessible energy.

Each year, the International Energy Agency (IEA) publishes a World Energy Outlook providing the public with an analysis of the global energy systems.<sup>47</sup> The IEA is an organisation which provides “*authoritative analysis, data, policy recommendations, and real-world solutions to help countries provide secure and sustainable energy for all*”.<sup>48</sup> In the

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<sup>45</sup> European Environment Agency (14.12.2023), *Renewable energy*, European Environment Agency, From: <https://www.eea.europa.eu/en/topics/in-depth/renewable-energy>

<sup>46</sup> Equinor (2022). *Energy Perspectives: Global macroeconomic and energy market outlook*, Equinor, <https://cdn.equinor.com/files/h61q9gi9/global/530bfce8bfbae0762ed3e99317126cc16a272f7d.pdf?energy-perspectives-2022-final-2.pdf>, page 12

<sup>47</sup> IEA (2023), *World Energy Outlook 2023*, IEA, Paris, From: <https://www.iea.org/reports/world-energy-outlook-2023>,

<sup>48</sup> International Energy Agency (14.05.2024). *Mission: The IEA works with governments and industry to shape a secure and sustainable energy future for all*. IEA, From: <https://www.iea.org/about/mission>

report from 2023, they found that the global energy-related CO<sub>2</sub> emissions could peak as soon as 2024, and by 2025 at the latest which is two years earlier than what was predicted in the 2022 report. This shows that the world needs a transition away from fossil fuels in order to meet the climate targets set out in climate laws.

The European Union (EU) requires that their countries cut GHG emissions by at least 55% by 2030, to reach their main goal which is to make EU climate neutral by 2050. This means that the GHG emissions levels will have to drop to net-zero by 2050, both through removals and reductions. For net zero to be reachable, the share of fossil fuels must decrease from today's 80% to maximum 20% within the next 25 years.<sup>49</sup> This would mean that the share of fossil fuels in the global energy mix must be less than one fifth, by 2050, in order to be compatible with the goal of climate neutrality. Out of these fossil fuels, only a fraction can be "unbated"<sup>50</sup>, that is not combined with measures to capture, store, and then reuse CO<sub>2</sub>, also known as carbon capture storage and carbon capture utilisation (CCS).<sup>51</sup>

When eastern EU encountered gas disruptions in the winters of the early 2000s, the EU started working on a common energy policy to ensure and strengthen their energy security as well as the internal energy markets. With investments in infrastructures, especially cross-border connections, the EU managed to reduce the number of Member States who were exclusively dependent on one single supplier. The EU established the Security of Supply Regulation<sup>52</sup> where the main objective is to enhance the emergency preparedness and resilience of gas disruptions within the EU. This includes a warning system that identifies potential problems ahead, as well as a standing advisory group, the Gas Coordination Group consisting of experts, to discuss and assess the security of supply.

To reduce the dependency on Russian gas imports, the EU published the REPower EU outlining various measures that the EU plans to take to reduce its dependency, including

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<sup>49</sup> Thiegles, Sonja (2023): *The global shift away from fossil energy: A blind spot in climate foreign policy*, SWP comment (No.38/(2023)), Stiftung Wissenschaft und Politik (SWP), Berlin. From: <https://www.econstor.eu/bitstream/10419/279925/1/1852602570.pdf>, page 3

<sup>50</sup> Fossil fuels which are used and produced with no reduction of the amount of CO<sub>2</sub> emitted throughout its life cycle

<sup>51</sup> Thiegles, Sonja (2023): *The global shift away from fossil energy: A blind spot in climate foreign policy*, SWP comment (No.38/(2023)), Stiftung Wissenschaft und Politik (SWP), Berlin. From: <https://www.econstor.eu/bitstream/10419/279925/1/1852602570.pdf>, page 3

<sup>52</sup> EU 2017/1938

reducing demand and diversifying supplies, to ensure energy security, as well as increasing the production of green energy within the EU.

As the EU prompts for its own climate ambition, the existence of less stringent climate policies in many non-EU countries creates a risk of a “carbon leakage”. Carbon leakage occurs when companies within the EU move their carbon-intensive production abroad to outside of the EU, to where the climate policies are less stringent. It also occurs if products produced in the EU get replaced by more carbon-intensive imports.<sup>53</sup> In order to secure a fair price on the carbon emitted during the production of carbon-intensive goods entering the EU, as well as encouraging countries outside of the EU to commit to a cleaner industrial production, the EU created the Carbon Border Adjustment Mechanism (CBAM).<sup>54</sup>

#### *2.1.1.1 The European Green Deal*

To reach climate neutrality by 2050, the EU developed the EU Green Deal. This is a set of regulations aiming to make all sectors of EU’s economy fit to reach their climate targets by 2030 in a just, competitive, and cost-efficient manner.<sup>55</sup> In other words, it will ensure that there are no net emissions from GHG by 2050, an economic growth decoupled from resource usage, and lastly that no person and no place will be left behind.<sup>56</sup>

On the 2 May 2022, the 8<sup>th</sup> Environment Action Programme (EAP) entered into force. The EAP builds upon the European Green Deal and sets out priority objectives for 2030 and the conditions needed to achieve these and aims to speed up the transition the Green Deal wants to achieve.<sup>57</sup> Also, a key part of the European Green Deal, is the Just Transition Mechanism (JTM), which provides regions and workers, who are adversely affected by the transition

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<sup>53</sup> European Union (2023). *Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism*. Official Journal of the European Union. From: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R0956>, nr. (9)

<sup>54</sup> European Union (2023). *Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism*. Official Journal of the European Union. From: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R0956>, nr. (15)

<sup>55</sup> European Commission. *The European Green Deal* (11.12.2019). European Commission. From: [https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF) page 2

<sup>56</sup> European Commission. *The European Green Deal* (11.12.2019). European Commission. From: [https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF) page 4

<sup>57</sup> European Union (2022). *Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030*. Official Journal of the European Union. From: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022D0591>, article 1 nr 2

away from fossil fuels, financial support. This to ensure that the transition towards climate neutrality happens in a fair and just manner.<sup>58</sup>

As a part of the Green Deal Industrial Plan's pillar to ensure a predictable and simplified regulatory environment, the Net-Zero Industry Act (NZIA) aims to promote investments in production capacity, which are key to meeting the climate neutrality goals, including solar panels amongst others.<sup>59</sup> By contributing to accelerate the development and production of net-zero technologies, the Act further aims to prohibit the EU from replacing its reliance on Russian fossil fuels with other strategic dependencies, which could limit the access to key components and technologies for the green transition.

The shift in EU energy policy has shown that there is a bigger transition towards renewable energy sources. However, while renewables are being scaled up, there is still some reliance on natural gas as a supplementary energy source. As domestic production has decreased, the EU's dependency on imported gas from Russia has increased. The NZIA will simplify the regulatory frameworks relating to technologies like solar panels, which will increase the competitiveness of the net-zero industry in Europe, as well as accelerate the capacity to store CO<sub>2</sub> emissions.<sup>60</sup>

## **2.2 Supply of fossil fuels**

For many oil, gas and coal companies, such as Equinor, the overarching goal is to reach zero methane emissions by 2030 and to reach net zero by 2050.<sup>61</sup> In order for these goals to be achieved there needs to be a big change in the relationship between demand and supply of fossil fuels. Oil and natural gases act as intermediaries between supply and demand to ensure that the source of supply meets the changes in demand, thus maintaining stability.<sup>62</sup> Even

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<sup>58</sup> European Investment Bank (07.09.2022). *Just transition: EIB to provide up to €10 billion in support of regions most affected by the shift away from fossil fuels*. European Investment Bank, From: <https://www.eib.org/en/press/all/2022-346-just-transition-eib-to-provide-up-to-eur10-billion-in-support-of-regions-most-affected-by-the-shift-away-from-fossil-fuels>

<sup>59</sup> European Commission (16.03.2023). *Questions and Answers: The Net-Zero Industry Act and the European Hydrogen Bank*. European Commission, From: [https://ec.europa.eu/commission/presscorner/detail/en/QANDA\\_23\\_1666](https://ec.europa.eu/commission/presscorner/detail/en/QANDA_23_1666)

<sup>60</sup> European Commission (16.03.2023). *Questions and Answers: The Net-Zero Industry Act and the European Hydrogen Bank*. European Commission, From: [https://ec.europa.eu/commission/presscorner/detail/en/QANDA\\_23\\_1666](https://ec.europa.eu/commission/presscorner/detail/en/QANDA_23_1666)

<sup>61</sup> Equinor (22.03.2022). *2022 Energy transition plan*. Equinor, page 3

<sup>62</sup> IEA (2023), *The Oil and Gas Industry in Net Zero Transitions*, IEA, Paris <https://www.iea.org/reports/the-oil-and-gas-industry-in-net-zero-transitions>, License: CC BY 4.0, page 33

though fossil fuels are used as a collective term for oil, gas and coal it is important to view them individually, due to their different impacts in terms of climate, supply, export and import as well as consumption levels.

### **2.2.1 Oil supply**

Oil is one of the largest sources of energy regarding fossil fuels. Over the years nations such as Saudi Arabia, the US and Norway have become major oil nations and suppliers. The oil supply is declining globally following the transition away from fossil fuels. However, years of underinvestment in upstream projects have caused shortages of oil supply where the supply seems to decline faster than the demand, resulting in a shortage of alternative energy sources to substitute this decline. In 2019 the global oil consumption stood at 99 million barrels per day (hereafter mb/d). To put this in perspective: 1 barrel of oil gives enough gasoline to drive a medium-sized car over 280 miles.<sup>63</sup>

Despite action to shift towards greener forms of technology, the most possible scenario for 2030 is that the amount of oil consumed globally per barrel would only increase.<sup>64</sup> The global oil demand has increased from 2,3 mb/d to 101.9 mb/d for 2023 as a whole, which is being driven by the passenger vehicles-sector.<sup>65</sup> Looking at the current trend in the world oil demand, it is predicted that the demand will only continue to rise this year.<sup>66</sup> While a transition has to be achieved, EU states like Italy and Germany have been affected by fluctuations in prices and external geopolitics as they are still reliant on crude oil imported from Russia. Thus, an abrupt cessation of use without sufficient planning could compromise their energy security.

### **2.2.2 Gas supply**

Over the past 50 years, the share of natural gas in the global primary energy supply has risen from 16% to 26%.<sup>67</sup> In terms of the green transition, it is relatively less polluting (compared

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<sup>63</sup> Chevron el Segundo (non-dated). *What's in a barrel of oil?* From: <https://elsegundo.chevron.com/our-businesses/whats-in-a-barrel-of-oil> (Read: 26.05.2024)

<sup>64</sup> Equinor (2022). *Energy Perspectives: Global macroeconomic and energy market outlook*, Equinor, <https://cdn.equinor.com/files/h61q9gi9/global/530bfec8bfbae0762ed3e99317126cc16a272f7d.pdf?energy-perspectives-2022-final-2.pdf>, page 34

<sup>65</sup> IEA (2023), *Oil Market Report - October 2023*, IEA, Paris <https://www.iea.org/reports/oil-market-report-october-2023>, page 4

<sup>66</sup> Organization of the Petroleum Exporting Countries (14.05.2024). *OPEC Monthly Oil Market Report*. OPEC, page v

<sup>67</sup> DNV (2023). *Energy Transition Outlook 2023*, page 91

with oil and coal) and is cheaper in terms of overall price. These characteristics have led to the ideas that gas can be a suitable “bridge fuel” in the green transition. The EU has imported natural gas from Russia and Norway. The Russian invasion of Ukraine prompted Europe to significantly reduce its reliance on Russian natural gas. By 2022, the volume of gas imported from Russia had decreased to 303 billion cubic meters. This trend is expected to persist, with further declines anticipated until 2050.<sup>68</sup> However, the reduction in the reliance on Russian gas has acted as a catalyst for an acceleration of the green transition and the creation of the green deal in the phase-out of fossil fuels.

In April 2023, the EU launched “Joint Gas Purchasing mechanism” to reinforce gas supply security in key import markets. This mechanism aims to improve and diversify the EU gas supply and to avoid unnecessary buyer competition within the EU, thereby enhancing the buyer power of EU members states. The mechanism is also meant to mitigate price volatility and reduce uncertainty by providing information about accessible energy supplies. Both Liquid Natural Gas (LNG) and natural gas are covered by this mechanism, and bidding processes are organized every two months.<sup>69</sup>

As the increase in global (LNG) production proved insufficient to offset the continued decline in Russian gas deliveries to Europe, gas supplies remain tight.<sup>70</sup> Due to feed gas supply issues and project delays, LNG did not meet prior expectations. The increase of renewable energy sources and better availability of nuclear power weighed on gas demand in Europe, causing lower prices.<sup>71</sup> With gas being the most consumed energy source in Europe, the phase-down would result in more immediate action taken toward the shift to greener energy, which is not as easy geographically and economically as one may think.

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<sup>68</sup> DNV (2023). *Energy Transition Outlook 2023*, page 92

<sup>69</sup> Le Coq C & Paltseva E (06.11.2023). *The EU gas purchasing mechanism: A game-changer or a storm in a teacup?* Stockholm School of Economics, From: <https://www.hhs.se/en/about-us/news/site-publications/2023/the-eu-gas-purchasing-mechanism-a-game-changer-or-a-storm-in-a-teacup/>

<sup>70</sup> Etienne C, Furukawa T, Molnár G & Ritter F (January 2024). *Gas Market Report*. International Energy Agency, From: <https://iea.blob.core.windows.net/assets/601bff14-5d9b-4fef-8ecc-d7b2e8e7449a/GasMarketReportQ12024.pdf>, page 4

<sup>71</sup> Etienne C, Furukawa T, Molnár G & Ritter F (January 2024). *Gas Market Report*. International Energy Agency, From: <https://iea.blob.core.windows.net/assets/601bff14-5d9b-4fef-8ecc-d7b2e8e7449a/GasMarketReportQ12024.pdf>, page 4

### 2.2.3 Coal supply

As a result of Russia's invasion of Ukraine and the pandemic, the coal market, much like the oil and gas market, has experienced a turbulent period, which ultimately triggered the global energy crisis. So far, coal markets have been less volatile, although projections are uncertain.<sup>72</sup> In the EU, coal demand increased by 0,9% in 2022, due to a high gas prices and the necessity to reduce gas usage amid reduced Russian gas supplies, and this combined with a low output of hydro as well as the French nuclear fleet having temporary shutdowns, resulted in coal-fired power generations being pushed.<sup>73</sup> Before the Russian invasion of Ukraine, the natural gas imported from Russia was Germany's main source of energy. When Russia invaded Ukraine, this source vanished resulting in Germany's return to coal production and consumption in order to meet their energy demand.

Currently, Germany holds the position as the largest producer of brown coal, despite having closed its last hard coal mines in 2018.<sup>74</sup> Out of the total energy-related CO<sub>2</sub> emissions in 2021, coal accounted for 13%, resulting in coal being responsible for the largest share of CO<sub>2</sub> emissions globally, primarily in the power sector.<sup>75</sup>

## **2.3 Export and import of fossil fuels**

Import and export is essential to the state's progression, but also their survival. The European energy markets consist of both domestically produced and imported energy. EU's main supplier is Russia, accounting for approximately 43% of the natural gas consumed in the EU.<sup>76</sup> When it comes to fossil fuels export, the European dependency varies.

Several countries in Europe, mainly in Eastern-Europe, export natural gas to neighboring countries. One example is Russia, a major exporter of natural gas to Europe. Another example is Norway that exports its natural gas primarily through its extensive offshore gas

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<sup>72</sup> Alvarez F.C & Lilienkamp A (July 2023). *Coal Market Update*. International Energy Agency, From: [https://iea.blob.core.windows.net/assets/6d364082-35fc-49cf-bf3e-c06a05a3445d/CoalMarketUpdate\\_July2023.pdf](https://iea.blob.core.windows.net/assets/6d364082-35fc-49cf-bf3e-c06a05a3445d/CoalMarketUpdate_July2023.pdf), page 3

<sup>73</sup> Alvarez F.C & Lilienkamp A (July 2023). *Coal Market Update*. International Energy Agency, From: [https://iea.blob.core.windows.net/assets/6d364082-35fc-49cf-bf3e-c06a05a3445d/CoalMarketUpdate\\_July2023.pdf](https://iea.blob.core.windows.net/assets/6d364082-35fc-49cf-bf3e-c06a05a3445d/CoalMarketUpdate_July2023.pdf), page 3

<sup>74</sup> Figure 3, Appunn K (18.01.2023). *Coal in Germany*, Clean Energy Wire. From: <https://www.cleanenergywire.org/factsheets/coal-germany>

<sup>75</sup> International Energy Agency (2021). *Europe- Coal*. IEA, From: <https://www.iea.org/regions/europe/coal#what-is-the-climate-impact-of-coal-in-europe>

<sup>76</sup> European Council (2024). *Infographic-Where does the EU's energy come from?* European Council. <https://www.consilium.europa.eu/en/infographics/where-does-the-eu-s-energy-come-from/>



fields in the North Sea. When it comes to oil or crude oil, European countries do not export large quantities, but mainly import oil to meet domestic demand. However, there are some European countries that export refined petroleum products such as diesel, gasoline and jet fuel. In recent years, the coal export has declined significantly due to environmental regulations, decreased coal consumption, and the global shift towards cleaner energy sources. Germany is one of the few countries in Europe that has chosen to reinvest in coal as its main energy source in 2022.

Europe is one of the continents that import the most fossil fuels worldwide as the European countries are depleted from domestic resources or the extraction of these resources become too costly. In 2022 imports of oil, gas and solid fuels accounted for 28% of total extra-EU imports.<sup>77</sup> Until 2022, Russia was the largest and most important exporter of fossil fuels in Europe, resulting in “*an over-reliance on a single, untrustworthy supplier*”, as the European Commission phrased it.<sup>78</sup>

The result of dependency on exportation of Russian fossil fuel caused an energy crisis across Europe, teaching the European energy markets a hard lesson when it comes to the importance of diversifying energy supplies and energy suppliers. Europe continues to rely on imports to meet its energy requirements; however, since 2022, it has been increasingly investing in renewable energy to gradually substitute fossil fuels in the long term.

Whereas the production of renewables has increased in recent years, the production of natural gas has decreased, resulting in a greater reliance on imported gas. With the energy prices surging and the high volatility, this prompted action towards reducing EU’s dependency on energy imports.<sup>79</sup> As explained in paragraph 2.1.1 the EU has established some regulations and policies to reduce their reliance on imported fossil fuels. One of these mechanisms are the CBAM.

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<sup>77</sup> Wettengel J. (03.04.24), *Germany, EU remain heavily dependent on imported fossil fuels*, Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/germanys-dependence-imported-fossil-fuels#three>

<sup>78</sup> European Commission (15.02.24), *In focus: EU energy security and gas supplies*, European commission. From: [https://energy.ec.europa.eu/news/focus-eu-energy-security-and-gas-supplies-2024-02-15\\_en](https://energy.ec.europa.eu/news/focus-eu-energy-security-and-gas-supplies-2024-02-15_en) & Wettengel J. Wettengel (03.04.24), *Germany, EU remain heavily dependent on imported fossil fuels*, Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/germanys-dependence-imported-fossil-fuels#three>

<sup>79</sup> European Commission (20.04.2022). *In focus: Reducing the EU’s dependence on imported fossil fuels*. EU, From: [https://commission.europa.eu/news/focus-reducing-eus-dependence-imported-fossil-fuels-2022-04-20\\_en](https://commission.europa.eu/news/focus-reducing-eus-dependence-imported-fossil-fuels-2022-04-20_en)

The CBAM will apply to all imports as well as selected initial states whose production is carbon-intensive and propose a risk of carbon leakage, including hydrogen and electricity amongst others. Importers of goods within the CBAM's scope, will be obliged to report GHG emissions embedded in their imports, both indirect and direct emissions.<sup>80</sup> The companies are given three ways to report these emissions: (1) full reporting in accordance with EU method, (2) reporting based on an equivalent method, and lastly (3) reporting based on reference values by default until July 2024, provided by the Implementing Regulation.<sup>81</sup> With the dependency in energy supply, export and import, the question now is how reliant on fossil fuels is the EU in terms of consumption?

## **2.4 Consumption of fossil fuels**

Fossil fuels consumption has changed significantly over the years, both in terms of how much we burn, but also what we burn.<sup>82</sup> Today fossil fuels account for approximately 80%<sup>83</sup> of all the energy we use, and 60%<sup>84</sup> of all the electricity. This itself shows a great dependency of fossil fuels when it comes to the amount of energy needed to meet the public's basic needs, such as heating and cooling their homes. In 2022, the European Union imported approximately 62,5% of the energy consumed, which is more than half of its total energy consumption.<sup>85</sup> Europe's most consumed energy source is imported natural gas from either Russia or Norway.

Over the years the greatest problem when it comes to climate and energy is the world's energy consumption. Countries such as Norway and Iceland have recorded the largest electricity demand per capita in Europe in the last few years. In 2021, Iceland had an

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<sup>80</sup> European Commission (2023). *Carbon Border Adjustment Mechanism*. EU, From: [https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism\\_en](https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en)

<sup>81</sup> European Commission (2023). *Carbon Border Adjustment Mechanism*. EU, From: [https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism\\_en](https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en)

<sup>82</sup> Ritchie H & Rosado P. (published October 2022, revised January 2024). *Fossil fuels*. Out World in Data, From: <https://ourworldindata.org/fossil-fuels>

<sup>83</sup> Adegbulgbe A., Fenhann J, Konstantinavičiute I, Moomaw W, Nimir. B. H, Schlamandinger B, Torres-Martinez J, Turner C, Uchiyama Y, J.v.Vuori S, Wamukonya N & Zhang X (2007): *Energy Supply*, Intergovernmental Panel on Climate Change, (Cambridge UK and New York USA: Cambridge University Press, 2007) From: <https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg3-chapter4-1.pdf> , page 256

<sup>84</sup> D'Ámbrosio B & Schoenfisch M (11.07.2023), *Electricity*, International Energy Agency, <https://www.iea.org/energy-system/electricity>

<sup>85</sup> Wettengel J. (21.02.2024). *Germany, EU remain heavily dependent on imported fossil fuels*. From: <https://www.cleanenergywire.org/factsheets/germanys-dependence-imported-fossil-fuels>

electricity demand averaging at over 52 megawatt-hours per person, which is more than twice that of Norway's consumption.<sup>86</sup>

Oil, natural gas and coal are all consumed differently. When it comes to coal, only 20% of the total coal supply in 2021 is used by final consumers, such as residential purposes, while 68% is used by the industry, for instance in steelmaking.<sup>87</sup> Meanwhile, for natural gas, 62% of the natural gas supply in 2021 is used by final consumers, where 42% of these 62% is for residential purposes like heating, and 33% is used industrially.<sup>88</sup> Oil is the fossil fuel that is most consumed in the transport sector, accounting for 64% of the total final consumption of oil products.<sup>89</sup>

The war in Ukraine has prompted considerable reforms in the European electricity markets. At the end of 2023, the EU Council and Parliament agreed to reform the EU electricity market design (EMD) as an attempt to insulate the consumers from extreme price surges, boost the transparency and oversight within the markets, as well as to foster a greater inclusion of renewable energy sources in the energy mix. Pivotal to these changes in the reforms is the national governments encouragements of directly financed power purchase agreements (PPA's) for energy projects investing in renewables. In doing so, governments can encourage adoption of renewables, acting as purchasers of green energy. These reforms can also mitigate the volatility of prices within the electricity markets, through contracts which sets predefined price limits to match the price variability of renewables.<sup>90</sup>

In an attempt at reducing the overall energy consumption within the EU, the EU highlighted the importance of energy efficiency as a tool to both reduce energy consumption, as well as enhancing both present and future energy affordability and security, both a necessity for the EU to reach their climate ambitions. To ensure that EU's climate target of reducing GHG emissions by at least 55% would be met, the Commission revised the Energy Efficiency

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<sup>86</sup> Statista (28.02.24). *Leading countries by per capita electricity demand in Europe in 2023*. Statista Research Department. <https://www.statista.com/statistics/1262218/per-capita-electricity-consumption-europe-by-country/>

<sup>87</sup> International Energy Agency (2021). *Europe- Coal*. IEA, From: <https://www.iea.org/regions/europe/coal#what-is-the-climate-impact-of-coal-in-europe>

<sup>88</sup> International Energy Agency (2021). *Europe- Natural gas*. IEA, From: <https://www.iea.org/regions/europe/natural-gas>

<sup>89</sup> International Energy Agency (2021). *Europe- Oil*. IEA, From: <https://www.iea.org/regions/europe/oil>

<sup>90</sup> World Energy Council (2024). *World Energy Trilemma 2024: Evolving with resilience and justice*. From: [https://www.worldenergy.org/assets/downloads/World\\_Energy\\_Trilemma\\_2024\\_Full\\_Report.pdf?v=1713438208](https://www.worldenergy.org/assets/downloads/World_Energy_Trilemma_2024_Full_Report.pdf?v=1713438208), Page 46

Directive together with climate and energy rules.<sup>91</sup> The Energy Efficiency Directive establishes “energy-efficiency first” as the main principle of EU energy policy, which means that energy efficiency must be considered by all Member States in both relevant policies, as well as investment decisions taken in the energy sectors and likewise in the non-energy sectors.<sup>92</sup> The law has reduced fossil fuel consumption by promoting energy efficiency measures across the EU, encouraging a transition towards sustainable and efficient energy sources, thereby supporting EU’s climate ambitions and enhancing energy security.

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<sup>91</sup> European Union. *Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast)*. Official Journal of the European Union. From: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL\\_2023\\_231\\_R\\_0001&qid=1695186598766](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766) , nr. (2)

<sup>92</sup> European Union. *Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast)*. Official Journal of the European Union. From: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL\\_2023\\_231\\_R\\_0001&qid=1695186598766](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766) , nr. (15)

# Chapter 3: How has the phase-down of fossil fuels been implemented or planned in Germany, what specific policies are driving this transition and how does Germany's approach differ from France's?

## **3.1 Introduction**

In 2019, The Glasgow Climate Pact became the first key COP document to include this agreement to phase-down of unabated coal-fired power generation.<sup>93</sup> Some member states of the UNFCCC, under the Powering Past Coal Alliance, have since 2017 been committed to phasing out of unabated coal-fired power generation by 2030 since 2017. The biggest coal producer country in this alliance is Germany.<sup>94</sup>

Throughout the years, German energy policy has ranged from great enthusiasm for coal and nuclear energy to scepticism for both. Promises of an allegedly clean, cheap and sustainable renewable energy supply contrasts with the concerns regarding the emissions and climate change arising from combusting fossil fuels. Yet implementing policies which are in favour of renewable energy sources have been proved to not be as simple as first believed.<sup>95</sup> As an EU member state, Germany is obligated to implement regulations and directives adopted by the EU.<sup>96</sup>

Europe created the Green Deal as a way to become the first climate-neutral continent in the world, which Germany has attempted to align into its domestic frameworks. In order to meet both the demands of the Green Deal as a member state of the EU, but also meet the international climate change goals, Germany finds itself in a tricky situation. With all the talk

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<sup>93</sup> Thiegles, Sonja (2023): *The global shift away from fossil energy: A blind spot in climate foreign policy*, SWP comment (No.38/(2023)), Stiftung Wissenschaft und Politik (SWP), Berlin. From: <https://www.econstor.eu/bitstream/10419/279925/1/1852602570.pdf>, page 5

<sup>94</sup> Thiegles, Sonja (2023): *The global shift away from fossil energy: A blind spot in climate foreign policy*, SWP comment (No.38/(2023)), Stiftung Wissenschaft und Politik (SWP), Berlin. From: <https://www.econstor.eu/bitstream/10419/279925/1/1852602570.pdf>, page 5

<sup>95</sup> Marshall J.P & Renn O. (02.05.2016). *Coal, nuclear and renewable energy policies in Germany: From the 1950s to the "Energiewende"* (Volume 99, Energy Policy 2016 Pages 224-232) page 224

<sup>96</sup> European Commission (non-dated). *Implementing EU law*. EU, From: [https://commission.europa.eu/law/application-eu-law/implementing-eu-law\\_en](https://commission.europa.eu/law/application-eu-law/implementing-eu-law_en) (Read: 20.05.2024)

of phasing down the coal dependency and usage, there is still little progress made in Germany.

### **3.2 Attempting to crowd out of fossil fuels**

The “Energiewende”, which translates to energy transition, is central to Germany’s climate- and energy policies. Germany’s key mechanism to reach its target on reducing emission, is the expansion of renewable energy sources, the cessation of fossil fuels and lastly the reduction of energy consumption, in all sectors of the economy. The “Energiewende” has two pillars, namely is renewable energy sources and energy efficiency.<sup>97</sup>

When it comes to the phase-down of fossil fuels, one could say that Germany has taken quite a piecemeal approach to this scenario. By 2045 the goal is to be Greenhouse gas-neutral, and Germany has become the first major economy to announce that they intend to introduce a target to reach “net negative” emissions<sup>98</sup> later this century.<sup>99</sup> Germany has developed a number of legal frameworks, strategies and packages, in an attempt to meet both international climate targets, as well as their obligations as a Member State, which will be presented and discussed in paragraph 3.2.1-3.2.5.

#### ***3.2.1 The Renewable Energy law (EEG)***

The Renewable Energy law (EEG) came into effect on 1 January 2023, and lays the foundation for Germany to become climate neutral. The EEG regulates the renewable electricity sector and states that in order to become climate neutral, the EEG’s goals are to increase the share of gross electricity consumption so that at least 80% comes from renewable energy sources by 2030.<sup>100</sup> This to ensure that power generation is virtually free of GHG by

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<sup>97</sup> International Trade Administration (06.12.2023). *Energy*. ITA, From: <https://www.trade.gov/country-commercial-guides/germany-energy>

<sup>98</sup> A state where removals exceeds emissions, cf. Dunne D. (27.03.2024). *Explainer; Why some countries are aiming for “net-negative” emissions*. CarbonBrief. From: <https://www.carbonbrief.org/explainer-why-some-countries-are-aiming-for-net-negative-emissions/>

<sup>99</sup> Dunne D. (27.03.2024). *Explainer; Why some countries are aiming for “net-negative” emissions*. CarbonBrief. From: <https://www.carbonbrief.org/explainer-why-some-countries-are-aiming-for-net-negative-emissions/>

<sup>100</sup> International Trade Administration (06.12.2023). *Energy*. ITA, From: <https://www.trade.gov/country-commercial-guides/germany-energy>

2035, to limit global warming to 1.5 degrees Celsius, and lastly, to reduce the national dependence on fossil fuels.<sup>101</sup>

Paragraph 1a first subsection<sup>102</sup> says: “Nach der Vollendung des Kohleausstriebs wird die Treibhausgasneutralität der Stromversorgung im Bundesgebiet angestrebt”.<sup>103</sup> It is in this paragraph that the phase-out of coal, not of natural gas and oil, is mentioned as a key element to reach climate neutrality. As of 2030, the renewable expansion target is raised to at least 80% of domestic gross electricity consumption. Due to Germany’s wish to quickly reduce its dependency on fossil fuel imports, mainly on natural gas, they aim to quicken the renewables electrification and expansion.<sup>104</sup>

### **3.2.2 Building Energy Law (GEG)**

Germany agreed to concrete steps to reduce emissions from heating systems for buildings., which accounts for around 15% of Germany’s CO2 output. Today, fossil fuels supplied 80% of Germany’s heating demand. With the energy-efficient retrofit rates still being on the lower end, the sector is off-target for Germany’s goal to reach climate neutrality by 2045, resulting in the new Building Energy Law (GEG). The Building Energy Law (GEG) mandates that heating systems for buildings are fossil fuel free by 2045. In order to get there Germany, as an example, gave a mandate and a key provision of the proposed law to install a heating system based on 65 % renewables for all heaters that are newly installed as of 2024.<sup>105</sup>

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<sup>101</sup> Die Bundesregierung (23.12.2023). *EEG 2023: «We’re tripling the speed of the expansion of renewable energies»*. Bundesregierung. From: <https://www.bundesregierung.de/breg-de/schwerpunkte/klimaschutz/amendment-of-the-renewables-act-2060448>

<sup>102</sup> Erneuerbare-Energien-Gesetz (EEG 2023). *Gesetz für den Ausbau erneuerbarer Energien (Erneuerbare-Energien-Gesetz-EEG 2023)* (22.12.2023). From: [https://climate-laws.org/documents/law-for-the-expansion-of-renewable-energies-renewable-energy-sources-act-eeeg-2021\\_bbdd?q=ausphasen](https://climate-laws.org/documents/law-for-the-expansion-of-renewable-energies-renewable-energy-sources-act-eeeg-2021_bbdd?q=ausphasen)

<sup>103</sup> “Once the coal phase-out has been completed, the aim is to achieve greenhouse gas neutrality in the electricity supply in Germany”, English translation

<sup>104</sup> Federal Ministry for Economic Affairs and Climate Action (11.05.2022). *What’s inside the Easter Package*. Federal Ministry for Economic Affairs and Climate Action, From: <https://www.bmwk-energiewende.de/EWD/Redaktion/EN/Newsletter/2022/04/Meldung/topthema.html>

<sup>105</sup> Amelang S. (11.09.2023). *Q&A- Germany agrees phaseout of fossil fuel heating systems*. Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/qa-germany-debates-phaseout-fossil-fuel-heating-systems>

### **3.2.3 Climate law (Klimaschutzgesetz)**

In the summer 2021, German policy-and lawmakers adopted a crucial reform of the Climate Action Law, introducing new and more ambitious GHG reduction targets as well as details on post-2030 goals. With the Climate Action Programme 2030 and the Climate Action Act (Klimaschutzgesetz), Germany made a binding undertaking to reduce the greenhouse gas emissions by 55% Germany has set specific emission limits through 2030 for each sector in its climate law (Klimaschutzgesetz). This emission limit is considered to be another indirect approach to the fossil fuel phase-down.

The general purpose of the law is to guarantee that Germany fulfils both national and European climate targets in order to safeguard against the effects of climate change globally. Furthermore, it is meant to rest upon the Paris Agreement target to limit global warming to well below 2 degrees Celsius and hopefully to 1,5 degrees Celsius.<sup>106</sup> The Climate law is also meant to enshrine the national GHG targets in law with at least 65% by 2030 and at least 88% by 2040, as well as reaching GHG neutrality by 2045 and negative GHG emissions after 2050. However, ambition of national targets cannot be lowered, but can be raised if necessary to meet international or European obligations.<sup>107</sup>

### **3.2.4 National Hydrogen Strategy**

As a way to support the energy transition, Germany adopted its National Hydrogen Strategy in 2020, which was recently updated. Its aim is to speed up the development of a market for the fuel, something which would be vital in order to meet climate neutrality by 2045. The strategy emphasizes that state support will only be available for green hydrogen, on the production side, but also states that applications using hydrogen made from fossil fuels that are both capture and stored, blue hydrogen, potentially could receive state support.<sup>108</sup> Hydrogen is important for Germany's clean energy future, supporting the two goals of

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<sup>106</sup> Appunn K & Wettengel J (19.06.2023). *Germany's Climate Action Law*. Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/germanys-climate-action-law-begins-take-shape>

<sup>107</sup> Appunn K & Wettengel J (19.06.2023). *Germany's Climate Action Law*. Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/germanys-climate-action-law-begins-take-shape>

<sup>108</sup> Wettengel J (26.07.2023). *Germany aims to accelerate hydrogen market ramp-up with strategy update*. Clean Energy Wire. From: <https://www.cleanenergywire.org/news/germany-also-support-hydrogen-made-co2-capturing-under-upcoming-strategy-update-media>



decarbonization of energy-intensive industries like steel to reduce emissions, as well as to serve as a backup energy generation for growing shares of renewable energy.<sup>109</sup>

In order to help the industry, as well as potentially heavy-duty transport and aviation, transition away from fossil fuels, Germany updated their national Hydrogen Strategy, including subsidies, to foster green hydrogen production and pursue an import strategy. Based on this strategy, the national hydrogen demand is expected to reach 95-130 TWh by 2030, where around 50-70% of the hydrogen will be imported through pipelines, mainly from Denmark and Norway.<sup>110 111</sup>

The National Hydrogen Strategy comprises a two-stage plan. In the first “ramp-up” phase, the focus is on establishing a robust domestic hydrogen market, including developing infrastructure for hydrogen distribution and transport, as well as derived products. The second phase aims to reinforce this market ramp-up and provide a basis for an international and European cooperation, where the updated strategy is to accelerate growth of hydrogen in the market, including its derivatives in transportation and industry sectors.<sup>112</sup>

### ***3.2.5 German Easter Package: the action package for energy***

Due to the climate crisis and the Russian invasion of Ukraine, a sense of urgency for a package of immediate energy action implementing many of the energy policies in the coalition agreement, appeared.<sup>113</sup> According to Germany’s Federal Minister Robert Habeck, both these crises show how important it is to phase-out from fossil fuels as fast as possible

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<sup>109</sup> International Trade Administration (06.12.2023). *Energy*. ITA, From: <https://www.trade.gov/country-commercial-guides/germany-energy>

<sup>110</sup> Global CCS Institute (07.08.2023). *Germany Updates its National Hydrogen Strategy*. Global CCS Institute, From: <https://www.globalccsinstitute.com/news-media/latest-news/germany-updates-its-national-hydrogen-strategy/>

<sup>111</sup> Wettengel J (26.07.2023). *Germany aims to accelerate hydrogen market ramp-up with strategy update*. Clean Energy Wire. From: <https://www.cleanenergywire.org/news/germany-also-support-hydrogen-made-co2-capturing-under-upcoming-strategy-update-media>

<sup>112</sup> International Trade Administration (06.12.2023). *Energy*. ITA, From: <https://www.trade.gov/country-commercial-guides/germany-energy>

<sup>113</sup> Federal Ministry for Economic Affairs and Climate Action (06.04.2022). *Overview of the Easter Package*. Federal Ministry for Economic Affairs and Climate Action. From: [https://www.bmwk.de/Redaktion/EN/Downloads/Energy/0406\\_ueberblickspapier\\_osterpaket\\_en.pdf?\\_\\_blob=publicationFile&v=5](https://www.bmwk.de/Redaktion/EN/Downloads/Energy/0406_ueberblickspapier_osterpaket_en.pdf?__blob=publicationFile&v=5)

and permanently, as well as to press ahead with renewable energy sources such as wind and sun.<sup>114</sup>

The main principle in the package is the principle that renewable energy serves public security and is in the overriding public interest.<sup>115</sup> Germany plans to source its electricity more or less from renewable energy as early as 2030. In order for this to be achievable, several policies and laws within the energy sector had to be amended, including the EEG.

The strategy to move away from Russian import dependency of natural gas was formulated in the German Easter Package aiming to boost the transformation of the energy industry, as well as reshaping German energy law. The German Easter Package is considered a mix between ramping up renewables and energy efficiency, hydrogen as well as to switch to new suppliers of LNG and not only the United States. Accordingly, new LNG import structure was set up.

### **3.3 The cessation of fossil fuels in domestic law**

An issue with Germany's implementation, or lack of implementation, of the cessation of fossil fuels is its disregard of gas and oil. As shown in 3.2 there are certain targets for phasing out of coal, but the same targets and goals are non-existent for oil and gas, with exception of the heating sector.

When it comes to generating electricity, Germany plans to gradually phase-out of coal. At the COP28 summit, German Chancellor Olaf Scholz called for the world to phase-out of coal, oil and gas, but foremost coal. Furthermore, he said that Germany is leading the development for clean energy solutions and reiterated Germany's pledge to be climate-neutral by 2045. These are strong statements given the absence of a comprehensive national policy or framework that explicitly mandate the phase-out and the phase-down of all fossil fuels, rather than solely targeting coal. If inadequate policies and frameworks are enacted, Germany are at risk of leaving itself open to challenges.

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<sup>114</sup> Federal Ministry for Economic Affairs and Climate Action (11.05.2022). *What's inside the Easter Package*. Federal Ministry for Economic Affairs and Climate Action, From: <https://www.bmwk-energiewende.de/EWD/Redaktion/EN/Newsletter/2022/04/Meldung/topthema.html>

<sup>115</sup> Federal Ministry for Economic Affairs and Climate Action (11.05.2022). *What's inside the Easter Package*. Federal Ministry for Economic Affairs and Climate Action, From: <https://www.bmwk-energiewende.de/EWD/Redaktion/EN/Newsletter/2022/04/Meldung/topthema.html>

To maintain its electricity supply security, where most of the oil and gas consumed is imported, Germany has been heavily dependent on oil and gas. This dependency generates two potential instances of instability. Firstly, changes in the global energy prices, will strongly affect German energy users and importer. Secondly, developments in the markets will be heavily dependent on Germany's relations with certain countries. The nuclear phase-out, and the planned coal phase-out's will increase Germany's reliance on natural gas, making it important to continue its efforts at diversifying gas supply options, which also includes LNG imports.<sup>116</sup> At present, the only good decision Germany has made, is to go against its original decision and invest in CCS-technologies in an attempt to nullify the emissions released by its domestic consumption and production of coal.

### **3.4 How does Germany's approach differ from France's approach in terms of facilitating a greener transition?**

Germany is not the only key economy in Europe which is struggling to facilitate a cleaner energy transition. The other key economy is France. When it comes to the energy and climate discussion both countries are equally important in regard to facilitating a cleaner energy transition and are considered to be EU's largest energy consumers. Both, Germany and France have major influence regarding EU energy policy and are crucial when it comes to implementing a sustainable transformation of the European energy system. In 2021 both countries accounted for roughly 38 per cent of EU's total energy consumption.<sup>117</sup>

Like many EU countries, France is also heavily reliant on fossil fuels, which in 2022 accounted for almost half of the country's primary energy consumption. As around two third of France's electricity is produced by nuclear power, the country's emissions within the energy sector are lower than other EU countries such as Germany.<sup>118</sup> France and Germany

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<sup>116</sup> International Trade Administration (06.12.2023). *Energy*. ITA, From: <https://www.trade.gov/country-commercial-guides/germany-energy>

<sup>117</sup> Lafrance C & Wehrmann B (03.07.2023). *How energy systems and policies of Germany and France compare*. Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/how-energy-systems-and-policies-germany-and-france-compare>

<sup>118</sup> Lafrance C. & Portala J (17.05.2024). *CLEW Guide- France awaits key climate legislation, government keeps focus on nuclear*. Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/clew-guide-france-moves-action-new-climate-plan-green-industry-makeover>

play a key role in EU's goal of reaching climate neutrality.<sup>119</sup> In terms of facilitating a cleaner energy transition, they have gone in separate directions. The EU stands neutral when it comes to energy sources, which means that the member states are free to choose where they supply energy from.<sup>120</sup> France is one of the countries in the EU that has a very low-carbon electricity mix, owing to its large nuclear fleet. As a part of their ambitious energy transition, France's 2019 Energy and Climate act aims to reduce its GHG emissions by 55% by 2030, legislating a net-zero emission target for 2050.<sup>121</sup>

To maintain their electricity security long term as well as a low-carbon footprint, France decided to invest in building more nuclear power plants as well as investing in offshore wind, all the while enhancing a more flexible operation system for its power.<sup>122</sup> Whereas France decided to invest heavily in nuclear power, Germany has been phasing out operational nuclear power plants and prioritised the expansion of renewable energy sources, alongside the decommissioning of natural gas power stations and coal.<sup>123</sup> The nuclear dispute in the energy discussion is driving a wedge between Germany and France, threatening EU's transition away from fossil fuels. Their dispute over how to treat nuclear power in some EU reforms has had consequences for how Europe plans to move towards greener and cleaner energy.<sup>124</sup>

Despite new decarbonisation goals published last year, including the progressive phase-out of fossil fuels, France seems more focused on building new power plants, than bridging the differences with other EU countries, in terms of developing clean energy sources.<sup>125</sup> Germany decided to phase out of nuclear in 2000, but completed its exit from nuclear in April 2023, due to a delay caused by the energy crisis in Europe. While Germany phased out of nuclear

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<sup>119</sup> Lafrance C & Wehrmann B (13.07.2023). *How Germany's and France's climate policies and greenhouse gas emissions compare*, Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/how-germanys-and-frances-climate-policies-and-greenhouse-gas-emissions-compare>

<sup>120</sup> Directorate-General for Energy (13.03.2024). *In focus: EU nuclear energy policy- why it matters to us all*. European Commission. From: [https://energy.ec.europa.eu/news/focus-eu-nuclear-energy-policy-why-it-matters-us-all-2024-03-13\\_en](https://energy.ec.europa.eu/news/focus-eu-nuclear-energy-policy-why-it-matters-us-all-2024-03-13_en)

<sup>121</sup> International Energy Agency (2021). *France*. IEA, From: <https://www.iea.org/countries/france>

<sup>122</sup> International Energy Agency (2021) *France*. IEA, From: <https://www.iea.org/countries/france>

<sup>123</sup> Vallée S. (16.10.2023). *A Franco-German Grand Bargain on Energy Policy*. Internationale Politik Quarterly. From: <https://ip-quarterly.com/en/franco-german-grand-bargain-energy-policy>

<sup>124</sup> Hancock A, Pitel L. & White S (15.10.2023). *The nuclear dispute driving a wedge between France and Germany*. Financial Times. From: <https://www.ft.com/content/b1dbd7b4-d8b9-45eb-bd18-4976f7c9af5e>

<sup>125</sup> Lafrance C. & Portala J (17.05.2024). *CLEW Guide- France awaits key climate legislation, government keeps focus on nuclear*. Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/clew-guide-france-moves-action-new-climate-plan-green-industry-makeover>

power, France reduced their coal-fired power generation, resulting in only four plants in operation as of 2023.

In the months following the Russian invasion of Ukraine, both Germany and France found themselves in a crisis. The nuclear power supply fell 30% compared to the last 20 years. In Germany, the government found themselves without enough energy to meet the national energy demand, which resulted in countries return to coal as their main source of energy. This to substitute for the shortage of imported natural gas from Russia.

A nuclear alliance was formed with the aim to integrate non-renewable nuclear energy in EU's renewable energy plans, led by France. A compromise was made through EU's intermediate renewable power goals, which included nuclear power provisions, allowing EU states to move on in the nuclear discussion, this time as well. Even though both countries disagree on nuclear power, both countries have agreed and vowed to see through that Europe reaches its goal of climate neutrality, as well as greater energy sovereignty.

The European Green Deal compels all member states to improve coordination, where the key steps in order for the Green Deal to succeed is to make sure that countries step up coordination on avoiding excess fossil fuel infrastructure investments, as well as to push interconnections and reform the EU power market.<sup>126</sup> In order for this to happen, it is vital that the Germany and France set their differences aside and push forward renewable energy sources to reach climate neutrality.

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<sup>126</sup> Lafrance C & Wehrmann B (07.07.2023). *Russia's war has exposed France and Germany's energy policy differences. Can it also bring them together?* Energypostevents. From: <https://energypost.eu/russias-war-has-exposed-france-and-germanys-energy-policy-differences-can-it-also-bring-them-together/>

# Chapter 4: How will the changes impact the sector overall and what opportunities and challenges might arise, given the volatility of the current landscape of energy markets?

## **4.1 Introduction**

After the UN parties agreed to initiate a phase-down of fossil fuels, many questions arose. If fossil fuels were as bad as multiple reports, studies and research showed, why did the phase-down only become a topic of discussions, along with actual plans of action, just recently. Why does it also have to come to natural disasters, loss of human lives and homes for the world leaders to acknowledge that it is time to act, and why do they only act when it is close to too late. And if the world were to, for once, follow up on its promises, what challenges would arise from phasing down of fossil fuels, and what opportunities may grow, given the volatility of the current landscape of energy markets.

## **4.2 Opportunities**

Over the years, fossil fuels have accounted for a large portion of the world's energy consumption and supply levels. With the decision to phase-down of fossil fuels, hope began to arise as to whether the time had finally come for renewable energy sources to grow and take the place of fossil fuels. At present, more and more countries are investing and building new windmills and solar power plants amongst others, to supply electricity and energy for heating and cooling. Germany is one of the many countries investing in renewable energy, where wind power accounted for over 50% of the nation's gross electricity production.<sup>127</sup>

Energy efficiency, also called the “first fuel” in clean energy transitions, is currently being more focused on globally among policy makers recognising the important role it serves in enhancing energy affordability and security, as well as accelerating a cleaner energy transition.<sup>128</sup> With the phase-down of fossil fuels, the world has been forced to think greener, renewable and more creative, making it important to secure energy efficiency, which in turn

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<sup>127</sup> Statista Research Department (11.04.2024). *Distribution of energy sources used for gross electricity generation in Germany in 2023*. Statista. From: <https://www.statista.com/statistics/736640/energy-mix-germany/>

<sup>128</sup> Howarth N & Lane K (2023) *Energy efficiency*. IEA. From: <https://www.iea.org/energy-system/energy-efficiency-and-demand/energy-efficiency>, page 19

would reduce the overall energy consumption. This would be central in order to reach the EU's climate ambitions.<sup>129</sup>

### **4.3 Challenges**

Due to the geopolitical pressures the world has been under during the last two years, market volatility and high energy prices have been fuelling a fear of energy risk. As shown in chapter two, the EU is highly reliant on imported natural gas for power and heat, having imported approximately 83% of its gas in 2021. Out of these 83%, 46% was imported from Russia.<sup>130</sup>

#### ***4.3.1 A unison energy law: one-size does not fit all***

Over the years, there has been many discussions on why the world does not have a unison energy law with rules and targets that every country has to follow and meet. If they fail to do so, then the law should include suitable sanctions to prevent further breaches. The biggest issue, and the main reason for why a union energy law does not exist, is that there are too many opinions and perspectives from every country, making it difficult to fit them all into one law. Another issue is to formulate the law both precise enough so that every country has main targets they need to work towards and reach, but at the same time vaguely enough so that the countries can implement these targets and rules into their own national law.

The main blind spot in climate foreign policy is the never-ending battle of national law versus international law and obligations. One of the greatest problems regarding this is the fact that countries often use their national sovereignty to get away from international obligations, such as climate change policies. Most of the time, climate law or energy law is largely just talk and little action. Reasons for this is the lack of implementation of rules or international policies regarding climate, requisite ambition, but also the lack of participations of major countries. An example of this is that the EU target of climate neutrality is implemented differently in

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<sup>129</sup> European Union. *Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast)*. Official Journal of the European Union. From: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL\\_2023\\_231\\_R\\_0001&qid=1695186598766](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766), nr (14)

<sup>130</sup> Enel North America (10.04.2023). *2023 Energy trend: energy market volatility*. ENEL, From: <https://www.enelnorthamerica.com/insights/blogs/energy-market-volatility>

France and Germany, where Germany aims to achieve net-zero emissions by 2045, while France aims to reach the same target by 2050.<sup>131</sup>

If there ever will come a chance to create a unison European energy law, there are three principles that will be vital to ensure the law is applicable in every country. The first principle is the most important, which is that the priority and the focus of the law must be placed on fighting the climate change and in that way, decarbonisation of the energy systems. Furthermore, policies regarding decarbonisation adopted in Europe must be accepted and recognized by every party. This to ensure that the policy is being followed and that every party has the same rights, targets and rules to follow and meet. Lastly, it is important that the member state's policies or actions in developing collective initiatives should not obstruct the progress of decarbonisation projects undertaken by fellow member states.

In different political settings, like the COPs, what is most evident is the lack of will to support less-fortunate countries economically. Now that the world is, hopefully, going to initiate the cessation of fossil fuels, the focus has moved to renewable energy sources. When it became clear how much the energy transition would cost, the question became: Who will pay?

#### ***4.3.2 There are no such things as free lunches***

The EU's green transition will require more than 760 billion dollars a year in investments to help Europe combat climate change within its energy transition goals. Included in these numbers is an investment of about 675 billion dollars annually to meet the objectives of the Green Deal and of EU's REPowerEU plan, as well as an additional 92 billion euros to address the objectives set out in the Net-Zero Industry Act over the 2023-2030 period.<sup>132</sup> The Net-Zero Industry Act aims to counter the massive subsidies by China and the US, as well as boosting Europe's manufacturing in net-zero products under the Green Deal Industrial

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<sup>131</sup> Lafrance C & Wehrmann B (13.07.2023). *How Germany's and France's climate policies and greenhouse gas emissions compare*, Clean Energy Wire, From: <https://www.cleanenergywire.org/factsheets/how-germanys-and-frances-climate-policies-and-greenhouse-gas-emissions-compare>

<sup>132</sup> Payne J. (06.07.2023). *EU needs over \$760 bln/yr to hit green transition targets- Commission*. Reuters. From: <https://www.reuters.com/sustainability/climate-energy/eu-needs-over-760-bl-yr-hit-green-transition-targets-commission-2023-07-06/> & Whiting K. (11.07.2023). *World's hottest day and month recorded- plus other nature and climate stories you need to read this week*. World Economic Forum. From: [https://www.weforum.org/agenda/2023/07/world-hottest-day-nature-and-climate-stories/#2.-\\$760bn-a-year-for-eu's-green-transition](https://www.weforum.org/agenda/2023/07/world-hottest-day-nature-and-climate-stories/#2.-$760bn-a-year-for-eu's-green-transition)



Plan.<sup>133</sup> With numbers as big as this, one may question where this money would come from, and who, ultimately, would pay the big bill.

Over the years, one of the main issues with the energy transition is the financing. Current trends within the banking sector shows that banks still invest heavily in fossil fuels projects and demonstrate little change when it comes to foster a green investment shift. If banks were to change their perspective in terms of investment, and rather invest in greener projects, from infrastructures to windmills, there would be a greater opportunity for the industry to choose renewable energy instead of the cheaper fossil fuels.

#### ***4.3.3 Can fossil fuels be replaced long-term?***

From an outside perspective, renewables such as solar and wind power are considered “good” while fossil fuels are “bad”, this is however much more nuanced. In debates, one of the more common cons on renewables is their dependency on weather as a main factor for producing energy. Solar-power depends on sunny weather, hydropower depends mostly on dams and wind-power relies on wind in order to produce energy. This is one of the main reasons why countries continue to use fossil fuels, because they are easier to store, more efficient and continuously available. With the current energy crisis, it is easier to meet the energy demand with fossil fuels rather than renewables, even if fossil fuels are the “bad” option of the two in with regard to emissions and climate consequences.

Countries have begun looking for a way to substitute fossil fuels in order to be able to phase-down, and eventually phase-out of fossil fuels. One of the alternative energy sources is nuclear power. The EU currently relies on nuclear power for about a quarter of its electricity and provides to about half the low-carbon electricity.<sup>134</sup> According to the IEA nuclear energy can contribute to making the journey away from fossil fuels more secure and faster. Nuclear energy contributes to reaching net zero emissions of greenhouse gases by avoiding 1.5 gigatonnes (Gt) of global emissions and 180 billion cubic meters of global gas demand a

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<sup>133</sup> Payne J. (06.07.2023). *EU needs over \$760 bln/yr to hit green transition targets- Commision*. Reuters. From: <https://www.reuters.com/sustainability/climate-energy/eu-needs-over-760-bl-yr-hit-green-transition-targets-commission-2023-07-06/>

<sup>134</sup> World Nuclear Association (January 2024). *Nuclear power in the European Union*, World Nuclear Association, From: <https://world-nuclear.org/information-library/country-profiles/others/european-union.aspx>

year.<sup>135</sup> Across the world approximately 60 reactors are under construction whereas 110 are planned, most of these in Asia.<sup>136</sup>

Hydrogen has been a hot topic in the discussion on the clean energy transition. If produced with renewable or nuclear energy, or even fossil fuels, with the use of carbon capture, hydrogen can decarbonise a range of sectors such as transport. Using hydrogen to power vehicles would promote energy security and result in improved air quality. Hydrogen serves as a valuable asset in the integration of variable renewables within the electricity system. It stands out as one of the limited options capable of storing energy effectively over extended periods, whether its days, weeks, and even months. Hydrogen production is primarily based on fossil fuel technologies. One sixth of the hydrogen supply comes from “by-product” hydrogen, mainly chemical products derived from natural gas or petroleum.<sup>137</sup> Natural gas accounted for 70% of the energy required for dedicated hydrogen production, and coal accounted for the remaining 30%.<sup>138</sup>

#### **4.4 The end of the fossil fuel age?**

Ever since COP28 agreed to a phase-down of fossil fuels, the world has struggled to find energy sources that could substitute fossil fuels. Around the world various initiatives aims at lowering incentives for production of oil and gas. The United States, Germany, Italy, Canada, France, Japan and the United Kingdom, also known as the G7 countries, plans to develop an international approach to report, monitor, measure and verify methane emissions generated by the fossil-fuel production process.<sup>139</sup>

Alternative energy sources are not happening as quickly as needed in order for the cessation of fossil fuels to be feasible. Even with the major investments in infrastructures supporting renewables in some countries, there are still disparities in how far the countries have gotten.

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<sup>135</sup> International Energy Agency (June 2022). *Nuclear Power and Secure Energy Transitions*, International Energy Agency, <https://www.iea.org/reports/nuclear-power-and-secure-energy-transitions>, page 7

<sup>136</sup> World Nuclear Association (April 2024). *Plans for New Reactors Worldwide*. World Nuclear Association. From: <https://world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide.aspx>

<sup>137</sup> Bermudez J.M & Evangelopoulou S. (10.07.2023). *Hydrogen*. International Energy Agency. From: <https://www.iea.org/energy-system/low-emission-fuels/hydrogen>

<sup>138</sup> Bermudez J.M & Evangelopoulou S. (10.07.2023). *Hydrogen*. International Energy Agency. From: <https://www.iea.org/energy-system/low-emission-fuels/hydrogen>

<sup>139</sup> Thiegles, Sonja (2023): *The global shift away from fossil energy: A blind spot in climate foreign policy*, SWP comment (No.38/(2023), Stiftung Wissenschaft und Politik (SWP), Berlin. From: <https://www.econstor.eu/bitstream/10419/279925/1/1852602570.pdf>, page 4

This in turn has resulted in there still being little progress made within the EU energy sectors. In order for the cessation of fossil fuels to be feasible, the countries need to come together and invest in renewable energy. However, there also needs to be an investment in a fund which less fortunate countries can use to similarly support this investment in renewable energy infrastructures. All countries need to make the same efforts for the phase-down of fossil fuels to be both feasible, but also durable. A transition to clean energy is not only about making an investment in our future, but also about an investment in the future of the generation coming after us.

The phase-down of fossil fuels will reshape the energy markets in different ways. While challenges including managing volatility and ensuring a just transition for these markets will occur, there are clear benefits to the cessation of fossil fuels. Increased investments in renewable energy, enhanced focus on energy security, and a greener focus within the markets will not only benefit the markets itself, but also our climate. By diversifying the energy sources, Europe and its markets can mitigate the risks associated with the price fluctuations in global fossil fuel markets, as well as supply disruptions. As for what effect the phase-down of fossil fuels will have on the European energy markets, that remains to be seen. Unless the cessation of fossil fuels becomes a reality and not just another term used in a COP to derive the focus from the criticality of the current climate situation, then the markets are at risk of disrupting themselves with another energy crisis, and no substituting sources. Due to this, the need for an accelerated action is no longer just necessary, but critical.

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