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The Grid that Binds:  
The Renewable Energy Transition in Germany, France, and Italy

Katherine Mason  
University of San Francisco  
April 28, 2023

# Master of International Studies

2

The Grid that Binds:  
The Renewable Energy Transition in Germany, France, and Italy

In Partial Fulfillment of the Requirements for the Degree

MASTER OF ARTS

in

INTERNATIONAL STUDIES

by Katherine Mason

April 28, 2023

UNIVERSITY OF SAN FRANCISCO

Under the guidance and approval of the committee, and approval by all the members, this thesis project has been accepted in partial fulfillment of the requirements for the degree.

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5/11/23

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Abstract:

The current energy crisis and climate change are just some of the challenges that the European Union and its member states are forced to reckon with. The loss of fossil fuel supplies from Russia in the wake of the invasion of Ukraine forced the acceleration of the renewable energy transition and created a new set of problems to be addressed, namely the effectiveness of climate work that had already begun, and what the roadmap for the future would look like. Examining the history and infrastructure of Germany, France, and Italy presents insights into how this challenge can be met, and why countries take the paths they do when responding to such crises. Additionally, it demonstrates the most effective role of the European Union at this time. When the European Union does not enforce a single agenda on member states, and instead acts as a support structure that supports trans-European projects and partnerships, it more effectively maintains European unity and integration, allowing each member state to draw on its own resources most efficiently, while providing the financial and structural means to accelerate the renewable energy transition, improving Europe's energy security as a whole, and working towards the climate goals established in the European Green Deal.

Acknowledgments:

First and foremost, I would like to thank my family for their support and encouragement throughout both the entirety of this program and the steps that it took to get here. To my friends, thank you for your support every time I had to hide myself away and patience when you had to hear about energy policy for the hundredth time.

Thank you to my friends in the MAIS cohort for the incredible graduate school experience. The consistent support and encouragement helped make this project what it was.

Finally, I would like to thank my advisor, Professor Keally McBride, for your support throughout this project, and for helping me transform the collection of ideas in my head into a concrete project.

Thank you for helping me cross the finish line.

**TABLE OF CONTENTS**

<b><i>INTRODUCTION:</i></b> .....	<b>1</b>
<b><i>LITERATURE REVIEW:</i></b> .....	<b>3</b>
<b><i>METHODOLOGIES:</i></b> .....	<b>23</b>
<b><i>FINDINGS:</i></b> .....	<b>27</b>
<b><i>Germany:</i></b> .....	<b>27</b>
<b><i>France:</i></b> .....	<b>44</b>
<b><i>Italy:</i></b> .....	<b>55</b>
<b><i>CONCLUSION:</i></b> .....	<b>70</b>

## INTRODUCTION:

The period between now and 2035 presents a critical juncture for combatting the effects of climate change. The Paris Agreement, adopted in 2015 at COP21, implemented the goal of keeping increasing global temperatures below two degrees Celsius above pre-industrial levels and limiting the rise to 1.5 Celsius.<sup>1</sup> However, as the targets laid out proved insufficient, the European Union (EU) introduced new climate measures through the European Green Deal, which was approved in 2020. Through the European Green Deal, the EU aims to become the first climate-neutral continent and emit 55% fewer greenhouse gas emissions in comparison to 1990 levels<sup>2</sup> A key part of this strategy is REPowerEU, which focuses on affordable, secure, and sustainable energy for Europe. Within this framework, the EU aims to diversify its energy supply, save energy, and accelerate the clean energy transition.<sup>3</sup> Here, the EU highlights a key aspect of the energy transition: “Renewables are the cheapest and cleanest energy available, and can be produced domestically, reducing our need for energy imports.”<sup>4</sup> This also serves to increase the security of the energy supply. This aspect of the transition was emphasized after the invasion of Ukraine by Russia, which resulted in fossil fuel supplies slowing significantly.

Focusing on three specific countries within the EU, Germany, France, and Italy, provides insights into the practicalities of the renewable energy transition and the history of such a process. As initial members of the European Coal and Steel Community, and later the European

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<sup>1</sup>Maria Gaeta, Corine Nsangwe Businge, and Alberto Gelmini, “Achieving Net Zero Emissions in Italy by 2050: Challenges and Opportunities,” MDPI (Multidisciplinary Digital Publishing Institute, December 22, 2021), <https://www.mdpi.com/1996-1073/15/1/46>.

<sup>2</sup>“A European Green Deal,” European Commission, accessed March 15, 2023, [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en).

<sup>3</sup>“RepowerEU: Affordable, Secure and Sustainable Energy for Europe,” European Commission, accessed March 15, 2023, [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en).

<sup>4</sup>“RepowerEU: Affordable, Secure and Sustainable Energy for Europe”

Economic Community and the European Atomic Energy Community, these countries have been at the forefront of Europewide movements, and their approach to energy policy reflects this.<sup>5</sup>

These countries are also no strangers to crises, having weathered the oil crises of the 70s and later financial crises.<sup>6</sup> With additional questions about the future of the EU posed by the results of the Brexit referendum in the United Kingdom and the potential rise of exit movements in other Member states, the process of European integration could be called into question.

However, member states also benefit from the largest stimulus package ever put forward in an EU budget, NextGenerationEU (NGEU), which aims to help Europe recover post-COVID-19 with the goal of creating a “greener, more digital, and more resilient Europe.”<sup>7</sup> The green transition is, without doubt, considered a key aspect of the long-term success of the EU. The budget also aims to emphasize the value of the single market, stating that “Everybody is a winner from being part of the single market,” with funds from the EU being provided based on forecasts for GDP growth.<sup>8</sup> This focus on Europe growing stronger together highlights the value placed on presenting a united front in the face of crisis.

Looking at the history of these countries and the EU and how their current actions reflect or differ from their history demonstrates that forms of united action within the EU are vital to the energy transition. However, this does not necessarily mean that the renewable energy transition needs to look identical in each member state. Due to the infrastructural and economic needs that come with implementing the energy transition, the EU plays a vital role in supporting the energy

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<sup>5</sup>“From 6 to 27 Members,” European Neighbourhood Policy and Enlargement Negotiations (DG NEAR), accessed March 15, 2023, [https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/6-27-members\\_en](https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/6-27-members_en).

<sup>6</sup>“History of the European Union – 2010-19,” European Union, accessed March 15, 2023, [https://european-union.europa.eu/principles-countries-history/history-eu/2010-19\\_en](https://european-union.europa.eu/principles-countries-history/history-eu/2010-19_en).

<sup>7</sup>“Recovery Plan for Europe,” European Commission, accessed March 15, 2023, [https://commission.europa.eu/strategy-and-policy/recovery-plan-europe\\_en](https://commission.europa.eu/strategy-and-policy/recovery-plan-europe_en).

<sup>8</sup>“Recovery and Resilience Facility,” European Commission, accessed March 15, 2023, [https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility\\_en](https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en).



transition in its Member States in a way that accounts for the country's histories and values. In this way, the EU can avoid being seen to be overstepping boundaries, and continue to present a unified European front, supporting both EU climate goals and the needs of respective Member States. Success in the renewable energy transition can be better achieved by accommodating differences within Member States, allowing them to draw on their own infrastructure and natural resources, instead of attempting to enforce homogeneity. The current European energy crisis and the transition to renewable energy will bring EU member states closer together and will not fracture the EU. It falls to the EU, however, to ensure that the green transition does not only benefit the Member States that are already financially secure and well on their way to becoming energy secure.

## LITERATURE REVIEW:

### **I. Energy Crisis**

The European Union (EU) defines energy security as “[an] uninterrupted availability of energy supplies at reasonable prices.” While energy security has been on the policy agenda of the EU for several years, it has only become more pressing in recent years. As the EU pushes to decrease reliance on imported fuels, countries outside the EU will be forced to do the same, examining the possible ways in which they can become self-sufficient, all while still meeting EU-wide goals of reaching carbon net-zero in the next decade. With current events throwing light on how reliant many countries are on others for their energy supplies, this juncture provides a unique moment to explore the importance of energy security and the ongoing energy crisis Europe is experiencing.

While the invasion of Ukraine and the subsequent loss of Russian natural resources is a critical component of the energy crisis in Europe today, energy is not a new challenge. Over a

decade ago, in “Deconstructing the Energy Weapon: Russia’s Threat to Europe as a Case Study,” Karen Smith Stegen noted that Russia would most likely come to dominate the EU’s energy supply. Here, she introduced the idea of an “energy weapon,” which Russia could then use to influence the policies of the EU and gain extra political leverage. To understand the potential severity of the threat posed by such a “weapon,” it was essential to know how such a “weapon” could possibly come into being. These steps include consolidating control over energy resources and means of transportation and showing a willingness to introduce price hikes and cut off supplies. This occurred in Ukraine in 2006 when a government more sympathetic to Western interests was elected, resulting in a loss of supplies to the country.<sup>9</sup> After this cut-off, in the next election cycle, pro-Russian politicians were more successful in parliamentary elections. Smith notes that the energy supply has not always been used successfully when attempting to gain political advantages. Many Baltic countries were able to resist Russia, especially using alliances. Strategic uses of the energy supply, both successful and unsuccessful, demonstrate the varying ways politics and the energy supply are intertwined. The important role that energy suppliers play in politics cannot be understated. Understanding how these supplies have previously been leveraged is vital when examining the current energy crisis in the EU.

Costantini et al. discuss how the lack of action regarding the energy crisis from the EU contributes to the situation currently occurring in Europe, especially regarding the relationship between the EU and Eastern European countries in “Fueling the Fire: Rethinking European Policy in Times of Energy and Climate Crisis.” They note that the ability of states to stop reliance on Russian fossil fuels rapidly varies greatly; Poland, for example, claims to be able to supply sufficient oil, whereas other countries cannot. In prior instances, for example, when

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<sup>9</sup>Karen Smith Stegen, “Deconstructing the ‘Energy Weapon’: Russia's Threat to Europe as Case Study,” *Energy Policy* (Elsevier, August 24, 2011), <https://www.sciencedirect.com/science/article/pii/S0301421511005866>.

Russia cut supplies to Ukraine in 2004, despite promises that other countries would not be impacted, France's supply fell by 25-30%, and Italy's fell by 25%.<sup>10</sup> While this did not last for a prolonged period, it shows that the concerns surrounding energy supply is not something new to the European Union. While the authors note this event did prompt the 2030 Framework on Climate and Energy, which aimed for a 32% share of renewable energy in the energy mix, and improvements to energy efficiency, it did not necessarily address the problem.<sup>1112</sup> Instead, they note the impact that this could have on Russian Revenue, and the threat this could have on the Russian economy, as 25% of the GDP and 45% of the federal budget are represented by oil, gas, and coal exports.<sup>13</sup>

Costantini et al. also discuss how the European Union's energy mix is vital when discussing energy security.<sup>14</sup> As of 2020, according to Eurostat, the EU has not significantly decreased reliance on natural gas and oil, with a significant portion of this coming from imports. However, the share of renewables has increased gradually, though it remains insufficient to make up the needed portion of the energy supply. The high number of imports makes the EU particularly vulnerable to disruptions to the energy supply, especially in countries that are heavily reliant on Russian fossil fuels. However, larger EU countries, especially Germany, are much better equipped to respond to these challenges, as they have the economic capacity to look elsewhere for sources of fuel or work to develop additional infrastructure. This highlights the discrepancies that come when dealing with an energy crisis. Countries that are better off

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<sup>10</sup>Valeria Costantini et al., "Fuelling the Fire: Rethinking European Policy in Times of Energy and Climate Crises," MDPI (Multidisciplinary Digital Publishing Institute, October 20, 2022), <https://www.mdpi.com/1996-1073/15/20/7781>.

<sup>11</sup> "2030 Climate & Energy Framework," Climate Action, accessed April 28, 2023, [https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-energy-framework\\_en](https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-energy-framework_en).

<sup>12</sup> Costantini, "Fuelling the Fire"

<sup>13</sup>Costantini, "Fuelling the Fire"

<sup>14</sup>Costantini, "Fuelling the Fire"

economically or already have more diversified energy mixes are much better equipped to handle energy crises should they come and are less likely to be significantly impacted by EU-wide sanctions or decisions. In this case, the authors propose that the EU should stop importing fossil fuels and instead work towards leveling the playing field within Europe to ensure that the energy transition is as equal as possible.<sup>15</sup> Most importantly, this must be implemented into climate change policy and the new energy strategy in the EU.

In “The Energy Union and European Union Energy Security,” Magdalena Zajackowska also writes, “the political challenges over the last years have shown that diversification of energy sources, suppliers and routes is crucial for ensuring secure and resilient energy supplies.”<sup>16</sup> This reflects both the ongoing causes of the current energy crisis and the emphasis that this has placed on the need for a practical solution to the energy crisis. In turn, this has caused many countries to examine moving up the timeline for the transition to renewable energy sources or falling back on prior sources of energy unique to each country. This comes with its own set of challenges, especially when it comes to discrepancies between the capabilities of each country to invest in new technologies or bridge the gap in their current energy uses and supplies while the transition takes place.

In “EU Environmental Policy in Times of Crisis,” Charlotte Burns et al. introduce a concern that environmental policy can be pushed to the back of policy priorities in times of crisis.<sup>17</sup> However, she notes that EU environmental policy has generally remained relatively robust. She notes that climate policy is often left untouched and is not actively dismantled or

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<sup>15</sup>Costantini, “Fuelling the Fire”

<sup>16</sup>Magdalena Zajackowska, “The Energy Union and European Union Energy - ProQuest,” 2018, <https://www.proquest.com/docview/2119848228>.

<sup>17</sup>Charlotte Burns, Peter Eckersley, and Paul Tobin, “EU Environmental Policy in Times of Crisis” (Journal of European Public Policy, 2020).

acted against. However, in times of economic crisis, the policy has become less ambitious, especially in Member States that were previously considered pioneers, such as Germany. In this energy crisis, it is important that this does not occur. As the Member States attempt to find ways to meet energy demands, it is important that the climate policy goals also remain intact. This will push the transition to renewable energy as an alternative to fossil fuels while attempting to ensure that states have adequately diverse energy mixes to both meet immediate demand and improve overall energy security for the future.

## **II. Renewable Energy Transition**

The transition to renewable energy addresses two key issues in the EU today: the energy crisis and the climate crisis. Apostu et al. offer a definition of the energy transition: “the global energy sector’s shift from fossil-based systems of energy production and consumption-including oil, natural gas, and coal- to renewable energy sources like wind and solar, as well as lithium-ion batteries.”<sup>18</sup> According to the United Nations Framework Convention of Climate Change, in order to reach carbon net-zero by 2050, there must be a \$125 trillion investment in the climate transition.<sup>19</sup> According to the UNFCCC, while this has not been achieved, in 2021 alone, \$755 billion was spent on implementing low-carbon technologies. Germany, France, and Spain are included in the top 10 countries that spend money, accounting for three-quarters of the total. Key areas of investment included renewable energy, nuclear, and electrified transport. The EU is recognized as a global leader when addressing climate change and implementing the energy transition. However, the World Economic Forum notes that this transition also requires

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<sup>18</sup> Simona Andreea Apostu, Mirela Panait, and Valentina Vasile, “The Energy Transition in Europe-a Solution for Net Zero Carbon? - Environmental Science and Pollution Research,” SpringerLink (Springer Berlin Heidelberg, May 21, 2022), <https://link.springer.com/article/10.1007/s11356-022-20730-z>.

<sup>19</sup>“United Nations Framework Convention on Climate Change,” Unfccc.int,<https://unfccc.int/process-and-meetings/what-is-the-united-nations-framework-convention-on-climate-change>.

significant investment in additional infrastructure and storage, highlighting the widespread changes needed to ensure a successful and sustainable transition.<sup>20</sup>

In the context of the EU, Apostu et al. present the roles that consumers, investors, and other stakeholders have in managing the shift to renewable energy.<sup>21</sup> They note that while the energy transition will reduce carbon emissions, it will come with its own set of unique challenges that will need to be addressed. In the given economic climate, the total reduction of carbon emissions cannot be met, and the importance of coordination between economic growth and carbon emissions will become more prominent. The authors pull out several factors that help determine how difficult the energy transition will be in respective countries: the level of economic development, political will to manage the protection of the environment and climate change, if private-public relationships are in place, levels of financial development, and technological innovation. These factors demonstrate the complexity of the transition to renewable energy and what must be considered when making policy and setting climate goals that can realistically be achieved.

There are several proposed solutions to aid in combating the economic challenges posed by the renewable energy transition. In order to incentivize companies to invest in research and development in the renewable energy field, Apostu et al. note the potential use of fiscal incentives and subsidies and the state's major role in investing in renewable technologies due to costs and potential risks.<sup>22</sup> Additional key players in this area include state investment banks or state-owned financial institutions, such as the European Investment Bank. With better structures

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<sup>20</sup>“Investments in Renewable Energies Must Quadruple to Meet Climate Target - Irena,” World Economic Forum, accessed April 28, 2023, <https://www.weforum.org/agenda/2023/04/investments-in-renewable-energies-must-quadruple-to-meet-climate-target-irena/>.

<sup>21</sup>Apostu, “Energy Transition in Europe”

<sup>22</sup>Apostu, “Energy Transition in Europe”

in play for financing and incentivizing companies to begin investing in renewable energy or adopting it further, the energy transition will be eased along. This will also give countries better access to what they may need to implement the transition in line with their own policies.

A key idea when discussing the transition to renewable energy is the idea of the circular economy. While definitions vary, in “Measuring the Progress Towards Circular Economy in European Union Countries,” Nicolae Pintilie defines the circular economy as “keeping resources in a usable state as much as possible before they are disposed of as waste.”<sup>23</sup> This reduces the number of raw materials used and thus reduces the impact on the environment. The use of circular economy principles when it comes to the renewable energy transition has become an increasingly popular idea, as it helps transition the energy market while avoiding other environmental concerns. Pintilie discusses the important role of the European Investment Bank in helping transition the EU to a circular economy. She notes that between 2016 and 2020, over 2.7 billion euros were invested in projects related to this transition across a variety of different sectors, all of which help conserve resources, increase competition, and create new jobs.<sup>24</sup> An example of one such project is the Ecotitanium Plant in France, which, according to constructors, will prevent 100,000 tons of CO<sub>2</sub> emissions when making titanium for the aviation industry.<sup>25</sup> Here, it is important to note that the circular economy concept ties into the Sustainable Development Goals established by the United Nations in 2015.<sup>26</sup>

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<sup>23</sup> Nicolae Pintilie, “Measuring the Progress towards Circular Economy in European Union Countries,” accessed April 28, 2023, <https://beman.ase.ro/no111/2.pdf>.

<sup>24</sup> Pintilie, “Measuring Progress.”

<sup>25</sup> “Ecotitanium Premium Quality Titanium Alloys by Recycling: Aubert & Duval,” Aubert & Duval English, July 7, 2022, <https://www.aubertduval.com/markets/aerospace/integrated-solution-for-titanium-processing/ecotitanium/>.

<sup>26</sup> “The 17 Goals | Sustainable Development,” United Nations (United Nations), accessed April 28, 2023, <https://sdgs.un.org/goals>.

Piotr Bórawski discusses the important role of renewable energy in the decarbonization process and notes that renewable energy sources need to increase significantly to meet climate targets.<sup>27</sup> European energy policy, in turn, includes the introduction of nuclear energy and the continued development of renewable energy sources, especially when looking at potential options like biofuels. When discussing the practicalities of the transition to renewable energy, Bórawski presents several key hypotheses: that the share of renewable energy sources is diversified regionally and that renewable energy sources increase the sustainable development of countries, especially when it comes to environmental issues. Focusing on regional diversity of energy resources allows countries to develop their own plans for the climate transition instead of attempting to conform to one standard. This, in turn, aids nations in reaching Sustainable Development Goals (SDGs). These two ideas seem to answer the challenges posed by both the climate crisis and the energy crisis in Europe, especially when discussing the use of regional resources as opposed to placing the same standards on every country. This allows countries to take advantage of their own resources, such as access to offshore wind, and develop renewable energy strategies focused on those areas. Bórawski also presents the renewable energy transition in the context of sustainable development.

Bórawski argues that investment and development of renewable energy sources will increase countries' sustainable development, especially concerning environmental issues. The UN presented 17 SDGs intended to be a “shared blueprint of peace and prosperity of people and the planet.”<sup>28</sup> Several of these relate to climate change and environmental issues, including affordable and clean energy, sustainable cities and communities, and climate action. Goal 7,

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<sup>27</sup>Piotr Bórawski et al., “Development of Renewable Energy Sources in the European Union in the Context of Sustainable Development Policy,” MDPI (Multidisciplinary Digital Publishing Institute, February 19, 2022), <https://www.mdpi.com/1996-1073/15/4/1545>.

<sup>28</sup> “The 17 Goals”



Affordable and Clean Energy, established several targets to reach by 2030, including ensuring universal access to affordable, reliable, and modern energy services and substantially increasing the amount of renewable energy in the global energy mix. However, the UN notes that the current pace will not achieve Goal 7 in 2030, especially due to disparities in access to technology. This further demonstrates the importance of technological investment and institutions' role in improving access to the funding necessary to implement the energy transition.

Here, Bórawski highlights the importance of institutions in implementing these goals. By engaging with the energy sector, the approach to developing renewable energy sources aligns with the SDGs. Most importantly, he emphasizes that the transition cannot occur without the cooperation of authorities across countries and notes that renewable energy sources depend on the availability of resources and the technology required to process them. This increases the need for cooperation amongst different entities and at different levels, as well as showing the importance of flexibility in policy, as what works in one country is not necessarily an effective global standard.

Swain, Karimu, and Gråd discuss the intersection of sustainable development, the renewable energy transition, and the impact on employment, a key concern for many when it comes to policy that may significantly impact the economy.<sup>29</sup> They determined that renewable energy has a positive employment impact on the EU and has the potential to aid employment in both the long and short term. In this case, policies surrounding the renewable energy transition are more likely to encourage public support. This, in turn, makes it possible to design and implement policies that encourage the energy transition and align with SDGs.

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<sup>29</sup> Ranjula Bali Swain, Amin Karimu, and Erik Grad, "Sustainable Development, Renewable Energy ... - Tandfonline.com," accessed April 28, 2023, <https://www.tandfonline.com/doi/pdf/10.1080/13504509.2022.2078902>.

Balcilar, Rouband, and Shahbaz address the impact of uncertainty in the energy market on the transition to renewables.<sup>30</sup> Due to the uncertainty in the market, economic activity slows, in part due to investment concerns and the uncertainty of adopting other energy methods. This also impacts the speed at which policy solutions may be adopted due to an unwillingness to make changes. However, actors may be forced to look elsewhere in an energy crisis. The authors point out several arguments on whether an energy crisis may help or hinder the energy transition. On the one hand, the shifting price of fossil fuels may push people towards renewables, which are considered less volatile in price. However, this does not necessarily mean they are a perfect solution, and the urgency to switch over may not be present. It also raises questions about the ability to successfully switch to a supply of renewable energy without losing energy supplies. When discussing the transition to renewable energy, the economics of the situation remains an important consideration when it comes to policymaking.

Policy recommendations regarding the renewable transition share several common features among authors. Balcilar, Rouband, and Shahbaz note that the market still heavily impacts the energy transition and the importance of building resilience into policies to ensure that they will be able to withstand unexpected shocks. Additionally, policies that promote new technologies should be enacted, as this will help reduce the volatility of renewable energy. As previously discussed, many policy recommendations feature the use of circular economy principles, especially when it comes to investment from both the public and private sectors. Apostu, Panait, and Vasile state that it is also important to account for the differences in each country, including natural features and the country's place in the global economy. They propose

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<sup>30</sup>Mehmet Balcilar, David Roubaud, and Muhammad Shahbaz, "The Impact of Energy Market Uncertainty Shocks on Energy Transition in Europe," *The Energy Journal* (International Association for Energy Economics, June 1, 2019), <https://www.iaee.org/energyjournal/article/3303>.

a series of policy measures that include continuing international meetings and efforts, establishing public funds to support the energy transition, rethinking the energy subsidy system, increasing public-private partnerships, and better trade to allow for better access to technology and better education of consumers.<sup>31</sup> These policy guidelines offer an approach to the energy transition.

The transition to renewable energy will not happen overnight. While the speed at which it is occurring has increased, there is still a long way to go before climate goals are attainable. At the same time, the transition also must balance economic and social factors that come with the shift to renewables and a rethinking of institutions' role in facilitating change. As an added layer, it also comes into play with the SDGs laid out by the UN, requiring global cooperation. Should the EU wish to remain a climate leader, its policies and those enacted by member states will need to address these issues.

### **III. EU and National Policies (Renewable Energy and Climate Crisis)**

Many EU and national policies seek to address energy security in energy policy, especially in the context of the transition to renewable energy and the energy crisis. Magdalena Zajackowska argues that energy security is difficult to balance against other policy objectives, as it is often approached from two different directions: the economic and the geopolitical.<sup>32</sup> From an economic perspective, energy security and policy relate to fuel shortages and supply chain disruptions. From a geopolitical perspective, energy security is closely linked to national security and should be studied from both points of view. Zajackowska addresses the confusion over the definition of energy security, and the best approach to take when addressing it reflects the

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<sup>31</sup> Apostu, "Energy Transition in Europe"

<sup>32</sup> Zajackowska, "The Energy Union and European Union Energy."

difficulties that occur at both the EU-wide and national level when it comes to policy surrounding energy security. Additionally, policy related to the energy transition also needs to address disparities when it comes to access to new technologies and the goals laid out by the UN. At this moment in time, when energy security is closely tied to climate policies and the renewable transition, it becomes incredibly important to determine the best way to address this issue.

In 2008, new climate and energy policies were added to the Lisbon Treaty to decrease emissions and increase energy security in the EU. There are many definitions of energy security, although they largely draw on the same key points. Thaler and Hofmann offer a definition that includes Accessibility, Availability, and Affordability. Energy security must include the ability to access sufficient energy sources and an uninterrupted provision of energy supplies, and energy must be available at a competitive price.<sup>33</sup> Energy security is often examined through crisis, as that is when it becomes most evident that there may be an unresolved issue. Ahmed Elbassoussy states that the growing reliance of the European Union on limited energy suppliers has forced an attempt to diversify energy sources.<sup>34</sup> However, a key issue that often arises when diversifying energy is the struggle that comes with also attempting to achieve carbon net zero. John Vogler argues that the EU has taken an approach that combines energy security and climate change.<sup>35</sup> However, he notes difficulties with getting Member States to agree to specific policies and the difficulties that come with the way policymaking and implementation work in the EU, such as

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<sup>33</sup> Philipp Thaler and Benjamin Hofmann, "The Impossible Energy Trinity: Energy Security, Sustainability, and Sovereignty in Cross-Border Electricity Systems," *Political Geography* (Pergamon, December 27, 2021). <https://www.sciencedirect.com/science/article/pii/S0962629821002390>.

<sup>34</sup> "European Energy Security Dilemma: Major Challenges and Confrontation Strategies," *Review of Economics and Political Science*, accessed April 28, 2023, <https://www.emerald.com/insight/content/doi/10.1108/REPS-02-2019-0019/full/html>.

<sup>35</sup> John Vogler, "Changing Conceptions of Climate and Energy Security in Europe," Taylor & Francis, accessed April 28, 2023, <https://www.tandfonline.com/doi/abs/10.1080/09644016.2013.806634>.

delays in policy implementations. Céline Guivarch and Stéphanie Monjan further discuss energy security and the move towards a low-carbon Europe.<sup>36</sup> They agree that the target of increasing the energy supply and decreasing emissions is difficult but not impossible.

The idea of an EU Energy Union was first proposed in 2014 and, per the European Council, included three key objectives: provide affordable energy for businesses and consumers, secure energy for all EU countries by reducing the EU's energy dependency, and the generation of more green energy to fight climate change. This became part of the framework for the EU's 2030 energy policy. As a part of the EU's climate and energy policy, it ultimately featured five key dimensions: energy security, solidarity and trust, a fully integrated European energy market, energy efficiency contributing to moderation of demand, decarbonization of the economy, and research, innovation, and competitiveness. However, Zajaczkowska notes that the overall goals of the EU often contradict energy policies implemented by member states, especially those with larger economies and already established energy infrastructure.<sup>37</sup>

The European Investment Bank (EIB) plays a role in financing the renewable energy transition. Jointly owned by EU countries, the EIB serves to boost potential in terms of jobs and growth, support action to mitigate climate change, and promote EU policies outside the EU.<sup>38</sup> The EIB is also the majority shareholder of the European Investment Fund (EIF), which also provides climate and infrastructure funds for those investing in their thematic strategies, which include the clean energy transition and climate.<sup>39</sup> Both of these instruments reflect ways that the

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<sup>36</sup> Céline Guivarch and Stéphanie Monjan, "Identifying the Main Uncertainty Drivers of Energy Security in a Low-Carbon World: The Case of Europe," *Energy Economics* (North-Holland, April 13, 2016), <https://www.sciencedirect.com/science/article/pii/S014098831630086X>.

<sup>37</sup> Zajaczkowska, "The Energy Union"

<sup>38</sup> "European Investment Bank – EIB," European Union, accessed April 28, 2023, [https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/search-all-eu-institutions-and-bodies/eib\\_en](https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/search-all-eu-institutions-and-bodies/eib_en).

<sup>39</sup> "Climate and Infrastructure Funds," Climate and infrastructure funds, May 5, 2022, <https://www.eif.org/InvestEU/climate-and-infrastructure-funds/index.htm>.

EU can drive the renewable energy transition while allowing countries to develop infrastructure and strategies best suited to their needs.

In the energy security and policy context, Berling, Surwillo, and Sørensen argue that energy security must be related to specific sociotechnical settings.<sup>40</sup> A key part of this argument highlights the differences between stable and unstable technological and societal discourses. Using Norway and Ukraine as an example, they argue that the process of national identity has been formed alongside choices of energy sources and technologies. In the case of Norway, emphasis was placed on the Norwegian people and the soil of Norway, making the natural resources of Norway a source of energy production. On the other hand, Ukraine strives to differentiate itself and maintain independence from Russia by decreasing its reliance on Russian fossil fuels. The energy sector remains vital for Ukrainian national identity to continue to play out. Based on these two case studies, Berling, Surwillo, and Sørensen conclude that themes that run through the national identity of countries are continued through national ideas of energy security and impact policy decisions being made. This raises the idea that energy security is driven forward by national visions alongside the development of national identity. This reflects the importance of implementing climate policy on the EU, national, and regional levels to ensure that it is as effective as possible. Martin Jänicke and Rüdiger Wurzel introduce the idea of multilevel climate governance in the EU.<sup>41</sup> They discuss how multilevel climate governance in the EU has encouraged climate leadership at varying levels, including the regional and city

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<sup>40</sup> Trine Villumsen Berling, Izabela Surwillo, and Sandra Sørensen, "Norwegian and Ukrainian Energy Futures: Exploring the Role of National Identity in Sociotechnical Imaginaries of Energy Security - Journal of International Relations and Development," SpringerLink (Palgrave Macmillan UK, March 30, 2021), <https://link.springer.com/article/10.1057/s41268-021-00212-4>.

<sup>41</sup> Martin Jänicke and Rüdiger Wurzel, "Leadership and Lesson-Drawing in the European Union's Multilevel Climate Governance System," Taylor & Francis, accessed April 28, 2023, <https://www.tandfonline.com/doi/abs/10.1080/09644016.2019.1522019?journalCode=fenp20>.

levels. They also introduce the EU as a ‘leaderless leader’, noting that it has turned into a system that encourages interaction on all climate governance levels and recognizes the benefits of this.

The EU’s main goals regarding climate action are laid out in the European Green Deal, aiming to become the first climate-neutral continent by 2050. Under this plan, each Member State was required to reduce emissions by hitting annual targets or annual emission allocations. According to the EU, these targets are based on the gross domestic product per capita of the Member States, with wealthier countries having higher targets. These targets follow a linear path. Additionally, at the EU level, the European Commission presented the REPowerEU Plan in response to Russia’s invasion of Ukraine. The plan is intended to make Europe independent from Russian fossil fuels prior to 2030. It includes both short-term and long-term goals. According to the European Commission, it includes a significant increase in investment in renewable energy, increasing the current 2030 target from 40% to 45%. This marks an increase from the prior goal, which was laid out in the Fit for 55 plan, which aimed to reduce emissions by 55%. The plan will also significantly increase investment in solar power, decarbonize industry, and encourage saving energy. The EU also established the first international emissions trading system (EU ETS). The EU ETS places limitations on the total amount of emissions from all participating and allows for auctioning and trading to find the most effective way to reduce emissions. According to the EU, in the current phase of the EU ETS, emission allowances will decline at 2.2% per year to better reach climate goals. The EU has also implemented the Just Transition Fund, which aims to support the countries that will be most impacted by the climate transition by financing the diversification of the local economy and helping offset unemployment.

The EU has also implemented the Circular Economy Action Plan, which draws on previously discussed principles of the circular economy.<sup>42</sup> Javier CiFuentes-Faura discusses the role that this plays when looking at the progress the EU has made in combating climate change. He highlights the need for education surrounding sustainability at various institutional levels, along with keeping materials inside the EU economy as long as possible. Indre Siksnyte-Butkiene et al. discuss discrepancies between EU-wide accomplishments and the accomplishments of Member states, noting that while the EU as a whole achieved climate change and energy targets set out in the Europe 2020 strategy, 14 countries did not meet at least one of the targets.<sup>43</sup> It was especially notable in countries that relied heavily on fossil fuels.

While the EU has continued to enact policies related to climate change, Costantini argues that the EU has been largely unsuccessful at implementing policies that will secure the energy supply.<sup>44</sup> This is due in part to the continued dependence on fossil fuels, noting the especially high concentration of Russian fossil fuel. She argues for the importance of policy that addresses this issue, introducing three key aspects, many of which overlap with climate change policy desires. These include replacing fossil fuels with renewable energy, reducing the energy demand overall, accelerating the research, development, and deployment of new technologies, and an improvement of inclusion and distribution. This specifically highlights the intersection of policy regarding the transition to renewable energy and climate change while noting that much work still needs to be done. Additionally, the article highlights the disparities in the ability of countries to roll out new technologies and innovations to help address both the climate and energy crises. In this way, Costantini shows the need for increased accessibility and opportunity to allow

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<sup>42</sup> "Circular Economy Action Plan," Environment, accessed April 28, 2023, [https://environment.ec.europa.eu/strategy/circular-economy-action-plan\\_en](https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en).

<sup>43</sup> Costantini, "Fuelling the Fire"

<sup>44</sup> Costantini, "Fuelling the Fire"



countries and the EU to meet necessary targets. While the accomplishments of the EU at large cannot be overlooked when it comes to climate change, it is also important to examine policies adopted by Member States, in this case, Germany, France, and Italy.

Germany is considered an early environmental leader. Martin Jänicke and Rüdiger Wurzel present Germany as a national climate leader and discuss what actions have been taken for the country to be classified as such.<sup>45</sup> They note the fact that Germany was quick to adopt cleaner power options and worked to reduce emissions. As the largest economy within the EU, Germany was able to develop a strong market for wind and photovoltaics. However, they continue to rely on coal power stations. Jänicke and Rüdiger also discuss the situation amongst German states and how they have played a role in climate leadership. For example, Freiburg was one of the first cities to adopt the energy transition, having previously begun adopting Energy Supply Concepts in 1986 and setting emission reduction targets in 1996. In this way, Germany reflects the variety of levels on which climate leadership can be enacted and how it can be done.

At the national level, the German transition to a low-carbon environment is called the *Energiewende*, or “energy turnaround.” Fischer et al. discuss the targets that Germany wants to meet when attempting to achieve a low-carbon society.<sup>46</sup> They include increasing energy productivity by 20%, reducing greenhouse gas emissions by 40% in 2020 and 80% by 2050, increasing the share of renewables in energy consumption by 60% in 2050, and phasing out nuclear power by 2022, which has since been pushed back to 2023. At the time, the decision to phase out nuclear power on such a rapid timeline raised concerns about the lack of additional sources of energy and the potential for blackouts, which would weaken the German economy.

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<sup>45</sup>Jänicke and Wurzel, “Leadership and Lesson-Drawing.”

<sup>46</sup> W. Fischer, “German Energy Policy and the Way to Sustainability: Five Controversial Issues in the Debate on the ‘Energiewende,’” *Energy* (Pergamon, July 4, 2016), <https://www.sciencedirect.com/science/article/pii/S0360544216306867?via%3Dihub>.

Fischer discusses the German energy transition as a technical and social experiment, as there are several challenges that remain unaddressed, such as competitiveness in industries and the capacity to bridge the gap once fossil fuels are ultimately phased out. Despite this, the transition to renewable energy is now considered a key element of German policy.

Oliver Wagner and Thomas Götz discuss how Germany is perceived internationally. In 2020, they note that Germany was only ranked 23rd on the Climate Change Performance Index, showing that if Germany wishes to maintain its position as a climate leader, its energy policy may require some revamping.<sup>47</sup> Wagner and Götz offer several points that must be addressed, including a strengthening of regulatory framework and the implementation of specific business models that will help facilitate the transition. The situation in Germany reflects the ongoing energy transition process and the importance of considering various aspects of policy, including economic and social implications. However, it also demonstrates the varying levels on which climate leadership can be enacted and how this can be leveraged to successfully implement policies that work for specific regions and nations. This is especially important in areas of Germany previously reliant on coal for both power and livelihood, especially as the energy crisis leads some policymakers to consider returning to prior sources of energy.

According to the International Energy Agency, France is also considered an early energy transition leader, having hosted the Paris Agreement. They also benefit from the significant use of nuclear energy. The IEA also notes that the 2019 Energy and Climate Law legislated carbon neutrality by 2050 and introduced legislation to help curb emissions. France also created the High Climate Council in 2019, which is intended to coordinate climate action across various

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<sup>47</sup>Oliver Wagner and Thomas Götz, "Presentation of the 5DS in Energy Policy: A Policy Paper to Show How Germany Can Regain Its Role as a Pioneer in Energy Policy," MDPI (Multidisciplinary Digital Publishing Institute, October 18, 2021), <https://www.mdpi.com/1996-1073/14/20/6799>.

levels of government, once again demonstrating the importance of action occurring in multiple areas and fields. France ranks 28th in the Climate Performance Index.<sup>48</sup>

The Climate and Resilience Law was passed in 2021 and aims for a 40% reduction in Greenhouse gases. France's Recovery and Resilience plan also demonstrates a further commitment to climate objectives laid out by the EU. Here, the plan lays out changes to speed up actions taken against climate change, such as decarbonizing industry and investing in transport. All of this is intended to help France reach the climate goals laid out by the EU. However, Marion Jousseume argues that while this legislation may allow France to reach their own goals, it will not help them reach the targets set by the EU.<sup>49</sup> She notes that part of the problem was caused by disputes between the French government, the National Assembly, and the Senate, who all accused each other of wanting to make legislation less ambitious while saying that their draft would be the most successful. Additionally, she notes that several bodies, such as the National Council for Ecological Transition, state that these measures are limited and are not sufficient to reduce greenhouse gas emissions. The situation in France represents the tensions between the EU at large and the Member States. While legislation by Member States may be sufficient to align with their reduction targets, it may not necessarily align with the EU. Here, Jousseume argues that France has failed to demonstrate that it has significant climate ambitions, and it has failed to match action and rhetoric, noting the fact that France has previously been called out for non-compliance with EU standards by both the Court of Justice of the EU and the Paris Administrative Court.<sup>50</sup> While France is not the only country that has not reached the standards

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<sup>48</sup> "France – Climate Performance Ranking 2023: Climate Change Performance Index," Climate Change Performance Index | The Climate Change Performance Index (CCPI) is a scoring system designed to enhance transparency in international climate politics., November 16, 2022, <https://ccpi.org/country/fra/>.

<sup>49</sup> Marion Jousseume, "The French Climate and Resilience Law" (cepInput, January 18, 2022).

<sup>50</sup> Jousseume, "The French Climate."

set by the EU, it serves as an example of tensions that can arise, both inside a country and with the EU at large.

According to the Climate Change Performance Index, Italy currently ranks 29th, having introduced the National Recovery and Resilience Plan in 2021. This is a revision of the National Energy and Climate Plan. However, the Index states that the proposed revisions have yet to be enacted a year after they were adopted. Italy also reflects one of the issues posed by the energy crisis; while coal was supposed to be phased out by 2025, the remaining power plants in the country continue to operate at full capacity, reflecting the difficulties in phasing out older sources of power and the difficulties that arise with reaching climate targets. The Ministero dell'Economia e dell Finanze (MEF) notes that the plan includes a plan for a “Green Revolution and Ecological Transition,” which aims to improve the sustainability and resilience of the economic system while making sure that the environmental transition is fair and inclusive.<sup>51</sup> This includes further support for using hydrogen in industry and promoting circular economy principles, especially when it comes to waste management. The plan also includes Italy’s target for renewable energies, which is currently 30% of final consumption by 2030.<sup>52</sup>

Gaeta, Businge, and Gelmini discuss the challenges that come with attempting to reach net zero emissions in Italy.<sup>53</sup> In 2021, the Italian government published the Long-Term Strategy on Reducing Greenhouse Gas Emissions which was promoted by the Ministry of the Environment, Land, and Sea, the Ministry of Economy Development, and the Ministry of Infrastructure and Transport, along with several other areas. A key issue that is pointed out is the

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<sup>51</sup> “Italia Domani,” Green revolution and ecological transition - Missions, accessed April 28, 2023, <https://www.italiadomani.gov.it/en/il-piano/missioni-pnrr/rivoluzione-verde-transizione-ecologica.html>.

<sup>52</sup> “Italia Domani”

<sup>53</sup> Maria Gaeta, Corine Nsangwe Businge, and Alberto Gelmini, “Achieving Net Zero Emissions in Italy by 2050: Challenges and Opportunities,” MDPI (Multidisciplinary Digital Publishing Institute, December 22, 2021), <https://www.mdpi.com/1996-1073/15/1/46>.

increase in the renewable-based energy mix, which will require a different electricity system from the one that is currently in place. The authors note that a key aspect of the transition to renewable energy in Italy will be looking at the potential of solar and wind resources while accounting for the necessary materials in their consumption. They also note the pace and infrastructure demands of the transition pose another challenge due in part to the cost and necessary materials. In this way, the situation in Italy reflects another dimension of the climate and energy crisis. While targets may be established, the practicalities of reaching them, especially when it comes to establishing new infrastructure, reflect a challenge that must be addressed.

The EU and its Member States take varying approaches to address the climate and energy crises. While the EU reflects the leadership role that can be gained from taking decisive action regarding climate change, it is also possible to acknowledge the fact that they were unprepared for the energy crisis, which accelerated the transition to renewable energy. Within the Member States, such as Germany, France, and Italy, the various problems that come with climate change and the energy crisis can also be seen, with states failing to hit more ambitious targets, facing political battles within countries, and the challenge of upgrading or building infrastructure faster than planned. These all demonstrate the difficulties caused by the intersection of these three issues and offer case studies for different methods and solutions.

#### METHODOLOGIES:

I will adopt a historical approach when examining the history of energy and climate policy in the European Union, Germany, France, and Italy. I will begin with energy sources and policy post World War II to better understand how the situation in post-war Europe, directly and

indirectly, continues to impact energy security and policy today, focusing on how historic energy policy decisions have impacted the infrastructure and policy pathways countries adopt. This idea of path dependency, or the idea that “the present and future evolution of a technological system depends...on the particular historic sequence of events that led to its current state,” provides a way to examine these decisions in Germany, France, and Italy.<sup>54</sup> I will then move forward through significant moments in both the climate sphere and energy sphere, including the Paris Agreement, the European Green Deal, and the invasion of Ukraine. Examining my case studies at these moments allows me to track climate and energy policies at significant moments, both in times of crisis and not. This will allow me to examine different approaches these specific member states take and how they adapt to historic decisions that were made. Important to examine here is how countries attempt to balance the key issues today, including energy security, the environment, and the economic impact that such policies may have, positive or negative.

Examined together, these countries provide various insights into the practicalities of the renewable energy transition and possible trajectories for the strengthening or breaking of European ties. Each country has a unique energy mix and existing infrastructure. Additionally, these countries are at varying points in their renewable energy transition. Taking an overview of this policy, with a specific focus on the time period that includes some of the most significant energy crises in the past decades, and the beginning of the renewable energy transition and the green movement highlights some of the common problems faced by these countries, and the lessons that can be learned from and applied to the current energy crisis. Policies surrounding energy security and infrastructure were deeply impacted by the oil crises in 1973 and 1979, with the price of oil rising nearly 300 percent in less than six months in 1973. In 1979, due to the

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<sup>54</sup> <https://www.sciencedirect.com/science/article/pii/S2214629620303984>

Iranian revolution, the production of oil dropped significantly.<sup>55</sup> Both of these events significantly impacted energy supplies in Europe and forced policy changes and considerations. Decisions made during this period continue to impact the energy mix of member states today.

Policy and infrastructure decisions made in the wake of the European Green Deal and the invasion of Ukraine offers further insight into the role that the European Union can play during this transition, and how each country seeks to adapt. Policies implemented in specific member states not only reflect the goals of the EU at large but also show how decisions are made to secure funding for renewable energy projects, along with how trans-European projects can be leveraged to improve energy security and the renewable energy transition. This shows the role the EU can play as an instrument of promoting the energy transition while allowing countries to work with their own resources and existing infrastructure, as opposed to a more universal agenda.

While Germany as a country continues to rely heavily on fossil fuels, it is widely perceived to be a green leader. Taking a historical approach to Germany's energy and climate policies will demonstrate how true or untrue that statement is. Tracking the development of energy policy in the country following World War II shows the lasting impact that policy decisions made at that time had on the country's energy policy trajectory. As one of the larger and more influential Member States within the EU, Germany also influences EU policy. Looking at specific German policy not only allows the tracking of changes over time but how this policy is impacted by current events and social movements. Additionally, examining how Germany has shifted or adapted their energy policy in response to the European Green Deal and the current

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<sup>55</sup> "Was the European oil industry"

energy crisis will allow me to demonstrate the impact that this crisis had on energy policy as opposed to other crises and how this has impacted the country's relationship with the EU.

France presents a unique case study, as due to early investment in nuclear power, the country has an energy mix that is already significantly less reliant on fossil fuel than other European states. This presents an opportunity to examine how starting in a position already advanced in the renewable energy transition impacts responses to energy crises. Examining France also allows for the interrogation of shifting attitudes toward what constitutes green energy and the decisions that come with the need to find alternative sources of energy. The French state's heavy involvement in implementing policy quickly and efficiently presents a unique opportunity to examine how this may impact the energy transition. France's relationship with the EU also offers a lens through which to examine the impact of EU policy.

As a country that remains reliant on fossil fuels and has throughout its history, Italy represents the difficulties that come from implementing a renewable energy transition with very little to start with. With a lack of early investment in renewable energy and a focus on securing sources of energy from imports, Italy faces a difficult energy transition. Additionally, with Italy remaining consistently out of line with EU goals, the country presents a more strained relationship with the EU, especially due to the increased support for parties that have not traditionally supported the role of the EU. Italy provides an interesting lens through which to examine both the history of energy and renewable policy and the possibility of shifting relationships with the EU at a time when collaborative movement is needed.

Comparing the history and infrastructure of these three countries will show the importance of a renewable energy transition that takes the strengths and weakness of each country into consideration to allow for a stronger response overall. Additionally, it will serve to



highlight the role that the EU can play in unifying the European response without forcing a homogenous response.

## FINDINGS:

### *Germany:*

The energy crisis has had a significant impact on Germany. The country is currently the largest energy market in Europe.<sup>56</sup> Like many other European countries, it does not have abundant natural resources that provide sources of energy, although it does have coal.<sup>57</sup> As of 2021, 75.61% of Germany's energy supply comes from fossil fuels, with almost 16% coming from coal.<sup>58</sup> Of their imported oil and natural gas, Russia supplied 34.1%.<sup>59</sup> The loss of this supply further demonstrates the importance of the Green transition and the country's choices when it comes to balancing energy supply needs and its status as a green leader. Whether this is reflected in the now delayed decommissioning of the country's nuclear reactors, a potential return to coal, or another option, the renewable energy transition in Germany reflects the difficulties that come with being perceived as a climate leader while still ensuring energy supplies remain stable, the importance of strong policy and regulatory framework, and the varying levels of governance across which these policies can be implemented. These themes can be seen across

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<sup>56</sup>Ortwin Renn and Jonathan Paul Marshall, "Coal, Nuclear and Renewable Energy Policies in Germany: From the 1950s to the 'Energiewende,'" *Energy Policy* (Elsevier, May 17, 2016), <https://www.sciencedirect.com/science/article/pii/S0301421516302294>.

<sup>57</sup>Sarah Elise Wiliarty, "Nuclear Power in Germany and France - Polity," SpringerLink (Palgrave Macmillan UK, April 8, 2013), <https://link.springer.com/article/10.1057/pol.2013.9>.

<sup>58</sup>Hannah Ritchie, Max Roser, and Pablo Rosado, "Germany: Energy Country Profile," *Our World in Data*, October 27, 2022, <https://ourworldindata.org/energy/country/germany>.

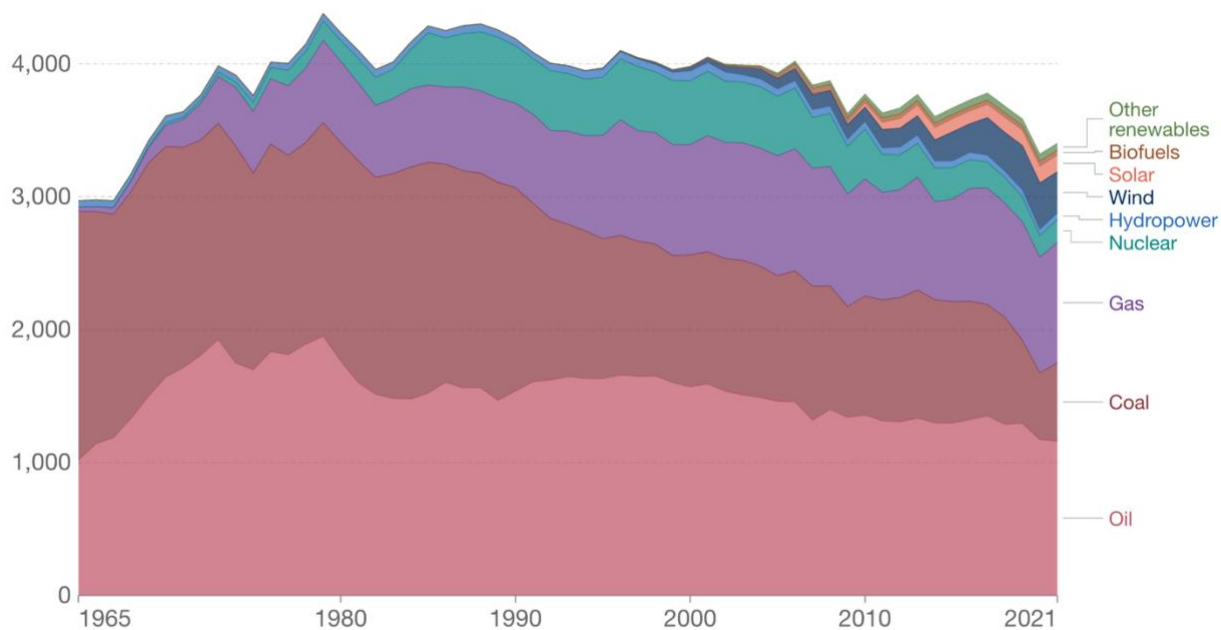
<sup>59</sup>"Germany, EU Remain Heavily Dependent on Imported Fossil Fuels," *Clean Energy Wire*, January 16, 2023, <https://www.cleanenergywire.org/factsheets/germanys-dependence-imported-fossil-fuels#:~:text=In%202021%2C%20Germany%20imported%2081,percent%20and%20Norway%209.6%20percent>.

the history of Germany's energy policy transition and the country's approach to more modern-day climate and energy crisis dealings.

## Energy consumption by source, Germany

Our World  
in Data

Primary energy consumption is measured in terawatt-hours (TWh). Here an inefficiency factor (the 'substitution' method) has been applied for fossil fuels, meaning the shares by each energy source give a better approximation of final energy consumption.



Source: BP Statistical Review of World Energy

Note: 'Other renewables' includes geothermal, biomass and waste energy.

OurWorldInData.org/energy • CC BY

### *POST WWII to the 2000s*

As was the case with many European countries in the postwar era, nuclear power was seen as a potential way, and sometimes the only way, to ensure sufficient energy supplies in West Germany. Between 1945 and 1973, energy policy involved little state intervention and focused largely on the coal industry.<sup>60</sup> However, unlike countries like France, Germany faced delays in beginning nuclear power programs. Following the Second World War, Germany was

<sup>60</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

initially banned from developing nuclear technology, and what development later did occur was largely done in the private sector.<sup>61</sup> Nuclear power was not seen as a way to develop national pride as it was in countries like France and did not have the same driving factors, with technologies being developed for more practical uses rather than helping build national sentiments.<sup>62</sup> However, by the end of the 60s, companies dependent on oil and gas became interested in using nuclear power and coal as alternative energy sources.<sup>63</sup> As energy prices fluctuated, so did interest in nuclear power as an additional source of energy.

Nuclear development in Germany also faced significant pushback in the 1970s. Early criticism began in the late 60s, as air and water pollution were discussed more frequently.<sup>64</sup> The success of anti-nuclear movements was due to a combination of protesting, successful activities in the courts, and the election of anti-nuclear officials, culminating in the creation of a Green Party in the 1980s.<sup>65</sup> The first of these protests occurred at a construction site in Freiburg, where 20,000 protestors occupied the site.<sup>66</sup> One of the key goals of the party was to phase out nuclear power. This rise in anti-nuclear protests coincided with increased concern about the environmental implications of nuclear power.<sup>67</sup> Additionally, amongst protestors, nuclear power was seen as a threat to democracy and an excess of technology, raising fears of a totalitarian state to ensure it was safely used.<sup>68</sup> These fears were especially effective against the backdrop of the

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<sup>61</sup> Wiliarty, "Nuclear Power in Germany and France," 3.

<sup>62</sup> Wiliarty, "Nuclear Power in Germany and France," 15

<sup>63</sup> Christian Marx, "Failed Solutions to the Energy Crises: Nuclear Power, Coal Conversion, and the Chemical Industry in West Germany since the 1960s," *Historical Social Research*, January 1, 2014, [https://www.academia.edu/97963995/Failed\\_solutions\\_to\\_the\\_energy\\_crises\\_nuclear\\_power\\_coal\\_conversion\\_and\\_the\\_chemical\\_industry\\_in\\_West\\_Germany\\_since\\_the\\_1960s](https://www.academia.edu/97963995/Failed_solutions_to_the_energy_crises_nuclear_power_coal_conversion_and_the_chemical_industry_in_West_Germany_since_the_1960s).

<sup>64</sup> Marx, "Failed solutions."

<sup>65</sup> Wiliarty, "Nuclear Power in Germany and France," 4

<sup>66</sup> Eva Oberloskamp, "Ambiguities of Transnationalism: Social Opposition to the Civil Use of Nuclear Power in the United Kingdom and in West Germany during the 1970s," Taylor & Francis, accessed March 15, 2023, <https://www.tandfonline.com/doi/full/10.1080/13507486.2022.2042489>.

<sup>67</sup> Oberloskamp, "Ambiguities of Transnationalism"

<sup>68</sup> Oberloskamp, "Ambiguities of Transnationalism"

Second World War. European cooperation in this field was not seen in a positive light by protestors either, with protestors positioning the more pro-nuclear Europe as the “Europe from above.”<sup>69</sup> This distinction shows a clear separation between Germany's ideas and other European countries' attitudes, highlighting the role that public opinion plays when shaping public policy directions. With the Green Party consistently represented in the Bundestag and polling relatively well consistently, they were able to continually push for the phase-out of nuclear power, despite many other European countries beginning to build out their programs.<sup>70</sup> Anti-nuclear protests in Germany reflect not only the somewhat unique position that Germany found itself in when not working to develop robust nuclear programs but also how it was at times positioned against European movements. This history ultimately demonstrates how Germany found itself on a different path toward the development of different energy sources than many other countries in Europe. Political parties in Germany continued to work towards phasing out nuclear power. In 2000, a Social Democratic-Green coalition agreed to phase out nuclear power completely by 2020; although this date was later pushed back by a decade, the Fukushima nuclear disaster in 2011 ultimately led to a 2022 target.<sup>71</sup>

Nuclear power was not Germany's only option when it came to seeking additional sources of energy. The dependence on oil also resulted in a push for an expansion of the country's coal refining capacity, as Germany possessed large coal deposits, and an increased interest in the idea of coal conversion, in which coal is converted into various alternate fuels.<sup>72</sup> This idea was supported by both industry and government in the latter half of the 60s, as it was

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<sup>69</sup> Oberloskamp, “Ambiguities of Transnationalism”

<sup>70</sup> Wiliarty, “Nuclear Power in Germany and France,” 14

<sup>71</sup> Wiliarty, “Nuclear Power in Germany and France,” 4

<sup>72</sup> Marx, “Failed solutions.”

believed that it would allow for greater national energy independence.<sup>73</sup> The Six-Day War in 1967 also highlighted the vulnerability of Germany's energy supply and sparked a conversation about what could be done to prevent future energy crises.<sup>74</sup> The oil crisis in 1973 added even more urgency to the energy situation and led to the implementation of a program that increased investment in the coal sector in order to help quell fears about energy supplies.<sup>75</sup> This led to interventions in order to protect coal companies in order to secure the energy supply while attempting to balance environmental priorities.<sup>76</sup> The Energy Research Program of 1974-1977 assumed that natural gas and oil reserves would dry up in the coming decades and stressed the importance of coal and nuclear power to meet energy needs.<sup>77</sup> Following the second oil crisis in 1979, Germany again looked at prioritizing domestic coal. However, the shift was not successful, as attention shifted towards energy saving and recovery. Additionally, much like with nuclear power, environmental movements continued to grow, presenting their own set of challenges.<sup>78</sup> Early anti-coal movements, however, remained relatively local.<sup>79</sup> The support for the coal industry was aided significantly by the anti-nuclear movement following Chernobyl. Multiple parties in government gave their support to the coal industry, including the Christian Democratic Party and the Social Democratic Party; subsidies for hard coal mines were guaranteed until 2018, when they would be phased out, while lignite was considered a national reserve.<sup>80</sup> While attempts were made to make coal cleaner, it ultimately ended up causing damage to German

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<sup>73</sup> Marx, "Failed solutions."

<sup>74</sup> Marx, "Failed solutions."

<sup>75</sup> Marx, "Failed solutions."

<sup>76</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>77</sup> Marx, "Failed solutions."

<sup>78</sup> Marx, "Failed solutions."

<sup>79</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>80</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

forests through the creation of acid rain.<sup>81</sup> This opposition to coal continued into the 90s and reversed ideas that it was a plausible source of domestic energy. Economics played a key role here. German coal was more expensive than coal from Poland or Austria.<sup>82</sup> Coupled with the environmental concerns already raised in hard coal and lignite cases, the coal industry also faced pressures. Here, the history of energy crises in Germany reflects the difficulties of balancing social movements and economics when attempting to implement successful responses to energy crises.

The structure of the energy market in Germany plays an important role in looking at sources of energy and the renewable transition, and it is first necessary to examine both the structure of the energy market and the way energy policy is made within the government. The oil industry in Germany is completely privatized, as refineries and distribution companies were made private in 1992.<sup>83</sup> As a part of the wider liberalization process that happened across Europe at the time, several mergers made the competition within the market less intense.<sup>84</sup> The coal sector in Germany is the largest in Europe, despite the fact that there is only one company that produces hard coal, RAG AG, which was previously owned by the government, and the lignite mining sector is controlled by a subsidiary of the leading electricity producers.<sup>85</sup> While the coal sector is largely monopolized, the gas sector is also the largest in Europe and is complex and competitive. There are numerous producers and companies, and ownership ranges from municipally owned distribution companies to ones that cover multiple regions.<sup>86</sup> The electricity

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<sup>81</sup> Renn et. Al, “Coal, Nuclear, and Renewable Energy in Germany.”

<sup>82</sup> Renn et. Al, “Coal, Nuclear, and Renewable Energy in Germany.”

<sup>83</sup> Renn et. Al, “Coal, Nuclear, and Renewable Energy in Germany.”

<sup>84</sup> Renn et. Al, “Coal, Nuclear, and Renewable Energy in Germany.”

<sup>85</sup> Renn et. Al, “Coal, Nuclear, and Renewable Energy in Germany.”

<sup>86</sup> Renn et. Al, “Coal, Nuclear, and Renewable Energy in Germany.”

sector is similar to the gas sector. However, the introduction of the energy reform has increased the number of solar producers, reflecting a significant change in the market.<sup>87</sup>

How this intersects with the German government is also important to consider. German energy policy is often enacted at multiple levels of government. At the Federal level, energy policy and research responsibility fall to the Federal Ministry of Economics and Technology, while environmental policies fall to the Federal Ministry of Environment, Nature Conservation, and Nuclear Safety.<sup>88</sup> In 2000, the Federal Ministry of Economics and Technology led the Energy Dialogue 2000, which ultimately ended up recommending the termination of the usage of fossil fuels and a phase-out of nuclear power, an idea that would later be reinforced by Fukushima.<sup>89</sup> These ideas ended up forming key pillars of the energy policy that was introduced in 2011.

In 2011, the German government introduced the *Energiewende*, or energy transformation, which laid out Germany's ambitious energy and environmental policy. It called for a reduction in the number of fossil fuels from 80 percent to 20 percent of the energy supply by 2050 and called for the full phasing out of nuclear power by 2022; it did not, however, decrease the share of coal in the electricity market.<sup>90</sup> Between 2000 and 2010, due in part to government subsidies offered for energy-efficient renovations, the demand for primary energy sources decreased.<sup>91</sup> Until 2010 and the later introduction of the *Energiewende*, half of Germany's domestically produced energy came from coal and lignite, with the rest being made up of nuclear, gas, and renewables.<sup>92</sup> The passage of the *Energiewende* was, in part, aided by Fukushima. For the first time, the Green

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<sup>87</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>88</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>89</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>90</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>91</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>92</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

party won a majority of the votes in Baden-Württemberg and could make a key party member the Premier of the State.<sup>93</sup> The *Energiewende* was ultimately passed by all parties in the Bundestag, reflecting the beginning of Germany's energy transition, and its role as a climate leader.<sup>94</sup> This was widely supported by the German public, with 78 percent of the public approving of the government's stance.<sup>95</sup> The adoption of the policy relatively early on seemed to jump-start the German energy transition. However, it also came with its own unique challenges.

The first years after the passage of the *Energiewende* resulted in successes and failures for the renewable energy transition and the response to climate change. As the European Emission Trading System was strengthened, carbon prices rose.<sup>96</sup> Between 2011 and 2015, shares of renewable energy increased, and nuclear power decreased.<sup>97</sup> As lignite remained competitive in the market, the amount of CO<sub>2</sub> produced increased, with the government introducing plans to help offset the use of lignite.<sup>98</sup> However, the process of phasing it out created a new set of challenges, especially when it came to towns that are reliant on brown coal. In 2015, Foreign Minister Frank-Walter Steinmeier opened a conference discussing the energy transition: "It is right to establish strategic energy partnerships with increasingly important producing and transit countries. At the same time, we must reduce our dependence on imports with a decentralized and regenerative energy supply."<sup>99</sup> This reflects the importance of striking a

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<sup>93</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>94</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>95</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>96</sup> Andrea Furnaro, "Geographies of Devaluation: Spatialities of the German Coal Exit," accessed March 16, 2023, <https://journals.sagepub.com/doi/10.1177/0308518X221148731>.

<sup>97</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>98</sup> Renn et. Al, "Coal, Nuclear, and Renewable Energy in Germany."

<sup>99</sup> "Speech by Foreign Minister Frank-Walter Steinmeier at the Opening of the Conference Berlin Energy Transition Dialogue at the Federal Foreign Office," German Federal Foreign Office, accessed March 15, 2023, <https://www.auswaertiges-amt.de/en/newsroom/news/150326-bm-energiewende-konf/270420>.



balance between creating relationships with countries able to produce energy while highlighting the importance of a decentralized and renewable source of energy.

In 2018, coal still made up 38 percent of the energy supply in Germany, although the last hard coal mine closed when previously mentioned subsidies ran out, with Germany continuing to import coal.<sup>100</sup> A transition package was put in place in 2007 that included job placement or early retirement for workers in hard coal.<sup>101</sup> In 2020, the German government introduced a new aspect of the *Energiewende*: the Coal Exit Law. This set 2038 as the final year that coal could be extracted and used in power production.<sup>102</sup> Part of this was driven by commitments made in the Paris Agreement, which Germany was not meeting in 2020, and regulation changes made at the EU level in terms of pollution.<sup>103</sup> Both the Christian Democratic Union and Social Democratic Party acknowledged that Germany would not meet the 40 percent reduction in 1990 emissions, which impacted the country's reputation as a leader in the climate crisis.<sup>104</sup> While setting lofty climate goals, Germany has not always been able to reach them, in part due to the continued dependence on coal. While the country has made progress toward its goals, increased environmental efforts have been impacted by the energy crisis caused by the Russian invasion of Ukraine.

### *The European Green Deal and the Energy Crisis*

There is a gap between the ambitions laid out in the Paris Agreement and the actual results accomplished by countries committed to those goals. Part of the European Green Deal, which outlines the route that EU member states will take to reach climate targets, attempts to

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<sup>100</sup>Tessa Coggio and Thane Gustafason, "When the Exit? the Difficult Politics of German Coal," accessed March 16, 2023, <https://www.proquest.com/docview/2272174611>.

<sup>101</sup> Coggio, "When the Exit."

<sup>102</sup> Furnaro, "Geographies."

<sup>103</sup> Furnaro, "Geographies."

<sup>104</sup> Coggio, "When the Exit."

bridge this gap.<sup>105</sup> In line with the “Fit-for-55” package that was introduced by the European Commission, Germany introduced the 2021 Federal Climate Change Act.<sup>106</sup> The act's purpose is to: “provide protection from the effects of worldwide climate change by ensuring achievement of the national climate targets and compliance with the European targets.”<sup>107</sup> The act raises the carbon dioxide emission reduction targets, with a goal to reduce greenhouse gas emissions by 65 percent of 1990 levels by 2030.<sup>108</sup> Along with this, the government also approved 8 billion euros to help support the decarbonization of the industrial sector, green hydrogen, and energy-focused building refurbishments, all with the aim of reducing emissions in the short term.<sup>109</sup> With evaluations occurring every two years, this plan was expected to help keep Germany in line with EU regulations, aiming to work at both the national and EU level.<sup>110</sup> This act shows a willingness to work with the EU to reach climate targets and attempts to make up for shortcomings in 2020. However, emissions in Germany once again rose between 2021 and 2022, with a 17 percent increase coming from coal-fired power plants.<sup>111</sup> With targets in additional sectors, such as housing and transport, also being missed, the practicalities of the transition away from fossil fuels remain difficult.<sup>112</sup>

Germany has also proven the benefits that come with working inside a more interconnected grid. In 2020, the share of Renewable Energy Sources in German electricity

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<sup>105</sup>Grischa Perino et al., “Closing the Implementation Gap: Obstacles in Reaching Net-Zero Pledges in the EU and Germany,” SSRN, July 18, 2022, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4151574](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4151574).

<sup>106</sup> Perino et al., “Closing the Implementation Gap.”

<sup>107</sup>“Federal Climate Change Act (Bundes-Klimaschutzgesetz),” accessed March 16, 2023, [https://www.bmuv.de/fileadmin/Daten\\_BMU/Download\\_PDF/Gesetze/ksg\\_final\\_en\\_bf.pdf](https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Gesetze/ksg_final_en_bf.pdf).

<sup>108</sup>“Climate Change Act: Climate Neutrality by 2045.,” Die Bundesregierung informiert | Startseite, accessed March 15, 2023, <https://www.bundesregierung.de/breg-de/themen/klimaschutz/climate-change-act-2021-1936846>.

<sup>109</sup>“Climate Change Act”

<sup>110</sup>“Climate Change Act”

<sup>111</sup>Perino et al., “Closing the Implementation Gap.”

<sup>112</sup> Perino et al., “Closing the Implementation Gap.”

generation rose to over 50 percent.<sup>113</sup> Additionally, Germany changed from a net exporter of electricity to a net importer of electricity through the use of the European Network of Transmission System Operators for Electricity.<sup>114</sup> While not without its own problems, such as unexpected changes in power networks having wider repercussions, the success of Germany when using an interconnected grid demonstrates how valuable a resource this may be when transitioning to renewable energy.<sup>115</sup> This allows countries that may lack natural resources or infrastructure to utilize and work with other countries on the same grid.

While Germany appears to work to keep policies in line with the EU, concerns arise in certain areas. One of these is the tension between the ETS and German overall reduction targets. In 2021, Germany introduced its own price for fuels outside of the ETS, although these are not sufficient to meet the old German targets.<sup>116</sup> These are part of an attempt to shield consumers from energy price increases, but they are out of line with the prices set in the ETS. This tension between EU-wide instruments that attempt to keep the EU on track to meet climate targets and member states attempting to protect their own citizens while also maintaining climate targets reflects an increasingly difficult part of the transition to renewable energy and the climate crisis.

The invasion of Ukraine and a new energy crisis significantly impacted the renewable energy transition and response to the climate crisis in Germany and Europe at large. The impact of this can be seen clearly with Germany's involvement in Nord Stream 2. Nord Stream 2, a 767-mile natural gas pipeline that connected Russia and Germany, was intended to improve and

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<sup>113</sup>Stephanie Halbrugge, Hans Buhl, and Gilbert Fridgen, "How Germany Achieved a Record Share of Renewables during the COVID-19 Pandemic While Relying on the European Interconnected Power Network," *Energy* (Pergamon, January 28, 2022), <https://www.sciencedirect.com/science/article/pii/S0360544222002067>.

<sup>114</sup>Halbrugge et al., "Record Share"

<sup>115</sup>Halbrugge et al., "Record Share"

<sup>116</sup>Perino et al., "Closing the Implementation Gap."

diversify Germany's energy supply.<sup>117</sup> As a part of Germany's attempt to improve liquified natural gas (LNG), the pipeline was intended to connect the European grid to new deposits in Russia.<sup>118</sup> As of 2018, Germany invested over 1.8 billion euros in the pipeline, second only to Russia.<sup>119</sup> While the pipeline was completed in September 2021, it never entered use, as it had yet to be certified by Germany and the European Union, and the project was officially halted on February 22, 2022.<sup>120</sup>

Nord Stream 2 began as a hotly debated project, representing the difficulties in balancing the development of new energy infrastructure with issues like energy security and environmental concerns. While some concerns arose surrounding perceived contradictions between EU climate goals and fossil fuel import infrastructure, the key issue became concerns over the ability of Russia to use the pipeline as a way to exert influence over the rest of Europe.<sup>121</sup> Gazprom, owned by the Russian State, was the sole shareholder and provided over 50% of the funding for the project.<sup>122</sup> Much of this opposition came from Central and Eastern European countries, with Polish President Andrzej Duda stating that the pipeline "should not be realized" and expressing surprise that the EU Commission had not spoken out negatively.<sup>123</sup> Nord Stream 2 also faced issues with compliance with European Energy Law, especially when it came to the 2009 Gas

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<sup>117</sup> "The Nord Stream 2 Pipeline," accessed April 28, 2023, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690705/EPRS\\_BRI\(2021\)690705\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690705/EPRS_BRI(2021)690705_EN.pdf).

<sup>118</sup> BMWK - Federal Ministry for Economics Affairs and Climate Action, "Second Progress Report on the Energy Transition," BMWK, accessed April 28, 2023, <https://www.bmwk.de/Redaktion/EN/Dossier/energy-transition.html>.

<sup>119</sup> "Nord Stream 2 Capital Spending by Country 2018," Statista, May 3, 2021, <https://www.statista.com/statistics/1119274/capital-expenditure-on-nord-stream-2-by-country/>.

<sup>120</sup> Madeline Chambers and Sarah Marsh, "Germany Freezes Nord Stream 2 Gas Project as Ukraine Crisis Deepens," Reuters (Thomson Reuters, February 22, 2022), <https://www.reuters.com/business/energy/germanys-scholz-halts-nord-stream-2-certification-2022-02-22/>.

<sup>121</sup> "Nord Stream 2 pipeline"

<sup>122</sup> "Nord Stream 2 – Symbol of Failed German Bet on Russian Gas," Clean Energy Wire, March 8, 2023, <https://www.cleanenergywire.org/factsheets/gas-pipeline-nord-stream-2-links-germany-russia-splits-europe>.

<sup>123</sup> "Poland's President Calls for Stop to Gas Pipeline – DW – 10/23/2018," dw.com (Deutsche Welle, October 23, 2018), <https://www.dw.com/en/polish-president-andrzej-duda-calls-for-stop-to-nord-stream-2-gas-pipeline/a-46001118>.

Directive, which established rules for the internal market in natural gas.<sup>124</sup> In 2017, the European Commission adopted a proposal that applied provisions of the 2009 Gas Directive to pipelines between Member States and other countries.<sup>125</sup> This change was seen to be the European Commission's response to the pipeline, as the increased Russian influence would impact the balance of the internal market.<sup>126</sup> Despite this, in 2021, a poll conducted by Forsa showed that 75% of people over 18 were in favor of completing the project.<sup>127</sup> However, Germany's investment in the project, which was intended to reflect a significant change in Germany's energy security policy, ultimately failed, as it instead increased reliance on Russian oil and gas. At the same time, it also represented significant investment in fossil fuels, out of line with Germany's perceived status as a "green leader." With later attacks on both Nord Stream pipelines in September 2022, it is unclear if the pipeline will ever come into operation.

In order to ensure a sufficient supply of energy, the German government is returning to coal plants, with assurances that they will remain under the cap set by the ETS.<sup>128</sup> Additionally, Germany also delayed the phasing out of nuclear power plants, opting to keep them operational until April 2023.<sup>129</sup> Alongside those plans, Germany is also building up infrastructure for the import of liquified natural gas, intended to replace gas from Russia.<sup>130</sup> While intended to be

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<sup>124</sup> "Lex - 32009L0073 - En - EUR-Lex," EUR, accessed April 28, 2023, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32009L0073>.

<sup>125</sup> "Common Rules for Gas Pipelines," accessed April 28, 2023, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/614673/EPRS\\_BRI\(2018\)614673\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/614673/EPRS_BRI(2018)614673_EN.pdf).

<sup>126</sup> "Common Rules for Gas Pipelines"

<sup>127</sup> "Forsa Survey on the Project Nord Stream 2," accessed April 28, 2023, [https://www.ost-ausschuss.de/sites/default/files/pm\\_pdf/OA-Forsa-Umfrage-Nord-Stream-handout%20ENG.pdf](https://www.ost-ausschuss.de/sites/default/files/pm_pdf/OA-Forsa-Umfrage-Nord-Stream-handout%20ENG.pdf).

<sup>128</sup> Sören Amelan, Kerstine Appunn, Benjamin Wehrmann, Julian Wettengel et al., "Q&A: Is Germany Reverting to Coal to Fight the Gas Supply Crunch?," Clean Energy Wire, September 30, 2022, <https://www.cleanenergywire.org/news/qa-germany-reverting-coal-fight-gas-supply-crunch>.

<sup>129</sup> Carolina Kyllmann and Benjamin Wehrmann, "Transition State of Play – Germany Is Emerging from the Energy Crisis," Clean Energy Wire, March 3, 2023, <https://www.cleanenergywire.org/germany-net-zero-transition-energy-crisis>.

<sup>130</sup> Kyllmann, "Transition State of Play."

temporary, it is unclear what sources of energy will take the place of coal plants, and what timeline that will follow. However, the Chancellor of Germany, Olaf Scholz, stated: “Because what must not happen is that we slide into a global renaissance of fossil energy, and coal in particular. No one can be pleased that the share of coal-fired power generation is rising again, in Germany as well, in response to looming bottlenecks in gas supplies.”<sup>131</sup> This shows the continued importance placed on a successful renewable energy transition. The lack of energy supplies raises concerns about how energy crises may impact the transition to renewables.

As a part of the plan to reduce European reliance on fuel from Russia, the European Commission presented the REPowerEU Plan. The plan aims to make amendments to the Recovery and Resilience Facility implemented by member states prior and offers country-specific recommendations.<sup>132</sup> The EU will provide additional funding to accelerate the renewable energy transition.<sup>133</sup> The 2017 Renewable Energy Sources Act is one way that Germany has worked to fund renewable energy. The Bundesnetzagentur (Federal Network Agency), a regulatory office that includes electricity and gas, sets levels of funding that operators can receive.<sup>134</sup> Operators in renewable energy sources bid how much funding they need, with the lowest bid winning; this marks a shift away from set funding rates, and aims to increase market

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<sup>131</sup>“Speech by Olaf Scholz, Chancellor of the Federal Republic of Germany and Member of the German Bundestag, at the 13th Petersberg Climate Dialogue,” Bundesregierung, accessed March 15, 2023, <https://www.bundesregierung.de/breg-en/news/speech-by-olaf-scholz-chancellor-of-the-federal-republic-of-germany-and-member-of-the-german-bundestag-at-the-13th-petersberg-climate-dialogue-2064056>.

<sup>132</sup>“Lex - 32022R0720 - En - EUR-Lex,” EUR, accessed March 15, 2023, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0720>.

<sup>133</sup>“Regulation of the European Parliament and of the Council Amending ...,” accessed March 16, 2023, [https://commission.europa.eu/document/download/6d918e86-cc5e-4901-8bef-0b98878afc7e\\_en?filename=com-2022-231\\_en.pdf](https://commission.europa.eu/document/download/6d918e86-cc5e-4901-8bef-0b98878afc7e_en?filename=com-2022-231_en.pdf).

<sup>134</sup>BMWK - Federal Ministry for Economics Affairs and Climate Action, “Funding for the Expansion of Renewable Energy Sources: National and European Auctions,” BMWK, accessed April 28, 2023, <https://www.bmwk.de/Redaktion/EN/Textsammlungen/Energy/funding-for-the-expansion-of-renewable-energy-sources.html>.

diversity.<sup>135</sup> The Act aims to integrate renewable energy sources into the existing system, as well as increasing the how much electricity is generated from renewable sources.<sup>136</sup> In 2021, Germany invested 13.35 billion euros in renewable energy plants.<sup>137</sup> However, despite this funding, and despite increases in electricity generated from renewable sources, Germany is still not on track to reach its 2030 goals. To ensure that 80% of electricity consumption comes from renewable sources, nearly 600 terawatt hours (TWh) need to be generated- in 2022, Germany generated 256 TWh.<sup>138</sup> This falls behind the goals laid out in the Renewable Energy Sources Act. While the energy crisis caused by the invasion of Ukraine has incentivized countries to accelerate their own renewable energy transitions, it remains to be seen if the targets set can be reached.

In January 2022, the state of Germany's climate targets became clear. If no new legislation or measures were put in place, Germany would miss their climate targets by 15%.<sup>139</sup> New legislation included changes to the Renewable Energy Act, including the abolition of an EEG surcharge, increases in targets, and increased offshore wind capacity.<sup>140</sup> Additionally, as it became clear that Germany's power grid was going "nowhere as fast as necessary for the

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<sup>135</sup>“Funding for the Expansion of Renewable Energy Sources: National and European Auctions,”

<sup>136</sup>“Development of Renewable Energies: Federal Government,” Die Bundesregierung informiert | Startseite, accessed April 28, 2023, <https://www.bundesregierung.de/breg-de/themen/klimaschutz/amendment-of-the-renewables-act-2060448>.

<sup>137</sup>Evgenia Koptuyug, “Renewable Energy Plant Investments Germany 2021,” Statista, March 28, 2023, <https://www.statista.com/statistics/583526/investments-renewable-energy-plants-germany/#:~:text=In%202021%2C%20around%2013.35%20billion,invested%20in%20renewable%20energy%20plants>.

<sup>138</sup> Corinne Meunier, “Mehr Grüner Strom Und Mehr Erneuerbare Wärme Im Jahr 2022,” Umweltbundesamt (Umweltbundesamt, December 9, 2022), <https://www.umweltbundesamt.de/themen/mehr-gruener-strom-mehr-erneuerbare-waerme-im-jahr>.

<sup>139</sup>BMWK - Bundesministerium für Wirtschaft und Klimaschutz, “Richtlinien Zur Bundesförderung Für Effiziente Gebäude (Beg),” BMWK, accessed April 28, 2023, <https://www.bmwk.de/Redaktion/DE/Downloads/S-T/tma-beg-em.html>.

<sup>140</sup>Bundesanzeiger Verlag GmbH, “Bundesgesetzblatt BGBL. Online-Archiv 1949 - 2022: Bundesanzeiger Verlag,” Bundesgesetzblatt BGBL. Online-Archiv 1949 - 2022 | Bundesanzeiger Verlag, accessed April 28, 2023, <https://www.bgbl.de/xaver/bgbl/start.xav>.

transformation,” further plans were made to make the permit process simpler.<sup>141</sup> This expansion was aided by the European Investment Bank (EIB).

Germany saw significant investment from the EIB in 2022. Germany received 6.61 billion euros, up 20% from the previous year, with 75% of financing going to climate-friendly projects.<sup>142</sup> This included eight new or ongoing projects in the energy sector.<sup>143</sup> Among these projects was 450 million euros loaned to TenneT, an electricity transmission system operator, in order to expand the federal grid and prepare it for better renewable energy integration.<sup>144</sup> This will allow for energy in the North and Baltic seas in Northern Germany to be transported to Bavaria following the shutdown of nuclear power plants.<sup>145</sup> This project represents another vital aspect of the energy transition within the EU at large. As energy sources shift away from fossil fuels or nuclear power, moving energy from different areas of the country to fulfill demand becomes necessary. The EU’s role in supporting this project strengthens not only the German energy supply but the energy supply of the EU. With upgrades to the grid in Germany also laying the groundwork for future cross-border connections (in this case with the Czech Republic), the European energy system is strengthened and pulled closer together.<sup>146</sup>

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<sup>141</sup>BMWK - Bundesministerium für Wirtschaft und Klimaschutz, “Richtlinien Zur Bundesförderung Für Effiziente Gebäude (Beg),” BMWK, accessed April 28, 2023, <https://www.bmwk.de/Redaktion/DE/Downloads/S-T/tma-beg-em.html>.

<sup>142</sup>“Germany: EIB Group Boosts Financial Support for Green and Innovative Projects,” European Investment Bank (European Investment Bank, February 7, 2023), <https://www.eib.org/en/press/all/2023-034-germany-eib-group-boosts-financial-support-for-green-and-innovative-projects>.

<sup>143</sup>“Financed Projects,” EIB.org, accessed April 28, 2023, <https://www.eib.org/en/projects/loans/index.htm?q=&sortColumn=loanParts.loanPartStatus.statusDate&sortDir=desc&pageNumber=0&itemPerPage=25&pageable=true&language=EN&defaultLanguage=EN&loanPartYearFrom=2022&loanPartYearTo=2022&orCountries.region=true&countries=DE&orCountries=true&ors=1000&orSectors=true>.

<sup>144</sup>“Environmental and Social Data Sheet - Eib.org,” accessed April 28, 2023, <https://www.eib.org/attachments/registers/156422546.pdf>.

<sup>145</sup>“Germany: EIB Shows Strong Commitment to Tennen’s Grid Expansion in Bavaria,” European Investment Bank (European Investment Bank, October 25, 2022), <https://www.eib.org/en/press/all/2022-406-eib-shows-strong-commitment-to-tennet-s-grid-expansion-in-bavaria>.

<sup>146</sup> “Germany: EIB Shows Strong Commitment to Tennen’s Grid Expansion in Bavaria,”



Energy and climate policy in Germany represent some of the challenges posed by the transition to renewable energy. While Germany is a significant economy within the EU and presents itself as a climate leader, its energy policy history reflects a strong reliance on fossil fuels. While Germany represents a success story in terms of moving from a fossil fuel-heavy nation to one with a progressive energy policy, it continues to face difficulties caused by internal and external factors. Despite strong energy policies, Germany failed to meet the 2020 goals laid out in the Paris Agreement and may not meet new sets of goals laid out under the European Green Deal and REPowerEU, despite passing new legislation to do so. Germany has successfully used a wider European grid to temporarily increase its own share of electricity obtained from renewable sources, representing the success that can be found when working inside a larger whole. Additionally, while presented as a country making significant strides in renewable energy, Germany also invested significantly in fossil fuels with their involvement in Nord Stream 2. This case study demonstrates the valuable lessons that can be learned from a large European economy, which despite being seen as a green leader, is unable to reach its own targets. The history of Germany's energy policy and infrastructure demonstrates how the country has achieved its current energy mix and has been impacted over time. However, despite an ongoing energy crisis, Germany continues to accelerate their own green transition while working within an EU framework. While not in agreement on all aspects of the transition, Germany still presents a strong case for the value of working on the energy transition both as a country and within the EU ensure a smoother and more successful transition. Speaking in 2023, the Chancellor made a bold prediction: "My successor will address you at the World Economic Forum in 2045. Sure: He or she will present Germany as one of the world's first climate-neutral industrial nations. Energy supplies in Germany and Europe will then be sourced almost

exclusively from green electricity, heat, and hydrogen.”<sup>147</sup> This reaffirms Germany’s commitments to both working towards the green transition and to continue to work with Europe and the EU towards energy security and established climate goals.

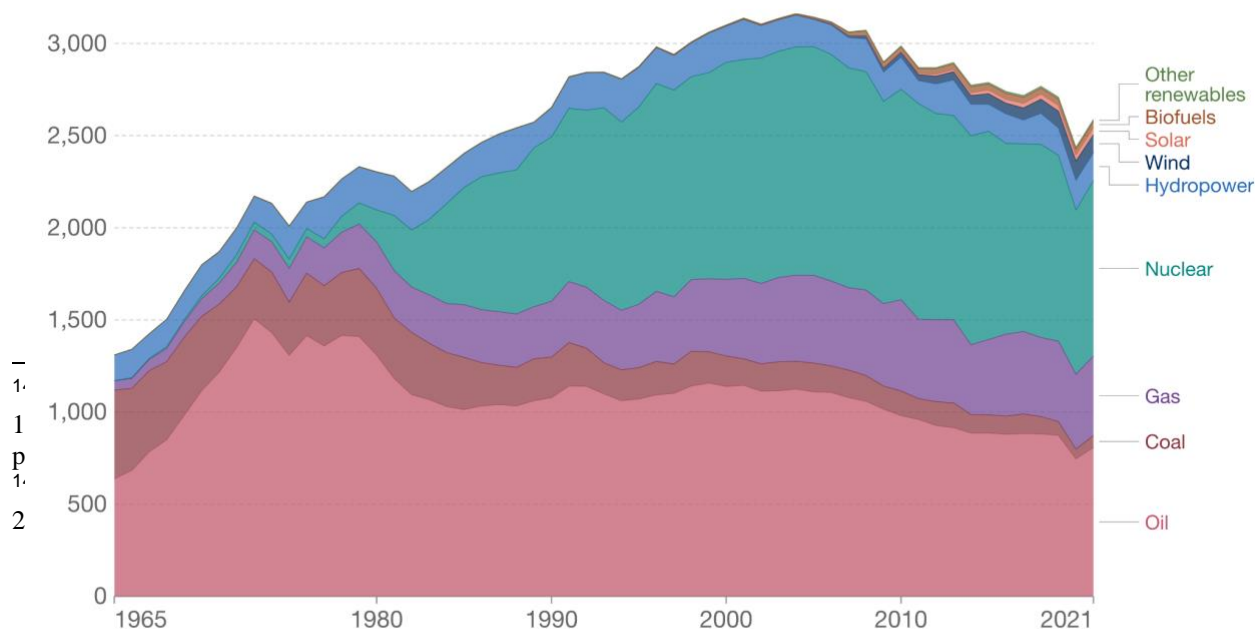
### France:

As is the case in Germany, the energy crisis in Europe has had a significant impact on France, although they find themselves in a different situation, due in part to the history of renewable energy policy in the country. Due to early investments in nuclear power, less than half of the country's supply of energy comes from fossil fuels, with a significant portion of the energy supply coming from nuclear power.<sup>148</sup> However, France faces problems with meeting climate targets and balancing state-first policies with EU initiatives and requirements. Additionally, France struggles with changing views towards the EU, impacting the speed at which the renewable energy transition is occurring. This can be seen through the history of French energy policy, its changing relationship with the EU, and the political struggles that arise when losing a political majority.

### Energy consumption by source, France

Primary energy consumption is measured in terawatt-hours (TWh). Here an inefficiency factor (the 'substitution' method) has been applied for fossil fuels, meaning the shares by each energy source give a better approximation of final energy consumption.

Our World  
in Data



## POST WWII TO 2015

In the years following the Second World War, France experienced tremendous economic growth, significantly impacting energy consumption. Referred to in France as ‘les trentes glorieuses’, this period included a significant increase in GDP for many Western European countries.<sup>149</sup> France was heavily reliant on uranium mined in its former colonies.<sup>150</sup> Niger gained independence from France in 1960, and it was around this time that the French Commissariat à l’Énergie Atomique (CEA) began operating uranium mines and mills, all while exploring further sites that they could develop.<sup>151</sup> During the decolonization process, France negotiated a series of defense and raw materials accords with Niger, and this process gave them access to the materials necessary to facilitate a successful nuclear program. When nuclear power was discussed in France, it was linked to nationalism and the strength of the French state, allowing for the legitimization of government decisions made in the sector, especially when it came to anti-nuclear protestors.<sup>152</sup> This, in part, is a reason for the relative lack of success felt by protestors in France during this time, who were unable to make significant challenges to investment in nuclear power.<sup>153</sup>

Following the oil crisis in the 70s, France continued to turn to nuclear power to decrease oil consumption. This firmly established France’s use of nuclear power early on. Prior to the oil crises, France was largely dependent on fossil fuels and oil and, due to the lack of domestic reserves, was largely dependent on imports.<sup>154</sup> France also possessed coal mining resources,

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<sup>149</sup>Nicholas Crafts, “‘Les Trente Glorieuses’: From the Marshall Plan to the Oil Crisis,” Academic.oup.com, accessed March 15, 2023, <https://academic.oup.com/edited-volume/34342/chapter/328428732>.

<sup>150</sup>Iea, “France - Countries & Regions,” IEA, May 19, 2022, <https://www.iea.org/countries/france>.

<sup>151</sup> Hecht, *Becoming Nuclear*, 52

<sup>152</sup>Wiliarty, “Nuclear Power in Germany and France”

<sup>153</sup>Wiliarty, “Nuclear Power in Germany and France”

<sup>154</sup>Ariane Millot, Anna Krook-Riekkola, and Nadia Maïzi, “Guiding the Future Energy Transition to Net-Zero Emissions: Lessons from Exploring the Differences between France and Sweden,” *Energy Policy* (Elsevier, February 27, 2020), <https://www.sciencedirect.com/science/article/pii/S0301421520301154#bib31>.

which accounted for 23 percent of their consumption.<sup>155</sup> Due to France's prior interest in developing nuclear programs, the government was successful in coordinating a quick transition in the electricity sector, in part due to state engineers who could coordinate between the government and institutions responsible for reactor development.<sup>156</sup> This resulted in the government ordering 18 reactors in 1973, 18 by the end of 1975, 8 in 1980, and 4 in 1984.<sup>157</sup> Of the nuclear reactors commissioned, 54 were connected to the grid within 16 years.<sup>158</sup> At the same time, the government also moved to decrease the share of oil imported from the Middle East, helped in part by the discovery of domestic oil in Lacq in 1953.<sup>159</sup> At the time, the French government also looked into methods of reducing energy consumption, creating the Agency for Energy Savings in 1974, although this was abandoned when oil prices began to decrease.<sup>160</sup> France's response to the oil crises of the 70s differs in some ways from other European nations due in part to the heavy focus placed on nuclear power. France was aided in this department by the early focus that they had placed on the project, alongside the influence of both government and industry. This early nuclear investment significantly impacted France's energy mix diversity today. The use of nuclear power also aided the competitiveness of electricity, leading the EDF (electricite de France), which was supported by the government, to promote the use of electricity throughout the 80s.<sup>161</sup> Decisions made during this time period also highlight the policy goals of the French government during this time, which focused on increasing energy independence and

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<sup>155</sup> Millot, "Guiding"

<sup>156</sup> Millot, "Guiding"

<sup>157</sup> Millot, "Guiding"

<sup>158</sup> Romain Mauger, "Forced Nuclear Energy Reactors Shutdown in France: the Energy Transition Act's Mechanisms," Academic.oup.com, accessed March 15, 2023, <https://academic.oup.com/jwelb/article-abstract/11/3/270/4985466?redirectedFrom=fulltext&login=false>.

<sup>159</sup> Millot, "Guiding"

<sup>160</sup> Millot, "Guiding"

<sup>161</sup> Millot, "Guiding"

decreasing oil consumption.<sup>162</sup> The oil crises and the response of the French government reflect the importance of having clear policy goals to work towards and how these goals can shift over time.

The French energy sector was liberalized in the 2000s, as was the case in many European nations. With the EU pushing liberalization for three decades, the process occurred over a long time and resulted in an electricity market that remains highly centralized.<sup>163</sup> Currently, the leading electricity produced in France is the EDF, with an energy mix comprised largely of nuclear and hydraulic energy.<sup>164</sup> The EDF was created in 1946 by the French government, and they have remained a key figure throughout the liberalization debate, as the state continues to hold 85 percent of shares.<sup>165</sup><sup>166</sup> The creation of such an entity was due in part to the desire to create stronger energy independence for the country while maintaining a supply of energy that was secure and affordable.<sup>167</sup> The reluctance to liberalize the energy market has placed France and the EU at odds.<sup>168</sup> The process of decentralization also moves the debate on energy policy to a more local level as opposed to the national level.<sup>169</sup>

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<sup>162</sup> Millot, “Guiding”

<sup>163</sup>Carine Sebi and Anne-Lorene Vernay, “Community Renewable Energy in France: The State of Development and the Way Forward,” *Energy Policy* (Elsevier, September 16, 2020), <https://www.sciencedirect.com/science/article/pii/S0301421520305905#bib39>.

<sup>164</sup> Georgios Maris and Floros Flouros, “The Green Deal, National Energy and Climate Plans in Europe: Member States' Compliance and Strategies,” *MDPI* (Multidisciplinary Digital Publishing Institute, July 23, 2021), <https://www.mdpi.com/2076-3387/11/3/75>.

<sup>165</sup>“History,” EDF FR, February 11, 2022, <https://www.edf.fr/en/the-edf-group/edf-at-a-glance/history#:~:text=EDF%20emerges,-from%20the%20post&text=In%20the%20France%20of%20the,on%20service%20provider%20and%20region>.

<sup>166</sup>Viktoria Brendler, “Who Shapes the Energy Transition? National Regulatory Styles and Societal Involvement in Renewable Energy Policy - *Zeitschrift Für Politikwissenschaft*,” SpringerLink (Springer Fachmedien Wiesbaden, July 11, 2022), <https://link.springer.com/article/10.1007/s41358-022-00326-2>.

<sup>167</sup>Florian Engels, “The French (Non-)Compliance with the European Energy Policy - *Zeitschrift Für Politikwissenschaft*,” SpringerLink (Springer Fachmedien Wiesbaden, August 30, 2022), <https://link.springer.com/article/10.1007/s41358-022-00329-z>.

<sup>168</sup> Engels, “French non-compliance.”

<sup>169</sup>Fengyu Liu et al., “Influence of Fiscal Decentralization and Renewable Energy Investment on Ecological Sustainability in EU: What Is the Moderating Role of Institutional Governance?,” *Renewable Energy* (Pergamon, October 13, 2022), <https://www.sciencedirect.com/science/article/pii/S0960148122015294>.

However, while this topic is discussed in France, the practicalities of the transition away from centralization have been difficult to implement. This reflects the importance of the involvement of multiple levels of governance in the climate and renewable transition and the practicalities of this occurring. Local authorities in France have been given responsibilities related to pursuing renewable energy strategies, as France is not yet on track to reach the renewable energy targets established in 2020 for 2030.<sup>170</sup> In order to keep the country on track to meet EU objectives, the renewable energy transition operates at varying levels of government, with the central government implementing incentive mechanisms, regional governments implementing their own plans, and local governments having a say in implementation choices.<sup>171</sup> All of this works to decentralize the energy transition in France. France's relationship with the EU and the renewable energy transition can also be observed in how national policy intersects with the European Green Deal and the response to the ongoing energy crisis, as it goes against the grain of French decision making.

### *The European Green Deal and the Energy Crisis*

The relationship between France and the EU has continued to change over time. While French influence was at one point perceived to be waning, the presidency of Emmanuel Macron has led to an increased French presence in the EU.<sup>172</sup> When elected in 2017, Macron called for a 'sovereign' Europe and attempted to build ties with other countries like Germany in order to gain

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<sup>170</sup>Jacques-Aristide Perrin and Christine Bouisset, "Emerging Local Public Action in Renewable Energy Production. Discussion of the Territorial Dimension of the Energy Transition Based on the Cases of Four Intermunicipal Cooperation Entities in France," *Energy Policy* (Elsevier, July 7, 2022), <https://www.sciencedirect.com/science/article/pii/S0301421522003688>.

<sup>171</sup>Perrin, "Emerging Local Public Action"

<sup>172</sup>Salih Isik Bora and Lucas Schramm, "Toward a More 'Sovereign' Europe? Domestic, Bilateral, and European Factors to Explain France's (Growing) Influence on EU Politics, 2017–2022 - French Politics," SpringerLink (Palgrave Macmillan UK, January 30, 2023), <https://link.springer.com/article/10.1057/s41253-022-00203-y#ref-CR45>.

further support for his ideas.<sup>173</sup> In a speech given at the Sorbonne, he stated: “[T]he time when France makes proposals in order to move forward with Europe and every European who so wishes—that time has returned,” reflecting an outwardly pro-European stance.<sup>174</sup> While the German government never officially responded to Macron's speech calling for increased commitments to the European project, it reflects the desire felt by France to strengthen ties to the EU and to other European countries. As the largest Member States, France and Germany have often seen success working together when it comes to influencing the agenda of the EU, as they are able to work together to implement their national preferences at a wider level.<sup>175</sup> While this relationship often swung in favor of Germany, due to a migration crisis in 2015 and 2016, along with the announcement that Angela Merkel would not seek another term in office, Macron was able to shift power from Germany to France.<sup>176</sup> This culminated in the French-Germany Treaty of Friendship, signed in 2019, and suggested combined action when it came to EU policy.<sup>177</sup> While these ideas were initially met with skepticism, by the end of Macron's first term, the idea of ‘European sovereignty’ ended up in the guidelines of the European Commission, reflecting the influence that France ultimately did end up having.<sup>178</sup> While these ideas were not unique to Macron, he was ultimately able to use several factors to rebuild French influence in the EU.

Domestic structures and institutions have become increasingly important when it comes to exerting influence over the EU. La République en Marche (LREM), Macron's party, held an absolute majority in parliament, allowing for smoother passage of pro-EU legislation.<sup>179</sup>

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<sup>173</sup>Bora, “Sovereign Europe.”

<sup>174</sup>Bora, “Sovereign Europe.”

<sup>175</sup>Bora, “Sovereign Europe.”

<sup>176</sup>Bora, “Sovereign Europe.”

<sup>177</sup>Bora, “Sovereign Europe.”

<sup>178</sup>Bora, “Sovereign Europe.”

<sup>179</sup>Bora, “Sovereign Europe.”

Additionally, the influence of pro-EU members from both the Left and the Right gave the party a clearer pro-EU mandate. While a more pro-EU movement, these policy proposals remained in line with national interests and faced difficulties when it came to EU energy and security policy, alongside the loss of Macron's political majority.<sup>180</sup> The situation in France, which advocated for stronger European integration, demonstrates the difficulties that come with balancing European integration and national interests, especially as countries gain and lose influence. France also faces difficulties caused by their ties to Russia. France has historically had a close relationship with Russia, and Macron attempted to mediate with Putin during the energy crisis.<sup>181</sup> This has caused tensions between member states in Central and Eastern Europe and reflects how quickly influence can be gained or lost in the EU, making coordinated efforts difficult.

In 2017, the French government announced the goal of reaching carbon neutrality by 2050. In 2019, France passed an Energy and Climate Law and committed to reducing nuclear power production to 50% by 2035.<sup>182</sup> This reinforced ideas laid out in the 2015 Energy Transition for Green Growth Law, which included the same goal. At the time, many reactors were reaching the end of their operational life and had been in service for nearly 40 years.<sup>183</sup> Here, this prompted the French government to make decisions about the future of French sources of energy and the need for new investments in the energy system. However, the implementation of nuclear closures was consistently pushed back.<sup>184</sup> In the same bill, France introduced incentives to encourage local actors to participate in renewable projects and was the first EU Member State to do so, once again reflecting their climate leadership.<sup>185</sup> In 2020, the French

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<sup>180</sup>Bora, "Sovereign Europe."

<sup>181</sup>Bora, "Sovereign Europe."

<sup>182</sup>Legifrance.gouv.fr, accessed March 15, 2023, <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000039355955/>.

<sup>183</sup>Mauger, "Forced Nuclear."

<sup>184</sup>Millot, "Guiding"

<sup>185</sup>Perrin, "Emerging Local Public Action"



government introduced a budget of 7 billion euros to develop a national strategy to develop decarbonized hydrogen, with the aim of it to become an energy carrier.<sup>186</sup> Such changes require increased public and government support and reflect the challenges that arise when attempting to meet climate commitments while balancing energy needs.

Surveying shows that overall, European citizens have positive feelings towards renewable energy sources such as solar and wind, and negative feelings towards nuclear and coal.<sup>187</sup> In France, however, attitudes towards nuclear power were much more neutral, reflecting the lasting legacy of nuclear power in the country.<sup>188</sup> In this way, French energy policies when it comes to nuclear power remain in line with public opinion, opting for a gradual reduction of nuclear power plants instead of a total shutdown. Polling also demonstrates support for increasingly diversified energy mixes, with limitations on imports from neighboring countries.<sup>189</sup> This may prove a challenge in countries lacking domestic fuel sources or infrastructure. This represents another energy transition challenge- balancing public interest and opinions with practical options for the energy transition.

The invasion of Ukraine has had a significant impact on France's energy mix. With natural gas prices reaching a new high in Europe, the challenge of balancing the renewable energy transition and securing adequate energy supplies has become increasingly difficult.<sup>190</sup> France faces several challenges when it comes to the transition to renewable energy. The first of these is the power grid, which will need to be decentralized in order to avoid congestion, an issue

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<sup>186</sup>Badr Eddine Lebrouhi et al., "Energy Transition in France," MDPI (Multidisciplinary Digital Publishing Institute, May 11, 2022), <https://www.mdpi.com/2071-1050/14/10/5818>.

<sup>187</sup>Georgios Xexakis and Evelina Trutnevyte, "Consensus on Future EU Electricity Supply among Citizens of France, Germany, and Poland: Implications for Modeling," *Energy Strategy Reviews* (Elsevier, October 27, 2021), <https://www.sciencedirect.com/science/article/pii/S2211467X21001279>.

<sup>188</sup> Xexakis, "Consensus"

<sup>189</sup> Xexakis, "Consensus"

<sup>190</sup>Lebrouhi, "Energy Transition."

that has plagued other countries.<sup>191</sup> This will require significant investment in infrastructure, as the grid must be adapted to allow for new technologies. While the French government has supported plans to develop smart grid systems as early as 2014, the combination of actors involved in such a process makes this a difficult aspect of the energy transition.<sup>192</sup> Additionally, France is a primary exporter of electricity. This requires sufficient modes of transmission, especially as new renewable energies are introduced into the energy mix, requiring further interconnection with neighboring countries.<sup>193</sup>

France's transition to renewable energy can also be examined in the context of the European Green Deal and policy changes made following the invasion of Ukraine. In 2021, France was considered a pacesetter, showing their initial success in implementing policies that aligned with the new regulations set out by the EU.<sup>194</sup> Macron reinforced his commitment to the ideals laid out by the EU in his speech given at the Leaders' Summit on Climate, stating: "We need to move more quickly to implement commitments for 2030. A plan of action that is clear, measurable, and verifiable. Basically, 2030 is the new 2050. It is this plan that the European Union put forward in December with its Green Deal. It is therefore up to us to use all the levers available to us: innovation, transformation, regulation."<sup>195</sup> While originally following a more state-centric plan, France's eventual compliance allowed them to begin to align with goals set out by the EU. In order to encourage green industry in France, the French Economy Minister announced new incentives to encourage green industries in France, due in part to fears that the

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<sup>191</sup>Lebrouhi, "Energy Transition."

<sup>192</sup>Lebrouhi, "Energy Transition."

<sup>193</sup>Lebrouhi, "Energy Transition."

<sup>194</sup>Maris, "Compliance"

<sup>195</sup>"Leaders Summit on Climate - Speech by French President Emmanuel Macron," [elysee.fr](https://www.elysee.fr/en/emmanuel-macron/2021/04/22/leaders-summit-on-climate-speech-by-french-president-emmanuel-macron), April 22, 2021, <https://www.elysee.fr/en/emmanuel-macron/2021/04/22/leaders-summit-on-climate-speech-by-french-president-emmanuel-macron>.

subsidies provided in the Inflation Reduction Act passed by U.S. President Joe Biden could take the competition out of Europe.<sup>196</sup> Le Maire also announced the intention to push partners to adopt a “European Inflation Reduction Act”, working with Germany to orchestrate such a measure.<sup>197</sup> However, France is still not on track to meet renewable energy targets and has not reached the 2020 targets.<sup>198</sup> Difficulties in securing collaboration across numerous parties in government have also played a role in the delay in the renewable transition, struggling to find a balance between the Right and the Left.<sup>199</sup>

Like Germany, France also received support from the EIB to drive the renewable energy transition. In 2022, France received 8.4 billion euros from the EIB and 1.5 billion from the EIF, the second highest amount of funding within the EU.<sup>200</sup> 70% of this financing went towards climate and environmental action, with 5.9 billion euros invested in renewable energy, transport, and energy efficiency.<sup>201</sup> This included 15 new or ongoing projects in the energy sector.<sup>202</sup> One of these projects includes co-financing floating offshore wind farms in the Mediterranean.<sup>203</sup>

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<sup>196</sup>Clea Caulcutt, “France Hits Back at America with Green Industry Plan,” POLITICO (POLITICO, January 4, 2023), <https://www.politico.eu/article/france-us-america-green-incentives-plan-biden-macron/>.

<sup>197</sup>Caulcutt, “France Hits Back.”

<sup>198</sup>Perrine Mouterde, “France to Pay up to €500m for Falling Short of Renewable Energy Targets,” Le Monde.fr (Le Monde, November 25, 2022), [https://www.lemonde.fr/en/environment/article/2022/11/25/renewable-energy-france-will-have-to-pay-several-hundred-million-euros-for-falling-short-of-its-objectives\\_6005566\\_114.html](https://www.lemonde.fr/en/environment/article/2022/11/25/renewable-energy-france-will-have-to-pay-several-hundred-million-euros-for-falling-short-of-its-objectives_6005566_114.html).

<sup>199</sup>Mariama Darame and Ivanne Trippenbach, “Renewable Energy: French Government Struggles to Find a Majority on Bill,” Le Monde.fr (Le Monde, November 2, 2022), [https://www.lemonde.fr/en/environment/article/2022/11/02/renewable-energy-french-government-struggles-to-find-a-majority-on-bill\\_6002655\\_114.html](https://www.lemonde.fr/en/environment/article/2022/11/02/renewable-energy-french-government-struggles-to-find-a-majority-on-bill_6002655_114.html).

<sup>200</sup>Eib, “The EIB Group Invested Nearly €10 Billion in France in 2022,” European Investment Bank (European Investment Bank, February 17, 2023), <https://www.eib.org/en/press/all/2023-041-le-groupe-bei-a-investi-pres-de-10-milliards-d-euros-en-france-en-2022>.

<sup>201</sup>Eib, “The EIB Group Invested Nearly €10 Billion in France in 2022.”

<sup>202</sup>“Financed Projects,” EIB.org, accessed April 28, 2023,

<https://www.eib.org/en/projects/loans/index.htm?q=&sortColumn=loanParts.loanPartStatus.statusDate&sortDir=desc&pageNumber=0&itemPerPage=25&pageable=true&language=EN&defaultLanguage=EN&loanPartYearFrom=2022&loanPartYearTo=2022&orCountries.region=true&countries=FR&orCountries=true&ors=1000&orSectors=true>.

<sup>203</sup> “France: The EIB, with the Support of the European Commission, Is Co-Financing the Construction of Three Floating Offshore Wind Farms for a Total of €210 Million,” European Commission - European Commission, accessed April 28, 2023, [https://ec.europa.eu/commission/presscorner/detail/da/IP\\_22\\_4155](https://ec.europa.eu/commission/presscorner/detail/da/IP_22_4155).

These turbines serve to aid the energy transition in France but also provide an opportunity for further research and development in offshore wind.<sup>204</sup> Here, the EIB plays an important role in financing renewable energy sources and investing in the future of specific technologies to aid the transition. In 2023, the European Commission approved 2.08 billion euros to help develop French offshore wind energy, in order to help the country reach targets laid out in the European Green Deal, namely the goal of producing 33% of energy from renewable sources in 2030.<sup>205</sup> The current political situation in France and how it impacts the renewable energy transition is an ongoing struggle faced by many countries attempting to reach their own climate targets. France's continued investment in wind power reflects significant investment in new forms of renewable energy. While movement is occurring in the right direction, it remains to be seen if it will be sufficient.

The history of energy policy and the renewable energy transition in France differs from that of Germany in several key areas. France's early development of nuclear power allowed them to remain less reliant on imported fuel, and oil crises significantly expedited the process. The state's involvement also allowed these projects to be enacted quickly, ensuring that they could respond to the challenges posed by the crisis in a relatively timely manner. However, as nuclear power became seen as a less green option, France also faced pressures to speed up the renewable energy transition and meet climate change goals. When supported by a government majority, France was able to foster a stronger relationship with the EU, guiding policies in directions that suited their goals and gaining public and political support. But when the political majority was lost, it became more difficult to implement policies to meet targets rapidly. While working with

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<sup>204</sup> "France: The EIB, with the Support of the European Commission."

<sup>205</sup> "Press Corner," European Commission - European Commission, accessed March 15, 2023, [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_23\\_1410](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1410).

countries like Germany, France increased their influence and pushed forward measures that supported the renewable transition. In this way, the country demonstrates some of the challenges and successes of the renewable energy transition; it shows the success that comes from working with other Member States and the difficulties that come with passing policy without a political consensus at home.

*Italy:*

Like many European countries, Italy has also been heavily impacted by the energy crisis. In 2021, over 80% of Italy's energy came from fossil fuels, with the rest coming from renewable sources, including hydropower and solar.<sup>206</sup> Of the natural gas that Italy imported, almost 30% came from Russia.<sup>207</sup> This loss of a significant portion of the country's energy supply served to highlight the importance of the green transition in Italy. However, when looking at a country with such high energy imports, it becomes important to look at how a country, which began looking into alternative sources of power in the 50s and 60s, found itself so reliant on imported natural gas and so unprepared for the energy crisis they and the rest of Europe are facing. These answers can be approached by inspecting Italy's energy policy and infrastructural development history, its historical and current relationship with the European Union, and the issues arising from the green transition when it comes to new infrastructure demands and strains on the grid currently in place.

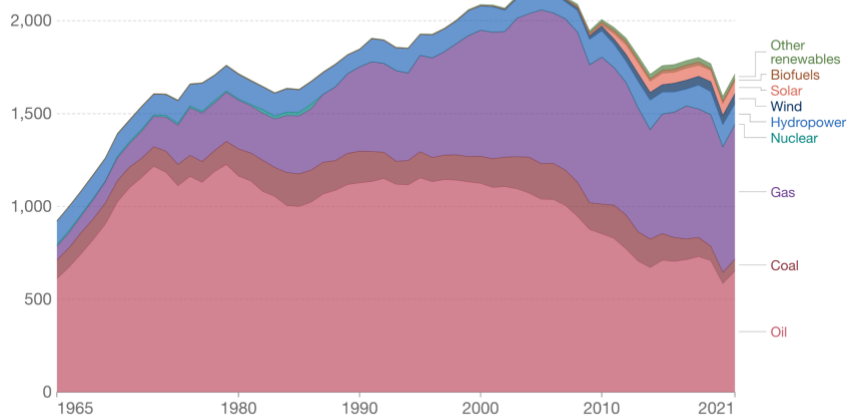
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<sup>206</sup>Hannah Ritchie, Max Roser, and Pablo Rosado, "Italy: Energy Country Profile," Our World in Data, October 27, 2022, <https://ourworldindata.org/energy/country/italy>.

<sup>207</sup>Published by Statista Research Department and Jan 5, "Italy: Natural Gas Imports by Country 2021," Statista, January 5, 2023, <https://www.statista.com/statistics/787720/natural-gas-imports-by-country-of-origin-in-italy/#:~:text=In%202021%2C%20Russia%20was%20the,of%20natural%20gas%20from%20Algeria>.

### Energy consumption by source, Italy

Primary energy consumption is measured in terawatt-hours (TWh). Here an inefficiency factor (the 'substitution' method) has been applied for fossil fuels, meaning the shares by each energy source give a better approximation of final energy consumption.



Source: BP Statistical Review of World Energy

Note: 'Other renewables' includes geothermal, biomass and waste energy.

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### POST-WW2 to 2000

The history of Italy's energy policy can be approached from several different angles, including examining participation or lack thereof in Europe-wide energy initiatives, internal conflict between industry and government-sponsored initiatives, and the early beginning of climate change initiatives. Many of these themes are displayed throughout the early beginnings of the development of Italy's nuclear program. In 1947, Gilberto Bernardini, a key figure in attempts to revive Italian physics after World War II, helped found the first Italian nuclear research center, which eventually became the Istituto Nazionale di Fisica Nucleare (INFN).<sup>208</sup> In the aftermath of WWII, more focus was placed on ideas of European integration to recover from the mass destruction the war caused. In 1948, Bernardini and fellow scientist Edoardo Amaldi proposed the idea of sharing resources in the technical-scientific field.<sup>209</sup> While this initial proposal was unsuccessful, the idea of international cooperation was again posed at the General Conference of UNESCO in 1950, where the idea of a European laboratory was again proposed, this time with American support, noting that "Identical problems arise in different

<sup>208</sup>"CERN Accelerating Science," CERN Document Server, accessed March 15, 2023, <https://cds.cern.ch/>.

<sup>209</sup>"Italy and the Development of European Energy Policy: From the Dawn of the Integration Process to the 1973 Oil Crisis," Taylor & Francis, accessed March 15, 2023, <https://www.tandfonline.com/doi/full/10.1080/13507486.2012.697875>.

countries. No single country can solve them all; international cooperation is necessary.”<sup>210</sup> This initial proposal reflects the fact that the idea of European cooperation, especially when it came to sharing technological and scientific findings, was explored early on. These discussions would cumulate in the later establishment of the European Community of Atomic Research (EUROATOM) and the Conseil Européen pour la Recherche Nucléaire (CERN).<sup>211</sup> While Italy initially remained involved in European collaborations, it continued to face problems caused by the significant energy demands and a lack of natural resources. Additionally, Italy faced internal problems: the Ente Nazionale Energia Elettrica (ENEL) and the Ente Nazionale Idrocarburi (ENI).

The creation of a new corporation caused a significant delay in the establishment of the Italian energy policy, especially when it came to electrical and nuclear power. Prior to the establishment of ENEL, the Italian energy sector consisted of public and private utilities that often acted as local monopolies.<sup>212</sup> The establishment of a new national entity for electricity in 1962 came with its own set of problems, including a lack of clear priorities; this in turn caused delays with Italy’s integration into the European framework.<sup>213</sup> As Italy’s energy demands increased, the country became increasingly dependent on oil imports, with plans for nuclear power falling into the background.<sup>214</sup> Here, ENI played an important role when it came to prospecting oil and gas fields.<sup>215</sup> As plans for European cooperation in the nuclear sector stalled, Italian dependence on imports continued to grow, especially with lack of support from the rest of

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<sup>210</sup>Unesdoc.unesco.org, accessed March 15, 2023, <https://unesdoc.unesco.org/ark:/48223/pf0000114589>.

<sup>211</sup> “Italy and the Development.”

<sup>212</sup>Maria Di Nucci, “The Nuclear Power Option in the Italian Energy Policy,” accessed March 16, 2023, <https://journals.sagepub.com/doi/10.1260/095830506778119353>.

<sup>213</sup> “Italy and the Development.”

<sup>214</sup> “Italy and the Development.”

<sup>215</sup> Multilevel system

Europe, as they tended to favor and support larger programs, such as ones in France.<sup>216</sup> This early failure at attempting to create a European project when it came to nuclear power, and Italy's early dependence on energy imports foreshadows the problems that the country faces today. The creation of Italy's new electrical entity and lack of clear policy focus coincided with attempts to drive European cooperation, demonstrating the difficulties that arise with such a project, and the ease with which countries can fall out of such plans. While this did not mean Italy never explored nuclear as an option to their energy supply needs, it occurred at a later date, and was disrupted before it was ever really established.

This did not mean nuclear power was Italy's only option for exploring additional sources of energy. By the late 1950s, over 80% of electricity was generated by hydropower.<sup>217</sup> However, the infrastructure was aging, and the Suez crisis had significantly increased the price of oil.<sup>218</sup> This reintroduced the nuclear debate, although fears arose about potential exploitation of nuclear power by private industry.<sup>219</sup> By 1965, Italy had three power stations in operation, and accounted for 13.8% of the world's nuclear power capacity.<sup>220</sup> The ownership of these plants was later transferred to ENEL, and as oil prices once again dropped, focus was shifted to other sources of power, effectively halting the early nuclear transition in Italy. This shift to reliance on imported fossil fuels reflects the precarious nature of Italy's energy supply, and the early decisions that ultimately impacted the country's development of its own sources of power, especially as demand for electricity grew.

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<sup>216</sup> "Italy and the Development."

<sup>217</sup>Di Nucci, "Nuclear Power Option"

<sup>218</sup>Di Nucci, "Nuclear Power Option"

<sup>219</sup>Di Nucci, "Nuclear Power Option"

<sup>220</sup>Di Nucci, "Nuclear Power Option"



Italy's problems with energy supply only continued to increase in the 70s and 80s. A plan to deal with the first oil crisis in 1973 was not developed until 1975, and was considered largely ineffective.<sup>221</sup> While the need to move away from reliance on the Middle East of oil was evident, there was no immediate solution, as any infrastructural development took time, meaning that energy demands would not be met. This left the country with no effective plan when the second oil crisis occurred in 1979, and later plans in 1980 and 1981 saw a greater emphasis on energy saving measures, coal, nuclear power, and additional sources of renewable energy.<sup>222</sup> However, as was the case in many European countries, the Chernobyl disaster significantly impacted nuclear development plans. Nuclear power became a deeply political issue, and the Italian government eventually halted construction on new nuclear power plants, and called for the shut down of plants in operation.<sup>223</sup> This further drove the conversation around developing additional sources of renewable energy, driven in part by the soon to be established Italian Green Party.<sup>224</sup> Italy's early struggles with energy import dependence and struggles with renewable energy sources, especially the development of nuclear programs, reflect themes ongoing to this day. Despite awareness of potential insufficiencies in energy supplies, the difficulties around effectively and efficiently establishing alternatives plague energy policy. The additional delay in developing plans to respond to crises after the fact further reflects the importance of having provisional policies in place that can be used to respond to such crises, and the importance of looking in the long term when it comes to infrastructural development.

At the end of the 90s, the energy sector in Italy underwent significant changes, aiming to address the issues that had previously impacted the country. In 1999, the Bersani Decree was

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<sup>221</sup>Di Nucci, "Nuclear Power Option"

<sup>222</sup>Di Nucci, "Nuclear Power Option"

<sup>223</sup>Di Nucci, "Nuclear Power Option"

<sup>224</sup>Di Nucci, "Nuclear Power Option"

implemented. This decree implemented EU directive 96/92 to Italy, and concerned internal energy markets.<sup>225</sup> Despite delays in its implementation, the decree introduced greater competition, allowed the Government to maintain a majority stake, and created a larger open market for eligible customers.<sup>226</sup> In 2000, the Lette Decree played an important role in the liberalization of the gas sector, once again opening up a more competitive market.<sup>227</sup> These reforms were intended to reduce the power that ENEL had in the markets and allow for greater exploration of renewable energy sources.<sup>228</sup> Additionally, Law 481/95, or the Authority Law, created additional rules for competition and regulation when it came to public utilities, creating the Authority for Electricity and Gas.<sup>229</sup> The importance of these reforms in creating a competitive market and the delays that occurred when implementing these forms demonstrate the importance of a fast-moving policy that allows for the exploration of renewable sources of energy. Despite all of this, oil continued to play a key role in the Italian energy mix.

In 2011, the Italian National Action Plan for Renewable Energy was presented. Part of this plan required that 19-20 percent of domestic energy consumption would be covered by renewable energy, which was a larger portion than required by the EU at the time.<sup>230</sup> Italy's early history with sources of energy and energy crises demonstrates several of the key issues that arise when looking at the Green Energy transition and the ongoing energy crisis in Europe.

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<sup>225</sup>“Lex - 32022R0720 - En - EUR-Lex,” EUR, accessed March 15, 2023, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0720>.

<sup>226</sup>Alessandra Ferrari and Monica Giuletti, “Competition in Electricity Markets: International Experience and the Case of Italy,” *Utilities Policy* (Pergamon, October 7, 2004), <https://www.sciencedirect.com/science/article/pii/S0957178704000724#bib12>.

<sup>227</sup>“New Regulatory Policies in Italy: Impact on Financial Results, on Liquidity and Profitability of Natural Gas Retail Companies,” *Utilities Policy* (Pergamon, October 18, 2012), <https://www.sciencedirect.com/science/article/pii/S0957178712000215>.

<sup>228</sup>Di Nucci, “Nuclear Power Option”

<sup>229</sup>Di Nucci, “Nuclear Power Option”

<sup>230</sup>“The Effectiveness of European Energy Policy on the Italian System: Regional Evidences from a Hierarchical Cluster Analysis Approach,” *Energy Policy* (Elsevier, May 21, 2019), <https://www.sciencedirect.com/science/article/pii/S0301421519303179>.

### *The European Green Deal and the Energy Crisis*

Many of these issues can also be seen in more current discussions surrounding the climate, energy crises, and transition to renewable energy. However, in 2019, Italy was found to still be non-compliant with many EU policies, as they suffered from inadequate systems of monitoring and funding, high emissions in Northern and Central Italy, and a lack of nature protection.<sup>231</sup> Italy was also found to not be working within the principles of the circular economy, despite the fact that this was a part of Italy's implementation strategy.<sup>232</sup> It then became necessary for Italy to address these shortcomings in future policies.

As a part of its commitments to the Paris Agreement, Italy released its National Long-term Strategy, which identified several pathways to achieve climate neutrality by 2050.<sup>233</sup> This was promoted by several different ministries, including the Ministry of the Environment, Land, and Sea, the Ministry of Economic Development, and the Ministry of Infrastructure and Transport.<sup>234</sup> The process of decentralization has aided in expanding the scope of the Italian energy transition, as it allows for better experimentation across multiple sectors and levels of government and increases the scope of the project.<sup>235</sup>

In 2021, Italy introduced the Ministry for the Ecological Transition, which grouped many different ministries together to work towards a new energy policy. While the national

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<sup>231</sup>Benedetta Cotta, "Catching up with the European Union's Recovery and Resilience Agenda: Green Transition Reforms in the Italian National Recovery and Resilience Plan," Taylor & Francis, accessed March 15, 2023, <https://www.tandfonline.com/doi/full/10.1080/23248823.2022.2126925>.

<sup>232</sup> Cotta, "Catching up."

<sup>233</sup>"National Recovery and Resilience Plan," National Recovery and Resilience Plan, accessed March 15, 2023, <https://www.italiadomani.gov.it/en/strumenti/documenti/archivio-documenti/national-recovery-and-resilience-plan.html#:~:text=The%20National%20Recovery%20and%20Resilience,pandemic's%20economic%20and%20social%20impact>.

<sup>234</sup>"National Recovery and Resilience Plan,"

<sup>235</sup>Maria Rosaria Di Nucci and Andrea Prontera, "The Italian Energy Transition in a Multilevel System: Between Reinforcing Dynamics and Institutional Constraints - Zeitschrift Für Politikwissenschaft," SpringerLink (Springer Fachmedien Wiesbaden, December 23, 2021), <https://link.springer.com/article/10.1007/s41358-021-00306-y>.

government plays a key role, more responsibilities are shifted to regional governments.<sup>236</sup> In contrast to France, Italy began to shift away from the role of the state and looked to adopt a more bottom-up approach, which allowed regional governments to take advantage of opportunities offered by the EU.<sup>237</sup> Italy continues to face infrastructural challenges due in part to the large projects required to ensure that the renewable energy transition can be implemented successfully.

Also, in 2021, Italy announced its National Recovery and Resilience Plan. It aimed to make “Italy more equitable, sustainable and inclusive.”<sup>238</sup> This plan was required in order for Member States to access funds provided in the Next Generation EU (NGEU) program implemented by the EU in 2020.<sup>239</sup> First proposed in January 2021 by Giuseppe Conte and his coalition, they faced pushback from several parties and were not submitted to the European Commission until June, after Conte’s government resigned.<sup>240</sup> Given these circumstances, it was unclear how successful the goals and policy reforms laid out in the plan would be. While the document laid out plans that were in line with the European Green Deal and Sustainable Development Goals, they sometimes lacked complex descriptions and strategy- for example, revisions to the smart grid had no clear source of funding.<sup>241</sup> While the plan’s initial goals appear to align with EU plans and policies, the lack of practical implementation strategies raises concerns about their implementation.

In 2022, the European Commission announced that Italy would receive 1 billion euros to aid in a just climate transition. This fund aims to help the Member States support regions that will be negatively impacted by the transition to climate neutrality through a variety of ways,

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<sup>236</sup> Di Nucci, “Italian energy transition.”

<sup>237</sup> Di Nucci, “Italian energy transition.”

<sup>238</sup> “National Recovery and Resilience Plan,”

<sup>239</sup> Cotta, “Catching up.”

<sup>240</sup> Cotta, “Catching up.”

<sup>241</sup> Cotta, “Catching up.”

including the creation of new firms and job-search assistance.<sup>242</sup> In the case of Italy, this funding directly supports workers in the steel sector, who will be retrained for jobs that are linked to the energy transition and the circular economy.<sup>243</sup> Additionally, Italy supported proposing higher levels of state aid, similar to proposals put forward by France and Germany, in order to ensure that the EU remained competitive with the United States.<sup>244</sup> In this way, Italy continues to demonstrate its willingness to work with the EU on climate issues.

Italy received significant investment from the EIB in 2022. Totalling 10.09 billion euros, Italy received 15.9% of EIB activity in the EU and was the leading country for financing within the EU.<sup>245</sup> In the energy sector, this included 14 new or ongoing projects.<sup>246</sup> 5.54 billion was invested in projects that aimed to produce renewable energy, ensure energy security, and promote sustainability.<sup>247</sup> As part of an ongoing project to reduce greenhouse gas emissions, the launch of an “e-grid” project, which will renew and further develop the power grid in order to continue to accelerate the energy transition, received funding from the EIB in both 2021 and 2022.<sup>248</sup>

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<sup>242</sup>“Just Transition Fund,” European Commission, accessed March 16, 2023, [https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/just-transition-fund\\_en](https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/just-transition-fund_en).

<sup>243</sup>“Press Corner,” European Commission - European Commission, accessed March 16, 2023, [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_22\\_6562](https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6562).

<sup>244</sup>Person, “Italy Says EU Green Subsidies Plan 'Can and Must' Be Improved,” Reuters (Thomson Reuters, February 3, 2023), <https://www.reuters.com/business/sustainable-business/italy-says-eu-green-subsidies-plan-can-must-be-improved-2023-02-03/>.

<sup>245</sup>Eib, “EIB Group Activity in Italy in 2022: €10.09 Billion of Investment and Record Green Financing,” European Investment Bank (European Investment Bank, February 8, 2023), <https://www.eib.org/en/press/all/2023-035-attivita-del-gruppo-bei-in-italia-nel-2022-1009-miliardi-in-investimenti-e-record-di-finanziamenti-green>.

<sup>246</sup>“Financed Projects,” EIB.org, accessed April 28, 2023, <https://www.eib.org/en/projects/loans/index.htm?q=&sortColumn=loanParts.loanPartStatus.statusDate&sortDir=desc&pageNumber=0&itemPerPage=25&pageable=true&language=EN&defaultLanguage=EN&loanPartYearFrom=2022&loanPartYearTo=2022&orCountries.region=true&countries=IT&orCountries=true&ors=1000&orSectors=true>.

<sup>247</sup>Eib, “EIB Group Activity in Italy in 2022.”

<sup>248</sup>Eib, “Italy: First Sustainability-Linked EIB Loan Agreement of 600 Million Euros to E-Distribuzione,” European Investment Bank (European Investment Bank, July 20, 2021), <https://www.eib.org/en/press/all/2021-246-first-sustainability-linked-eib-loan-agreement-of-600-million-euros-to-e-distribuzione>.

Italy also presents an interesting case when it comes to looking at the political stances of current Prime Minister Giorgia Meloni. Contrary to expected right-wing beliefs, the success of the Right-Wing Populist Party, Brothers of Italy, has not led the country to take an explicitly anti-EU or slow down climate and renewable reform. Meloni stated: “There is nothing more ‘right-wing’ than ecology. The right loves the environment because it loves the land, the identity, the homeland.”<sup>249</sup> Meloni aims to strike a balance between combating climate change and moving away from more state-centric approaches, but despite her speeches, the manifesto of the party once again has no clear plan for reaching EU targets.<sup>250</sup> While Meloni is skeptical of the way EU funding is being spent, and the overall goals of the EU, it may not be possible to break rules without payments being frozen.<sup>251</sup> The situation in Italy continues to reflect how changing political parties and goals can impact the renewable energy transition and how climate goals are reached. Meloni’s policies are also not that different from ones held by prior governments, who also turned away from green solutions to the energy crisis, attempting to build further ties to the Middle East, and working to find loopholes when it came to EU bans on electric cars.<sup>252</sup> It also, however, shows the staying power of the goals set by the EU. When discussing the relationship between Italy and the EU, Meloni stated: “I want to give a signal about our will to collaborate with the EU and to defend our national interest,” demonstrating the desire and difficulty of balancing national interest with EU goals and directive.<sup>253</sup> The dialing down of anti-EU rhetoric

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<sup>249</sup>Federica Di Sario, “Italy's Meloni Aims to Make Climate Change a Right-Wing Issue,” POLITICO (POLITICO, October 24, 2022), <https://www.politico.eu/article/italy-giorgia-meloni-climate-change-right-wing/>.

<sup>250</sup>“Dait.interno.gov.it,” accessed March 16, 2023, [https://dait.interno.gov.it/documenti/trasparenza/POLITICHE\\_20220925/Documenti/68/\(68\\_progr\\_2\\_-programma.pdf](https://dait.interno.gov.it/documenti/trasparenza/POLITICHE_20220925/Documenti/68/(68_progr_2_-programma.pdf).

<sup>251</sup>Di Sario, “Meloni.”

<sup>252</sup>Di Sario, “Meloni.”

<sup>253</sup>Eleonora Vasques, “Meloni Offers Support for EU and Vows to Bring 'Strong Voice of Italy',” [www.euractiv.com](https://www.euractiv.com/section/politics/news/meloni-offers-support-for-eu-and-vows-to-bring-strong-voice-of-italy/), November 3, 2022, <https://www.euractiv.com/section/politics/news/meloni-offers-support-for-eu-and-vows-to-bring-strong-voice-of-italy/>.

represents a shift from what has come to be expected from Right-Wing parties and presents an interesting example of how this may change future EU and Italian relations.

As a country largely reliant on imported fuel, Italy represents many of the difficult aspects of the renewable energy transition and policy requirements implemented by the EU. Despite beginning the postwar period with support for Europe-wide projects, Italy soon moved away from these ideas due in part to internal conflict between national energy companies and corporations looking elsewhere for sources of power. Italy's lack of domestic sources of fuel also posed a unique challenge, as they did not develop significant nuclear capabilities like France or possess coal deposits like Germany. This, in turn, caused Italy to be impacted significantly by energy crises throughout the 70s, and what policy was implemented was often done so too late. This led to Italy's continued dependence on fossil fuels and challenges down the road when it came to the implementation of green policies and sources of renewable energy. Italy was also delayed when it came to decentralizing the energy sector and faced further challenges falling in line with EU reforms passed throughout the 2000s. Delays and ambiguities in Italy's plans to reach climate goals also demonstrate the difficulties that come with making policy changes in these sectors. However, Italy remains willing to work with the EU and other Member States, despite recent shifts to more right-wing governments.

The cases of Germany, France, and Italy all represent various aspects of the transition to renewable energy, and each country faces its own challenges. With France's position as a country that already produces over half of its energy supply from renewable sources, Germany's position as a perceived climate leader, and Italy's continued reliance on fossil fuels, each case represents a country at a different stage in their energy transition. However, there are many areas in which they face common issues, despite being driven by their own unique energy policy

histories. Here, the World Energy Trilemma Index can be used to examine the success of a country when it comes to balancing energy security, energy equity, and environmental sustainability, all goals covered under national plans and EU-wide plans. The 2022 index report notes that the current energy crisis has “disrupted previous assumptions about the state of energy worldwide,” and the continent faces a dilemma between the need for diversification and commitment to sustainability goals.<sup>254</sup> Germany (7) and France (6) both rank in the top performers according to the index, while Italy ranks 16th.<sup>255</sup> Italy’s performance has remained relatively stable, and both France and Germany’s performance has gradually increased over time.<sup>256</sup> This index serves to highlight the importance of a diversified energy mix, especially as the renewable energy transition accelerates to close the gap caused by the loss of sources of fossil fuels.

For most countries, it will not be possible to diversify the energy supply alone. Here, the importance of establishing and balancing a relationship with the EU and its Member States becomes increasingly important. For countries to achieve the points laid out by the energy trilemma index and remain economically competitive with other nations, it becomes important to look at how EU integration and cooperation can play a role in this area. The support for EU subsidies for investment in renewable energy is one such example of the form that this relationship could take. Due to the importance placed on countries balancing their own national interests with the interests of the EU, it is important that the EU support and develop relationships between the member states instead of implementing specific EU-wide objectives.

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<sup>254</sup>“World Energy Trilemma Index: 2022,” World Energy Council, accessed March 16, 2023, <https://www.worldenergy.org/publications/entry/world-energy-trilemma-index-2022>.

<sup>255</sup>“World Energy Trilemma.”

<sup>256</sup>“World Energy Trilemma.”



The EU's role in supporting member states with their development can be seen through their increased support of trans-European infrastructure. As a part of the European Green Deal, the EU has made changes to encourage and support trans-European energy infrastructure. The EU established an interconnection target of at least 15% by 2030, which was intended to ensure that electricity cables were present to transport 15% of the electricity produced within a country's borders to neighboring countries; as of 2021, 16 countries were on track to reach the set target.<sup>257</sup> Regulation 2022/869 (TEN-E) of the European Parliament provided guidelines for trans-European energy infrastructure, highlighting that “The trans-European energy networks policy is a central instrument in the development of an internal energy market and necessary to achieve the objectives of the European Green Deal.”<sup>258</sup> The regulation also specifies that “the provisions of this Regulation should not affect a Member State’s right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply.”<sup>259</sup> TEN-E is intended to help connect regions currently isolated from markets and is intended to allow for easier cross-border infrastructure by simplifying and increasing the speed of authorization and permitting for these projects.<sup>260</sup> There are three thematic areas that are considered high priority, including smart electricity grid deployment, smart gas grids, and a cross-border carbon dioxide network.<sup>261</sup> Additionally, the EU introduced

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<sup>257</sup>“Electricity Interconnection Targets,” Energy, accessed April 28, 2023, [https://energy.ec.europa.eu/topics/infrastructure/electricity-interconnection-targets\\_en#:~:text=EU%20electricity%20interconnection%20target,-The%20EU%20has&text=This%20means%20that%20each%20country,its%20borders%20to%20neighbouring%20countries.](https://energy.ec.europa.eu/topics/infrastructure/electricity-interconnection-targets_en#:~:text=EU%20electricity%20interconnection%20target,-The%20EU%20has&text=This%20means%20that%20each%20country,its%20borders%20to%20neighbouring%20countries.)

<sup>258</sup>“Lex - 32022R0869 - En - EUR-Lex,” EUR, accessed April 28, 2023, [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L\\_.2022.152.01.0045.01.ENG&toc=OJ%3AL%3A2022%3A152%3ATOC.](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2022.152.01.0045.01.ENG&toc=OJ%3AL%3A2022%3A152%3ATOC.)

<sup>259</sup>Lex- 32022&0869

<sup>260</sup> “Trans-European Networks for Energy,” Energy, accessed April 28, 2023, [https://energy.ec.europa.eu/topics/infrastructure/trans-european-networks-energy\\_en.](https://energy.ec.europa.eu/topics/infrastructure/trans-european-networks-energy_en.)

<sup>261</sup> “Trans-European Networks for Energy.”

cross-border renewable energy projects as a part of revisions to the Connecting Europe Facility (CEF).

The CEF is an EU funding instrument that allows for infrastructure investment at a European level. The CEF Energy budget for the 2021-2027 period is 5.84 billion euros and is intended to make EU energy systems interconnected, smarter, and digitized.<sup>262</sup> Projects that are considered Projects of common interest (PCIs) are able to apply for this funding; to qualify, a project must significantly impact energy markets and integration in at least two countries, boost competitiveness and energy security, and contribute to climate goals with the integration of renewables.<sup>263</sup> PCIs also benefit from expedited permitting, regulatory incentives, and financial support.<sup>264</sup> Some of these projects include clusters of electricity interconnections between Austria and Germany, the development of open-access cross-border transportation of CO<sub>2</sub> in both France and Germany and offshore gas pipeline connections between Italy and Greece.<sup>265</sup>

Germany is involved in several cross-border projects. This includes MosaHYc, a project with France and Luxembourg, which will convert inactive gas pipelines into sustainable hydrogen pipelines connecting the countries.<sup>266</sup> The pipeline will be able to transport 60 MW of pure hydrogen.<sup>267</sup> This also reflects the EU's desire to use and adapt existing infrastructure. The project is a collaboration between Creos Deutschland GmbH and GRTgaz SA, and will connect

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<sup>262</sup>“About the Connecting Europe Facility,” European Climate, Infrastructure and Environment Executive Agency, accessed April 28, 2023, [https://cinea.ec.europa.eu/programmes/connecting-europe-facility/about-connecting-europe-facility\\_en#cef-energy](https://cinea.ec.europa.eu/programmes/connecting-europe-facility/about-connecting-europe-facility_en#cef-energy).

<sup>263</sup>“Key Cross Border Infrastructure Projects,” Energy, accessed April 28, 2023, [https://energy.ec.europa.eu/topics/infrastructure/projects-common-interest/key-cross-border-infrastructure-projects\\_en](https://energy.ec.europa.eu/topics/infrastructure/projects-common-interest/key-cross-border-infrastructure-projects_en).

<sup>264</sup> “Achievements of the European Energy Infrastructure Policy,” accessed April 28, 2023, [https://energy.ec.europa.eu/system/files/2022-12/Infrastructure\\_factsheet\\_COVER.pdf](https://energy.ec.europa.eu/system/files/2022-12/Infrastructure_factsheet_COVER.pdf).

<sup>265</sup> “Lex - 32022R0564 - En - EUR-Lex,” EUR, accessed April 28, 2023, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0564&qid=1663087079030>.

<sup>266</sup> “Mosahyc,” Grande Region Hydrogen, accessed April 28, 2023, <https://grande-region-hydrogen.eu/en/projects/mosahyc/>.

<sup>267</sup> “MosaHYc (Mosel Saar Hydrogen Conversion),” ENTSG, accessed April 28, 2023, <https://www.entsog.eu/mosahyc-mosel-saar-hydrogen-conversion>.

the Saar, Lorraine, and Luxembourg border.<sup>268</sup> The project received approval within the PCI framework and is able to start before final funding is in place.<sup>269</sup> This project serves to highlight the impact that EU policy has had on projects that support the renewable energy transition and investment in the infrastructure necessary to support the transition.

Along with MosaHYc, France is also working on a cross-border project with the United Kingdom. IFA2 is a subsea electrical link between the UK and France.<sup>270</sup> Also considered a PCI, the project was eligible for 5.9 million euros.<sup>271</sup> IFA2 allows the import of lower-carbon electricity from France and is estimated to have prevented 1.2 million tons of CO<sub>2</sub> from entering the atmosphere.<sup>272</sup> This project demonstrates the effectiveness of trans-European projects and the ability to work outside of the EU.

Italy is also involved in several PCIs. One of these is the construction of a Trans-Adriatic Pipeline between Greece and Italy via Albania.<sup>273</sup> Different stages of the project were awarded a total of nearly 14.5 million euros from the CEF.<sup>274</sup> Recognized as a way to ensure the security and diversity of energy supplies in Europe, the pipeline was considered a PCI four times in a row, as projects are reviewed every two years.<sup>275</sup>

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<sup>268</sup> “Hydrogen: Launch of the MOSAHYC Project,” GRTgaz.com, accessed April 28, 2023, <https://www.grtgaz.com/en/medias/press-releases/hydrogen-launch-mosahyc-project>.

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The history of energy policy and climate objectives in each of these countries shows the difficulties of responding to energy crises and the importance of rapidly implementing a successful policy framework. They also demonstrate the difficulties of diversifying an energy mix alone, whether that is due to reliance on imports, lack of natural resources, differing opinions on what constitutes green technology, and the historical implementation of infrastructure. As proven by the trans-European projects that are receiving continued support from the EU and the EIB, however, it is possible to work with neighboring European countries to increase shares of renewable energies and change energy mixes. This can provide a way of looking at European integration that can balance these aspects, with countries working together and with the EU to remain both competitive and energy secure. In this way, the energy crisis and accelerated renewable energy transition may ultimately end up drawing countries closer together instead of dividing them as previous crises in the EU have done.

#### CONCLUSION:

Finding a practical and successful solution to the climate crisis is a global effort and is an issue that must be addressed quickly as climate deadlines approach. While the EU was disrupted by the energy crisis, it is not the first time that such an event has occurred, and the lessons learned in the case of Germany, France, and Italy reflect the importance of a united front when combating climate change and the energy crisis. Each of these countries approached developing energy policies differently after the Second World War, due in part to the political and economic situations in the country during the post-war years. These early decisions had lasting ramifications for how they were able to work through the energy crises in the following years and set up varying challenges for the renewable energy transition.

In the case of Germany, the lack of nuclear investment resulted in the use of imported fuel and domestic coal reserves, with the renewable energy transition representing part of Germany's image as a green leader. In France, early investment in nuclear energy resulted in a significant portion of the energy supply already coming from renewable sources, although later decisions surrounding what constituted green technology would impact the green view of the country. With Italy's lack of domestic resources and lack of commitment to early forms of renewable energy, the country faced significant hurdles when implementing the energy transition. The way these countries intersect with EU energy policy demonstrates further difficulties, as while the EU sets overall goals, difficulties with implementation strategies arise, bringing the energy transition's success into question. However, these countries currently remain committed to maintaining their relationship with the EU, especially as it becomes a practical way for Europe to remain economically competitive in the renewable energy sector, demonstrating a new form of European integration.

Should the EU successfully become carbon neutral, as is their goal with the European Green Deal, they can serve as a blueprint and success story for other countries. For this reason, it is imperative that the energy crisis in Europe not result in a return of increased fossil fuel consumption and instead drive an accelerated energy transition. If the EU further demonstrates cooperation among Member States in the face of crisis, as opposed to fracturing, this transition can also demonstrate the effectiveness of combined action when it comes to fighting global issues. The transition also has the added benefit of improving equity across Europe if member states can support those who are moving away from domestic resources that are not green or do not yet have the infrastructure in place.

As climate goals approach, the success of the energy transition and cooperation in Europe can continue to be monitored. All these countries required a significant ramping up of the speed of their climate policies to reach climate goals, and whether this can practically be achieved remains in question. As the political objectives of countries continue to shift, especially as governments that established initial relationships with the EU leave power, the integrity of the EU can also be monitored. Should the EU successfully implement mechanisms to support climate and renewable energy transitions equitably across Member States, it could prove an effective way of strengthening the ties of the EU. It remains to be seen if the EU will be successful in ensuring that the green transition does not leave smaller Member States behind and that they are equally supported through the process.

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