

THE NUCLEAR OPTION: GREEN ENERGY GOALS IN THE EUROPEAN ENERGY TRANSITION

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ABSTRACT

After Russia’s invasion of Ukraine and increasing pressure from the ongoing climate crisis, Europe stands at a *Zeitenwende*, or turning point, that requires European unity to achieve energy independence and ambitious climate goals. Emphasis on unity during the European energy transition has once again highlighted the stark differences in energy frameworks between France and Germany, especially concerning nuclear energy regulations. Both countries—and the wider European energy market—must recognize that nuclear energy is neither a scourge nor a silver bullet. By implementing both nuclear and other green energy regulations that account for national governing structures, create a tiered system for energy production prioritization, and foster diversified energy markets, nuclear energy laws can be an effective part of a wider European green energy framework.

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INTRODUCTION

In the wake of Russia’s invasion of Ukraine in February 2022, European unity reached an all-time high. With the declaration of a *Zeitenwende*, or the “turning of an era,” German Chancellor Olaf Scholz emphasized the importance of developing European energy policy to achieve energy independence from foreign actors such as Russia—the sort of energy reform for which France has been advocating for years.¹ This reassessment of energy policy also comes at a pivotal moment in the fight against climate change as these countries seek to meet their targets set in the Paris Agreement.²

This newfound emphasis on European unity has shined light once again on the stark difference in approaches to European energy policy. Nowhere are these differences more apparent than in France and Germany. Due to historic concerns around energy independence, France is a world

¹ Michael Hirsh, *The French–German Divide is Back*, FOREIGN POLICY (Apr. 25, 2022, 5:40 PM), <https://foreignpolicy.com/2022/04/25/macron-scholz-france-germany-european-unity-russia-ukraine> [<https://perma.cc/R8EF-V2VA>].

² *The Paris Agreement*, UNITED NATIONS CLIMATE CHANGE CONFERENCE, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement> [<https://perma.cc/WJ2D-YM3U>].

leader in nuclear energy development and implementation.³ Today, France derives 70 percent of its electricity from nuclear energy.⁴ Nuclear energy in Germany, on the other hand, produced roughly 25 percent of the country's electricity at its peak in 2011.⁵ Due to longstanding antinuclear sentiment and public pressure after the Fukushima plant disaster, Germany had been phasing out nuclear energy entirely, with initial plans to shut down its fleet of nuclear reactors by the end of 2022.⁶

Last year, both countries' nuclear energy frameworks were challenged and reevaluated. Facing a "winter of discontent"⁷ and among the highest energy prices in Europe,⁸ Germany's phaseout of nuclear energy in favor of a reliance on Russian natural gas had German policymakers, including Chancellor Scholz, reexamining the importance of European energy independence. In October of 2022, the German Bundestag amended Germany's *Atomgesetz*, or Atomic Energy Act, to extend the phaseout of nuclear energy to April 15, 2023.⁹

Although in a less dire situation than Germany, France's nuclear energy scheme has also been called into question. The French nuclear energy fleet, created to ensure some measure of French energy independence, hit a thirty-year low in its output right as French energy markets were cut off from Russian natural gas imports.¹⁰ In efforts to keep energy prices affordable, the French government clashed with Électricité de France, its sole operator of nuclear plants, leading to plans to fully nationalize the company.¹¹ Within the European Union, France has also received pushback on categorizing nuclear energy as "green" energy. While the fight to list nuclear energy as "green" energy in the EU's

³ *Nuclear Power in France*, WORLD NUCLEAR ASS'N (Oct. 9, 2022), <https://world-nuclear.org/information-library/country-profiles/countries-a-f/france.aspx> [<https://perma.cc/U25K-PREL>].

⁴ *Id.*

⁵ WORLD NUCLEAR ASS'N, *supra* note 3.

⁶ *Id.*

⁷ Rosa Balfour, *European Unity Can Endure the Winter of Discontent*, CARNEGIE EUROPE (Sept. 8, 2022), <https://carnegieeurope.eu/strategieurope/87867> [<https://perma.cc/HRV4-DHS9>].

⁸ WORLD NUCLEAR ASS'N, *supra* note 3.

⁹ *Atomgesetz* [Atomic Energy Act], Dec. 23, 1959, BGBl I at 1565, last amended by Gesetz [G], Dec. 4, 2022, BGBl I at 2153, art. 1 (Ger.) <https://www.gesetze-im-internet.de/atg/BJNR008140959.html> [<https://perma.cc/BNK6-KC7B>].

¹⁰ Sam Meredith, *France's Nuclear Energy Strategy – Once its Pride and Joy – Faces Big Problems This Winter*, CNBC (Oct. 5, 2022, 6:06 AM), <https://www.cnbc.com/2022/10/05/frances-nuclear-heavy-energy-strategy-faces-big-problems-this-winter.html> [<https://perma.cc/C8VU-T57W>].

¹¹ *EDF Nationalisation Ruling Imminent, Sources Say*, REUTERS (Nov. 18, 2022, 10:27 AM), <https://www.reuters.com/business/energy/french-regulator-decide-edf-nationalisation-offer-tuesday-sources-2022-11-18> [<https://perma.cc/LVA7-CTB7>] [hereinafter *EDF Nationalisation*].

“taxonomy” seems to have been won,¹² France still needs to show that nuclear energy will aid in Europe’s decarbonization efforts. To achieve its goal of carbon neutrality by 2050, France is forgoing renewable energy sources in favor of further expanding its nuclear energy industry.¹³ Critics argue this so-called “nuclear renaissance” will cause the country to fall short of its goals.¹⁴

To achieve a European consensus on nuclear energy policy, the fundamental differences and priorities in energy laws must be reconciled between France and Germany. This Comment will explore these differences and argue that both countries must adopt energy laws that, in effect, create a tiered system for different energy sources—disincentivizing fossil fuels, supporting short-term nuclear energy development, and building lasting and flexible renewable energy solutions. Germany had the opportunity to take a positive step in achieving these goals last year by amending § 7 of the Atomic Energy Act to allow for ongoing support of nuclear power. Instead, German lawmakers stayed the course of nuclear phaseout—one that was over twenty years in the making—and in doing so, eliminated an energy tool that could have helped them meet Germany’s environmental and energy independence goals. Unlike their German counterparts, French lawmakers can still seize the opportunity to take positive strides towards a well-rounded nuclear energy regulatory scheme that further promotes the development of renewable energy alternatives by amending France’s Energy Code.

In Part I, this Comment will examine the legal structures, policy goals, and history underpinning the French and German nuclear energy systems. Part II will discuss the strengths and weaknesses of each system, paying particular attention to environmental and energy independence concerns. Part III will discuss the lessons European energy regulators can take from the French and German models. Finally, Part IV will argue that a unified, independent, and “green” European energy policy cannot exist

¹² Mary Love, EU Taxonomy to Include Nuclear Energy, Recognizing Its Role in Global Decarbonization, Nuclear Energy Institute (July 6, 2022), <https://www.nei.org/news/2022/nei-statement-on-nuclear-in-eu-taxonomy> [<https://perma.cc/F7GU-APFU>]. Although the European Union has decided that nuclear energy solutions will be categorized as “green” energy, whether nuclear energy generally is or should be considered a “green” energy in the fight against climate change is beyond the scope of this comment.

¹³ See Paul Hockenos, *Emmanuel Macron Gets Nuclear Energy All Wrong*, FOREIGN POLICY (Mar. 22, 2022, 11:40 AM), <https://foreignpolicy.com/2022/03/22/macron-france-nuclear-energy-climate-renewables> [<https://perma.cc/BS66-5NUA>].

¹⁴ *Id.*

without a nuclear energy implementation that is promoted to supplement, not stifle, Europe's growing green energy sector.

I. BACKGROUND

The German and French nuclear energy regulatory schemes trace back to similar nuclear development schemes after the Second World War. Both countries adopted nuclear liability principles laid out in the Paris Convention of 1960, which established a nuclear liability and compensation regime for victims of nuclear accidents.¹⁵ In the 1970s, however, the two countries' approaches to nuclear energy regulatory frameworks diverged, with the West German government wrestling with a growingly popular antinuclear sentiment while France doubled down on nuclear energy development. Today, the two regulatory schemes are antithetical to one another, with one scheme pushing for continued nuclear energy development and the other having phased out nuclear energy entirely.

A. DECENTRALIZED AND SKEPTICAL: GERMANY'S NUCLEAR ENERGY REGIME

The modern German nuclear energy regime is an extension of West German regulations in the Federal Republic of Germany.¹⁶ West Germany readily adopted nuclear energy in the postwar era by passing the *Atomgesetz*, or Atomic Energy Act, in 1959.¹⁷ Nuclear energy was seen as a significantly cleaner alternative to Germany's primary source of energy at the time—coal.¹⁸ The West German government ordered the construction of dozens of nuclear reactors between 1962 and 1989.¹⁹ After the German reunification in 1990, all reactors in the eastern German

¹⁵ See *Paris Convention on Third Party Liability in the Field of Nuclear Energy (Paris Convention or PC)*, NUCLEAR ENERGY AGENCY, https://www.oecd-nea.org/jcms/pl_20196/paris-convention-on-third-party-liability-in-the-field-of-nuclear-energy-paris-convention-or-pc [<https://perma.cc/3V9U-UHNP>].

¹⁶ *Constitution and Laws*, FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION, NUCLEAR SAFETY AND CONSUMER PROT., <https://www.bmu.de/en/topics/nuclear-safety/overview-nuclear-safety/legal-provisions-and-technical-rules-and-regulations/constitution-and-laws> [<https://perma.cc/88JM-7XMP>] (last updated Dec. 22, 2022).

¹⁷ *Id.*

¹⁸ Frank Jordans, *EXPLAINER: Why Germany is Delaying Its Nuclear Shutdown*, ASSOCIATED PRESS (Oct. 18, 2022, 4:36 AM), <https://apnews.com/article/russia-ukraine-technology-germany-nuclear-power-olaf-scholz-7b22d8d55cea98b76925376a94ffdeff> [<https://perma.cc/4RYJ-M7T5>].

¹⁹ *Id.*

Democratic Republic were dismantled due to safety concerns.²⁰ From this point forward, German nuclear energy policy would turn on whether nuclear energy should continue indefinitely or be phased out over time.

The unique paradigm in which German nuclear regulation and policy found itself was largely due to the longstanding unpopularity of nuclear power, particularly in the former West Germany. The German antinuclear movement is credited with beginning in the 1970s and culminated in the cancellation of nuclear reactor construction in the southwestern town of Wyhl.²¹ Concerned with the adverse effects the Wyhl reactor would have on the environment and local population in this wine-growing region along the Upper Rhine, a unique coalition of conservative farmers and young environmental activists occupied the future site of the reactor to prevent construction from continuing.²² The perceived heavy-handedness with which local officials attempted to push through construction efforts, coupled with images of police brutality as protestors were forcefully removed from the site, helped build considerable support for the German antinuclear movement.²³ Construction of the Wyhl reactor was eventually discontinued, and in 1995, a nature preserve was established on the site.²⁴

German antinuclear sentiment continued to grow into the 1980s, thanks to events such as the Three Mile Island disaster in the United States in 1979.²⁵ Plans to build a nuclear power reprocessing facility in Wackersdorf in southern Germany were met with significant resistance by

²⁰ Umair Irfan, *How East Germany Cleaned Up Dirty Power*, SCI. AM. (Nov. 3, 2014), <https://www.scientificamerican.com/article/how-east-germany-cleaned-up-dirty-power> [<https://perma.cc/V437-6ACH>].

²¹ Stephen Milder, *The New Watch on the Rhine: Anti-Nuclear Protest in Baden and Alsace*, ENV'T & SOC'Y PORTAL: ARCADIA (2013), no. 6, <https://doi.org/10.5282/rcc/5257> [<https://perma.cc/ZBD3-BL9L>].

²² *Id.*

²³ Nathalie Schils, *Mass Occupation of Proposed Wyhl Nuclear Power Plant Site in Germany, 1974-1977*, GLOB. NONVIOLENT ACTION DATABASE, <https://nvdatabase.swarthmore.edu/content/mass-occupation-proposed-wyhl-nuclear-power-plant-site-germany-1974-1977> [<https://perma.cc/362Q-P6DQ>] (last updated Aug. 20, 2011); Stephen Milder, "Wyhl and Then What. . .?" * *Between Grassroots Activism and Mass Protest, in GREENING DEMOCRACY: THE ANTI-NUCLEAR MOVEMENT AND POLITICAL ENVIRONMENTALISM IN WEST GERMANY AND BEYOND, 1968-1983*, 129, 132 (Cambridge Univ. Press 2017); see also Jan-Henrik Meyer, "Where do we go from Wyhl?" *Transnational Anti-Nuclear Protest Targeting European and International Organizations in the 1970s*, 39 HIST. SOC. RSCH., no. 1, 2014, at 212.

²⁴ *Atomic Dermanty*, DEUTSCHE WELLE (Sept. 10, 2009), <https://www.dw.com/en/nuclear-power-in-germany-a-chronology/a-2306337> [<https://perma.cc/AN6C-AP93>].

²⁵ *Id.*

antinuclear activists.²⁶ In 1981, local antinuclear advocates' resistance to the construction of a nuclear reactor in Brokdorf on the North Sea coast culminated in the largest German antinuclear protest to date, with one hundred thousand protestors facing off with ten thousand police officers.²⁷ Despite the size of the demonstrations, the Brokdorf plant finished construction and began its operations in 1986.²⁸

That same year, the Chernobyl catastrophe shook the world's faith in the safety of nuclear energy. The German people were particularly affected by the disaster's fallout, both literally and figuratively. As the winds shifted westward, a giant fallout cloud swept over the country, causing poisoned rain to fall on the southern state of Bavaria.²⁹ West German officials were quick to issue adverse health warnings, asking the people to refrain from letting their children play outside and from consuming salads, forest mushrooms, and fresh milk.³⁰ The environment ministry was founded as a result of this disaster.³¹ Consequently, a larger portion of the wider German public no longer considered nuclear energy to be safe.³² The newly-established Green Party staged protests and rallies against nuclear energy.³³

After German reunification in 1990, all nuclear reactors in the former East Germany were shut down due to safety concerns.³⁴ Under Chancellor Gerhard Schröder's Social Democrat–Green coalition, discussion began concerning the future of the German energy market and a need for an *Energiewende*, or energy transition, from nuclear to renewable energy.³⁵ In 2000, the Bundestag passed the Renewable Energy Act, creating a market incentive and subsidy scheme to encourage development of renewable energy sources.³⁶ Two year later, the Bundestag amended the Atomic Energy Act with a new purpose—to phase out

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.*

²⁹ Kateri Jochum, *East, West Germany Dealt Differently With Chernobyl*, DEUTSCHE WELLE (Apr. 26, 2006), <https://www.dw.com/en/east-west-germany-dealt-differently-with-chernobyl/a-1981654> [<https://perma.cc/QQD4-WQC2>].

³⁰ *Id.*

³¹ *Atomic Dermany*, *supra* note 24.

³² Jochum, *supra* note 29.

³³ *Id.*

³⁴ Irfan, *supra* note 20.

³⁵ See Adam Arnold, Feature, *The Quest for Sustainable Energy: Germany's Nuclear Scrutiny vs. "All of the Above"*, 15 SUSTAINABLE DEV. L. & POL'Y 26, 26 (2015).

³⁶ See *Glossary Beginning with E*, CLEAN ENERGY WIRE, https://www.cleanenergywire.org/glossary/letter_e#eeg [<https://perma.cc/Q9PR-DCCC>].

nuclear power in Germany entirely within the next twenty years³⁷—and added § 7, listing the country’s nuclear reactors and the date by which they had to be shut down.³⁸ Germany began shutting down nuclear plants in 2003.³⁹ The Schröder administration set the groundwork to supplement the loss of nuclear energy by importing fossil fuels from newly opened markets such as the Russian Federation with the construction of the first Nord Stream pipeline.⁴⁰

After the Christian Democrat–led coalition came to power in 2005 under Chancellor Angela Merkel, it looked as though Germany would soften its hard antinuclear stance. The Merkel administration expressed doubts that Germany could simultaneously meet its emissions targets and phase out nuclear energy entirely.⁴¹ As the country prepared to rely more on neighbors such as Russia, Germany faced mounting international pressure from the United States and European Union to reduce its reliance on Russian energy instead of increasing it.⁴² In 2010, Merkel briefly vowed to extend the operation of Germany’s nuclear power plants to 2036.⁴³

One year later, the world was shocked with another nuclear disaster—this time, at the Fukushima plant in Japan.⁴⁴ The antinuclear movement in Germany once again mobilized, calling for a rapid end to nuclear power in Germany.⁴⁵ Following Fukushima, Germany’s Reactor Safety Commission released a report outlining similar concerns in German

³⁷ *Atomic Dermamy*, *supra* note 24.

³⁸ Atomgesetz [Atomic Energy Act], Dec. 23, 1959, BGBl I at 1565, last amended by Gesetz [G], Dec. 4, 2022, BGBl I at 2153, art. 1 (Ger.) <https://www.gesetze-im-internet.de/atg/BJNR008140959.html> [<https://perma.cc/BNK6-KC7B>].

³⁹ *Atomic Dermamy*, *supra* note 24.

⁴⁰ Louis Anslow, *Fossil fools: How Germany’s Fear of Nuclear Power Put Putin in Charge of Europe*, BIG THINK (Mar. 22, 2022), <https://bigthink.com/pessimists-archive/germany-nuclear-power-russia-putin/#:~:text=The%20U.S.%20and%20the%20EU,nuclear%20power%20plants%20to%202036> [<https://perma.cc/B6U8-KGVT>].

⁴¹ *More Time*, DEUTSCHE WELLE (Sept. 28, 2010), <https://www.dw.com/en/merkels-cabinet-gives-thumbs-up-to-extension-for-nuclear-reactors/a-6052751> [<https://perma.cc/PX6G-2WK6>].

⁴² Anslow, *supra* note 40.

⁴³ *Id.*

⁴⁴ *Fukushima Daiichi Accident*, WORLD NUCLEAR ASS’N, <https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-daiichi-accident.aspx> [<https://perma.cc/TKX6-M7P5>].

⁴⁵ *No Delay*, DEUTSCHE WELLE (May 28, 2011), <https://www.dw.com/en/massive-nationwide-protests-call-for-an-immediate-end-to-nuclear-energy/a-15114349> [<https://perma.cc/5XBC-QMJA>].

nuclear plants if they were faced with extreme disaster.⁴⁶ Although all of the nuclear plants possessed “basic robustness” and did not require urgent shutdowns, the Reactor Safety Commission also highlighted the risks these plants posed if they were targeted by terrorist attacks.⁴⁷ Shortly thereafter, the German Ethics Commission announced its final report for Germany’s energy future, calling for nuclear power to be phased out in the next decade.⁴⁸

The Merkel administration rapidly backpedaled from their previous attempts to extend the lifetime of nuclear power in favor of embracing the *Energiewende*.⁴⁹ In the meantime, the Merkel administration continued the German policy of importing fossil fuels, particularly natural gas, from Russia, going as far as beginning construction of a second pipeline, Nord Stream 2, despite protests by the United States, European Union, and Eastern European countries.⁵⁰

Though internationally unpopular, Germany’s energy policy seemed sound until the invasion of Ukraine in February of 2022. Just as Germany was planning on shutting down its last three nuclear reactors, the country found itself at odds with its largest energy supplier when Russia began halting natural gas flows into the country.⁵¹ With energy prices skyrocketing and a “winter of discontent” ahead,⁵² the new administration under Chancellor Olaf Scholz began significant energy market reforms. The Renewable Energy Act was amended to rapidly increase the speed of renewable energy development, with a new goal for renewable energy to make up at least 80 percent of German energy consumption by 2030.⁵³ Additionally, the governing coalition—comprised of the same Social Democrats and Greens who initially pushed to phase out nuclear power—

⁴⁶ *Atomic Stress*, DEUTSCHE WELLE (May 17, 2011), <https://www.dw.com/en/germanys-nuclear-reactors-fall-short-in-disaster-scenario-tests/a-15083772> [<https://perma.cc/KZ4J-43W2>].

⁴⁷ *Id.*

⁴⁸ *No Delay*, *supra* note 45.

⁴⁹ *Id.*

⁵⁰ Matthew Karnitschnig, *Why Merkel Chose Russia Over US on Nord Stream 2*, POLITICO (July 26, 2021, 10:06 PM), <https://www.politico.eu/article/vladimir-putin-german-chancellors-nord-stream-russia-energy-angela-merkel> [<https://perma.cc/SQ37-QALN>].

⁵¹ Stanley Reed, *Russia Halts Natural Gas Flows to Germany Again*, N.Y. TIMES (Aug. 30, 2022), <https://www.nytimes.com/2022/08/31/business/russia-natural-gas-germany.html> [<https://perma.cc/3K3Z-KDHS>].

⁵² Balfour, *supra* note 7.

⁵³ Kerstine Appunn & Julian Wettengel, *Germany’s 2022 Renewables and Efficiency Reforms*, CLEAN ENERGY WIRE (Dec. 7, 2022, 12:08 PM), <https://www.cleanenergywire.org/factsheets/germanys-2022-renewables-and-energy-reforms> [<https://perma.cc/CYA7-CYME>].

amended § 7 of the Atomic Energy Act to extend the phaseout to late 2022, ensuring that the remaining nuclear reactors would remain online during the cold winter months.⁵⁴ Although some policymakers had pushed for further extensions on the lifetimes of the remaining nuclear plants,⁵⁵ Germany's three remaining nuclear reactors were shut down on April 15, 2023.⁵⁶

B. GERMANY TODAY: A NUCLEAR ENERGY FRAMEWORK WITHOUT NUCLEAR REACTORS

Since 1959, the Atomic Energy Act has governed German nuclear energy, and localized, private energy providers have operated nuclear reactors. The Atomic Energy Act defines the operations of Germany's nuclear energy system, from safety and logistical regulations to legal liability mostly in conformance with the 1960 Paris Convention. Although the act does call for the creation of a ministry to handle nuclear affairs, many tasks are delegated to other agencies. Due to Germany's governing structure as a federal republic, all other regulations are reserved to the Länder, Germany's states. Notably, in § 1 and § 7, the Atomic Energy Act clarifies that one of its purposes is to phase out the use of nuclear energy in Germany, setting strict statutory deadlines by which certain nuclear reactors must be shut down. The phaseout provision of § 7 was amended only once as part of the Atomic Energy Act's nineteenth amendment in 2022, requiring the final nuclear reactors to be shut down by April 15, 2023. As required by the Atomic Energy Act, all nuclear reactors in Germany were brought offline in accordance with § 7.⁵⁷

Supplementing the nuclear phaseout provisions in the Atomic Energy Act is the Renewable Energy Act, or EEG. The EEG promotes the development of renewable energy systems in the German market through

⁵⁴ Kate Brady, *Nuclear Power: German Greens Put Pragmatism First*, DEUTSCHE WELLE (Oct. 23, 2022), <https://www.dw.com/en/nuclear-power-german-greens-put-pragmatism-before-core-values/a-63521581> [<https://perma.cc/C3PA-GVEF>].

⁵⁵ *Germany's Lindner Repitches Nuclear to Ease Gas Crisis*, DEUTSCHE WELLE (July 31, 2022), <https://www.dw.com/en/germanys-lindner-repitches-nuclear-to-ease-gas-crisis/a-62662580> [<https://perma.cc/Y4VZ-SP9H>] [hereinafter *Lindner*].

⁵⁶ *The Nuclear Phase-out in Germany*, FED. OFF. FOR THE SAFETY OF NUCLEAR WASTE MGMT., https://www.base.bund.de/EN/ns/nuclear-phase-out/nuclear-phase-out_node.html [<https://perma.cc/Z89N-VA6P>]; see also Riham Alkousaa, *Atomic angst over? Germany Closes Last Nuclear Plants*, REUTERS (Apr. 15, 2023, 8:09 AM), <https://www.reuters.com/world/europe/atomic-angst-over-germany-closes-last-nuclear-plants-2023-04-14> [<https://perma.cc/8TP9-AE3X>].

⁵⁷ Alkousaa, *supra* note 56.

a system of feed-in-tariffs (FITs) that guarantee renewable energy producers above-market fixed prices for their energy over a period of twenty years.⁵⁸ Additionally, the EEG gives renewable energy producers priority in the energy grid and creates a framework for decentralized residential power generation, such as solar arrays on local buildings.⁵⁹ In order to make energy prices more affordable, the “EEG surcharge” that consumers paid to fund these market incentives was abolished last year.⁶⁰

C. THE FRENCH MODEL: CENTRALIZED NUCLEAR ENERGY DEVELOPMENT

From its inception, the French nuclear energy regime has been justified as a means for France to retain some degree of energy independence. After the Second World War, French policymakers recognized that France could make up for its lack of traditional fossil fuels by developing means of energy production from French uranium mines. As a result of its unitary government structure, development of the French nuclear energy program was highly centralized, beginning in 1945 with the creation of the Atomic Energy Commission (CEA).⁶¹ The CEA partnered with *Électricité de France* (EDF), a newly created state-owned corporation that had resulted from a mass nationalization of over one thousand individual energy generation, transmission, and distribution companies.⁶² In a joint project, the CEA and EDF completed the first French prototype nuclear reactor in 1955.⁶³ By 1963, the first commercial nuclear reactor was complete.⁶⁴ Through the late 1960s, French authorities continued to increase the size of the country’s nuclear reactor fleet.⁶⁵

⁵⁸ CLEAN ENERGY WIRE, *supra* note 36.

⁵⁹ *See id.*

⁶⁰ *The German Renewable Energy Sources Act 2023 (EEG 2023) Has Been Passed - A New Framework for Renewable Energy!*, CMS LAW-NOW (Aug. 23, 2022), <https://www.cms-lawnow.com/ealerts/2022/08/the-german-renewable-energy-sources-act-2023-eeg-2023> [<https://perma.cc/F3T6-EE9Q>] [hereinafter *EEG 2023 Framework*].

⁶¹ *Brief History of Nuclear Energy in France*, INT’L INST. OF NUCLEAR ENERGY, <https://www.i2en.fr/en/brief-history-of-french-nuclear-energy> [<https://perma.cc/5GQ9-LEDA>].

⁶² *The EDF Adventure: A Global Electricity Company in the Spotlight*, EDF, <https://www.edf.fr/en/the-edf-group/edf-at-a-glance/history> [<https://perma.cc/7AQ8-RRWJ>].

⁶³ INT’L INST. OF NUCLEAR ENERGY, *supra* note 61.

⁶⁴ *Id.*

⁶⁵ Philippe Roos, *Energy Crisis Has Much to Learn From 1973*, ENERGY INTEL. (Mar. 16, 2022), <https://www.energyintel.com/0000017f-8eb0-db3b-a9ff-ae8b0dc0000> [<https://perma.cc/974S-HEPX>].

These plans were vindicated in 1973 when an oil embargo by OPEC, the Organization of the Petroleum Exporting Countries, affected energy production in much of the western world.⁶⁶ The French government determined that energy independence was paramount and pushed to aggressively expand the country's nuclear power capabilities.⁶⁷ In the 1980s, France saw its nuclear energy production's most significant growth; at one point, the country was constructing eight separate reactors simultaneously.⁶⁸ This energy strategy relied on the idea of a "series effect" by which nuclear reactor maintenance costs could be optimized by constructing many similar reactors around the same time as one another.⁶⁹

Not even the 1986 Chernobyl disaster could halt the French government's enthusiasm for nuclear power. At the time, France's forty-six reactors generated roughly 65 percent of the country's electricity.⁷⁰ Unlike their German counterparts, French officials could safely assure their constituents that Chernobyl was far away and did not pose a health risk to the French people.⁷¹ Although this catastrophe gave rise to protests against nuclear power—especially in the regions bordering West Germany—popular backlash to the Chernobyl disaster focused far more on the French government's information policy towards nuclear energy, and whether French nuclear officials had engaged in a cover-up to quell public concerns about nuclear safety.⁷²

The French nuclear energy system underwent some major changes around the turn of the twenty-first century. After all its mines closed in 2001, France began importing all of its uranium and other nuclear material⁷³ under strict guidelines set out in its Defense Code.⁷⁴ As part of an early EU directive, EDF's energy monopoly ended in 1999.⁷⁵ It became

⁶⁶ *OPEC Enacts Oil Embargo*, HISTORY (Feb. 9, 2010), <https://www.history.com/this-day-in-history/opec-enacts-oil-embargo> [<https://perma.cc/3DJH-R3XF>] (last updated Oct. 15, 2020).

⁶⁷ INT'L INST. OF NUCLEAR ENERGY, *supra* note 61.

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ Judith Miller, *Trying to Quell a Furor, France Forms a Panel on Chernobyl*, N.Y. TIMES, May 14, 1986, at A10.

⁷¹ *See id.*

⁷² *Id.*

⁷³ Alison Hird, *Does France's Emphasis on Nuclear Power Guarantee Its Energy Independence?*, RADIO FR. INTERNATIONALE (Feb. 23, 2022, 12:14 PM), <https://www.rfi.fr/en/france/20220223-does-nuclear-power-guarantee-france-s-energy-independence-uranium-imported-niger-macron-russia> [<https://perma.cc/5NCJ-H85C>].

⁷⁴ Code de la défense [C. déf.] [Defense Code] arts. L1131–1–L1336–1 (Fr.).

⁷⁵ RONALD TIERSKY, EUROPE TODAY: NATIONAL POLITICS, EUROPEAN INTEGRATION, AND EUROPEAN SECURITY 280 (Ronald Tiersky ed., 2d ed. 2004).

a private, limited-liability corporation in 2004, but the French State retained nearly 85 percent ownership.⁷⁶ Public calls for more information and transparency in the nuclear energy industry culminated in the passing of new laws in 2006.⁷⁷ The Act of 13 June 2006 on Transparency and Security in the Nuclear Field, known as the “TSN Act” or “TSN Law,” sought to address popular concerns by redefining France’s nuclear regulatory scheme.⁷⁸ Most importantly, the TSN Act established the Nuclear Safety Authority (ASN), an independent agency tasked with regulating nuclear safety and radiation protection as well as informing the French citizenry.⁷⁹ The ASN’s core duties consist of drafting regulations, inspecting nuclear plants, and informing the public of its activities concerning nuclear security and environmental protection in France.⁸⁰

After the nuclear disaster at the Fukushima plant in 2011, France’s president, Nicolas Sarkozy, stood firmly behind nuclear power.⁸¹ The Sarkozy administration stressed the sophistication of France’s nuclear program and the vital impact it had on the economy, with thousands of jobs tied to the nuclear energy sector.⁸² After the 2012 presidential election, however, incoming President Francois Hollande introduced a nuclear-skeptic view, vowing to shut down several nuclear reactors in France and seriously limit France’s dependence on nuclear power.⁸³ The Hollande administration planned to align France with the German model, supplementing the loss of nuclear energy with a growing renewables sector.⁸⁴

In early 2022, the French administration under President Emmanuel Macron starkly pivoted from Hollande’s apprehension about

⁷⁶ *EDF Nationalisation*, *supra* note 11.

⁷⁷ See INT’L INST. OF NUCLEAR ENERGY, *supra* note 61.

⁷⁸ See Loi 2006–686 du 13 juin 2006 relative à la transparence et à la sécurité en matière nucléaire [Law 2006–686 of June 13, 2006 on Transparency and Security in the Nuclear Field], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], June 14, 2006, No. 2006–686.

⁷⁹ *ASN Overview*, NUCLEAR SAFETY AUTH., <https://www.french-nuclear-safety.fr/about-asn/asn-overview> [<https://perma.cc/3GJY-DH3R>].

⁸⁰ *Id.*

⁸¹ *France: A Study of French Nuclear Policy After Fukushima*, COLUMBIA CTR. FOR NUCLEAR STUD. (July 17, 2012), <https://k1project.columbia.edu/news/french-nuclear-policy-after-fukushima> [<https://perma.cc/C4SY-36TS>].

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *Id.*

nuclear power.⁸⁵ In announcing the plans for six new nuclear reactors, President Macron called for a rebirth of France's nuclear industry.⁸⁶ The current administration also seeks to extend the lifespan of many of France's oldest nuclear reactors where it is safe to help meet France's carbon-neutrality goals by 2050.⁸⁷

The Macron administration's vision for a nuclear renaissance is uncertain.⁸⁸ The current political climate after the June 2022 elections may make it difficult for the construction plans of the new nuclear reactors to materialize.⁸⁹ It is also unclear whether France's nuclear reactor fleet will be capable of providing enough electricity for the French and broader European energy market as Russia is holding back its fossil fuel exports due to the war in Ukraine.⁹⁰ Last year, the French nuclear energy sector hit a thirty-year low in energy output due to scheduled reactor upgrades, safety concerns, unfavorable weather, delays in reactor construction, and a backlog of necessary maintenance procedures that had been postponed due to the COVID-19 pandemic.⁹¹ These complications have raised the question of whether the French nuclear energy sector can guarantee energy independence for the entire nation. To insulate consumers from the resulting rise in energy prices, French authorities invoked price control measures from the Energy Code⁹² to shift costs onto EDF, causing the

⁸⁵ Richard Lough & Benjamin Mallet, *Macron Bets on Nuclear in Carbon-Neutrality Push, Announces New Reactors*, REUTERS (Feb. 10, 2022, 4:49 PM), <https://www.reuters.com/business/energy/macron-bets-nuclear-carbon-neutrality-push-announces-new-reactors-2022-02-10> [https://perma.cc/5FKE-KGWJ].

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ See Benjamin Plackett, *Why France's Nuclear Industry Faces Uncertainty*, NATURE (Sept. 5, 2022), <https://www.nature.com/articles/d41586-022-02817-2> [https://perma.cc/58EB-UBXD].

⁸⁹ *Id.*

⁹⁰ Matthew Dalton, *France's Nuclear Reactors Malfunction as Energy Crisis Bites*, WALL ST. J. (Oct. 23, 2022, 3:26 PM), <https://www.wsj.com/articles/frances-nuclear-reactors-malfunction-as-energy-crisis-bites-11666517581> [https://perma.cc/MHY2-R39L]; see also *France Steps Up Reassurances That It Can Avoid Power Cuts as Cold Weather Bites*, REUTERS (Dec. 14, 2022, 11:59 AM), <https://www.reuters.com/business/energy/france-steps-up-reassurances-that-it-can-avoid-power-cuts-cold-weather-bites-2022-12-14> [https://perma.cc/9NAD-PW5Z]; Reed, *supra* note 51.

⁹¹ Romain Zissler, *France's Nuclear Power: Current Difficulties, New Policies, and 100% Renationalization*, RENEWABLE ENERGY INST. (Aug. 23, 2022), <https://www.renewable-ei.org/en/activities/column/REupdate/20220823.php> [https://perma.cc/7E6Z-B7NV]; Meredith, *supra* note 10.

⁹² Code de l'énergie [C. Énergie] [Energy Code] art. L337–1.

company to lose an estimated €8 billion by the middle of 2022.⁹³ Since then, France has begun renationalizing EDF to secure its energy market.⁹⁴

D. THE FRENCH NUCLEAR ENERGY REGIME TODAY

France's current nuclear energy regime has deviated little from its initial, centralized design. The ASN, through the TSN Law, serves as a central regulatory body through which the French nuclear fleet is regulated and inspected for safety.⁹⁵ Nuclear energy is primarily regulated in the Energy Code,⁹⁶ but as of 2022, reduced risk nuclear plants can limit liability pursuant to the Environmental Code.⁹⁷

Nuclear energy is also regulated as a part of the larger French energy market pursuant to the Energy Code. The Energy Code authorizes French authorities to use price controls and “energy shield tariffs” to ensure affordable energy prices, and these measures were strengthened in response to the ongoing energy crisis.⁹⁸ Much like Germany's EEG, the French Energy Code also contains FITs and other market mechanisms to incentivize renewable energy development, but no additional financial or regulatory incentives.⁹⁹

⁹³ *EDF Sues French Government Over Electricity Sales*, WORLD NUCLEAR NEWS (Aug. 10, 2022), <https://www.world-nuclear-news.org/Articles/EDF-sues-French-government-over-electricity-sales> [<https://perma.cc/F4SX-2VTL>].

⁹⁴ *EDF Nationalisation*, *supra* note 11.

⁹⁵ *See* Loi 2006–686 du 13 juin 2006 relative à la transparence et à la sécurité en matière nucléaire [Law 2006–686 of June 13, 2006 on Transparency and Security in the Nuclear Field], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], June 14, 2006, No. 2006–686.

⁹⁶ Code de l'énergie [C. Énergie] [Energy Code] art. L314–1–L314–2 (Fr.).

⁹⁷ *See* Code de l'environnement [C. Env't] [Environmental Code] art. L597–4 (Fr.); *see also* Décret n° 2022–1186 du 25 août 2022 portant application de l'article L. 597–4 du code de l'environnement relatif à la responsabilité civile dans le domaine de l'énergie nucléaire et codifiant les dispositions applicables aux sites ne comportant que des installations présentant un risque réduit [Decree No. 2022–1186 of August 25, 2022 implementing Article L. 597–4 of the Environment Code relating to civil liability in the field of nuclear energy and codifying the provisions applicable to sites comprising only facilities with reduced risk], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], Aug. 27, 2022, No. 0198.

⁹⁸ Code de l'énergie [C. Énergie] [Energy Code] art. L337–1–L337–16 (Fr.); *see also* Loi 2022–1158 du 16 août 2022 portant mesures d'urgence pour la protection du pouvoir d'achat [Law 2022–1158 of August 16, 2022 on emergency measures for the protection of purchasing power], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], Aug. 17, 2022, No. 0189.

⁹⁹ Véronique Fröding & Stéphane Gasne, *Renewable Energy Laws and Regulations France 2023*, ICLG (Sept. 9, 2023), <https://iclg.com/practice-areas/renewable-energy-laws-and-regulations/France> [<https://perma.cc/6SVH-XW9G>]; CLEAN ENERGY WIRE, *supra* note 36.

II. ANALYSIS OF GERMAN & FRENCH POLICY GOALS

Two driving rationales behind both French and German nuclear energy schemes are concerns for energy independence and the environment. Both countries' legal frameworks are tailored to meet these priorities, but neither quite hits the mark on their stated goals. Germany's phaseout of nuclear energy sought to support future environmental and energy independence goals but consequently has increased the country's reliance on fossil fuels and energy imports. The Macron administration's long-term commitment to furthering nuclear energy development makes these same mistakes when addressing France's carbon emission targets, which must be addressed today. French regulators' steadfast commitment to nuclear energy may ultimately undermine the energy independence goals they seek to achieve. Unfortunately, Germany's complete phaseout of nuclear energy has eliminated a potentially useful energy source in achieving its short-term environmental goals, focusing now exclusively on renewable energies. France, on the other hand, can still robustly achieve its goals by adding more compelling incentives to its Energy Code to promote the development of nuclear energy alternatives.

Although criticized in recent years,¹⁰⁰ the energy independence rationale is still a driving force behind nuclear energy laws in both France and Germany. Popular understanding of energy independence has changed as energy markets have globalized.¹⁰¹ Where originally the term may have meant that a country relied solely on domestic supply chains and energy production to meet its needs, this is hardly the case today.¹⁰² Using the original definition, nuclear energy would be unable to provide energy independence to either France or Germany because uranium is imported from other countries.¹⁰³ In modern contexts, energy independence may be measured by looking at the net amount of energy resources imported and exported.¹⁰⁴ It may also be understood more broadly as energy security, where a state is able to guarantee enough energy to power its economy at

¹⁰⁰ E.g., Daniel Raimi, "Can We Please Stop Talking about Energy Independence?", RESOURCES (Mar. 16, 2022), <https://www.resources.org/common-resources/can-we-please-stop-talking-about-energy-independence> [<https://perma.cc/J4S7-FXCG>].

¹⁰¹ *Id.*

¹⁰² Hird, *supra* note 73; see WORLD NUCLEAR ASS'N, *supra* note 3.

¹⁰³ *Id.*

¹⁰⁴ Reuters Fact Check, *Fact Check—Which Factors Determine U.S. 'Energy Independence'?*, REUTERS (Mar. 23, 2022, 5:30 PM), <https://www.reuters.com/article/factcheck-energyindependence-explainer/fact-check-which-factors-determine-u-s-energy-independence-idUSL2N2VQ2ZV> [<https://perma.cc/GW5J-G8WD>].

an affordable price for consumers.¹⁰⁵ The latter definition of energy independence is based on an understanding that a country can never be independent of the global energy market but may be able to insulate itself from hostile actions by potential adversaries.¹⁰⁶

Environmental concerns are also a driving force behind nuclear energy development, both in law and policy. From its inception, nuclear energy was viewed as a cleaner alternative to traditional energy sources such as coal and oil.¹⁰⁷ Both France and Germany are signatories of the 2015 Paris Agreement, with the two countries pledging to drastically reduce their carbon emissions and to go carbon neutral by 2050.¹⁰⁸ Nuclear energy has been recognized as a part of decarbonization efforts in the European Union since its categorization as an environmentally sustainable economic activity in the EU taxonomy last year.¹⁰⁹

A. ENERGY POLICY GOALS: GERMANY

The interaction between Germany's governmental and economic structure and the Atomic and Renewable Energy acts defines Germany's nuclear energy system. It goes without saying that Germany's nuclear energy laws are eliminating the German nuclear energy industry with the Atomic Energy Act's phaseout provisions. However, even if the nuclear energy phaseout had been extended past April 15, 2023, Germany's federal structure and private energy market would not have been conducive of nuclear energy development, being much more sensitive to bottom-up pressure such as public opinion and local authorities' approval

¹⁰⁵ *Energy Security*, INT'L ENERGY AGENCY, <https://www.iea.org/topics/energy-security> [<https://perma.cc/GMC2-BMM3>].

¹⁰⁶ Raimi, *supra* note 100.

¹⁰⁷ Rob Schmitz, *Amid an Energy Crisis, Germany Turns to the World's Dirtiest Fossil Fuel*, NPR (Sept. 27, 2022, 8:48 AM), <https://www.npr.org/2022/09/27/1124448463/germany-coal-energy-crisis> [<https://perma.cc/R794-BBT3>]; WORLD NUCLEAR ASS'N, *supra* note 3.

¹⁰⁸ UNITED NATIONS CLIMATE CHANGE CONFERENCE, UPDATE TO THE LONG-TERM STRATEGY FOR CLIMATE ACTION OF THE FEDERAL REPUBLIC OF GERMANY 4 (2022), https://unfccc.int/sites/default/files/resource/Anlage%20_Update%20to%20the%20long-term%20strategy%20for%20climate%20action%20of%20the%20Federal%20Republic%20of%20Germany_02Nov2022_0.pdf [<https://perma.cc/FM7K-H9PX>]; UNITED NATIONS CLIMATE CHANGE CONFERENCE, FOUR-PAGE OVERVIEW OF REVISED NATIONAL LOW CARBON STRATEGY OF FRANCE (Feb. 8, 2021), https://unfccc.int/sites/default/files/resource/en_SNBC-2_summary_4-pages.pdf [<https://perma.cc/4ANJ-W3ER>].

¹⁰⁹ *EU Taxonomy for Sustainable Activities*, EUR. COMM'N, https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en [<https://perma.cc/UQ2S-C5B9>] [hereinafter *EU Taxonomy*]; see also Love, *supra* note 12.

of nuclear plant sites.¹¹⁰ This pressure pushed German lawmakers to codify a phaseout of nuclear energy and approve energy projects that placed German energy independence at significant risk and undermined Germany's emissions goals. However, the nature of the German energy market and incentives for renewables defined in the EEG may have helped put Germany back on track, having proven wildly successful in developing renewable energy alternatives in the past. Unfortunately, consumers historically bore the brunt of the cost of renewable energy development through the EEG surcharge. Rapid renewable energy development will also help Germany reach its ambitious 2030 emissions goals and make it a leader in the global decarbonization effort.

Beyond the Atomic Energy Act's § 7 phaseout provision, Germany's federalist principles and a competitive energy market are not conducive to the development of the German nuclear energy system. As a federal republic, some legislative and regulatory authority lies with the German Länder. Local authorities must approve of and regulate nuclear plant sites,¹¹¹ and are much less insulated from public opinion against the national development of nuclear power or simply against the zoning of sites in their communities. These conditions make it difficult for federal authorities to develop a centralized plan for nuclear development and to make guarantees to stakeholders in nuclear projects. For many stakeholders, the establishment of a nuclear plant site is a long and expensive undertaking with more profitable alternatives.

The culmination of German antinuclear sentiment can be found within the Atomic Energy Act itself. The first purpose listed in § 1 of the Atomic Energy Act is "to phase out the use of nuclear energy for the commercial generation of electricity in controlled manner, and to ensure orderly operation up until the date of termination."¹¹² The dates of termination are described in § 7(1a) and required the final three reactors to be shut down on or before April 15, 2023.¹¹³ Historically, these provisions led to an increase in German use of Russian fossil fuels, undermining both environmental and energy independence policy goals. Unless further amended, the Atomic Energy Act's phaseout provisions may still be undermining Germany's environmental goals, at least in the

¹¹⁰ Atomgesetz [Atomic Energy Act], Dec. 23, 1959, BGBl I at 1565, last amended by Gesetz [G], Dec. 4, 2022, BGBl I at 2153, art. 1 (Ger.), <https://www.gesetze-im-internet.de/atg/BJNR008140959.html> [<https://perma.cc/BNK6-KC7B>].

¹¹¹ *Id.* § 7(4).

¹¹² *Id.* § 1(1).

¹¹³ *Id.* § 7(1a), (1e).

short term. Even with the lifetime extension of its final reactors, German authorities were forced to reopen coal and oil-powered plants to ensure an adequate level of energy was available over the 2022–2023 winter.¹¹⁴ Now, with all the country's nuclear reactors offline, German energy markets must continue to rely on imported fossil fuel sources in the short term to help supplant the loss of nuclear energy.¹¹⁵ While it is likely that Germany's booming renewable energy sector will likely be able to supplement the lack of energy from Germany's nuclear plants in the long term, the shift back to fossil fuels in the next few years will hurt Germany's environmental goals, where it is currently on track to meet its emissions reduction goal under the Paris Agreement of 65 percent by 2030.¹¹⁶

Another weakness of the Atomic Energy Act is the statutory nature of the § 7 phaseout provision. Generally, codifying phaseout dates creates legal rigidity in a fluctuating energy market and may lead to delays or deadlock in times of crisis. Although both lawmakers and the German public had serious doubts about the timing of the nuclear phaseout leading into April 2023,¹¹⁷ these doubts arose too late for any meaningful action, amendment, or change in the Atomic Energy Act through the legislative process.

Germany's answer to the phaseout of nuclear power under the *Energiewende* is the Renewable Energy Act, or EEG, which serves as the cornerstone of the country's green energy regime. The EEG's market incentives have helped to create a booming renewable energy industry. In 2020, over half of German electricity generation came from renewable sources.¹¹⁸ The Renewable Energy Act amendments of last year have now

¹¹⁴ Schmitz, *supra* note 107.

¹¹⁵ Laura Paddison et al., *'A new era': Germany Quits Nuclear Power, Closing its Final Three Plants*, CNN (Apr. 15, 2023, 12:43 AM), <https://www.cnn.com/2023/04/15/europe/germany-nuclear-phase-out-climate-intl/index.html#:~:text=Germany%20plans%20to%20replace%20the,to%20help%20with%20energy%20security> [<https://perma.cc/NCM4-6B9U>]; see also Julian Wettengel, *Germany, EU Remain Heavily Dependent on Imported Fossil Fuels*, CLEAN ENERGY WIRE (Jan. 10, 2023, 4:00 PM), <https://www.cleanenergywire.org/factsheets/germanys-dependence-imported-fossil-fuels> [<https://perma.cc/WRR6-QURY>].

¹¹⁶ See *Germany*, CLIMATE ACTION TRACKER, <https://climateactiontracker.org/countries/germany/> [<https://perma.cc/9S3G-25UC>].

¹¹⁷ See Lindner, *supra* note 55; see also Carolina Kyllmann, *Two Thirds of Germans Against Shutting Down Last Nuclear Power Plants at This Point – Survey*, CLEAN ENERGY WIRE (Apr. 11, 2023, 1:21 PM), <https://www.cleanenergywire.org/news/two-thirds-germans-against-shutting-down-last-nuclear-power-plants-point-survey> [<https://perma.cc/HQG4-MPBL>].

¹¹⁸ *IEA Electricity Information 2022*, INT'L ENERGY AGENCY, <https://www.iea.org/data-and-statistics/data-product/electricity-information> [<https://perma.cc/7UZD-PBTY>] (last updated July,

set goals for renewables to generate 80 percent of Germany's energy by 2030.¹¹⁹ Last year, solar power alone generated 25 percent of Germany's electricity, making it the second largest source of power after coal.¹²⁰ Developments in Germany's renewable energy sector have undoubtedly furthered German environmental and energy independence goals.

However, the EEG's framework comes at a cost to German consumers. The EEG employs FITs to help incentivize development for all but the largest renewable energy producers,¹²¹ and up until 2022, German consumers paid an EEG surcharge to help finance these FITs.¹²² Eliminating the EEG's consumer surcharge has provided a one-time boost in the German state's ability to provide consumers with affordable energy, but it has also eliminated the primary source of funding for renewable energy incentives. Although the EEG also takes measures such as pitting the largest renewable energy producers against one another in public energy auctions to secure energy at the cheapest possible price for consumers,¹²³ energy prices rose dramatically during the 2022 energy crisis,¹²⁴ making German consumers particularly vulnerable and thus undermining the country's energy security and independence.

Overall, the German nuclear energy regime and its renewable energy counterpart under the *Energiewende* are on track to help Germany meet its long-term environmental goals, but the nuclear phaseout has undermined Germany's short-term environmental goals with a return to a greater reliance on fossil fuels. Due to a booming renewables market under the EEG's market-incentive scheme, Germany will likely be able to ensure long-term energy independence. However, the EEG's emphasis on a competitive energy market comes at a cost to German consumers, who bear the brunt of the costs in times of energy crisis,¹²⁵ thus making the

2023) (accessing data on Germany electricity generation by source) [hereinafter *IEA Electricity Information 2022*].

¹¹⁹ See *EEG 2023 Framework*, *supra* note 60.

¹²⁰ See *IEA Electricity Information 2022*, *supra* note 118.

¹²¹ See *EEG 2023 Framework*, *supra* note 60.

¹²² *Id.*

¹²³ *Id.*

¹²⁴ *Average Monthly Electricity Wholesale Price in Germany From January 2019 to August 2023*, STATISTA (Sept. 19, 2023), <https://www.statista.com/statistics/1267541/germany-monthly-wholesale-electricity-price/#:~:text=In%20December%202022%2C%20the%20average,469%20euros%20per%20megawatt%2Dhour> [https://perma.cc/ZX55-QBAA].

¹²⁵ See *id.*

German economy particularly susceptible to economic shocks from energy markets.

B. ENERGY POLICY GOALS: FRANCE

By virtue of its unitary system, centralized approach, and price control mechanisms, French nuclear energy law creates a system that encourages and streamlines nuclear energy development while keeping energy prices low for consumers. While this nuclear energy framework guarantees affordable energy prices, the French nuclear fleet's poor performance last year also demonstrates that a streamlined nuclear energy program is not only vulnerable to uncontrollable externalities like climate, but also to the very standardization that underpins some of the system's greatest strengths. Even within a streamlined system, nuclear energy development is a slow and rigid process that may be unable to provide the flexibility that environmental and climate goals demand.

France's unitary, semipresidential system of government is particularly conducive to the centralized planning required to field a fleet of standardized nuclear reactors. Thanks to its top-down approach, France's fleet of nuclear reactors enjoys a "series effect," which uses principles of scale to keep costs of nuclear reactor maintenance low.¹²⁶ However, the French nuclear fleet experienced technical difficulties in 2022 due to multiple reactors' delayed or backlogged maintenance schedules,¹²⁷ demonstrating that the "series effect" can also backfire and contribute to a thirty-year low in nuclear energy output.¹²⁸ Other factors, such as a lack of water to cool reactors in an exceptionally hot and dry summer,¹²⁹ show that even nuclear energy is vulnerable to climate and the effects of a warming world.

The poor performance of the French nuclear energy industry last year, compounded with France's reliance on nuclear energy and lack of equally developed energy alternatives, caused France to lose its title as Europe's largest energy exporter.¹³⁰ Although the French Energy Code, like Germany's EEG, does provide some market-based incentives for

¹²⁶ See INT'L INST. OF NUCLEAR ENERGY, *supra* note 61.

¹²⁷ See Meredith, *supra* note 10.

¹²⁸ *Id.*

¹²⁹ *Id.*

¹³⁰ Forest Crellin, *Sweden Tops France as Europe's Largest Net Power Exporter*, REUTERS (Aug. 10, 2022, 12:04 PM), <https://www.reuters.com/business/energy/sweden-tops-france-europes-largest-net-power-exporter-2022-08-10> [<https://perma.cc/B33C-ZUGE>].

renewable energies like FITs,¹³¹ France's renewable energy industry has not been able to develop as rapidly as Germany's and was less equipped to supplement energy shortages in the natural gas and nuclear energy sectors.¹³² As Germany's renewable energy production rose to 46 percent of its power consumption in 2022,¹³³ France's renewable energy production represented 25.3 percent of the country's consumption in 2022, with approximately two-thirds of French electricity still coming from the country's nuclear reactors.¹³⁴ However, thanks to "energy shield tariffs" in the Energy Code,¹³⁵ consumers were largely unaffected by energy shortages,¹³⁶ even as businesses were asked to reduce their consumption by 10 percent to conserve energy.¹³⁷ While energy prices remained low for consumers, France's primary energy producer and sole nuclear plant operator, EDF, shouldered the costs.¹³⁸ In other words, although France faced a series of energy setbacks in 2022, its nuclear energy framework was able to guarantee some degree of energy independence and security by keeping energy affordable for its citizens at the market's expense.

While nuclear reactor development and price controls for consumer energy costs have allowed France to retain some measure of energy independence, they do not help the country meet its environmental and climate goals. Although nuclear energy is considered a carbon-neutral or "green" activity,¹³⁹ further nuclear reactor development will not help France meet its emissions targets. As part of the European Union, France has pledged to reduce its carbon emissions by 40 percent by 2030, but it is not on track to meet these targets.¹⁴⁰ Historically, French nuclear reactor

¹³¹ Code de l'énergie [C. Éner.] [Energy Code] art. L221–5, L221–7 (Fr.).

¹³² Crellin, *supra* note 130.

¹³³ Riham Alkousaa, *Germany's 2022 Renewable Power Production Rises but Still Behind 2030 Target*, REUTERS (Dec. 11, 2022, 5:09 PM), <https://www.reuters.com/business/energy/germanys-2022-renewable-power-production-rises-still-behind-2030-target-2022-12-11> [<https://perma.cc/N7JH-Y69Q>].

¹³⁴ *France – Country Commercial Guide*, INT'L TRADE ADMIN. (Feb. 3, 2023), [https://www.trade.gov/country-commercialguides/franceenergyeng#:~:text=Renewable%20energy%20is%20taking%20on,\(%247.06%20billion\)%20in%202021](https://www.trade.gov/country-commercialguides/franceenergyeng#:~:text=Renewable%20energy%20is%20taking%20on,(%247.06%20billion)%20in%202021) [<https://perma.cc/UM3C-SU7T>].

¹³⁵ Code de l'énergie [C. Éner.] [Energy Code] art. 337–337–15.

¹³⁶ *Which Countries are Doing the Most to Tackle Energy Bills?*, BBC NEWS (Dec. 21, 2022), <https://www.bbc.com/news/61522123> [<https://perma.cc/4GZB-UQQR>].

¹³⁷ Liz Alderman, *As Russia Chokes Europe's Gas, France Enters Era of Energy 'Sobriety'*, N.Y. TIMES, Sept. 6, 2022, at B1.

¹³⁸ WORLD NUCLEAR NEWS, *supra* note 93.

¹³⁹ Love, *supra* note 12.

¹⁴⁰ Josh Gabbatiss, *The Carbon Brief Profile: France*, CARBON BRIEF (Apr. 13, 2022, 12:31 PM), <https://www.carbonbrief.org/the-carbon-brief-profile->

development has been a slow, time-intensive process. The country's line of Flamanville-3 reactors was set to begin operation in 2012, but will now be brought online in 2024 at the earliest.¹⁴¹ In the face of climate change and rapidly increasing global temperatures, France does not have the luxury of time to treat nuclear energy as a silver bullet for its carbon-neutral energy production needs.¹⁴²

Renewable energy sources are a more feasible alternative because they can be developed and deployed more quickly than their nuclear counterparts. Although renewable energy has been a growing sector of France's energy market, it has not developed to have the same market share as in Germany,¹⁴³ largely due to the entrenchment of French nuclear energy and energy shield tariffs.¹⁴⁴ Prior to his newfound emphasis on "nuclear renaissance,"¹⁴⁵ French President Emmanuel Macron's stated goal for France's energy market was to reduce the percentage of French nuclear power generation to roughly 50 percent by increasing market share for other renewable sources.¹⁴⁶ Although French nuclear energy continues to dominate the energy market, its share of electricity generation dropped from 75 percent in 2015 to 66 percent in 2020.¹⁴⁷ The International Energy Agency has criticized France's heavy use of regulated tariffs in its energy market to artificially keep prices low for consumers, arguing that a reduction in these tariffs will help create a more competitive electricity market that will allow for more innovation from competitors to the government-controlled nuclear power plants.¹⁴⁸

While the French nuclear energy regime has proven that it can provide some degree of energy independence and security through its nuclear fleet's "series effect" and price controls found in its Energy Code, both mechanisms have been shown to backfire. Because reactors in a

france/#:~:text=France%20also%20has%20its%20own,2050%20net%2Dzero%20emissions%20target [https://perma.cc/TDQ8-5PBX].

¹⁴¹ Zissler, *supra* note 91. See also *Further Delay to Flamanville EPR Start Up*, WORLD NUCLEAR NEWS (Dec. 19, 2022), <https://world-nuclear-news.org/Articles/Further-delay-to-Flamanville-EPR-start-up> [https://perma.cc/6LRN-C7T7].

¹⁴² See Hockenos, *supra* note 13.

¹⁴³ See *Executive Summary – France 2021*, INT'L ENERGY AGENCY, <https://www.iea.org/reports/france-2021/executive-summary> [https://perma.cc/NJH5-2H9D] [hereinafter *France Executive Summary 2021*].

¹⁴⁴ *Id.*

¹⁴⁵ See Plackett, *supra* note 88.

¹⁴⁶ *France Electricity Security Policy*, INT'L ENERGY AGENCY (June 30, 2022), <https://www.iea.org/articles/france-electricity-security-policy> [https://perma.cc/8XFA-VPXA].

¹⁴⁷ *IEA Electricity Information 2022*, *supra* note 118.

¹⁴⁸ *France Executive Summary 2021*, *supra* note 143.

“series” are identical, maintenance and possible defect issues can all occur simultaneously, leading to widespread nuclear shutdowns.¹⁴⁹ The Energy Code’s regulated tariffs help keep energy prices affordable for consumers, but also stifle innovation for potential competitors to the soon-to-be renationalized EDF.¹⁵⁰ The resulting market rigidity has tempered France’s EEG-like market incentives for renewable energy development, which must pick up if the country is to meet its climate emissions targets. Because nuclear energy is too slow and rigid to develop and deploy,¹⁵¹ France’s current nuclear energy approach—while “green” in the long run—undermines present environmental goals.

III. REGULATORY LESSONS LEARNED

Part II analyzed the strengths and weaknesses in the German and French nuclear energy schemes. This part identifies and discusses three important lessons for European energy regulators for the current European energy transition. First, there is no one-size-fits-all energy regulatory framework that can effectively be applied to every market or EU member state. Second, regulations that support and promote diversified energy markets are effective at furthering both the energy independence and environmental goals of a nation’s energy policy. Finally, and most importantly, green energy regulations must be designed with both short- and long-term policy goals in mind.

A. THERE IS NO ONE-SIZE-FITS-ALL ENERGY REGULATORY FRAMEWORK

For an observer, the stark difference between French and German nuclear energy laws may be surprising. Both western European countries’ nuclear energy programs began under similar circumstances at a similar time, and both states share almost a century-long history of cooperation and close ties in the European community. Despite all their similarities, key differences in their governing and legal structures have fostered two

¹⁴⁹ Zissler, *supra* note 91.

¹⁵⁰ See *France Executive Summary 2021*, *supra* note 143; see also *EDF Nationalisation*, *supra* note 11.

¹⁵¹ See Hockenos, *supra* note 13.

radically different approaches to nuclear energy, leading the two countries to “agree to disagree”¹⁵² on their laws and approaches to nuclear energy.

France’s unitary system and top-down approach to developing its nuclear reactor fleet has allowed the country to build a world-class nuclear energy program that largely benefits from a centralized planning approach,¹⁵³ with many regulatory decisions made by the central government or delegated administrative agencies like the ASN.¹⁵⁴ However, this same approach was met with significant backlash when it was first introduced in West Germany.¹⁵⁵ Regulators in Germany’s federal system who tried to establish nuclear plant sites were met with formidable opposition from local antinuclear interests.¹⁵⁶ These interests benefited greatly from Germany’s federal system and § 7(4) of the Atomic Energy Act, which required the licensing of new nuclear plant sites to be approved not only by federal authorities, but also by the Länder and other local and regional authorities.¹⁵⁷ Due to this system’s sensitivity to bottom-up pressure, many attempts at nuclear energy expansion were thwarted.¹⁵⁸

However, Germany’s decentralized approach to energy development has been a key factor in the EEG’s success. Because renewable energy sources are quick to develop and deploy, they have proven to be more successful in private and competitive energy markets. Market incentives such as FITs and landlord-tenant energy schemes that reward entities other than traditional energy producers for generating energy for themselves and selling the excess to the greater grid have created conditions for a renewable energy boom.¹⁵⁹ Germany was only able to foster such rapid renewable energy production because it had a competitive energy market. France’s attempts to create similar market incentives in the Energy and Environmental Codes have been less

¹⁵² *France, Germany ‘Agree to Disagree’ on Nuclear Power*, RADIO FRANCE INTERNATIONALE, <https://www.rfi.fr/en/france-germany-agree-to-disagree-on-nuclear-power> [<https://perma.cc/W59W-Z86W>] (last updated July 1, 2022, 10:22 PM).

¹⁵³ See INT’L INST. NUCLEAR ENERGY, *supra* note 61.

¹⁵⁴ See Loi 2006–686 du 13 juin 2006 relative à la transparence et à la sécurité en matière nucléaire (1) [Law No. 2006–686 of June 13, 2006 relating to transparency and security in nuclear matters (1)], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], Jun. 14, 2006, No. 0136.

¹⁵⁵ See Milder, *supra* note 21; see also *Atomic Dermant*, *supra* note 24.

¹⁵⁶ See Milder, *supra* note 21; see also *Atomic Dermant*, *supra* note 24.

¹⁵⁷ Atomgesetz [AtG] [Atomic Energy Act], Dec. 23, 1959, BGBl I at 1565, last amended by Gesetz [G], Dec. 4, 2022, BGBl I at 2153, art. 1 (Ger.) <https://www.gesetze-im-internet.de/atg> [<https://perma.cc/U8EX-E749>].

¹⁵⁸ See Milder, *supra* note 21; see also *Atomic Dermant*, *supra* note 24.

¹⁵⁹ CLIMATE ACTION TRACKER, *supra* note 116.

effective due to the anticompetitive nature of the French energy market.¹⁶⁰ European energy regulators can learn much from these examples when determining which sources of energy should be promoted and what kinds of incentives to employ.

B. REGULATIONS PROMOTING DIVERSIFIED ENERGY MARKETS FURTHER BOTH ENERGY INDEPENDENCE AND ENVIRONMENTAL GOALS

The energy crisis of 2022 and the resulting changes in regulation show that an overreliance on a single sort of energy production can undermine both energy independence and environmental goals. Germany's overreliance on natural gas imports impacted the country so much that it had to extend the lifespan of its remaining nuclear reactors and begin burning more coal.¹⁶¹ France's reliance on nuclear energy this past year showed that even nuclear energy, a very reliable source of energy production, can be unreliable when dealing with a backlog of technical issues and exceptionally hot and dry weather.¹⁶²

The answer, then, lies in a diversified European energy market that does not rely too heavily on any one source of energy production. Regulators must consider scenarios when primary energy production fails or if energy needs must be met through other means. Having regulations that support a variety of clean and secure energy alternatives ensures that regulators can meet their policy goals even when one source of energy flounders.

C. GREEN ENERGY REGULATIONS MUST ACCOUNT FOR SHORT AND LONG-TERM PLANNING

Both the French and German nuclear energy regulations tend to look forward into the future, focusing on 2030 climate goals or the deployment of a new series of nuclear reactors.¹⁶³ However, where many of these regulations consider where the nation should be next decade, they might fail to account for next year, or even next month. Both Germany and France show that failing to account for short-term steps may undermine an energy scheme's long-term goals.

¹⁶⁰ *France Executive Summary 2021*, *supra* note 143.

¹⁶¹ Schmitz, *supra* note 107.

¹⁶² Zissler, *supra* note 91.

¹⁶³ *See EEG 2023 Framework*, *supra* note 60; *see also* Hockenos, *supra* note 13.

The German nuclear phaseout through § 7 of the Atomic Energy Act may harm, more than help, Germany's long-term energy goals. Where energy production was already dramatically affected due to a lack of Russian natural gas imports, the country had to turn to its dirtiest fuel, coal, to keep the lights on.¹⁶⁴ In the middle of this crisis in 2022, German lawmakers still insisted on the nuclear phaseout, only extending the lifespan of the country's final three reactors by roughly four months.¹⁶⁵ At a time when energy costs are high for German consumers and energy sources with high carbon emissions are being revived to meet energy demands, German lawmakers had no mechanisms other than amending the Atomic Energy Act to pause the nuclear phaseout. This could only worsen the country's energy independence and environmental goals in the short term. Likewise, beginning development on a new series of nuclear reactors now will not help France meet its 40 percent climate emission reduction targets for 2030 or become fully carbon neutral by 2050.¹⁶⁶ Throwing everything behind nuclear energy fails to address the important developments required in other sectors to meet these environmental targets, even if these nuclear reactors will be fully carbon neutral by the time they are fully developed and deployed.

European energy regulators must build roadmaps that consider both the short- and long-term actions necessary to meet energy independence and environmental goals. Else, they risk creating regulations that undermine the very policy goals they were designed to address.

IV. RECOMMENDATION: CONSOLIDATING EUROPEAN APPROACHES TO NUCLEAR ENERGY LAWS

A. NUCLEAR ENERGY AS PART OF A TIERED GREEN ENERGY REGULATORY FRAMEWORK

The regulatory lessons learned from German and French nuclear energy laws clearly demonstrate that nuclear energy is not a silver bullet that addresses energy independence and environmental concerns on its own. Instead, European energy regulators must think of nuclear energy as

¹⁶⁴ Schmitz, *supra* note 107.

¹⁶⁵ Atomgesetz [AtG] [Atomic Energy Act], Dec. 23, 1959, BGBl I at 1565, last amended by Gesetz [G], Dec. 4, 2022, BGBl I at 2153, art. 1 (Ger.), <https://www.gesetze-im-internet.de/atg> [<https://perma.cc/U8EX-E749>].

¹⁶⁶ See Hockenos, *supra* note 13.

part of a greater “green energy” framework, as it is defined in the European Union’s taxonomy.¹⁶⁷

Regulators must draft laws as part of this green energy framework that consider the natures of their countries’ energy markets as well as legal and governing structures. Certain sources of green energy, like solar power, thrive in systems with decentralized authority and competitive energy markets.¹⁶⁸ Others, such as nuclear energy, benefit greatly from planning and oversight by a central regulatory body. Regulators must ensure, however, that no source of green energy production becomes irreplaceable. Regulations that foster diversified energy markets allow for the necessary flexibility to deal with sudden changes and remain on track for energy independence and environmental goals. These goals must not only be considered in the abstract. Instead, regulations must be designed with both short-term and long-term considerations to ensure that policy goals are furthered every step along the way.

These lessons can be broadly consolidated into an approach to nuclear and green energy regulations for all of Europe through a tiered system of priority for different energy sources. Regulators can sort different sources of energy into roughly three distinct categories: (1) energy sources that should be incentivized, (2) energy sources that should be maintained, and (3) energy sources that should be disincentivized. While such a tiered system may seem on its face to be incredibly simple, it is important to recognize that these priorities may change over time, and there may already be plans to change them in the long term. For example, regulators may look to incentivize the use of a certain energy technology in the short term but may want to disincentive or even simply maintain it in the long term.

(1) Incentivized Energy	(2) Maintained Energy	(3) Disincentivized Energy
Renewables and other rapidly deployed “green” energy; e.g., wind, solar	Established “neutral” sources; e.g., existing nuclear reactors	Fossil fuels; e.g., coal, oil, natural gas

The concept of a tiered approach to energy regulation is nothing without the legal mechanisms to implement it. Incentivizing mechanisms

¹⁶⁷ See *EU Taxonomy*, *supra* note 109.

¹⁶⁸ See *IEA Electricity Information 2022*, *supra* note 118.

for energy sources may include adjustable market incentives, such as those found in the EEG,¹⁶⁹ or more direct public investment and development through some central governing authority or agency. Similarly, disincentivizing certain energy sources may be as simple as incentivizing competing sources or statutorily phasing out certain forms of energy. The sections below discuss next steps that Germany and France can take to implement such a system and achieve their desired energy policy goals.

B. GERMANY: NUCLEAR ENERGY NOT FOR GERMANY, BUT FOR EUROPE

In 2022, Russia's invasion of Ukraine and the subsequent breakdown in relations rattled Germany's energy framework.¹⁷⁰ Due to a lack of natural gas, energy prices soared, and Germany turned back to fossil fuels such as coal to meet energy demands.¹⁷¹ At a time when energy independence was uncertain and the rate of carbon emissions was sure to increase, German lawmakers refused to stray from the twenty-year nuclear phaseout plan, choosing instead to only extend the lifetime of Germany's remaining reactors by four months.¹⁷² Extending the lifespan of the nuclear reactors would only delay the inevitable, however. German regulators could have taken this unique opportunity to reevaluate the country's short-term priorities to meet more ambitious long-term goals and amended the Atomic Energy Act to remove the § 7 nuclear phaseout provision, possibly delegating control to the central nuclear regulatory bodies that could reassess Germany's relationship to nuclear energy. Instead, German lawmakers stayed their course such that nuclear energy in Germany became a thing of the past.

Although Germany will likely not reimplement nuclear energy in its current form in the foreseeable future, German regulators and policymakers still have the power to define an effective, consolidated approach to the European energy transition—if not at the national, then at the international level. As the European Union grapples with achieving carbon neutrality, Germany must be willing to entertain the idea that nuclear energy—though not a silver bullet by any means—is a meaningful part of the solution. Increased cooperation on the nuclear energy issue will

¹⁶⁹ CLEAN ENERGY WIRE, *supra* note 36.

¹⁷⁰ See Reed, *supra* note 51.

¹⁷¹ Schmitz, *supra* note 107.

¹⁷² Brady, *supra* note 54.

allow European lawmakers to focus on enacting a meaningful regulatory framework for the European energy transition that will reduce Germany's newfound reliance on imported fossil fuels.

When defining which energy sources should be incentivized, disincentivized, or simply maintained in a European energy framework, German lawmakers must recognize that the traditional antinuclear sentiment is about fifty years old. Advancements in nuclear energy technologies have made nuclear energy safer, more efficient, and less wasteful.¹⁷³ Recent public opinion in Germany is unsure about Germany's own nuclear phaseout during the ongoing energy crisis.¹⁷⁴ And most meaningfully to Germany's own energy independence and environmental goals, France's nuclear-heavy energy regime was instrumental in helping Germany out of its "self-dug Russian gas trap."¹⁷⁵

When establishing legal mechanisms to guide both short- and long-term energy development, German regulators should ask themselves if a nuclear phaseout across the continent is feasible, or if it should be reconsidered in this *Zeitenwende* of European energy transition, like many other policies.

C. FRANCE: BRINGING RENEWABLE ENERGY SOURCES IN LINE WITH ITS NUCLEAR FLEET

Much like their German counterparts, French regulators would benefit greatly by recognizing the shifts in energy priorities over the short and long term. Although the French Energy Code has been able to provide some degree of energy independence even during a thirty-year low in nuclear energy output, long-term energy independence by France's nuclear fleet remains uncertain as reactors age and the climate changes. Additionally, although nuclear reactors are a "green" source of energy that will help keep France carbon neutral in the long term, other solutions, such as renewable energy, are needed in the short term to meet 2030 carbon emissions targets. In pursuit of both goals, France must take additional

¹⁷³ Mary Carpenter, *Advancing Nuclear Technologies*, Nuclear Energy Inst. (Sept. 30, 2021), <https://www.nei.org/news/2021/advancing-nuclear-technologies> [<https://perma.cc/35BY-HR3H>].

¹⁷⁴ Kyllman, *supra* note 117.

¹⁷⁵ Camille Lafrance & Benjamin Wehrmann, *French and German Energy Discrepancies Hamper Joint EU Climate Strategy*, CLEAN ENERGY WIRE (July 3, 2023, 2:15 PM), <https://www.cleanenergywire.org/news/french-and-german-energy-path-dependencies-put-checks-joint-eu-climate-strategy> [<https://perma.cc/D66N-PFLZ>]; *see also* Merlyn Thomas, *France Sends Germany Gas For First Time Amid Russia Energy Crisis*, BBC (Oct. 13, 2022), <https://www.bbc.com/news/world-europe-63246369> [<https://perma.cc/5B7D-D247>].

steps to further promote its renewable energy sector, such as amending its Energy Code to create a more competitive energy market. Alternatively, France may flex its central planning muscles and create more large-scale renewable energy projects to meet these goals.

If France wishes to create a more competitive energy market to foster a renewable energy boom such as the one seen in Germany, regulators must create meaningful market incentives for renewable energy. In addition to existing FITs, a relaxation on the energy “shield” tariffs for consumers found in Article L337-1 of the Energy Code may incentivize private entities to invest in, develop, and deploy renewable energy solutions in the French market.¹⁷⁶ Given the ongoing energy crisis and current popularity of these tariffs for consumers,¹⁷⁷ such a change may be immensely unpopular among French lawmakers and the French public. Other proposals, such as splitting off EDF’s renewable energy projects and creating a separate, competitive company have also been rejected.¹⁷⁸ If creating a more competitive energy market is not feasible for French policymakers, they should instead turn to the same central planning and governing strategies that underpin the legal framework for nuclear energy.

Ultimately, regulators must do more to promote renewable energy sources in the short term to displace fossil fuels while the French nuclear fleet develops for energy use in the long term. The French nuclear fleet may be world-class and a source of pride for the French nation, but even it alone cannot meet the country’s energy independence and environmental goals.

V. CONCLUSION

In its current form, nuclear energy can be an effective part of any European green energy framework, so long as countries address both their short- and long-term energy independence and environmental goals. By implementing green energy regulations that account for individual countries’ governing structures, creating a tiered system for energy

¹⁷⁶ Code de l’énergie [Energy Code] art. L337-1 (Fr.).

¹⁷⁷ See Loi 2022-1158 du 16 août 2022 portant mesures d’urgence pour la protection du pouvoir d’achat [Law 2022-1158 of August 16, 2022 on emergency measures for the protection of purchasing power], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], Aug. 17, 2022, No. 0189.

¹⁷⁸ See Leigh Thomas, *French State has no Plans to Break Up EDF – Finance Ministry Source*, REUTERS (Nov. 14, 2022, 4:23 PM), <https://www.reuters.com/business/energy/french-state-has-no-plans-break-up-edf-finance-ministry-source-2022-11-14> [<https://perma.cc/8378-5UPP>].

production prioritization, and fostering a diversified energy market, Europeans will be able to enjoy the intended effects of these policies. Although Germany phased out nuclear energy on the national scale, supporting nuclear energy efforts that supplant energy sources that would otherwise come from dirtier fossil fuels within the European Union can only help the bloc—and Germany—achieve their energy independence and environmental goals.¹⁷⁹ On the national level, French regulators can still incentivize or prioritize the development of French renewable energy sources to prevent future energy struggles in years of low nuclear-energy production, like 2022.¹⁸⁰ In all cases, such changes can further the *Energiewende* in all of Europe—and allow Europeans to focus on more pressing matters.

¹⁷⁹ See Ewa Krukowska et al., *France, Germany Dispute Over Nuclear Energy Leaves EU Deadlocked on Renewables*, BLOOMBERG (June 2, 2023, 10:51 AM), <https://www.bloomberg.com/news/articles/2023-06-02/eu-in-deadlock-over-renewables-as-france-and-germany-lock-horns> [https://perma.cc/W864-CMPH].

¹⁸⁰ Zissler, *supra* note 91.