

Orchestrating a Low-Carbon Energy Revolution Without Nuclear: Germany's Response to the Fukushima Nuclear Crisis

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In October 2010, the German conservative ruling coalition (Christian Democratic Union/Christian Socialist Union (CDU/CSU) and Free Democratic Party (FDP)) passed a law permitting the extension of contracts for Germany's seventeen nuclear power plants. This policy amended a law passed in 2001 by a Social Democratic Party (SDP) and Green Party majority to phase out nuclear energy by the early 2020s. The explosions in the nuclear reactors at the Fukushima Daiichi nuclear power facility, however, resulted in a decision to speed up the phaseout of nuclear energy. The nuclear meltdowns in Japan sent hundreds of thousands of protesters onto the streets. Angry voters made their disillusionment with the nuclear politics of the conservative government coalition clear in local elections. The federal government responded by setting up an Ethics Commission for a Safe Energy Supply, which recommended an end to nuclear energy and a shift to a renewable energy-based economy. Within months of the Fukushima disaster, the government had permanently shut down eight of the country's oldest nuclear power plants and issued a schedule for the phased shutdown of the remaining nine plants by 2022. In addition, the government reaffirmed its climate change plans, which call for a reduction in greenhouse gas emissions

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by around forty percent of 1990 levels by 2020 and eighty percent by 2050. Thus, out of a crisis, the German government is forging an opportunity to become a global leader in the promotion of new renewable energies, energy efficiency, and greenhouse gas emission reductions. In Japan, the nuclear crisis has also weakened support for nuclear energy, but with a strong industrial coalition calling for its continued use, both for energy stability and in response to climate change, a complete nuclear phaseout is less certain, at least in the short term.

I. INTRODUCTION: THE FUKUSHIMA NUCLEAR CRISIS

At 14:46 on March 11, 2011, Japan was hit by a level 9.0 earthquake that triggered the largest series of tsunami waves in the country's recorded history. The tsunami waves caused widespread destruction along much of Honshu Island's northeastern coastline, and numerous towns and many of their inhabitants were wiped out. The Fukushima Daiichi nuclear power plant was supposed to be immune to tsunami waves, as it was protected by a 5.7 meter (nineteen feet) high seawall, but the tsunami wave was more than twice that height and crashed over the barrier, flooding the plant's nuclear reactors.¹ Within hours, the loss of electricity to the nuclear facility led to malfunctions in the cooling systems that in the course of the next hours and days resulted in further disaster with the meltdown of three nuclear reactors and severe structural damage to a fourth.

On March 12 at 5:44 AM an evacuation order was issued for people living within a ten-kilometer radius of the Daiichi nuclear power plant. That same evening at 6:25 PM the evacuation zone was extended to a twenty-kilometer radius and again to thirty kilometers by the morning of March 15. Tens of thousands of people were forced to flee their homes, and one year later many still remained in temporary housing facilities built for these refugees. In the initial weeks after the explosions, citizens were warned not to eat agricultural products from the region, and some products remain too contaminated for consumption. The Fukushima nuclear disaster is considered the worst nuclear disaster since Chernobyl.

The impacts of these criticality accidents are still unfolding. According to the Japanese government, the damaged reactor units are now in "cold

1 Asahi Shimbun, *Tsunami Exceeded 21 Meters Near Fukushima Plant, Say Researchers*, JAPANESE L. BLOG (Feb. 9, 2012), <http://ajw.asahi.com/article/0311disaster/fukushima/AJ201202090049> (Japan).

shutdown,” meaning that conditions have stabilized and disaster management is shifting from crisis control to decommissioning.² Huge challenges remain, however. The fuel rods and melted fuel must be kept submerged under water and continuously cooled for years to come, producing thousands of tons of radioactive water that must somehow be stored. Eventually, the highly radioactive fuel will need to be removed from the damaged reactor cores, and the damaged facilities, which are also highly radioactive, will need to be decommissioned. The technological challenges are huge and there is no real experience with decommissioning such badly damaged facilities. Estimates are that the decommissioning will take three decades and thousands of workers.³

In no other country was the political reaction to the Japanese nuclear crisis as swift as in Germany. Although Fukushima was thousands of kilometers away, the crisis in Japan led to a major shift in energy policy in Germany. On March 14, Chancellor Angela Merkel announced a three-month moratorium on the government’s plans to extend the running lifetime of the country’s nuclear power plants. She also temporarily shut down eight of Germany’s oldest nuclear power plants. By July, this temporary shutdown had become permanent. The German *Diet* passed legislation closing these eight reactors and set a schedule for the remaining nine nuclear power plants to be closed down in stages over the course of the next decade. With respect to the implications of the disaster for the country’s energy policy, Germany has reacted more quickly than Japan.

How should this policy shift be understood? Why did Germany react so suddenly and in such haste? What does it mean for the country’s climate change policies, and what international repercussions has the decision had, especially in Japan? The remainder of this Article is structured as follows. Part II offers a theoretical examination of the link between crises and policy change, considering how crises can shift the power balance among actor coalitions and be used to reframe policy debates. Part III first looks at how the German government placed its bets on nuclear energy in the 1960s and 1970s, as the preferred energy for the future, but found itself confronted by an increasingly strongly skeptical public. It then turns to the Chernobyl nuclear accident and its political ramifications. This section explains how

2 Asahi Shimbun, *Prime Minister Declares Nuclear Crisis Under Control*, JAPANESE L. BLOG (Dec. 16, 2011), http://ajw.asahi.com/article/behind_news/politics/AJ201112160059 (Japan).

3 Phred Dvorak & Mitsuru Obe, *After Nuclear Milestone, A Long Road: Japan’s Plant’s Operator to Hail Cold Shutdown, but Progress Is Halting: Robot Is Stranded in Hot Zone*, WALL ST. J. ASIA, Dec. 16, 2011, <http://online.wsj.com/article/SB10001424052970204336104577096281099680526.html>.

the nuclear crisis altered the German energy debate, eventually leading to a decision to phase out nuclear energy. It also explores why this decision was later partially reversed. The section concludes with an analysis of the impacts of the Fukushima nuclear crisis on the German energy debate, and the emergence of a cross-party consensus on a more rapid nuclear phase out schedule. Part IV looks at how the nuclear phase out plan is being linked to climate and renewable energy politics and considers how renewable energy is replacing nuclear energy as Germany's preferred energy source for the future. Part V compares the German response to the Fukushima nuclear crisis with responses in other countries in Europe and Asia as well as the United States. Part VI considers why more than a year after the Fukushima disaster, Japan still had not decided what role nuclear energy should play in the future.

II. CRISIS AND POLICY CHANGE

Crisis can open a window of opportunity for policy change.⁴ A crisis can function as what John Kingdon termed a "focusing event" that directs media and public attention to an issue and puts political, industrial, or societal leaders under the spotlight in terms of how they respond to the event. Poorly managed responses to disasters or crises can invite criticism and risk a government's loss of legitimacy.⁵ That is what happened to President George W. Bush when the federal government was perceived as reacting slowly and inadequately to Hurricane Katrina.⁶ It was also the fate of Prime Minister Naoto Kan, who was in office at the time the tsunami hit and the nuclear crisis began to unfold in Japan. Both the government's and Tokyo Electric Power Company (TEPCO)'s responses to the disaster were criticized, and Kan was forced out of office within six months' time.

Typically, policy change and policy learning in response to natural disasters like earthquakes and hurricanes is what people tend to expect of leaders in the country or place where the disaster occurs. After the Exxon Valdez oil spill in Alaska, for example, there was strong pressure on U.S. policymakers to take regulatory action. In response, the Oil Pollution Act was passed.⁷ Parties

4 FRANK R. BAUMGARTNER & BRYAN D. JONES, AGENDAS AND INSTABILITY IN AMERICAN POLITICS 1-172 (1993); THOMAS A. BIRKLAND, LESSONS OF DISASTER: POLICY CHANGE AFTER CATASTROPHIC EVENTS 1-22, 157-90 (2006).

5 JOHN KINGDON, AGENDAS, ALTERNATIVES, AND PUBLIC POLICIES (1984).

6 Paul 't Hart, Karen Tindall & Christer Brown, *Crisis Leadership of the Bush Presidency: Advisory Capacity and Presidential Performance in the Acute Stages of the 9/11 and Katrina Crises*, 39 PRESIDENTIAL STUD. Q. 473 (2009).

7 Oil Pollution Act of 1990, 33 U.S.C. §§ 2701-2761 (amended 2000).

responsible for a ship were made liable for oil spills and responsible for financial damages, with a far higher cap than had previously existed. Tanker ship design requirements also were changed so that as of 2015 all tankers are required to have double hulls. Crisis provided an opportunity for change driven by previously excluded actors who had long tried to influence policy directions, but found no venue where they could get a favorable hearing. Crisis provided them with new opportunities and allies.⁸

Some events are of such magnitude that they can have reverberating effects far away. That was the case, for example, after the terrorist attacks on the World Trade Center and the Pentagon in the United States, which led to changes in security control systems not only in the United States, but also in countries around the world. After the 2004 Indian Ocean tsunami, tsunami warning systems were upgraded and new ones introduced in various regions of the world, not just in the Indian Ocean region.⁹ It was also the case after the explosion in the Union Carbide pesticide plant in Bhopal, India in 1984 that killed several thousand and injured tens of thousands more. After that disaster, toxic chemical control laws were changed in Europe and the United States and new safety measures were introduced by intergovernmental organizations and transnational corporations, even if many of the changes are still considered too limited to provide satisfactory protection.¹⁰

Certainly, though, there are many disasters that do not lead to policy changes either domestically or internationally. Some thought that the Deepwater Horizon oil spill in the Gulf of Mexico in 2010 would catalyze major energy policy change in the United States, but that did not happen. Furthermore, the same disaster can lead to policy change in one system, but not in another. Note, for example, the major short-, medium- and long-term differences in national responses to the Chernobyl nuclear accident among France, Germany, and Italy, even though these three countries were all part of the same supranational European Community: France continued to embrace nuclear

8 Rick S. Kurtz, *Coastal Oil Pollution: Spills, Crisis, and Policy Change*, 21 REV. POL'Y RES. 201 (2004).

9 Reid Basher, *Global Early Warning Systems for Natural Hazards: Systematic and People-Centred*, PHIL. TRANSACTIONS ROYAL SOC'Y A 2167 (2006); Miranda A. Schreurs, *Improving Governance Structures for Natural Disaster Response: Lessons from the Indian Ocean Tsunami*, in THE INDIAN OCEAN TSUNAMI: THE GLOBAL RESPONSE TO A NATURAL DISASTER 261 (Pradyumna P. Karan & Shanmugam P. Subbiah eds., 2011).

10 Tomás Mac Sheoin, *Waiting for Another Bhopal: Global Policies to Control Toxic Chemical Incidents*, 9 GLOBAL SOC. POL'Y 400 (2009).

energy, Germany decided to abandon it by the early 2020s, and Italy finished the decommissioning of the last of its four reactors in 1990.¹¹

Whether or not policy change occurs in response to a disaster is dependent on many factors, including how crises and disasters are framed by different domestic coalitions, the relative strength of those coalitions, the potential for the balance of coalition strength to be altered by a crisis, and the new participants it brings into a debate. Also important are the vulnerability of key decision-makers to charges of incompetence in the face of the disaster, and the availability of alternative policy solutions. To understand why the nuclear disaster in Japan had such a strong impact in Germany (but much less so in China, France, Great Britain, or the United States, and with still uncertain outcomes in Japan), it is necessary to consider some background information about the German context.

III. NUCLEAR ENERGY AND NUCLEAR OPPOSITION IN GERMANY

A. The Rise of the Antinuclear Movement: A Historical Overview

In 1973, in reaction to the Yom Kippur War, the Arab members of the Organization of Petroleum Exporting Countries (OPEC) initiated an oil embargo.¹² Western countries responded by creating the International Energy Agency (IEA). In the ensuing years, the IEA devoted its attention to increasing the supply of energy from nuclear power generators. In Europe, governments developed plans for a major increase in their nuclear power production capacity.

Opposition to these plans was particularly fierce in Germany. Citizens' initiatives against nuclear energy were launched and within years succeeded in establishing an antinuclear movement that is one of the strongest in the world. The 1970s was a decade of citizen mobilization and protest addressing a wide variety of issues, including Germany's fascist past, reform of the universities, gender equality, the Vietnam War, the stationing of missiles on German soil, pollution and the loss of nature, among many others. Although there were differences among the citizens' groups in terms of their priorities and strategies, they were able to form networks that strengthened their voice.

A particularly large number of these citizens' groups came together under an umbrella organization, the *Bundesverband Bürgerinitiativen Umweltschutz* (Federal Association of Citizens' Initiatives for Environmental Protection)

11 ANGELA LIBERATORE, *THE MANAGEMENT OF UNCERTAINTY: LEARNING FROM CHERNOBYL* (1999).

12 The Arab members of OPEC in 1973 included Iran, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and the United Arab Emirates.

(BBU) in 1972. By 1978, the BBU had about a thousand organizational members and 1,500,000 members.¹³ Antinuclear activism was at the heart of the BBU's agenda in the 1970s. Due to its large size, the BBU was able to wield considerable political weight. Other major groups that formed at about the same time with a strongly antinuclear agenda are the *Bund für Natur- und Umweltschutz Deutschland* (BUND: Friends of the Earth, Germany), which was established in 1975, and Greenpeace, which opened a branch in Hamburg in 1980. These and other environmental groups added their voices to the antinuclear protests.

The government's decision to expand its nuclear generation capacity in the wake of the 1973 OPEC oil embargo invited a powerful counter-response from these groups and from the German public, more generally. Plans to build a nuclear power plant in Wyl in southern Germany met with strong local resistance, including from the nearby university town of Freiburg. The use of the police to remove protesters initiated what was to become an increasingly combative relationship between the state and the growing antinuclear movement. In 1975 an administrative court withdrew the construction license for the plant.

Protests sprung up in other regions as well. The electric industry's announcement in November 1973 that it would build a nuclear power plant near the village of Brokdorf in Schleswig-Holstein was received with indignation. In August 1974 a local citizens' initiative collected tens of thousands of signatures for a petition against the project. Major protests at the site occurred in 1976 and 1977. Protests spread to other planned nuclear sites, including at Grohnde, Kalkar (the site of Germany's first fast breeder reactor), Gorleben (designated for a reprocessing and nuclear waste depository site), and Hannover. The fact that the Three Mile Island nuclear meltdown occurred during the Hannover protest swelled the protesters' ranks. An estimated 100,000 activists, farmers, and local citizens descended on the city. Protests were taken to the capital of Bonn as well, where an estimated 150,000 gathered.¹⁴

13 Helmut Weidner, *25 Years of Modern Environmental Policy in Germany: Treading a Well-Worn Path to the Top of the International Field* 8 (Veröffentlichungsreihe der Abteilung Normbildung und Umwelt des Forschungsschwerpunkts Technik-Arbeit-Umwelt des Wissenschaftszentrums Berlin für Sozialforschung, Working Paper No. FS II 95-301, 1995) (Ger.), available at <https://www.econstor.eu/dspace/bitstream/10419/48980/1/189347120.pdf>.

14 JOPPE CHRISTIAN, MOBILIZING AGAINST NUCLEAR ENERGY: A COMPARISON OF GERMANY AND THE UNITED STATES (1993); MIRANDA A. SCHREURS, ENVIRONMENTAL POLITICS IN JAPAN, GERMANY, AND THE UNITED STATES (2002); Dieter Rucht, *Campaigns, Skirmishes and Battles: Anti-Nuclear Movements in the USA, France, and West Germany*, 4 ORG. & ENV'T 193 (1990); Dieter Rucht & Jochen Roose, *Germany*, in ENVIRONMENTAL PROTEST IN WESTERN EUROPE 80 (Christopher Roots ed., 2007).

In contrast to Japan, where neither large environmental nongovernmental organizations (NGOs) nor a national Green Party were formed (until 2012), the antinuclear movement in Germany — despite being divided, with many divergent views on strategies and goals and the use of various tactics — coalesced with other movements (the women's, gay, and peace movements) to form a Green Party. The idea was spurred on by the first successful efforts by a green list to win seats in the Bremen state parliament in 1979. In October 1979, about a thousand environmental activists met in Offenbach to discuss the pros and cons of establishing a green political organization, which later became known as *die Grünen* (the Greens).

The Greens first ran in the 1980 federal election and received 1.5% of the vote. In 1983 they passed the five percent of the vote hurdle necessary to enter the federal parliament, gaining twenty-seven seats. At both the federal and the state level, *die Grünen* gathered in strength and visibility. In the 1987 federal election, the party received 8.3% of the vote (only slightly below the 9.1% won by the Free Democratic Party (FDP)). From 1985 to 1987, *die Grünen* became members of a coalition government with the Social Democratic Party in Hesse, further honing the party's skills. The Greens' success was bolstered by the increasing concern in the country that industrial society was destroying the environmental foundations upon which society depends. Germany's forests were suffering due to acid rain. The stratospheric ozone layer was being destroyed by chlorofluorocarbons.¹⁵ The major political parties began to take environmental considerations more seriously. They responded to public opinion with policies to address air pollution, control ozone-depleting substances, promote renewable energy, reduce packaging waste, and increase recycling.

In sum, unlike the situation in many other countries where there were also local antinuclear protests, including France and Japan, in Germany the antinuclear movement was able to become a major policy player not only at the local level, but also at the national level. It managed to pull off this feat because of its effective networking strategies and its decision to enter national party politics. The movement was able to institutionalize itself through the formation of large environmental NGOs, national umbrella organizations, and a Green Party. Protests against specific nuclear power plant construction plans were able to draw activists from around the country. Furthermore, the antinuclear movement was successful in linking up with other movements that were calling for more open, transparent, and democratic decision-making and challenging the policy agendas of the traditional parties. This also meant

15 See David W. Fahey, *The Montreal Protocol Protection of Ozone and Climate*, 14 THEORETICAL INQUIRIES L. 21 (2013).

that when crisis hit — as it did in Chernobyl — there was a strong coalition of antinuclear activists waiting to use the window of opportunity created by the crisis to call for major changes to Germany’s energy strategies.

B. Responding to the Chernobyl Nuclear Accident

The explosion at the Chernobyl nuclear power plant near Kiev in the Soviet Union on April 26, 1986, had huge reverberations in Germany. The radioactive fallout in Germany from the explosion heightened antinuclear sentiments and fears. People were warned against eating leafy vegetables and fruit, drinking milk, or letting their children play in sandboxes.

Politically, the Chernobyl nuclear crisis led to a further expansion of the antinuclear coalition. In particular, the crisis shifted the position of the Social Democratic Party, the country’s second-largest party, leading to a strengthening of the antinuclear coalition. The Social Democratic Party, long internally divided on the nuclear question, announced in August 1986 its support for a policy of abandoning nuclear power within ten years. This meant that it was no longer just the new “niche” party — the Greens — calling for an end to Germany’s nuclear politics, but also one of the two big traditional parties. A wing within the Christian Democratic Union (CDU) also began to question the viability of nuclear energy, even though the party continued to support it, arguing it was necessary for energy stability. Efforts were made by the supporters of nuclear energy to portray the nuclear crisis in Chernobyl as a problem tied to the Soviet regime and its lack of transparency and adequate standards. Such an accident, they argued, was not possible in Europe.

In June 1986, the Ministry of Environment, Nature Conservation, and Nuclear Safety was created; it was subsequently made responsible for the development of renewable energy. That renewable energy was made the responsibility of the environment ministry was critically important, as the new ministry became a powerful supporter. In 1990, a renewable energy feed-in law was passed.¹⁶ The law required grid operators to ensure access to the grid for electricity generated from renewable energy sources and to pay premium prices (feed-in tariffs) for this electricity. At the time only three percent of the country’s electricity was derived from wind, solar, hydropower and biomass. With the new law in place, renewable energy sources were provided an opportunity for expansion.

16 Gesetz über die Einspeisung von Strom aus erneuerbaren Energien in das öffentliche Netz [Stromeinspeisungsgesetz] [Law Regarding the Feed-in of Electricity from Renewable Energies into the Public Grid (Feed-In Law)], Dec. 7, 1990, BGBL. I at 2633 (Ger.).

In addition, due to the Chernobyl accident, not only was there no further construction of new nuclear power plants, but the Kalkar fast breeder reactor that was completed in 1985 was never put into operation (it was subsequently turned into an amusement park). Similarly, construction on a nuclear fuel reprocessing facility in Wackersdorf was halted.

In the meantime, German reunification provided another window of opportunity to take some concrete steps towards reducing the number of nuclear power plants. The half-dozen Soviet-style nuclear reactors that had been operating in the German Democratic Republic (DDR) did not meet safety standards set by the Federal Republic of Germany. Indeed, a nuclear reactor in Greifswald, the largest nuclear power station in the DDR, had itself come close to a criticality accident in 1975, which only became known in the West with the fall of the Soviet bloc. In a 1990 special issue of *der Spiegel*, Greifswald was referred to as a *Zeitbombe* (time bomb).¹⁷ The reactors in Greifswald were shut down and decommissioning work that lasted about a decade began.

In 1998, the Social Democrats and Greens formed Germany's first red-green coalition. Part of their electoral platform was putting a stop to nuclear power. This they managed to push through in 2001 over the opposition of the Christian Democratic Union (CDU), its Bavarian sister party, the Christian Socialist Union (CSU), and the Free Democratic Party (FDP). A nuclear phaseout law went into effect in 2002.¹⁸ The decision was reached only after long-drawn-out negotiations with the nuclear industry, which fought hard to avoid an early shutdown. In the end, the agreement allowed the industry to continue operating their plants for an additional 2,632,000,000,000 kWh spread over nineteen nuclear reactors, which averaged out to a shutdown by sometime in the early 2020s.

In many ways, this was a political turning point triggered by the Chernobyl crisis. Although it was more than a decade-and-a-half in the making, the crisis altered the power balance between the pro- and antinuclear power coalitions and attached to nuclear energy the image of a technology where human error could trigger risks of frightening proportions. Still, there was no cross-party consensus on the decision, as is apparent from the discussion

17 *Zeitbombe Greifswald, Die jahrzehntelang verschwiegenen Störfälle im DDR-Kernkraftwerk, Spiegel Spezial [Decades of Concealing Accidents in the Nuclear Power Plants in the German Democratic Republic]*, DER SPIEGEL, Feb. 1, 1990, <http://www.spiegel.de/spiegel/spiegelspecial/d-52397652.html> (Ger.).

18 *Gesetz Über die Friedliche Verwendung der kernenergie und den Schutz Gegen Ihre Gefahren [Law Regarding the Peaceful Use of Nuclear Energy and Protection Against Its Risks (Nuclear Law)]*, Dec. 1959, BGBL. I (last amended Apr. 22, 2002) (Ger.), available at http://www.kernchemie.uni-mainz.de/strahlenschutz/originaldokumente/atom_2002.pdf.

that took place in the Bundestag in December 2001. CDU energy expert, Dr. Klaus Lippold, warned Environment Minister Jürgen Trittgen, “You are celebrating too soon. We will reverse what you are calling a permanent phase out of nuclear energy You are quickly closing [nuclear energy] down without really thinking about what consequences will result out of this.”¹⁹ The FDP’s Birgit Homburger warned that the nuclear phaseout would put Germany’s climate change targets in danger and lead to increases in carbon dioxide emissions. As Dr. Lippold foresaw, the CDU/CSU and FDP, when given the chance, would push through a reversal of this policy. That policy window opened for them with the change in ruling coalition that took place after the federal election of 2009.²⁰

C. Phaseout of the Nuclear Phaseout

In October 2010 the CDU/CSU-FDP coalition, over considerable domestic opposition, pushed through an amendment to the law governing nuclear activities, which softened the nuclear phaseout plans of the Red-Green coalition. Instead of a complete phaseout by around 2022, as foreseen by amendments to the law governing nuclear energy that went into effect in 2002,²¹ under the new policy, Germany’s seventeen nuclear power plants were to be allowed to run for an additional twelve years on average beyond their anticipated phaseout dates under the nuclear phaseout law. This amounted to eight additional years for the oldest plants, and fourteen for the newest ones.

In the run-up to the decision and in the weeks and months afterwards, tens of thousands of antinuclear protesters poured back onto the streets. A human chain of about 120,000 people was formed that stretched 120 kilometers from the Krümmel to the Brunsbüttel nuclear reactors in April 2010.²² About 100,000 protesters encircled the German parliament building in Berlin in September 2010,²³ and tens of thousands showed their displeasure the following month in Munich.

19 DEUTSCHER BUNDESTAG [BT], Stenographischer Bericht (Stenographic Report), Dec. 14, 2001, Plenarprotokoll 14/209, at 20711 (Ger.) (translated by the author), available at <http://dip21.bundestag.de/dip21/btp/14/14209.pdf>.

20 *Id.* at 20714.

21 Gesetz Über die Friedliche Verwendung der kernenergie.

22 *KettenreAktion: Atomkraft abschalten!*, BÜNDNIS 90 DIE GRÜNEN (Mar. 3, 2010), <http://www.gruene.de/themen/atomausstieg-energiewende/kettenreaktion-atomkraft-abschalten.html> (Ger.); Dagmar Dehmer, Dieter Hanisch & Reimar Paul, *Die große Handreichung [The Big Handout]*, DER TAGESSPIEGEL, Apr. 25, 2010, <http://www.tagesspiegel.de/zeitung/atomkraftgegner-die-grosse-handreichung/1808112.html> (Ger.).

23 *Anti-Atom-Protest in Berlin übertrifft Erwartungen bei weitem: 100.000 Menschen*

Whether these protests alone would have had much impact on the governmental decision is unlikely, but the timing of the decision to extend the contracts of the nuclear power plants in Germany just months prior to the Fukushima nuclear disaster could not have been worse for the CDU-FDP government. The ill-timed decision (which was also viewed by many as being of questionable legitimacy, given the way it was rammed through the parliament) brought a crisis of its own upon the German government.

D. A Reversal of the Reversal: Return to a Nuclear Energy Phaseout Policy

The fallout on Germany from Fukushima was not so much radioactive as political. Antinuclear activists, a large majority of whom were also renewable energy advocates, used the crisis to focus public attention on what they considered to be the ruling coalition's imprudent decision to extend the deadline for nuclear phaseout well into the 2030s. After images of the Fukushima crisis hit the news, hundreds of thousands of protesters were back on the streets. With close to around-the-clock coverage of the tsunami waves' impacts, the hydrogen explosions at the Fukushima Daiichi nuclear facility, and the subsequent frantic efforts by TEPCO employees and Japanese government officials to prevent an even worse disaster, the German public was nervous, angry, and prepared for battle.

For many Germans, Fukushima brought back memories of the Chernobyl nuclear accident that had occurred twenty-five years earlier. The media was well prepared with articles, too, as preparations for the twenty-fifth anniversary coverage of Chernobyl were already underway. In several *Länder* (German states) it also happened to be election time. The CDU and FDP suffered badly in several of these state-level elections. Particularly shocking for the ruling coalition was the outcome in Baden Württemberg, which had been controlled by a CDU-led government for the past fifty-nine years. The CDU lost so much support that a Green-SPD government was able to form a coalition government. Both the nuclear catastrophe in Japan and a controversial railroad construction project (Stuttgart 21), which had been pushed through by the CDU over local opposition, contributed to the CDU's heavy losses. The new minister-president, Winfried Kretschmann, the first Green to hold this post

umzingeln das Regierungsviertel und fordern "Atomkraft: Schluss jetzt!" [Anti-Nuclear Protest in Berlin Exceeds Expectations: 100,000 People Surround the Government Quarter and Demand "Nuclear Shut Down Now!"], BUND (Sept. 18, 2010), <http://www.bund.net/nc/presse/pressemitteilungen/detail/artikel/anti-atom-protest-in-berlin-uebertrifft-erwartungen-bei-weitem-100000-menschen-umzingeln-das-regier/> (Ger.).

in the history of the country, made clear his will to shut down the nuclear facilities in the region as soon as possible.

The FDP, a particularly strong supporter of nuclear energy, suffered major losses in a number of elections. They were voted out of the state parliament in Mecklenburg-Vorpommern, Saxony-Anhalt, the Rhineland Palatinate, and Bremen. By contrast, the Greens surged, becoming the second-largest party in Baden-Wuerttemberg and Bremen and the third-largest in the Rhineland-Palatinate and Berlin. An astute politician, Angela Merkel responded to these developments with amazing speed. It was clearly important to the chancellor to take back control of how the issue was being framed and to show that her government was in charge. Failure to do so would most likely have led to further electoral losses for her party.

Three days after the tsunami struck in Fukushima, Angela Merkel announced a three-month moratorium on the nuclear plant running-time extension plan and ordered that the eight oldest nuclear power plants be taken off line (one already was). She requested the Nuclear Safety Commission to produce a report on the safety of Germany's nuclear power plants²⁴ and set up an Ethics Commission for a Safe Energy Supply (*Ethikkommission für ein sichere Energieversorgung*), the first of its kind in Germany and possibly the world. It is no coincidence that the CDU's Klaus Töpfer, Germany's environment minister after Chernobyl (1987-1994), who also helped pioneer Germany's first feed-in law for renewable energy, was asked to head the commission together with Matthias Kleiner, president of the German Research Foundation (*Deutsche Forschungsgemeinschaft* (DFG)).

The seventeen members of the Ethics Commission were assigned the task of answering the question: How should the Fukushima nuclear crisis impact our thinking about nuclear energy?²⁵ The ruling coalition announced it would wait for the Ethic Commission's report before announcing how it would respond to Fukushima. The commission included both opponents and supporters of nuclear energy, but purposively had no members close to the nuclear energy industry on it.

At its opening meeting, Chancellor Angela Merkel and Environment Minister Norbert Röttgen were present. Merkel explained that despite her government's decision to extend the contracts of Germany's nuclear power

24 REAKTORSICHERHEITSKOMMISSION [NUCLEAR SAFETY COMM'N], ANLAGENSPEZIFISCHE SICHERHEITSÜBERPRÜFUNG (RSK-SÜ) DEUTSCHER KERNKRAFTWERKE UNTER BERÜCKSICHTIGUNG DER EREIGNISSE IN FUKUSHIMA-I [PLANT-SPECIFIC SAFETY REVIEW OF GERMAN NUCLEAR POWER PLANTS IN LIGHT OF EVENTS IN FUKUSHIMA-I] (2011) (Japan).

25 The author was appointed to this commission.

plants in late 2010, Fukushima required a rethinking of this decision. Norbert Röttgen suggested that a shift towards a more sustainable energy future — one based on renewable energy and energy efficiency — could be a chance for economic innovation and stimulate new developments in the economy. Both noted that nuclear energy is a divisive issue that had led to decades of conflict in the country, and a decision to develop alternatives would be an opportunity to unify the country.²⁶

During its deliberations, and as can be seen in its final report, the commission concluded that nuclear energy carries with it a unique set of risks that are not comparable with any other form of energy. Germany and Japan have similarly high nuclear safety standards. The commission concluded that although Germany's nuclear power plants are among the safest in the world, the troubles in Fukushima show that even the best planning and safety measures cannot prevent unimaginable disasters. In Japan, human errors compounded a natural disaster and led to a system breakdown. The commission argued that a similar accident in Germany is highly unlikely, but other kinds of unforeseen disasters or terrorist attacks cannot be ruled out. And, in the case of a catastrophic accident, the consequences not only for densely populated Germany and Europe, but for the whole world, would be unacceptably great.

The commission also agreed that there are other ethical problems with using nuclear energy today for our own benefit, while leaving nuclear waste problems for future generations to deal with.²⁷ There is still no adequate answer to the nuclear waste storage problem and thus, in countries throughout the world, nuclear waste remains in temporary storage — also a rather risky solution. And as the nuclear disaster in Fukushima and the earlier one in Chernobyl have shown, the costs of cleanup are enormous and the decontamination and decommissioning processes can take decades, possibly centuries. Furthermore, there is a problem of nuclear proliferation. By rejecting nuclear energy, Germany is also sending a signal to other countries about the possibilities of alternatives to nuclear energy. Perhaps most importantly, the commission concluded that the German people — through their protests on the streets and at the ballot box — had made their voices heard. They do not want nuclear energy. They want a society built on sustainable forms of energy, and for the German people that means renewable energy.

26 Author's recollection.

27 A similar point regarding the characteristics of states that are concerned with the welfare of future generations is made in Dorit Kerret & Renana Shvartzvald, *Where There's a Will There's a Way — A Theoretical Analysis of the Connection Between Social Policy and Environmental Performance*, 14 THEORETICAL INQUIRIES L. 245 (2013).

The commission spent a good deal of its time thinking about how nuclear energy can be replaced through energy efficiency improvements and faster development of renewable energy. It was agreed that a faster nuclear phaseout would speed the development of a renewable energy infrastructure, stimulate new innovations, and provide new job opportunities. Where there was disagreement was on just how fast the phaseout should be. Thus, the commission simply recommended a phaseout within a decade or earlier if possible.

The commission handed over its report to Chancellor Merkel at the end of May.²⁸ The next day the ruling coalition announced its plans for a nuclear phaseout within a decade. The eight nuclear power plants that were already shut down were to remain off the grid. The remaining nine were given a shutdown schedule, with one plant to be taken off line each year in 2015, 2017, and 2019, and the remaining six in 2021 and 2022. In announcing the decision to the public, Angela Merkel spoke of the challenges and opportunities this would open for Germany.²⁹

On June 30, 2011, by a vote of 513 to 79, the German *Bundestag* voted to support the phaseout by 2022. The Left party, which voted against the amendment, announced that they were not opposed to a phaseout, but to its slow pace. The *Bundesrat* (the Upper House of Parliament) gave its consent to the law on July 8, and on 1 August, 2011, the German President Christian Wulff added his signature to the new nuclear energy law.³⁰ Essentially, an across-party consensus on nuclear phaseout had been achieved after decades of division and conflict. Crisis had opened the window for a policy change that was large in scale, but clearly had its roots in earlier policy decisions.

28 ETHIK-KOMMISSION SICHERE ENERGIEVERSORGUNG [ETHIC COMM'N FOR A SAFE ENERGY SUPPLY], DEUTSCHLANDS ENERGIEWENDE — EIN GEMEINSCHAFTSWERK FÜR DIE ZUKUNFT [GERMANY'S ENERGY TRANSITION — A COLLECTIVE PROJECT FOR THE FUTURE] (2011) (Ger.), available at http://www.bundesregierung.de/Content/DE/_Anlagen/2011/07/2011-07-28-abschlussbericht-ethikkommission.pdf?__blob=publicationFile&v=4 (English translation is available at http://www.bundesregierung.de/Content/DE/_Anlagen/2011/05/2011-05-30-abschlussbericht-ethikkommission_en.pdf).

29 *Germany Decides to Shut Down Its Nuclear Reactors*, YOUTUBE (May 31, 2011), http://www.youtube.com/watch?v=v2kchdJ_Z68.

30 Dreizehntes Gesetz zur Änderung des Atomgesetzes vom [Thirteenth Law Amending the Nuclear Energy Law], July 31, 2011, BGBl. I at 1704-05 (Ger.).

IV. CLIMATE CHANGE, RENEWABLES, AND THE NUCLEAR QUESTION

Growing scientific evidence about global warming has resonated strongly with the environmentally informed German public.³¹ Concerns about climate change are strong in Germany. A 2011 Eurobarometer survey on climate change found that sixty-six percent of those surveyed in Germany considered climate change to be “the single most serious problem facing the world as a whole.” The only issue of greater concern was poverty, hunger, and lack of drinking water (sixty-nine percent) (multiple responses were possible).³² A similar ranking was found in the 2008 Eurobarometer survey.³³

In 2010, Germany was the world’s sixth-largest emitter of GHGs, accounting for about 2.3% of global CO₂ emissions. The top emitters were China (24.6% of global emissions), the United States (16.4%), India (6.2%), the Russian Federation (5%), and Japan (3.4%). Per capita emissions in Germany are at about 9.3 tons CO₂-equivalent, substantially below the U.S. level of 17.6, but well above the Chinese level of 6.2 or the Indian level of 1.7.³⁴ Some progress has been made in reducing CO₂ emissions. German emissions at the end of 2011 were about 26.5% below 1990 levels.³⁵

At least since the German *Diet* established an Enquete Commission on Preventive Measures to Protect the Atmosphere in 1987, climate change has been a theme regularly visited by the German *Diet*. The commission’s first

31 For a history of German climate policy, see ELKE BRUNS, DÖRTE OHLHORST, BERND WENZEL & JOHANN KÖPPEL, *RENEWABLE ENERGIES IN GERMANY’S ELECTRICITY MARKET* (2011); RIE WATANABE, *CLIMATE POLICY CHANGES IN GERMANY AND JAPAN: A PATH TO PARADIGMATIC POLICY CHANGE* (2011); Michael T. Hatch, *The Politics of Climate Change in Germany: Domestic Sources of Environmental Foreign Policy*, in *EUROPE AND GLOBAL CLIMATE CHANGE: POLITICS, FOREIGN POLICY AND REGIONAL COOPERATION* 41 (Paul G. Harris ed., 2007); Helmut Weidner & Lutz Mez, *German Climate Change Policy: A Success Story with Some Flaws*, 17 J. ENV’T & DEV. 356 (2008).

32 TNS OPINION & SOCIAL, *CLIMATE CHANGE: REPORT* (2011), available at http://ec.europa.eu/public_opinion/archives/ebs/ebs_372_en.pdf.

33 TNS OPINION & SOCIAL, *EINSTELLUNGEN DER EUROPÄISCHEN BÜRGER ZUM KLIMAWANDEL [ATTITUDES OF EUROPEAN CITIZENS TOWARD CLIMATE CHANGE.]* (2008) (Ger.), available at http://ec.europa.eu/public_opinion/archives/ebs/ebs_300_full_de.pdf; see also Keret & Shvartzvald, *supra* note 27.

34 The Carbon Dioxide Information Analysis Center lists global, regional, and national data on carbon dioxide emissions, see CARBON DIOXIDE INFORMATION ANALYSIS CENTER, <http://cdiac.ornl.gov/> (last visited July 3, 2012).

35 Hans-Joachim Ziesing, *Milde Witterung lässt CO₂-Emissionen in Deutschland 2011 sinken [Mild Weather Behind the Fall in CO₂ Emissions in Germany in 2011]*, 62 ENERGIEWIRTSCHAFTLICHE TAGESFRAGEN 30 (2012) (Ger.).

interim report, released in 1989, urged sharp emission reductions and warned of the potential grave consequences if emissions were not reduced globally.³⁶

Angela Merkel served as environment minister from 1994 to 1998, during the time the Kyoto Protocol was formulated. When the European Union negotiated an eight percent reduction goal for its greenhouse gas (GHG) emissions relative to 1990 levels by 2008-2012, this was only possible because Germany agreed within the European Union burden-sharing agreement to cut its emissions by twenty-one percent over the same timeframe. Later a forty percent reduction target for 2020 was adopted and, as we will see below, this brought both renewable energy and nuclear energy strongly into the debate.

Nuclear energy has been closely linked to debates about climate change from the start. Prior to Fukushima, nuclear energy supporters and some climate change activists began to push nuclear energy as a clean, low-carbon energy that could provide base-load electricity. It was this framing that was used by the CDU and FDP to justify the extension of the nuclear power plants' running time in 2010. The Fukushima nuclear crisis basically crushed this framing's chances of taking stronger hold in Germany. The antinuclear community managed to win to their side many of those who had started to accept the conservative government's and utility industry's argument that nuclear energy could serve as a safe and affordable technology with low CO₂ emissions, which could help Germany smooth the transition to a future electricity system based primarily on renewables. After the Fukushima explosions, far fewer were willing to accept this framing of nuclear energy as a clean and safe energy.

Compared with other countries where nuclear opposition is also strong, one advantage that antinuclear proponents have in Germany is that the country has already started a transition to renewable energy. There has been a sharp growth in renewable energy capacity. The SDP-Green coalition of 1998-2002 not only pushed through the phaseout of nuclear energy, but also introduced a Renewable Energy Law replacing the earlier renewable electricity Feed-In Law.³⁷ The new law set a target for increasing the share of electricity generated from renewable sources from five to ten percent by 2010. This law can largely be credited with the rapid expansion in renewable energy capacity that Germany has experienced and Germany's rise to world leadership in renewable energy generation. It also meant that even after the grand coalition between the conservative CDU/CSU and the more left-leaning SPD was

36 STUDY COMM'N OF THE 11TH GERMAN BUNDESTAG: PREVENTIVE MEASURES TO PROTECT THE EARTH'S ATMOSPHERE, PROTECTING THE EARTH'S ATMOSPHERE: AN INTERNATIONAL CHALLENGE (1989) (interim report).

37 Hatch, *supra* note 31 (providing a general overview of the history of German climate policy as well as the introduction of the Renewable Energy Law).

formed in November 2005, Germany could continue to push new policies domestically and lead internationally on climate change. At the G-8 Summit in Heiligendamm in July 2007, Chancellor Merkel called on the United States to accept a global plan aimed at limiting the warming of the planet to 2°C above preindustrial levels. Domestically, the grand coalition passed the 2008 Integrated Climate and Energy Program, establishing three goals for 2020: a forty percent reduction in CO₂ emissions relative to 1990 levels, an increase in renewables to at least thirty percent in the electricity sector and fourteen percent in the heating sector by 2020, and a doubling of energy efficiency compared to 1990 levels.³⁸ In the ensuing year, implementing legislation was passed.³⁹

One might have expected that when a coalition was formed after the next election in 2009 between the two conservative parties — the CDU/CSU and FDP — they would have tried to relax the climate program. Instead, even more ambitious emission reduction targets were set, but with the argumentation that to meet them it would be necessary to extend the running lifetime of the nuclear power facilities. Under the Energy Concept of September 2010, CO₂ emissions are to be cut by forty percent of 1990 levels by 2020, fifty-five percent by 2030, seventy percent by 2040, and eighty to ninety-five percent by 2050.⁴⁰

These targets have not been changed as a result of the decision to phase out nuclear energy after the Fukushima disaster; they were included in an amendment to the Renewable Energy Law. In addition, the following renewable targets were set: achieving at least thirty-five percent of electricity from renewables by 2020, fifty percent by 2030, sixty-five percent by 2040, and eighty percent

38 BUNDESMINISTERIUM FÜR UMWELT, NATURSCHUTZ UND REAKTORSCHERHEIT, ECKPUNKTE FÜR EIN INTEGRIERTES ENERGIE- UND KLIMAPROGRAMM (2007) (Ger.), available at http://www.bmu.de/files/pdfs/allgemein/application/pdf/klimapaket_aug2007.pdf.

39 Martin Jaenicke, *German Climate Change Policy: Political and Economic Leadership*, in *THE EUROPEAN UNION AS A LEADER IN INTERNATIONAL CLIMATE CHANGE POLITICS* 129 (Rüdiger K.W. Wurzel & James Connelly eds., 2011).

40 BUNDESMINISTERIUM FÜR UMWELT, NATURSCHUTZ UND REAKTORSCHERHEIT UND BUNDESMINISTERIUM FÜR WIRTSCHAFT UND TECHNOLOGIE, ENERGIEKONZEPT FÜR EINE UMWELTSCHONENDE, ZUVERLÄSSIGE UND BEZAHLBARE ENERGIEVERSORGUNG (2010) (Ger.), available at <http://www.bmwi.de/BMWi/Redaktion/PDF/Publikationen/energiekonzept-2010,property=pdf,bereich=bmwi,sprache=de,rwb=true.pdf>. For an English translation, see FED. MINISTRY FOR THE ENV'T, NATURE PROTECTION, AND REACTOR SAFETY, ENERGY CONCEPT FOR AN ENVIRONMENTALLY SOUND, RELIABLE AND AFFORDABLE ENERGY SUPPLY (2010), available at <http://www.bmwi.de/English/Navigation/Service/Publications/publications-archive,did=367764.html>.

by 2050. Furthermore, the law requires that by 2020 at least eighteen percent of total energy is to be produced by renewables and sixty percent by 2050.⁴¹ This is to be accomplished in parallel to large-scale improvements in energy efficiency that are to reduce the total volume of energy consumed by twenty percent by 2020 and fifty percent by 2050.⁴²

Although there are some areas related to climate change and clean energy where Germany has not taken the lead in Europe (e.g., in relation to the establishment of automobile fuel efficiency standards or speed limits on highways), it is widely seen as a leader in developing policy proposals and goals for reducing dependence on carbon-emitting fuels and addressing climate change. An interview-based survey conducted internationally by the *Gesellschaft für internationale Zusammenarbeit* (GIZ), the German development aid agency, found that Germany is viewed as a “green nation,” a climate policy leader, and a green technology pioneer, although some also thought the German government was naïve, unrealistic, and rash in its decisions post-Fukushima.⁴³ Despite such criticism and skepticism, and although Germany is too small to be able to substantially contribute to a reduction in global GHG emissions through the actions it takes domestically, there is a strong belief that through the development of new technologies and knowhow, Germany can set a good example for others and contribute to the development of more effective and affordable clean energies. In this way, the decision to go low carbon (without nuclear) could be one of the largest contributions Germany could possibly make to pushing the world in the direction of cleaner energy.

Although the energy transition has been determined at the federal level, there is a powerful push for change from below. At the end of 2011, about

41 Gesetz zur Neuregelung des Rechtsrahmens für die Förderung der Stromerzeugung aus erneuerbaren Energien [Law Pertaining to the New Regulation of the Legal Framework for the Promotion of Electricity from Renewable Energies], July 28, 2011, BGBL. I at 1634 (Ger.).

42 *Der Weg zur Energie der Zukunft — sicher, bezahlbar und umweltfreundlich: Eckpunktepapier der Bundesregierung zur Energiewende* [The Road to the Energy of the Future — Safe, Affordable, and Environmentally Friendly], BUNDESMINISTERIUM FÜR UMWELT, NATURSCHUTZ UND REAKTORSICHERHEIT (June 6, 2011), http://www.bmu.de/energiewende/beschluesse_und_massnahmen/doc/47465.php (Ger.).

43 DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ) [GERMAN ASS'N FOR INT'L COOPERATION], DEUTSCHLAND IN DEN AUGEN DER WELT: ZENTRALE ERGEBNISSE DER GIZ-ERHEBUNG, AUSSENSICHT DEUTSCHLAND — RÜCKSCHLÜSSE FÜR DIE INTERNATIONALE ZUSAMMENARBEIT [GERMANY IN THE EYES OF THE WORLD: CENTRAL FINDINGS OF THE GIZ-SURVEY, “INTERNATIONAL VIEWS OF GERMANY — CONCLUSIONS FOR INTERNATIONAL COOPERATION”] (2012) (Ger.).

twenty percent of the country's electricity was produced from renewable resources. Approximately half of the renewable facilities are privately owned, suggesting a strong grassroots interest in renewables. Numerous communities have established their own plans for becoming one-hundred percent renewable electricity regions. The regions of Ulm and Neu Ulm, with a combined population of 285,000, have a plan to become completely renewable in the electricity sector by 2020 and one-hundred percent overall, including in the heating sector, by 2030. Bamberg, a region of 21,000 inhabitants, has a plan to become one-hundred percent renewable by 2035. The same holds for Freiburg. Already some smaller villages have achieved one-hundred percent (or greater) renewable energy supplies, such as Feldheim, in the vicinity of Berlin; Effelter in northern Bavaria; or Kronprinzkoog, near the North Sea.⁴⁴ A growing number of villages, cities, and regions are joining the push to become energy self-sufficient.

V. COMPARING NATIONAL RESPONSES TO THE NUCLEAR CRISIS

The Fukushima nuclear disaster has elicited different reactions from around the world. The reactions may well portend major differences in the energy development paths of countries in the years ahead. The differences speak less to the mix of energy sources available to countries domestically than to the power of pro- and antinuclear coalitions within them. Thus, the same nuclear crises have not led to the same policy responses.

Several countries have followed Germany's lead. In Italy a referendum was held in June 2011, in which over ninety percent of the population voted to oppose the restart of a nuclear energy program that had been stopped in the 1980s, but was being promoted anew by Prime Minister Silvio Berlusconi. The Berlusconi government gave up its nuclear ambitions after the referendum.⁴⁵ In Switzerland, in September 2011, the upper chamber joined an earlier vote of the lower chamber calling for a nuclear phaseout by 2034 (with the first nuclear plant to be shut down in 2019, followed by two in 2022, and the last two in 2029 and 2034, respectively).⁴⁶ The Belgian government announced its intentions to phase out nuclear energy, although there is still some uncertainty

44 See GO 100% RENEWABLE ENERGY, www.go100percent.org/cms (last visited July 3, 2012).

45 *Italy Nuclear: Berlusconi Accepts Referendum Blow*, BBC NEWS (June 14, 2011, 8:17 PM), <http://www.bbc.co.uk/news/world-europe-13741105>.

46 James Kanter, *Switzerland Decides on Nuclear Phase-Out*, N.Y. TIMES, May 25, 2011, <http://www.nytimes.com/2011/05/26/business/global/26nuclear.html>.

as to the speed of the process.⁴⁷ And with its newfound natural gas discoveries in the Mediterranean, Israel too appears unlikely to follow a civil nuclear energy expansion path; this is a clear break with the announcement in 2010 that it wanted to jointly build a nuclear reactor with Jordan.⁴⁸ In March 2012, the Israeli government announced that one of its civilian reactors, in Soreq, would be closed down in 2018.⁴⁹

In many countries where the nuclear industry is strong, there have been vigorous efforts to protect the status quo. In China, although nuclear energy still accounts for just over one percent of electricity, it is seen as an important part of a future energy mix, and one that can contribute to combating climate change. China is investing in every form of energy available and has made clear that despite Fukushima, it plans to continue its nuclear expansion. Still, as a result of Fukushima, the government did put a temporary moratorium on new construction, initiated safety checks of the country's existing fourteen plants, and developed a new nuclear safety plan.⁵⁰ Great Britain's government has announced that the country's nuclear power plants are safe and there is no reason not to continue with nuclear energy development.⁵¹ Yet plans for nuclear expansion have hit some bumps in the road. Investors RWE Npower and E.On announced in March 2012 that they would not go forward with their plans to build nuclear power plants in the United Kingdom.⁵² In the United States, there is some opposition to nuclear, but in January 2012, the Nuclear Regulatory Commission approved permits for two nuclear reactors at a new

47 *Belgium Plans to Phaseout Nuclear Power*, BBC NEWS (Oct. 31, 2011), <http://www.bbc.co.uk/news/world-europe-15521865>.

48 Steven Erlanger, *Israel Intends to Build Civilian Nuclear Plants*, N.Y. TIMES, Mar. 9, 2010, <http://www.nytimes.com/2010/03/10/world/middleeast/10nukes.html>.

49 Dan Williams, *Israel to Phase Out Civilian Atomic Reactor by 2018*, REUTERS (Mar. 20, 2012), <http://www.reuters.com/article/2012/03/20/israel-nuclear-idUSL6E8EK3AS20120320>.

50 Feng Jie, *New Nuclear Spring for China?*, CHINA DIALOGUE (Mar. 29, 2012), <http://www.chinadialogue.net/article/show/single/en/4847> (China).

51 *See, e.g.*, Letter from Chris Huhne, Sec'y of State, Dep't of Energy & Climate Change, U.K., to Dr. M.W. Weightman, HM Chief Inspector, Nuclear Directorate, Health & Safety Exec., Japanese Earthquake and Tsunami: Implications for the UK Nuclear Industry (Dec. 2011) (remarks in response to the nuclear safety report conducted in the United Kingdom) (U.K.), *available at* <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/nuclear/3718-gov-response-weightman-final.pdf>.

52 *RWE and E.On Halt UK Nuclear Plans at Wylfa and Oldbury*, BBC NEWS (Mar. 29, 2012), <http://www.bbc.co.uk/news/world-17546420> (U.K.).

nuclear power facility to be built in eastern Georgia, the first new approval since 1978.⁵³ In France, the former President Nicolas Sarkozy repeatedly commented on the safety of the country's nuclear power plants and aimed to extend their contracts beyond their original forty years, but his successor, the Socialist Party's François Hollande, has called for a reduction in the country's dependence on nuclear energy for electricity from the current seventy-five percent to fifty percent by 2025.⁵⁴

VI. NUCLEAR CRISIS AND RESPONSE IN JAPAN

Oddly, the country that in 2012 remains most uncertain about its nuclear energy future is Japan. The Fukushima nuclear crisis has brought the nuclear industry to a standstill; for a few weeks starting on May 5, 2012, all fifty-four nuclear reactors were offline. The shutdown of the reactors is for routine maintenance checks, but due to local opposition, prefectural governors have blocked them from going back online. The national government has indicated its desire to see the nuclear power plants put back in operation and restarted two nuclear reactors in the Ohi nuclear facility in July 2012.⁵⁵

Nuclear energy supplied about twenty-six percent of Japan's electricity in early 2011, but since Fukushima, through a combination of energy-saving measures and greater use of conventional fossil fuels, blackouts have been largely avoided. That Japan has gone now for a year on a greatly reduced nuclear energy supply has led many in the country to question whether a return to nuclear is necessary, even though the powerful Keidanren and others are arguing that Japan cannot afford to abandon nuclear energy.⁵⁶ The continued aftershocks from the 2011 Tohoku earthquake and expectations that the Tokyo region is overdue for a major earthquake have the country's inhabitants nervous and questioning whether the assurances of safety given to them by government officials can be trusted. Slowly, the idea that an alternative energy

53 Ayesha Rascoe, *NRC Approves First New Nuclear Plant in a Generation*, REUTERS (Feb. 9, 2012), <http://www.reuters.com/article/2012/02/09/us-usa-nuclear-license-idUSTRE8181T420120209>.

54 Tera Patel, *EDF Wins Reprieve as Hollande Cools on Greens Nuclear Pact*, BLOOMBERG BUS. WK., Apr. 25, 2012, <http://www.businessweek.com/news/2012-04-25/edf-wins-reprieve-as-hollande-cools-on-greens-nuclear-pact>.

55 J. Mark Ramseyer, *Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan*, 13 THEORETICAL INQUIRIES L. 457 (2012).

56 *Id.*; Asahi Shimbun, Minoru Nagata, *Keidanren Pans Government's Three Nuclear Energy Proposals*, JAPANESE L. BLOG (July 28, 2012), <http://ajw.asahi.com/article/0311disaster/fukushima/AJ201207280056> (Japan).

pathway could be possible is gaining supporters in Japan. Traditionally, civil society is weak and the antinuclear movement far less well networked than is the case in Germany. Protest actions are gaining in popularity, however, and huge demonstrations have been taking place in Kasumigaseki, where the government sits. This has especially been the case since the government gave its backing to the restart of the reactors at the Ohi nuclear power plant in Fukui prefecture.

The surprising development in Japan is that the government's slow response on the question of a future energy pathway post-Fukushima has led to a situation where sub-state actors — local governments (including the powerful mayor of Osaka, Toru Hashimoto), citizens' groups, and individuals among the public — have had the time to start to network in ways they never have before. New media tools, like Facebook and Twitter, have played a critical role in bringing protesters together. As their protest actions grow bigger and bigger in size, they have succeeded in gaining the government's attention. That and the international pressure to enhance information transparency after the disaster are forcing the government to open what traditionally has been a very closed policymaking discussion to greater participation by society. As a result, for the first time ever, public comments are being invited on the government's plans for Japan's energy future.

Different scenarios have been presented to the public, ranging from a future of twenty to twenty-five percent nuclear and twenty-five to thirty percent renewables in the electricity mix in 2030, to a midrange scenario with fifteen percent nuclear and thirty percent renewables in 2030, to a complete phaseout of nuclear and thirty to thirty-five percent renewables by 2030.⁵⁷ In all three scenarios, already far greater shares of renewable energy are foreseen compared to the situation before Fukushima (when plans were to expand nuclear to forty-five percent of electricity supply by 2030 and have just ten percent renewables). As a first implementation step in this direction in July 2012, a renewable electricity feed-in tariff was introduced. The difference between the first two scenarios is whether only existing nuclear power plants will be allowed to continue to operate or new ones will also be built. The nuclear industry and many energy bureaucrats would be happy to see contract extensions for the country's aging nuclear energy facilities and permit new building as well. The third scenario is a variant of the German model, where Japan would phase out nuclear energy and shift heavily to renewables. The

57 THE ENERGY & ENV'T COUNCIL, *OPTIONS FOR ENERGY AND THE ENVIRONMENT* (2012) (Japan), *available at* http://www.npu.go.jp/policy/policy09/pdf/20120720/20120720_en.pdf (the Japanese original is available at <http://www.sentakushi.go.jp/>).

question then would be at what speed this shutdown would occur. Some in the public are arguing for the complete and immediate shutdown of all of the country's nuclear reactors, while others would prefer a more gradual shutdown considering the impacts on the economy and industry.

Whether Japan will eventually follow a path towards a nuclear phaseout or continue along a path of relying on nuclear energy, however, is still an open question. Prior to his departure as prime minister, in a televised news conference, Naoto Kan called for a nuclear reduction and eventual nuclear-free Japan. His announcement was received positively by antinuclear activists in the country, but with anger by the Ministry of Economy, Trade and Industry and the Utility Industries.⁵⁸ His successor, Yoshihiko Noda, has been less unequivocal about a nuclear phaseout, instead limiting his comments to support for a reduction in nuclear energy, but also stressing the need to restart the country's nuclear power plants, starting with those in Fukui, a prefecture where the governor is supportive of nuclear energy. Yet criticism is strong and the Japanese government is struggling to win sufficient public support to restart Japan's reactors.⁵⁹ For Japan, the crisis continues and its long-term impacts on policy change are still unfolding.

CONCLUSION

Although the Fukushima nuclear disaster occurred on the other side of the planet, its impact was particularly large in Germany, where a powerful antinuclear energy coalition had already mobilized to protest the ruling coalition's plans to prolong the life of Germany's nuclear power plants and was gearing up for the twenty-fifth anniversary events to mark the Chernobyl nuclear accident. The antinuclear energy community brought their protests to the street and to the voting booth. Chancellor Merkel responded by tackling the issue head-on and turning the moment into her own chance to create a policy legacy. That was possible in part because earlier governments had already started to set Germany on the path toward a renewable energy option. She also won backing from the report of the Ethics Commission. As the antinuclear argument had formerly belonged to the opposition, there is little chance that the phaseout decision will be reversed again.

58 Asahi Shimbun, Satoru Iizuka, *Kan's Nuclear Phase-Out Plan Draws Anger over Lack of Details, Talks*, JAPANESE L. BLOG (July 15, 2011), <http://ajw.asahi.com/article/0311disaster/fukushima/AJ201107144468> (Japan).

59 Asahi Shimbun, *Noda Administration Puts Priority Back on Nuclear Energy*, JAPANESE L. BLOG (Apr. 15, 2012), http://ajw.asahi.com/article/behind_news/politics/AJ201204150017 (Japan).

The energy transition envisioned in Germany is of huge proportions and promotes a vision of energy development and supply that directly challenges the dominant vision of energy structures today. The dominant model suggests that modern industrial economies cannot function without access to coal, oil, gas, and nuclear. Achieving the ambitious climate and renewable energy goals while shutting down nuclear energy will require greater emphasis on energy efficiency; the development of a new electricity grid structure; development of offshore wind capacities; repowering of onshore wind turbines (that is, the replacement of an earlier generation of wind turbines with more powerful ones); development of electricity storage capacities in order to store electricity for days when there is insufficient wind or sun; research and development in energy technologies and processes, including smart grid technologies; and new low-carbon mobility structures. Essentially, Germany is planning an energy revolution that could bring with it a parallel industrial transformation.

If successful, the German energy model will present an alternative to these more conventional models, one that could be very attractive on many fronts. It could mean more jobs dispersed throughout the country, new international competitiveness, and a more environmentally sustainable economic structure. There have been many positive benefits already. Renewable energy-related jobs in Germany expanded from about 160,500 in 2004 to 249,300 in 2007 and about 370,000 in 2011.⁶⁰

Of course, there are also many points of concern. A major assumption the government has worked with is that offshore wind will be a major contributor of electricity. However, as of early 2012, there were still many problems with getting offshore wind facilities into operation. There have been delays in building offshore wind sites as well as in establishing the new high-voltage electricity grid structure that will be needed to transfer the electricity from offshore sites in the north to the south of the country where the big manufacturing industries are. There is also concern about winning public acceptance for the new grid infrastructure, as well as for more wind and solar parks and biomass facilities.

The changes underway have important implications for GHG emissions. In the short term, the policy shift could lead to somewhat higher GHG emissions (although in the first year since Fukushima, this has not been the case for

60 Statistics on jobs are provided by Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit [Ger. Ministry for the Env't, Nature Conservation & Reactor Safety], *Erneuerbare Energien geben in Deutschland bereits mehr als 380.000 Menschen Arbeit* [Renewable Energy Provides Already More than 380,000 Jobs in Germany], Press Release (Mar. 26, 2012) (Ger.), available at http://www.bmu.de/pressemitteilungen/aktuelle_pressemitteilungen/pm/48528.php.

Germany (although it could be for Europe)). In the medium- to long-term, however, the shift should help accelerate the transition to a low-carbon energy structure based on renewables.⁶¹ As the process is just beginning, there will inevitably be many bumps on the road and some wrong turns taken. The path ahead, however, is one that has many Germans excited about the future. Nuclear crises have opened the path to a new energy future in Germany that looks dramatically different from what was thought just a few decades earlier. The challenges are daunting, but Germany has placed its bets on renewable energies.

Change is happening in Japan as well. As the antinuclear coalition was very weak at the time the disaster struck, early mobilization against the nuclear policies of the government was limited, but over the course of a year, the movement has begun to take on new form. A Green Party was launched at the national level in July 2012. The public has demanded a say in the country's future energy strategy as well. The pro-nuclear energy coalition remains strong in Japan, but they are now confronted by strongly anti-nuclear public opinion and by an anti-nuclear energy movement that has become sufficiently powerful to launch an unprecedented debate about the role of nuclear energy in the country's future. Thus, although it is uncertain whether Japan will in the end opt for a phaseout of nuclear energy, it is clear that it will be reducing its dependence on nuclear energy and building its renewable energy sector. The debate is likely to continue long into the future. The long-term prospects for a non-nuclear Japan will depend on public opinion, the strength of the anti-nuclear coalition, the rate of development of renewable energy sources, and possible other unforeseeable events.

61 SACHVERSTÄNDIGENRAT FÜR UMWELTFRAGEN [GER. ENV'T ADVISORY COUNCIL], *WEGE ZUR 100 PROZENT ERNEUERBARE STROMVERSORGUNG, ZONDERGUTACHTEN [WAYS TO 100% RENEWABLE ELECTRICITY, SPECIAL REPORT]* (2011) (Ger.), available at http://www.umweltrat.de/SharedDocs/Downloads/DE/02_Sondergutachten/2011_07_SG_Wege_zur_100_Prozent_erneuerbaren_Stromversorgung.pdf?__blob=publicationFile.