

An electricity-generating windmill towers near a uranium enrichment plant in southern France.



A New Era in Energy

Germany vows to abandon nuclear power, but renewables are viewed as too expensive and unreliable

By *per Concordiam* Staff
Photos by Agence France-Presse

German Chancellor Angela Merkel spent four days in early March 2011, like many around the world, watching the nuclear disaster in Fukushima, Japan, unfold on television. These events caused Merkel, a reasoned supporter of nuclear energy, to make a radical change in direction. On March 15, Merkel announced that Germany was shutting down seven nuclear power plants immediately and would decommission the remainder by 2022. “We can’t simply continue as normal,” Merkel was quoted in *Der Spiegel*. “The events in Japan teach us that something that by all scientific benchmarks was considered impossible can actually occur.”

But Germany has more ambitious plans than simply ending the era of nuclear power. The Germans are also simultaneously committing to a transition to renewable energy to meet its goals of cutting “greenhouse” gas emissions. According to Yale Environment 360, an online journal from Yale University, the plan “makes Germany the world’s most important laboratory of green growth.”

The excitement surrounding the German plan and its promise of a new energy paradigm is attractive to Europeans, but is it realistic? Some in European industry and government have criticized the plan as being rash and potentially unworkable. They say the rush to shut down nuclear plants without sufficient energy substitutes in place could dramatically increase costs to consumers, lead to power blackouts, stunt economic growth, delay meeting emission goals and increase dependence on natural gas imports. And even if the transition is largely successful, nobody questions that it will be expensive. Cost estimates vary from 250 billion to 1.7 trillion euros in research, capital and subsidies, raising concerns that economic output from Europe’s industrial leader could be negatively impacted.

Fukushima: Apocalyptic warning or lesson learned?

The Fukushima disaster, the result of a magnitude-9 earthquake on March 11, 2011, followed quickly by a devastating tsunami, sent shock waves around the world. *The New York Times* reported that support for nuclear power in the United States dropped precipitously. There were anti-nuclear protests, not just in Germany

but also in France and Spain. Other European countries are embracing Germany’s anti-nuclear power stance. Belgium announced plans to close its nuclear power plants by 2025, and Switzerland will phase out nuclear power by 2034. Italy, which abandoned nuclear power in 1987, voted overwhelmingly against a government plan to restart the industry, with 94 percent opposed. Almost every country where nuclear power plants operate ordered reviews of safety procedures and emergency inspections.

Before Fukushima, the image of nuclear power had been experiencing a renaissance of sorts as an attractive “climate friendly” option to fossil fuels. It had been 25 years since the infamous Chernobyl nuclear disaster in the Soviet Union caused widespread fear. The need for an effective, affordable, low-carbon source for an energy-hungry world, combined with safer new technologies, had raised the public profile of nuclear power. The disaster at Fukushima has unquestionably damaged that image. But does Fukushima demonstrate that nuclear power really is too dangerous? Or does the disaster represent a unique convergence of unprecedented natural disaster with human error and insufficient safety precautions? Should Europeans conclude that the risks are too high or that proper planning and safety will minimize the dangers? The answers to these questions depend on one’s point of view.

Visceral and widespread opposition to nuclear energy in Germany dates back to the 1970s. To those already opposed to, or suspicious of, nuclear energy, Fukushima



An electrician for Gehrlicher Solar, a German photovoltaics company, checks solar cell panels near Munich.

Windmills of the Alpha Ventus offshore wind farm churn near the North Sea island of Borkum. Germany inaugurated the country's first offshore wind park in April 2010.



represents clear evidence of its unmitigated dangers. German Environment Minister Norbert Röttgen told *Der Spiegel* that the Fukushima disaster “refuted basic assumptions about safety in Japan. It was an occurrence of so-called residual risk, which was practically ruled out.” On the other hand, Jean-Christophe Füg, head of international energy affairs at the Swiss Federal Energy Office said that “Fukushima has had a certain impact on public attitude but only marginal – it hasn’t tipped basic opinions, whether for or against.” For Germany, the disaster was the breaking point for a conservative government that had been trying to extend the life of its nuclear plants.

Many don’t share Röttgen’s assessment and even those concerned about the inherent risks of nuclear power view the “clear and present danger” of climate change as a bigger threat. Former International Energy Agency Executive Director Nobuo Tanaka told Reuters after the disaster: “The cost of fighting against global warming will increase, that is sure. I think it is very difficult [to fight global warming], even impossible, without using nuclear power.”

In the July 2011 *Bulletin of the Atomic Scientists*, European nuclear expert Caroline Jorant argued that risk in the European Union is mitigated by the Euratom Treaty, which provides laws that govern the nuclear energy industry. She pointed to the post-Fukushima decision of the European Commission to conduct stress tests of nuclear power plants across Europe. “The EU’s desire to address the potential weaknesses of its reactors and to improve their capacity for crisis response shows that, in the aftermath of Fukushima, the right lessons are being learned,” Jorant wrote.

Europe not united

Despite Fukushima and the phase-out of nuclear energy in Germany, Switzerland, Belgium and Italy, not all of Europe is rushing to follow. There were 134 operational nuclear power plants in the EU in January 2012, with 53 more in Switzerland, Ukraine and Russia. EU countries Bulgaria, Slovakia, Finland and France have new plants under construction.

Fifteen of 17 nuclear countries are sticking with their programs. The United Kingdom still plans eight new plants to replace aging ones and Sweden will do likewise. France, which gets

about 75 percent of its electricity from nuclear power, will continue and expand its program. Russia already has 10 new plants under construction and plans to build more, both domestically and abroad. Poland, Belarus and Turkey, which currently have no nuclear plants, are following through with plans to build a total of 10 over the next two decades.

“Everybody, including the supporters of nuclear energy, agrees that the future belongs to renewable energy sources. At the same time everybody understands that nuclear energy is also necessary today,” Natalia Meden of the Russian Academy of Science wrote in March 2011 in the Russian policy journal *International Affairs*.

A rough road

It won't be easy for Germany to reach its nuclear-free and low-carbon energy goals. Problems are already evident with both solar and wind power production, *Der Spiegel* reported. A new wind farm in the North Sea is complete but the lines to bring the electricity to the mainland grid are far behind schedule, causing potential losses in excess of 100 million euros. “Balancing the grid” is also a problem, as most of the wind power from the north must be transferred to replace nuclear power in the south, necessitating large-scale investment in new power lines and energy storage.

Solar energy is even more problematic. The industry has received the greatest share of clean energy subsidies, to the tune of 100 billion euros, but is the least efficient of all clean energy sources. Wind is five times more cost efficient and hydroelectric, six times. And according to *Der Spiegel*, investments in natural gas are 25 times more cost-effective in avoiding CO₂ emissions. The Munich-based Ifo Institute for Economic Research called it “a waste of money at the expense of climate protection.” And in the cloudy German winter, solar panels produce almost no energy, which means the use of backup energy sources to avoid outages. In the winter of 2011-2012, Germany had to import large amounts of nuclear-generated power from France and the Czech Republic, and an old Austrian oil-fired plant was restarted as backup.

Additional factors

Germany's rapid transition away from nuclear power threatens to increase its use of high CO₂-emitting coal energy. Twenty-six coal power plants to offset energy losses from the already shuttered nuclear plants are in planning or construction, and energy analysts expect demand for more “clean coal” energy to increase. A report from the German Economic Ministry calls for the construction of 17 new large power plants, *Der Spiegel*

reported. “Fossil fuel-fired power plants are essential for a secure energy supply,” the government report said and noted that the new plants are needed to compensate for lost nuclear energy by 2022 and for erratic wind and solar supplies.

Natural gas comes with its own concerns. While gas burns more cleanly than other fossil fuels, Europe is already heavily reliant on Russia for its supplies. Considering Russia has used gas exports as a geopolitical tool in the past, it's not always viewed as a reliable supplier. The EU continues pushing for an alternative pipeline project to diversify gas supply routes from the Caspian basin and reduce reliance on Russia. New technology also allows Europe to exploit natural gas deposits at home. Hydraulic fracturing, or “fracking,” makes it possible to extract large amounts of gas from previously inaccessible shale rock formations. European environmental groups are challenging this process however, fearing that it would pollute water and, if successful, reduce incentives to develop renewable energy.

Nuclear-free fallout

Die Welt wrote: “The nuclear phase out marks a creeping rejection of the economic model which has transformed Germany into one of the richest countries in the world in recent decades.” German conglomerate Siemens, which built all 17 of Germany's nuclear plants, announced in January 2012 it was pulling out of the nuclear business to focus on renewables and power transmission. Siemens estimated that the transition will cost as much as 1.7 trillion euros by 2030, much more than some others have calculated. Siemens board member Michael Süß told Reuters the cost will be borne by consumers and taxpayers. He believes that if Germany fails to make the transition as planned, the country's credibility as an industrial nation will be undermined.

But Chancellor Merkel told Agence France-Presse: “We believe we as a country can be a trailblazer for a new age of renewable energy sources. We can be the first major industrialized country that achieves the transition to renewable energy with all the opportunities – for exports, development, technology, jobs – it carries with it.”

That Germany is willing to be the world's laboratory for transitioning to a non-nuclear and low-carbon energy regime may be a good thing. But the rest of Europe still worries the plan may leave the EU's industrial engine without the necessary fuel to run efficiently, thereby hurting economic growth and prosperity for the entire continent while undermining energy security by increasing dependence on imported natural gas. □