



Nuclear Power After Fukushima

European Fallout

As the Fukushima Daiichi nuclear plant teetered on the brink of total meltdown in March, some observers thought it signaled the end of the age of nuclear power. Potentially more catastrophic than Chernobyl, Fukushima would demonstrate that nuclear power generation is simply too dangerous to be sustainable. The impact would be especially pronounced in Europe, where nuclear is the largest generator of electricity, accounting for 28% of the continent's consumption.

Since the disaster, policymakers across the continent have been faced with the question: do the benefits of nuclear power (low carbon footprint, high production

value, greater energy independence) outweigh the associated health and safety risks so starkly illustrated in Japan? The answer has been a resounding yes.

The majority of European countries with a nuclear industry have chosen to continue pushing ahead or even increase investment in nuclear since Fukushima. Several with no history of nuclear power have decided to pursue a domestic industry for the first time. A handful, however, such as longtime nuclear powerhouses Germany and Switzerland, abruptly succumbed to public pressure and backed away from their commitment to nuclear power.

Despite the initial public outrage and panic immediately following Fukushima, the decisions made by the majority of European countries over the past five months suggest that a strengthened industry is emerging, with tougher regulations and stricter adherence to industry best practices for safety and efficiency.

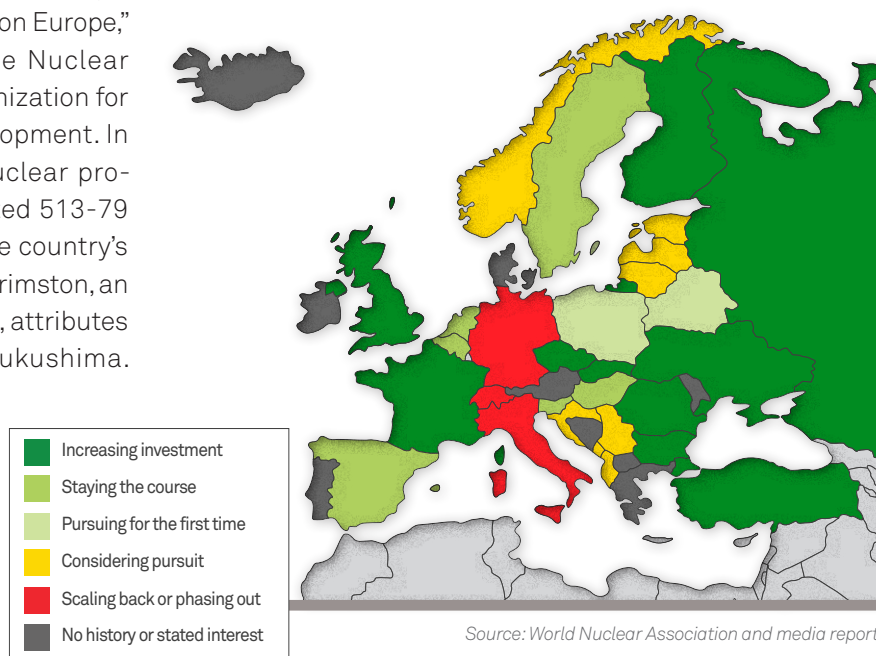
Ergo engaged five of our energy policy and nuclear engineering experts to assess the fallout of Fukushima in Europe and explore the future of nuclear power on the continent.

THE EXTREME REACTION: NUCLEAR ABANDONMENT

Immediately following Fukushima, intense anti-nuclear public sentiment in Germany, Switzerland, and Italy forced the governments to do an about-face on nuclear policy. Germany and Switzerland decided to phase out their existing nuclear power plants completely. Italy terminated its plans to introduce ten nuclear power plants into its energy mix. “The impact of Chernobyl on Europeans when they were younger is a very strong and forceful memory,” says John P. Banks, an energy security expert at Brookings.

Germany’s decision to shut down all 17 of its reactors is perhaps the “biggest single impact of the Fukushima disaster on Europe,” says Ron Cameron, Head of the Nuclear Development Division of the Organization for Economic Cooperation and Development. In response to widespread anti-nuclear protests, the Bundestag in June voted 513-79 to completely shut down all of the country’s nuclear plants by 2022. Malcolm Grimston, an energy analyst at Chatham House, attributes the vote’s outcome directly to Fukushima. “Deep-seated anti-nuclear feeling” in Germany exploited by the Green Party was a major threat to the Merkel government. “Regional elections just after Fukushima were disastrous for the CDU [Merkel’s party], and political panic was the result,” Grimston explains.

Status of European Nuclear Industries Since Fukushima



The reaction in **Switzerland** was similar. After public votes, the Swiss government agreed to phase out its five aging power plants as they reach the end of their lifecycles over the next 25 years. While nuclear power supplies a greater share of energy in Switzerland than in Germany (40% and 23%, respectively), Switzerland has a longer window of time to fill the energy deficit that will be created as its last nuclear plant will not be taken offline until 2029.

In **Italy**, a referendum had been on the table since 2008 to open a number of nuclear plants that were shuttered after Chernobyl. As soon as Fukushima occurred, the referendum was dead on arrival. The proposal was rejected in June by 95% of voters. While support for the referendum was already waning due to its support from an increasingly unpopular Silvio Berlusconi, experts agree that Fukushima was responsible for the lopsided margin.

THE MAJORITY REACTION: FAITHFUL TO NUCLEAR

Fukushima may have led Germany, Switzerland, and Italy to turn tail, but 15 of the 17 countries currently operating nuclear plants in Europe have not altered their policies at all. These nuclear stalwarts have judged that the long-term sustainability and relative cleanliness of nuclear power are worth the inherent risks associated with plant operation. This is not to say the lessons of Fukushima will be lost on them. The EU has ordered that all 143 power plants within its borders undergo stress-testing to identify safety vulnerabilities, a direct response to the disaster in Japan.

The **United Kingdom** will be one of the leaders of Europe's post-Fukushima nuclear age. With the first of eight new plants expected to come online in 2016 to replace aging plants, the UK's nuclear industry is likely to remain strong for the foreseeable future. Experts attribute the UK's acceptance of nuclear power to public and governmental sensitivity to climate change – a hot button issue among Britons for many years. Experts also note that there are no clear alternatives to nuclear for the UK to adopt without compromising its policy goals. Not only are coal, gas, and oil major sources of greenhouse gas emissions, but they are expensive to import and threaten the country's energy independence (a particular problem for the UK due to its lack of a robust alternative energy industry and the depletion of its existing natural resources).

Similarly, **France** has been generally unfazed by Fukushima and is pushing ahead with its nuclear energy program with little modification. Andrew Karam, a nuclear scientist specializing in radiation safety, attributes France's resoluteness to a "long history with safe nuclear power." He adds, "They are almost utterly dependent on it for their power – to me that would suggest they have neither the ability nor the inclination to change their course of action based on one accident (no matter how severe) far away." Indeed, France plans to replace all 58 of its nuclear plants as they reach the end of their lifecycles in the coming decades and to launch an additional plant (its 59th) next year. In recognition of the safety risks associated with such a dependence on nuclear power, President Nicolas Sarkozy announced in June that the French government would invest €1.43 billion in nuclear power industry development and safety research – a signal that the legacy of Fukushima will be closer scrutiny and improvement of industry standards.

In Italy, there was a plan to reintroduce nuclear, but public support was precarious and the Fukushima accident tipped the balance.

- **Ron Cameron**
Head of the Nuclear Development Division of the Organization for Economic Cooperation and Development

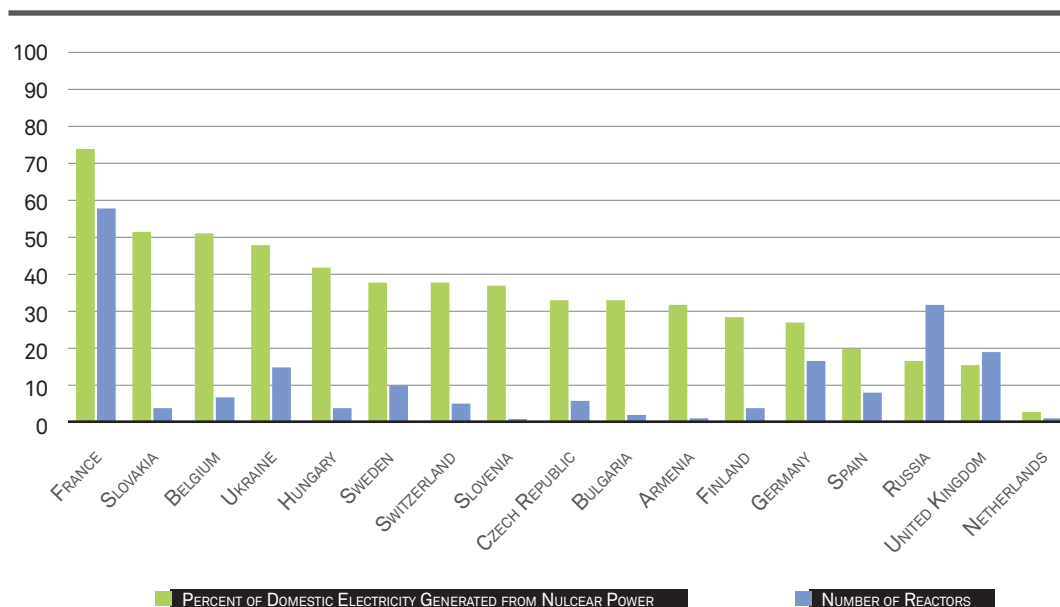


Nuclear energy is a part of the [French] national psyche and has always been regarded as essential since the 1973 oil price hike.

- **Malcolm Grimston**
Energy analyst at Chatham House



European Reactors and Their Output (April 2011)



Source: World Nuclear Association

Other European countries are aggressively pursuing plans to expand their nuclear industries in spite of Fukushima. Slovakia, Finland, and Russia all have additional nuclear plants currently under construction. Commitment to nuclear power in **Slovakia** is extremely strong – its four plants generate fully half of the country's electricity, and it has an additional two under construction. **Russia** is bolstering its program with ten new plants currently under construction, to add to the 32 it already has running. **Finland's** four plants provide 30% of its electricity, a share that will grow when its new plant comes online in 2013.

And seemingly against all odds, some European countries are planning to pursue nuclear energy for the first time. **Poland**, **Belarus**, and **Turkey** have concrete plans to build a total of ten new reactors over the next two decades. Lithuania is also considering getting in on the action.

ERGO'S VIEW

Coming on the heels of the twenty-fifth anniversary of the Chernobyl disaster, Fukushima served as a stark reminder to Europeans about the dangers of nuclear energy. Despite the terrible tragedy that befell Japan, the global nuclear power industry is not disappearing any time soon. Since March, as many as 60 countries have expressed interest in developing a nuclear power industry. Most European countries with existing programs continue to believe that the benefits of nuclear power outweigh the risks. Some countries based their decision to maintain or grow nuclear in the pursuit of a cleaner energy industry. Some are unwilling to walk away from the major investments made in existing infrastructure. For others, the alternatives are prohibitively expensive or politically unacceptable. **If there is any silver lining to Fukushima, it is the opportunity to usher in a set of much-needed industry improvements to avoid similar disasters in the future.**

Ergo sees opportunities for companies and countries that capitalize on the trend of developing nuclear in a sustainable, transparent manner. For instance, French industrial group AREVA recently developed an extra-safe European Pressurized Reactor (EPR). As safety standards tighten while nuclear programs expand, the EPR is a promising new reactor design that should gain traction across the EU. Additionally, Germany's loss can be France's gain. Germany, formerly a net electricity exporter, has already become a net importer in the months since it began shuttering its plants, and its electricity prices are forecast to rise 5% due to increased demand. France, a neighbor to Germany and the world's largest exporter of electricity, will have a new opportunity to step in and fill Germany's void.

Look for other countries to begin lining up to supply clean energy to Germany, where 26 coal-fired power plants are in planning or construction stages. As Fukushima becomes a more distant memory, Germany's decision to replace clean nuclear energy with dirty coal may end up being an unpopular one. Opportunities to introduce renewable energy and technology to Germany, and possibly even new "clean coal" production, will likely abound, especially on a continent that has long prided itself on its green-friendly policies and eco-stewardship.

Germany, Switzerland, and Italy decided to abandon their nuclear industries while reeling from having recently witnessed the greatest nuclear disaster in a generation. **It is not inconceivable that they would reconsider the timelines for phase-out as they begin to feel the full economic impact of these dramatic policy shifts.** With energy demand high in Germany's industrial south, blackouts and brownouts could occur with increasing frequency. Factories could face decreased production or even total shutdown, leading to increased unemployment – in addition to the growing ranks of out-of-work nuclear engineers and technicians. Close monitoring of the first, second, and third order effects of Europe's nuclear decisions this year will be critical for businesses looking to capture opportunity – and avoid getting caught in the fallout.