

# The Impact of Japan's Crisis on the Global Power Supply and Beyond

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THE BOSTON COMPANY

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## Executive Summary

Investment professionals from The Boston Company recently discussed the possible spillover effects of Japan's triple disasters in the form of its recent earthquake, tsunami and nuclear crisis. One of the main questions was the likely effects of Japan's nuclear crisis on the future of nuclear energy development and other forms of energy. The analysts looked at the possible implications of a pull-back in nuclear energy on the market for natural gas, coal and alternative energy sources such as wind and solar. More broadly, they discussed other markets, such as basic materials and manufacturing, that could be affected in the aftermath of the catastrophes.

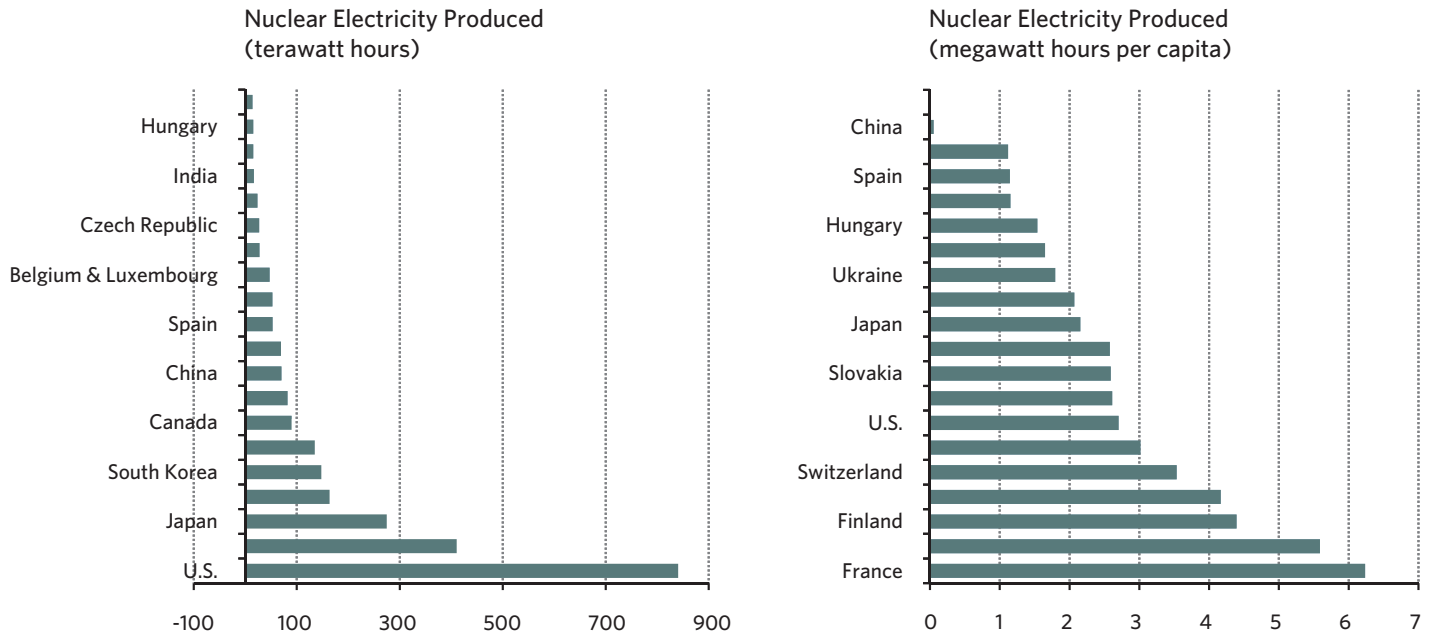
## What do the concerns over Japan's nuclear crisis mean for the future of nuclear energy?

**Robin Wehbé:** We believe the events in Japan have renewed doubts about nuclear energy. Still, in our view, this source of power will ultimately maintain a sizable share of the future energy picture, though delays in the construction of new nuclear facilities are likely. Over the near term, we believe renewable energy and natural-gas-fired power generation will likely benefit from the pause in development of new nuclear facilities.

**Brock Campbell:** As you can see in Exhibit 1, nuclear power remains an important source of electricity generation for many countries. Many developing countries like China look to nuclear power to supply their ever-growing electricity needs as their economies grow. As a result of the Japanese disaster, China recently announced it was suspending approval for new nuclear licenses. Previously China had intended to build as many as 60 reactors (as a reference point, the United States currently operates 104 reactors).<sup>1</sup> While near-term delays in permitting are likely, we still expect that new nuclear generators will be constructed as countries attempt to meet the energy

<sup>1</sup> For the Chinese nuclear production plans, see <http://www.world-nuclear.org/info/inf63.html> as of April 13, 2011. For the number of U.S. reactors, see <http://www.eia.gov> as of April 20, 2011.

**Exhibit 1: Nuclear-Powered Electricity Generation Across The World**



Source: British Petroleum, as of June 2010.

demands of economic growth while also limiting their carbon footprint. For example, in the U.S., both President Barack Obama and Secretary of Energy Steven Chu affirmed that nuclear power would continue to play an important role in the country’s future energy plans, even after the events in Japan.

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**Do you expect any changes to nuclear power plants in the U.S.?**

**Brock Campbell:** Clearly, this is not the first time the safety of nuclear power has been called into question. In the wake of the disasters at Chernobyl and Three Mile Island, nuclear facilities in the U.S. underwent exhaustive reviews as well as following the terrorist attacks of September 11, 2001, and the South Asian tsunami in 2004. As a result, many of the U.S. facilities are now fortified against some of the problems challenging the Japanese plants. As recent news reports have indicated, most of the back-up power facilities at plants in the U.S. are better protected from tsunamis than the Fukushima Dai-ichi facility. The emergency generators and diesel fuel tanks are typically located either underground or behind flood-proof doors, both of which would mitigate the impact of a tsunami. According to the U.S. Nuclear Regulatory Commission (NRC), the structures, systems and components of U.S. nuclear power plants need to take into account “the most severe natural phenomena historically reported for the site and surrounding area. The NRC then adds a margin of error to account for the limited historical data accuracy.”<sup>2</sup>

<sup>2</sup> U.S. Nuclear Regulatory Commission, www.nrc.gov, as of April 2011.

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Nonetheless, we see three changes affecting U.S. nuclear power plants:

- **Permitting of new nuclear facilities will likely take longer and costs will be higher.** While the first nuclear plant to be built by a public company was not expected to go on line until the latter part of the decade, the events in Japan will likely push out the majority of new construction into the next decade. Additionally, we also expect higher construction costs.
- **Relicensing will likely become a more contentious process.** All nuclear power plants must receive operating permits from the Nuclear Regulatory Commission (NRC). While the NRC is a federal body, we expect the relicensing of many facilities to be challenged by local and state representatives.
- **Higher operational and capital costs are likely.** As a result of the many failures at the Fukushima Dai-ichi plants, we expect numerous safety redundancies to be required, which will increase costs at these facilities.

#### **What are the implications of a pull-back in nuclear power in Japan and elsewhere?**

**Robin Wehbé:** In the immediate term, less nuclear power generation in Japan means other sources of power will need to compensate. We believe natural gas might provide a ready substitute and make up the difference. This is primarily in the form of imported Liquefied Natural Gas (LNG), which constitutes a small portion of the natural gas used in North America. So while there may be an increase in LNG for Asia, it will have little impact on Western energy markets. There are already several LNG projects under construction or under consideration to increase the global supply of LNG, and we expect the nuclear crisis is likely to expedite those plans. They include increasing natural gas exports from Western Canada. As a result of this increased demand for natural gas, we believe builders of natural gas facilities and infrastructure should also see an uptick in demand for their services.

In our view, there could be a more serious impact on energy markets if larger nations such as China and the U.S. gravitate towards other sources of power as they reconsider their nuclear plans. For us, the most obvious alternatives would be coal and natural gas. China could increase its dependence on coal, if it were to reduce its emphasis on nuclear power, while the U.S. would most likely shift to more gas-powered energy as these alternative are most in line with both countries' current infrastructure. While those substitutes could take a while to develop, they might be game-changers for those commodities as demand moves structurally higher. A shutdown of existing nuclear plants in either country for additional safety inspections could have an immediate impact on coal power in China and gas power in North America.

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### How could a greater reliance on coal in Asia benefit U.S. producers?

**Robin Wehbé:** The two U.S. regions that could export coal to Asia are in Appalachia and the Powder River Basin (PRB) in Montana and Wyoming. We believe the Atlantic basin around Appalachia would be challenged to increase volumes significantly, but there would likely be significant price appreciation if the supply from the entire Atlantic basin were to tighten (for example, if South Africa were to export more coal to Asia instead of Europe, and the U.S. were to step in to back fill coal exports to Europe). In our view, the Powder River Basin would be more likely to expand production as it is easier to increase supply there. However, this region has not typically been involved in producing coal for export and is only now recognizing the opportunity to export to Asia. We believe related industries such as railways and shipping could benefit as this coal finds its way from the Rocky Mountains toward China and other Asian markets.

### How would a greater reliance on natural gas affect the U.S.?

**Robin Wehbé:** The U.S. has more natural gas than it knows what to do with at the moment and is currently contemplating building LNG facilities to export natural gas. There is room to increase capacity at existing natural gas generators (a small facility can be built in about six months). We believe we will continue to see improved cost/benefit metrics for gas versus coal, and this is likely to lead to the construction of larger gas-fired power generation plants in the coming years. On an energy-equivalent basis, natural gas is currently far cheaper than oil. At market prices as of April 12, natural gas was trading at an astonishing 1/25 of the price of oil.<sup>3</sup> We believe markets will find a way to make the cheaper energy source more common.

We believe both the U.S. and Canada are likely to consume more natural gas domestically as well as increase exports. Recent concerns about the environmental impact of natural gas were related to fears of potential contamination of water aquifers and local drinking water as a result of hydraulic fracturing (fracs). There has been some question about the whether the contamination is a result of naturally occurring leaks prior to hydraulic fracturing or if hydraulic fracturing itself or poor drilling practices are to blame. In our view, the compelling economics of natural gas are likely to lead to greater investment in improved extraction and production methods, for both domestic and foreign consumption.

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<sup>3</sup> Bloomberg analytics, April 12, 2011.

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### How might Japan's nuclear crisis affect basic materials such as uranium and alternative energy sources such as wind and power?

**Jason Gibson:** We saw volatility in the uranium spot price before and after the nuclear crisis in Japan. China has been an active buyer in a fairly illiquid market in order to supply its fast growing nuclear industry. But we expect China's reduced purchases to have an effect on the commodity price as it puts a hold on new plant approvals and reconsiders its existing nuclear plants. In our view, however, it is hard to imagine China moving entirely away from nuclear energy, since the power requirements to support its high growth rate are so large.

However, we do think doubts about nuclear energy following the Japan crisis could create increased interest in solar and wind power. We expected solar demand growth to peak and slow materially in 2011 and 2012 as countries, particularly in Western Europe, pared back subsidies to the industry. The growth could reaccelerate as a result of the Japan crisis.

This potential increase in demand for solar energy might be a positive for companies that sell into the photovoltaic production chain. As for wind power, companies that manufacture composites might benefit, as their materials are used for wind turbine blades. The global composites supply chain is actually quite tight around the world.

### What other markets might be affected by the broader destruction Japan faces in the wake of the earthquake and tsunami?

**Jason Gibson:** In the shorter term, we believe these catastrophes will negatively affect grain prices, steel, rare earths, and chemicals used in the manufacture of electronics. Japan is a large importer of corn, accounting for roughly 20% of global exports.<sup>4</sup> The country also imports 3-5% of world wheat and soybean exports, but corn has a bigger impact on global agricultural markets given the input intensity.<sup>5</sup> Japan is also a big producer and consumer of steel and buys significant amounts of iron ore from Australia and Brazil.

Japan is also a large consumer of rare earths for applications such as hybrid vehicles. As we know from recent headlines, China produces 95% of the world supply of rare earths and has been introducing quotas.<sup>6</sup> We have already seen concern expressed about disruptions in the supply of semiconductors, displays, and smart phones manufactured in Japan and parts needed for goods manufactured elsewhere.

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<sup>4</sup> See <http://www.usda.gov/oce/commodity/wasde/latest.pdf>, April 2011.

<sup>5</sup> *Ibid.*

<sup>6</sup> Molycorp 10K filing for FY ending 12/31/2010, p. 5.

### Is it possible that some tech manufacturing might be relocated out of Japan?

**Jason Gibson:** We believe that is unlikely in the chemical sector. There appears to be redundancy with facilities in North America, China, South Korea and elsewhere as well as excess capacity. On a recent internal conference call, BNY Mellon Chief Economist Richard Hoey made a very apt comparison of today's Japan to Germany following World War II. Manufacturing is something Germany has historically done very well. As that country rebuilt after the war, German industry was able to build new capacity with what was at the time the most advanced manufacturing technology available. It took time, but Germany was able to resume its place in the world as a manufacturing powerhouse. We believe the same might be said for Japan and electronics. Any capacity that was destroyed by the earthquake and tsunami might be rebuilt as state of the art. We believe Japan will continue to have a strong tech manufacturing base.

### **Robin Wehbé, CFA, CMT, Portfolio Manager**

*Robin is a Lead Portfolio Manager as well as an Equity Research Analyst on The Boston Company's Core Research Team, covering the energy, utilities and basic materials sectors. Prior to joining The Boston Company in 2006, Robin was a Research Analyst at State Street Global Advisors, covering the basic materials sector. Robin earned a BS from Lehigh University and an MBA and an MSF from the Carroll School of Management at Boston College. Robin is a member of the Boston Security Analyst Society and The Market Technicians Association.*

### **Jason L. Gibson, Research Analyst**

*Jason is a Research Analyst on The Boston Company's Core Research Team covering basic materials. Previously, Jason was a Junior Research Analyst. During the summer of 2007, he was a summer intern at The Boston Company; he continued to work at The Boston Company part-time until he completed business school. Prior to joining The Boston Company, Jason served in the United States Marine Corps. Jason earned a BS in Mechanical Engineering from the United States Naval Academy and an MBA from Harvard Business School. Jason is a Level III candidate in the Chartered Financial Analyst Program.*

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