

## JAPAN'S NUCLEAR DILEMMA

**Policymakers are grappling not only with the current crisis,  
but also options for future energy supply**

By [Toufiq Siddiqi](#)

HONOLULU (March 18, 2011) -- As the triple disasters of the earthquake, tsunami and nuclear emergency continue to wreak havoc on Japan, our condolences and admiration go out to the Japanese people for the courage and determination with which they are dealing with the after-effects of an unprecedented set of calamities, even for a country that is possibly the best prepared in the world for handling such events.

Monday morning quarterbacks are already asking why Japan, a country known for its frequent earthquakes and occasionally severe Tsunamis (a word that originated in Japan), would decide to build so many nuclear power plants, and site so many of them in coastal areas.

Japan's lack of domestic oil resources was a principal contributor to its role in the World War II, and the end of that war did not change the country's feeling of vulnerability to oil supply disruptions. A program to develop the peaceful uses of nuclear energy was initiated in 1954, and the first commercial reactors were built during the 1970s in cooperation with General Electric and Westinghouse.

Since then, Japan has itself made contributions to reactor design and manufacturing and it had 54 nuclear power plants in operation prior to the Fukushima accidents. This is by far the largest commercial nuclear power program in Asia: The Republic of Korea has 21 plants, India 20, China 13; Taiwan, 6; and Pakistan 2. The United States has the largest number of nuclear power plants at 104. (All numbers are from the International Atomic Energy Agency).

In addition, as of 2010 China had 20 new nuclear power plants under construction, the Republic of Korea six, India five and Taiwan two, while Japan, Pakistan and the United States each had one.

Faced with the nuclear emergency arising from the Fukushima accidents, policymakers in Japan are grappling not only with the current crisis, but also with options for future energy supply. Shutting down all nuclear power plants is not a viable option, since they supply a third of Japan's electricity. Supplying the same amount of electricity by oil, for example, would increase oil imports by about 62 million metric tonnes per year, or about 1.25 million barrels per day.

At the current price of approximately \$100 per barrel, that would take an additional \$46 billion per year out of Japan's economy. Further, it would take almost a decade to build enough new oil, coal or natural gas-fired power plants to provide the equivalent amount of electricity, and tens of billions of dollars per year would be required to do so.

The production of Japan's economically critical exports, which requires reliable supplies of electricity, would be drastically affected, as we are already seeing in the northern part of the country. Thus, the likelihood is that only a few older nuclear plants that have either reached or exceeded their planned lifetime might be de-commissioned, and some that are located at particularly vulnerable sites might be further strengthened over the next few years.

Regarding siting questions, almost all of Japan is prone to earthquakes. Coastal sites are preferred all over the world for siting power plants, since large amounts of hot water usually have to be discharged, and the ocean can absorb the heat without a significant rise in temperature. In contrast, rivers and small lakes cannot do the same without affecting the fish or other parts of the local ecosystems. A substantial number of the nuclear power reactors in the United States, for example, are situated along the East Coast, the Great Lakes and the California coast.

Japan has been a global leader in efforts to curb local air pollution and reduce greenhouse gas emissions. It was one of the first countries to import liquefied natural gas (LNG) at a time when coal was much cheaper, primarily to improve air quality in its then highly polluted cities. The first United Nations Protocol to address climate change issues was signed in Kyoto, and Japan is one of the few countries in the world that has worked diligently to reduce its emissions of greenhouse gases. It has been planning on greater use of LNG and nuclear power to meet its future reduction goals as well.

One likely consequence of the current nuclear emergency might well be the lack of public support for the building of additional nuclear power plants in the country. This would result in much greater use of LNG, supplemented by new and renewable sources. Japan ranked third in the world in terms of solar photovoltaic capacity added to the grid in 2009, fourth for existing solar hot water/heat capacity, and fifth for total renewable capacity including all hydro. These trends are likely to accelerate during the coming years, as Japan recovers from its current disasters and meets the additional challenge of climate change, while preserving energy diversification for national security.

*Toufiq Siddiqi is an Adjunct Senior Fellow in the Research Program at the East-West Center, and is President of Global Environment and Energy in the 21st Century. He has a doctorate in nuclear physics, and initiated EWC programs on the environmental dimensions of energy policies. He can be reached at [SiddiqiT@eastwestcenter.org](mailto:SiddiqiT@eastwestcenter.org)*