

NUCLEAR GOVERNANCE AFTER FUKUSHIMA

Sharon Squassoni

The March 11, 2011, earthquake and tsunami that devastated Japan and killed tens of thousands of people resulted in partial core meltdowns at three reactors at the Fukushima Daiichi power plant. Although the plants shut down properly, off-site electricity was interrupted and back-up generators failed. When battery-supplied cooling was lost, fuel heated up and produced hydrogen explosions that exposed spent fuel pools and released radiation. The Japanese government evacuated residents and temporarily banned foodstuffs from the Fukushima region.

As expected, several countries that now operate nuclear power plants, including the United States, have announced intentions to conduct safety reviews. Germany shut down its oldest reactors pending a safety review, and China, which has the largest number of nuclear power plants under construction, has announced a temporary suspension. Italy has postponed a referendum on nuclear power that originally had been scheduled for June 2011.



The International Atomic Energy Agency (IAEA) announced it would hold a ministerial-level conference in June in Vienna, which will address improving the protection of nuclear power plants against multiple hazards, preparedness for prolonged power blackouts, enhancing emergency power supply, and protecting spent fuel under accident conditions. Parties to the Convention on Nuclear Safety in April agreed to hold an extraordinary review focused on Fukushima in 2012.

The long-term impact of the Fukushima accident on nuclear power in Japan and worldwide is unknowable at this point, as the crisis has stabilized but is not yet over. Estimates of damages have been as high as \$24 billion for the Tokyo Electric Power Company (TEPCO), which owned and operated the damaged reactors. Although many countries may regard the possibility of another such event combining earthquake and tsunami to be very low, particularly for them, the difficulties Japan—a highly sophisticated and technologically competent country—experienced because of the lack of electricity has raised questions about the costs and risks of nuclear power.

There will certainly be lessons for nuclear safety but also for nuclear security and, more broadly, nuclear governance.

Nuclear Safety

On nuclear safety, a key question centers on whether emergency planning, including evacuation zone standards, is adequate. The Japanese government initially recommended a 3-km evacuation zone, then quickly expanded it to a 20-km evacuation zone. Days later, the U.S. government recommended a 50-mile evacuation zone for its citizens near Fukushima, based on an assessment by the Nuclear Regulatory Commission. The difference in these recommendations raised concerns about what standards were being applied and what assumptions had been made. Experts have also questioned whether severe accident management, including international cooperation, needs to be improved.

Fundamentally, nuclear safety experts should consider whether the design basis of existing and future reactors should cover more severe accident triggers such as those experienced at Fukushima. In addition, the implications of locating nuclear plants near large populations, along seacoasts, with multiple reactors on site and in areas at risk from powerful earthquakes, tornadoes, fires, or terrorist attacks potentially capable of producing a prolonged “station blackout” as at Fukushima need to be assessed. At a minimum, extending the capabilities of back-up power, including diesel generators and batteries, is warranted.

Unlike other major accidents, the Fukushima crisis highlighted the vulnerability of spent fuel pools. A reevaluation of their design and permissible loading limits is likely. This could also prompt more support for moving spent nuclear fuel more quickly out of wet storage and into dry cask storage away from the reactor.

Aside from specific improvements to reactor designs and sites, the Fukushima crisis has already provoked a debate about transparency and responsibility in nuclear safety. Media reports have questioned the independence of Japanese regulators and whether U.S. safety improvements to the General Electric–designed reactors were carried out in Japan. A related issue is whether nuclear safety standards should be adopted and enforced globally.

The International Nuclear Safety Group stated in 2006 that “it is time to agree upon common safety principles and to undertake worldwide implementation of good safety practices in the siting, design, operation, and decommissioning of nuclear facilities. These principles should then be documented in international safety standards and international conventions.” Adoption of best practices regarding nuclear safety is key, yet some of the mechanisms for sharing information have not been effective.

Nuclear Security

The Fukushima crisis highlighted the vulnerability of infrastructure to support nuclear power, which has implications for nuclear security as well as nuclear safety. While nuclear safety measures aim to mitigate the risks of unintended events (primarily initiated by natural occurrences or errors), nuclear security measures must protect against intentional, malicious acts such as sabotage, theft, or unauthorized access. The goal of both is to protect people, society, and the environment from a large release of radiation or radioactive material. Fukushima has highlighted some new vulnerabilities (such as densely packed spent fuel pools), but also illustrated graphically just how disruptive a major accident can be. The first “Internet-accessible” nuclear accident undoubtedly has provided a lot of otherwise hidden information to terrorists.

Since 9/11, efforts to improve security at nuclear power plants have been undertaken in the United States and elsewhere. Although the 2010 Nuclear Security Summit focused on nuclear material, the Republic of Korea may choose to address enhancing the synergies between safety and security at nuclear power plants at the 2012 Nuclear Security Summit. Two critical issues that arise are how to adjudicate between nuclear safety’s need for transparency and nuclear security’s need for confidentiality and the different responsibilities of the state versus the operators.

How to adjudicate between nuclear safety’s need for transparency and nuclear security’s need for confidentiality?

Nuclear Governance

Before Fukushima, more than 65 countries had expressed an interest in developing nuclear power, compared with the 29 (plus Taiwan) that now operate nuclear power plants. It is not yet clear if Fukushima will have a similar impact as Chernobyl, after which many countries halted plans to develop nuclear power because of fears about safety. Nevertheless, some of these countries, spurred on by concerns about energy security, electricity demand, and climate change, may move forward. Quite a few are located in regions of political instability or have terrorists active on their soil. Many have governance issues, including corruption and lack of transparency. Few are likely to have “whistleblower” cultures. A possible silver lining from Fukushima could be a broader acceptance of the tremendous responsibilities that nuclear energy confers and a sober assessment of what sustainable nuclear governance entails. ■