

The high costs of going nuclear for Indonesia

Benjamin K. Sovacool, Singapore

The massive nuclear plant proposal for Muria, Indonesia, will likely exact severe economic and political costs extending well beyond "haram" and the obvious environmental risks if completed. And there is a better way for Indonesia to get the electricity it needs.

While developers expect Indonesia's first nuclear plant to cost around US\$2,000 per installed kilowatt (or a total of \$8 billion if the plant reached a capacity of 4,000 megawatts), the historical record suggests that costs will escalate. New nuclear power plants are extremely capital intensive and take years to build. The capital intensity of such projects means that they often cost \$1-2 billion more than anticipated, as they are more subject to greater interest rates, higher financing expenses, and changes in regulatory requirements during construction.

Moreover, because nuclear plants provide centralized power sited away from urban centers, they must rely on a vast and complex transmission network to distribute their power. Yet in tropical countries, such a network loses between 12 and 40 percent of its transmitted electricity before it ever reaches a single home or business, due to the laws of thermodynamics and decreased conductivity associated with warmer weather.

Nuclear plants also use around 5 to 7 percent of their own energy to contain and cool nuclear reactions, a thermal efficiency much lower than comparable fossil fuel plants.

In other words, getting electricity from the Muria plant would be the equivalent of purchasing a dozen beers at a local grocery only to lose between two and six bottles every time you transported them home, day after day.

Beyond the cost, inefficiency, and obvious problems with building a nuclear plant in a region prone to earthquakes, environmental issues abound. The reprocessing and enrichment of uranium and plutonium, needed for fuel, often necessitate fossil-fueled generators that emit significant amounts of carbon dioxide.

At an earlier stage in the nuclear fuel cycle, the mining and milling of uranium and the operation of nuclear reactors also present grave dangers to the environment. Abandoned mines, for example, can pose radioactive risks for as long as 250,000 years after closure.

Nuclear plants release toxic pollutants and gases, such as carbon-14, iodine-131, krypton, and xenon. They also produce prodigious amounts of waste that remain dangerously radioactive for more than 100,000 years-25 times longer than human civilization has practiced agriculture.

From a political standpoint, the Muria plant degrades Indonesian energy security in three ways. First, it makes the country more dependent on imported and interruptible fuels that have large price spikes. The cost of uranium, for instance, jumped from \$7.25 per pound in 2001 to \$47.25 per pound in 2006. While fuel costs constitute a low percentage of the plant's total operating costs, making Indonesia more reliant on other countries for fuel will constrain Indonesian economic and foreign policy for years to come.

Second, Muria would distribute power in a vulnerable fashion. In Britain during the coal-miner strikes of 1976, a leader of the power engineers famously remarked that "the miners brought the country to its knees in 8 weeks, but we could do it in 8 minutes." This is because the infrastructure needed to distribute nuclear power is brittle, and subject to cascading power failures easily induced by severe weather and small animals, to say nothing of accidental or intentional human interference.

Third, the safety record of nuclear plants worldwide is questionable. More than 90 nuclear accidents have occurred worldwide since the 1970s, according to data from the Union of Concerned Scientists and International Energy Agency. That's more than two incidents every year, including dozens this decade.

Moreover, the reactor would inevitably become a target for dissident groups wishing to resort to violence to promote their worldview. Such vulnerability would pose a strategic nightmare in a country plagued by political and religious violence. If an attack were successful, the ensuing disaster would be catastrophic for Indonesia and all of Southeast Asia.

Collectively, these economic, environmental, and political concerns make nuclear power a poor source for new electricity. Using distributed generation -- smaller, decentralized units such as wind turbines, photovoltaic systems, and cogeneration facilities -- to produce power offers a much better strategy. Such technologies are quicker to construct, less capital intensive per unit, and more modular, meaning that almost any demand can be matched.

The recent growth of these generators in Europe and the United States, for instance, offers a testament to their superior financial, technical, and environmental performance. It is these miniature generators -- not mammoth and capital intensive nuclear plants -- that offer the best strategy for diversifying electrical generation in Indonesia and the region.

In the end, the belief that nuclear power represents a clean and safe alternative to coal-, natural-gas-fired, or renewable power generation may be misguided. It legitimates transmission and distribution efficiency losses and obscures better alternatives towards a truly sustainable energy portfolio.

For these reasons, the proposed benefits of Muria deserve to be thoroughly evaluated before committing to build. Powerful interests that seek to benefit from such costly exercises should no longer ignore exciting new possibilities and force Indonesians to bear the burden of their shortsighted thinking.

The writer is a Research Fellow, Centre on Asia and Globalization Lee Kuan Yew School of Public Policy, National University of Singapore. This is a personal view He can be reached at sppbks@nus.edu.sg.