



Risk, technology, and society Woody Epstein

Time to refocus Asia's nuclear debate

October was an extraordinary month in Japan. A record five typhoons hit, with a near miss by a sixth. A 7.1-magnitude earthquake struck off the coast of Fukushima Prefecture on Oct. 26, just as one of the storms was arriving.

A worried world focused on the possible effects of all this on the Fukushima Daiichi nuclear power station. And indeed, although the earthquake did no further damage to the stricken plant, the heavy rainfall contributed to more contaminated water flowing into the facility's port area.

So why do I think that October was extraordinary? Well, according to the Japan Meteorological Agency, an average of 1 to 2 typhoons approach Japan in October. And since 1996, Japan has had an average of 1 earthquake greater than 7.0 Mw every 5 months, or about 2 per year.

We would be correct in saying that a month with five typhoons, one near miss and a 7.1 quake was an unexpected confluence of unlikely events. But are all unlikely events really unlikely? Is there any way to expect – and guard against – the unexpected?

Let us look at nuclear power generation and the possibility of a core damage accident. Over the years, the International Atomic Energy Agency and most regulators have endorsed several safety goals. Two such goals stipulate that reactor operators should ensure that for each unit, the likelihood of a core damage accident is no greater than one per 10,000 years; the likelihood of a large release of radiation should be no greater than one time every 100,000 years.

These seem like pretty unlikely events, right?

Let me put this in perspective. As of March 10, 2011, there were 438 commercial nuclear power generating units around the globe. If each unit was operating 70% of the time, and each one was safe according to the goals I have just described, the likelihood of a core damage accident somewhere on the planet was about three times every 100 years. To put this into very human terms, you should expect a core damage accident, somewhere in the world, about 2-3 times during your lifetimes.

So a core damage accident, although unlikely in a single nuclear reactor, does not seem so improbable if we look worldwide. In fact, in my lifetime there have been such accidents at three commercial reactor sites: Three Mile Island in the U.S., Chernobyl in Ukraine and Fukushima Daiichi.

Now, core damage accidents do not necessarily result in radiation releases. At Three Mile Island, no radiation escaped. If we use the same reasoning for large releases of radiation, then we should expect a Fukushima-like accident about once every 330 years.

Please remember, too, that I am only talking about the likelihood of an accident, not the consequence that people will get sick or die from one. The contamination surrounding Fukushima Daiichi is measurable, but according to the United Nations Scientific Committee on the Effect of Atomic Radiation (UNSCEAR) " ... [the accident at Fukushima Daiichi] is unlikely to be able to attribute any health effects in the future among the general public and the vast majority of workers."

Still, consider this: In the next 15 years, the number of new nuclear units will increase significantly worldwide. Therefore, we should expect the odds of core damage accidents to increase worldwide as well. In Asia alone, China has 29 reactors under construction, adding to 15 operational units; South Korea is building five units; and Taiwan is working on two. Thailand, Malaysia and Indonesia will be joining the nuclear power club by 2030.

So here is my question to you: Can you accept this risk?

Keep in mind that energy-related risks will not disappear if we abandon nuclear power. Look at all of the gas, oil, and liquefied natural gas tanks on the coasts of almost every Asian country. We have done studies on how large earthquakes, tsunamis, and typhoons could impact the chemical, oil and gas industries. Believe me, there are accident scenarios with environmental, social and economic consequences that could approach those of Fukushima.

After the Fukushima disaster, panels of scientists and engineers are being asked by their governments to attest that nuclear reactors are "safe." But Three Mile Island, Chernobyl and Fukushima Daiichi have clearly shown that nuclear power inevitably carries risks.

It is time to change the terms of the debate from the oversimplified "safe/unsafe" dichotomy to an honest and open discussion of what the risks are and what is being done to mitigate them. This applies not only to nuclear power but to all technological endeavors.

In this context, the risks of nuclear power have to be considered in a balanced comparison with other risks. At the end of the discussion, the public and the leaders they have elected – rather than technical experts – should make the final decision.

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