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Learning From Japan's Nuclear Disaster日本の核災害から学ぶ

Asia-Pacific Journal Feature

Between 2012 and 2014 we posted a number of articles on contemporary affairs without giving them volume and issue numbers or dates. Often the date can be determined from internal evidence in the article, but sometimes not. We have decided retrospectively to list all of them as Volume 10, Issue 54 with a date of 2012 with the understanding that all were published between 2012 and 2014.

By Amory Lovins

This article was first published at Rocky Mountain Institute on March 18, 2011.

As heroic workers and soldiers strive to save stricken Japan from a new horror--radioactive fallout--some truths known for 40 years bear repeating.

An earthquake-and-tsunami zone crowded with 127 million people is an unwise place for 54 reactors. The 1960s design of five Fukushima-I reactors has the smallest safety margin and probably can't contain 90% of meltdowns. The U.S. has 6 identical and 17 very similar plants.

Every currently operating light-water reactor, if deprived of power and cooling water, can melt down. Fukushima had eight-hour battery reserves, but fuel has melted in three reactors. Most U.S. reactors get in trouble after four hours. Some have had shorter blackouts. Much longer ones could happen.

Overheated fuel risks hydrogen or steam explosions that damage equipment and contaminate the whole site--so clustering many reactors together (to save money) can make failure at one reactor cascade to the rest.

Nuclear power is uniquely unforgiving: as Swedish Nobel physicist Hannes Alfvén said, "No acts of God can be permitted." Fallible people have created its half-century history of a few calamities, a steady stream of worrying incidents, and many near-misses. America has beenlucky so far. Had Three Mile Island's containment dome not been built double-strength because it was under an airport landing path, it may not have withstood the 1979 accident's hydrogen explosion. In 2002, Ohio's Davis-Besse reactor was luckily caught just before its massive pressure-vessel lid rusted through.

Regulators haven't resolved these or other key safety issues, such as terrorist threats to reactors, lest they disrupt a powerful industry. U.S. regulation is not clearly better than Japanese regulation, nor more transparent: industry-friendly rules bar the American public from meaningful participation. Many presidents' nuclear boosterism also discourages inquiry and dissent.

Nuclear-promoting regulators inspire even less confidence. The International Atomic Energy Agency's 2005 estimate of about 4,000 Chernobyl deaths contrasts with a rigorous 2009 review of 5,000 mainly Slavic-language scientific papers the IAEA overlooked. It found deaths approaching a million through 2004, nearly 170,000 of them in North America. The total toll now exceeds a million, plus a half-trillion dollars' economic damage. The fallout reached four continents, just as the jet stream could swiftly carry Fukushima fallout.

Fukushima I-4's spent fuel alone, while in the reactor, had produced (over years, not in an instant) more than a hundred times more fission energy and hence radioactivity than both 1945 atomic bombs. If that already-damaged fuel keeps overheating, it may melt or burn, releasing into the air things like cesium-137 and strontium-90, which take several centuries to decay a millionfold. Unit 3's fuel is spiked with plutonium, which takes 482,000 years.

Nuclear power is the only energy source where mishap or malice can kill so many people so far away; the only one whose ingredients can help make and hide nuclear bombs; the only climate solution that substitutes proliferation, accident, and high-level radioactive waste dangers. Indeed, nuclear plants are so slow and costly to build that they reduce and retard climate protection.

Here's how. Each dollar spent on a new reactor buys about 2-10 times less carbon savings, 20-40 times slower, than spending that dollar on the cheaper, faster, safer solutions that make nuclear power unnecessary and uneconomic: efficient use of electricity, making heat and power together in factories or buildings ("cogeneration"), and renewable energy. The last two made 18% of the world's 2009 electricity (while nuclear made 13%, reversing their 2000 shares)--and made over 90% of the 2007-08 increase in global electricity production.

Those smarter choices are sweeping the global energy market. Half the world's new generating capacity in 2008 and 2009 was renewable. In 2010, renewables, excluding big hydro dams, won $151 billion of private investment and added over 50 billion watts (70% the total capacity of all 23 Fukushima-style U.S. reactors) while nuclear got zero private investment and kept losing capacity. Supposedly unreliable windpower made 43-52% of four German states' total 2010 electricity. Non-nuclear Denmark, 21% windpowered, plans to get entirely off fossil fuels. Hawai'i plans 70% renewables by 2025.

In contrast, of the 66 nuclear units worldwide officially listed as "under construction" at the end of 2010, 12 had been so listed for over 20 years, 45 had no official startup date, half were late, all 66 were in centrally planned power systems--50 of those in just four (China, India, Russia, South Korea)--and zero were free-market purchases. Since 2007, nuclear growth has added less annual output than just the costliest renewable--solar power --and will probably never catch up. While inherently safe renewable competitors are walloping both nuclear and coal plants in the marketplace and keep getting dramatically cheaper, nuclear costs keep soaring, and with greater safety precautions would go even higher. Tokyo Electric Co., just recovering from $10-20 billion in 2007 earthquake costs at its other big nuclear complex, now faces an even more ruinous Fukushima bill.

Since 2005, new U.S. reactors (if any) have been 100+% subsidized--yet they couldn't raise a cent of private capital, because they have no business case. They cost 2-3 times as much as new windpower, and by the time you could build a reactor, it couldn't even beat solar power. Competitive renewables, cogeneration, and efficient use can displace all U.S. coal power more than 23 times over--leaving ample room to replace nuclear power's half-as-big-as-coal contribution too--but we need to do it just once. Yet the nuclear industry demands ever more lavish subsidies, and its lobbyists hold all other energy efforts hostage for tens of billions in added ransom, with no limit.

Japan, for its size, is even richer than America in benign, ample, but long-neglected energychoices. Perhaps this tragedy will call Japan to global leadership into a post-nuclear world. And before America suffers its own Fukushima, it too should ask, not whether unfinanceably costly new reactors are safe, but why build any more, and why keep running unsafe ones. China has suspended reactor approvals. Germany just shut down the oldest 41% of its nuclear capacity for study. America's nuclear lobby says it can't happen here, so pile on lavish new subsidies.

A durable myth claims Three Mile Island halted U.S. nuclear orders. Actually they stopped over a year before--dead of an incurable attack of market forces. No doubt when nuclear power's collapse in the global marketplace, already years old, is finally acknowledged, it will be blamed on Fukushima. While we pray for the best in Japan today, let us hope its people's sacrifice will help speed the world to a safer, more competitive energy future.

Physicist Amory Lovins consults on energy to business and government leaders worldwide. His books include, Winning Oil Endgame, Natural Capitalism (iwth Paul Hawken and L. Hunter Lovins), and The Essential Amory Lovins: Selected Writings. He's written 31 books and over 450 papers, and received the Blue Planet, Volvo, Onassis, Nissan, Shingo, Zayed, and Mitchell Prizes, MacArthur and Ashoka Fellowships, 11 honorary doctorates, and the Heinz, Lindbergh, Right Livelihood, National Design, and World Technology Awards. He's an honorary U.S. architect, a Swedish engineering academician, and a former Oxford don, and has taught at nine universities, most recently Stanford. His RMI team's autumn 2011 book Reinventing Fire describes business-led pathways for a vibrant U.S. economy that by 2050 needs no oil, coal, or nuclear power to provide clean and resilient energy with superior economics.