

Dangers of nuclear reactors

Nuclear power, which currently provides roughly 19 percent of the U.S. electricity supply, has proven to be one of the **dirtyest, most dangerous and most expensive** sources of energy since it was first commercialized well over half a century ago. Nuclear reactors in the U.S. and around the globe have been plagued by a long history of accidents,¹ leaks,² extended outages,³ delayed construction and skyrocketing costs.⁴ Nuclear reactors produce highly radioactive waste that will continue to threaten the environment and public health for thousands of years and for which no safe disposal exists.⁵ Additionally, spent nuclear fuel contains plutonium which can be extracted for use in nuclear weapons through “reprocessing.” It is time to transition away from the dirty and dangerous energy sources of the past like nuclear power, and to move to sustainable energy sources by utilizing efficiency and clean renewable technologies.



Vogtle Nuclear Power Plant, Georgia. Photo credit: High Flyer.

Safety problems stymie nuclear power

With the Fukushima Daiichi reactors still spewing radiation into the Pacific Ocean, it is clear that nuclear accidents can happen with catastrophic results. Approximately 40 percent of the U.S. population lives within 50 miles of a nuclear reactor (the zone that U.S. officials recommended evacuating around Fukushima).⁶

- 1 “Nuclear power plant accidents: listed and ranked since 1952.” The Guardian. April 14, 2011. <http://www.theguardian.com/news/datablog/2011/mar/14/nuclear-power-plant-accidents-list-rank>
- 2 Jeff Donn. “PART II: AP IMPACT: Tritium leaks found at many nuke sites.” The Associated Press. <http://www.ap.org/company/awards/part-ii-aging-nukes>
- 3 Mark Cooper. Renaissance in Reverse: Competition Pushes Aging U.S. Nuclear Reactors to the Brink of Economic Abandonment. South Royalton, VT: Vermont Law School.
- 4 Pam Sohn. 2012, June 4. “Delays mire nuclear plant construction.” Times Free Press. <http://www.timesfreepress.com/news/2012/jun/04/delays-mire-nuclear-plant-construction/>
- 5 J. Fahey & R. Henry. “U.S. Nuclear Waste Increasing With No Permanent Storage Available.” Huffington Post via The Associated Press. March 11, 2011. http://www.huffingtonpost.com/2011/03/23/us-nuclear-waste-radioactive-storage_n_839438.html
- 6 Jeff Donn. “US nuclear evacuation plans haven’t kept up with population,” Associated Press. June 27, 2011 http://www.nbcnews.com/id/43529122/ns/us_news-environment/t/us-nuclear-evacuation-plans-havent-kept-population/#.Ui-EyCB-P5A (accessed September 10, 2013)

It’s still too early to know the full health impacts of the Fukushima catastrophe, but preliminary studies show that 36 percent of children in the Fukushima prefecture have developed thyroid abnormalities.⁷ Studies of Ukrainians who were children during the Chernobyl accident show that most cancers take decades to develop and that thyroid problems continue to develop long after initial exposure to radiation.⁸

While dramatic accidents like Chernobyl and Fukushima are dreadful, daily reactor operation present safety problems to the workers and communities surrounding them. Operating U.S. nuclear reactors have had hundreds of documented releases of radioactive tritium, cesium, and strontium – some of which have made their way into drinking water and aquifers⁹ – and the risks grow as reactors age.¹⁰ Fires are also a constant threat at reactors. Since 1995, there have been over 150 fires at commercial U.S.

- 7 Julian Ryall. “Neawry 36pc of Fukushima children diagnosed with thyroid growths.” The Telegraph (UK). July 19, 2012. www.telegraph.co.uk/news/worldnews/asia/japan/9410702/Nearly-36pc-of-Fukushima-children-diagnosed-with-thyroid-growths.html
- 8 Gardiner Harris. “Chernobyl Study Says Health Risks Linger.” The New York Times. March 17, 2011. www.nytimes.com/2011/03/18/health/research/18cancer.html?_r=0
- 9 Jeff Donn. “Radioactive tritium leaks found at 48 US nuke sites” The Associated Press. June 21, 2011. <http://www.ap.org/company/awards/part-ii-aging-nukes>
- 10 Jeff Donn. “Safety rules loosened for aging nuclear reactors.” The Associated Press. June 20, 2011. <http://www.ap.org/company/awards/part-i-aging-nukes>.



reactors.¹¹ Between catastrophic meltdowns and smaller daily safety failures, it's clear that nuclear reactors are not safe.

After the electricity is gone, nuclear waste remains

In addition to the environmental and health hazards posed by reactor accidents, there remains no solution for how to deal with spent nuclear fuel (nuclear waste). **The typical nuclear reactor produces 20 metric tons of lethal high-level radioactive waste every year, with 69,720 metric tons already piled up** at reactor sites across the country.¹² Most of the current nuclear waste is packed into pools at reactors, which pose the risk of a catastrophic spent fuel pool fire.¹³

There is no silver bullet “fix” for the significant problem of radioactive waste. The Yucca Mountain project was riddled with technical problems and has rightfully been scrapped.¹⁴ “Consolidated storage” of nuclear waste would spread the problem by hauling highly radioactive spent fuel across the country on trucks, trains and barges to dump sites that are likely to become de facto permanent above ground storage sites.

Consolidated storage also opens the threat that spent fuel will be reprocessed. Reprocessing spent fuel separates weapons-usable plutonium from the other elements in the fuel and the resulting stockpiles of plutonium are a proliferation risk. Reprocessing is also extremely dirty, creating new highly radioactive waste streams that we don't know how to manage. In fact, radioactive waste from reprocessing during the Manhattan Project still threatens the Columbia River in Washington State and the Savannah River between South Carolina and Georgia.

The best immediate way to address currently overpacked cooling pools is to **transfer spent nuclear fuel into “dry casks,” a system called Hardened On-Site Storage.** Casks at each reactor site must be hardened against terrorist attacks and natural disasters. Ultimately, the only solution to nuclear waste is to stop creating it.

11 “NRC’s Failure to Enforce Reactor Fire Regulations.” Union of Concerned Scientists. June 2013 http://www.ucsusa.org/assets/documents/nuclear_power/ucs-nrc-fire-regulations-5-2-13.pdf, accessed November 27, 2013.

12 “On-Site Storage of Nuclear Waste.” Nuclear Energy Institute. <http://www.nei.org/Knowledge-Center/Nuclear-Statistics/On-Site-Storage-of-Nuclear-Waste>

13 Spent Nuclear Fuel: Accumulating Quantities at Commercial Reactors Present Storage and Other Challenges. Government Accountability Office. August, 2012. <http://www.gao.gov/assets/600/593745.pdf>

14 Hearing on the status of the Yucca Mountain project: Hearing before the Environment and Public Works Committee, United States Senate, 109th Cong. 2-6 (2006) (testimony of Dr. Allison MacFarlane). http://www.epw.senate.gov/109th/MacFarlane_Testimony.pdf (accessed on September 11, 2013)

Economics inhibiting the nuclear “renaissance”

The nuclear industry cannot compete without government subsidies.¹⁵ Even with massive federal subsidies, dozens of reactors have been postponed or cancelled. The only reactor projects currently moving forward are in states where utilities are allowed to force their customers to finance construction by charging in advance for nuclear construction.¹⁶

The first generation of nuclear reactors dramatically exceeded their original cost estimates, with many being scrapped before completion. Predictably, the two reactor projects currently under construction, Vogtle in Georgia and V.C. Summer in South Carolina, are years behind schedule and hundreds of millions of dollars over budget.

New reactors aren't the only ones facing financial problems. Since May 2013, utilities have announced plans to close five aging reactors. While three of these closures are related to botched replacements of age-degraded equipment, two are directly tied to the evolving economics of the 21st century energy mix.¹⁷ Deregulated market structures and lower prices for other electricity sources have pushed nuclear beyond profitability.¹⁸

Transition to a nuclear-free future

Decades of use have shown that nuclear reactors are dangerous, dirty and expensive energy sources that are not a sustainable way to power America's future. It is time for the country to chart a new path by moving beyond outdated fossil fuels and nuclear power by investing in efficiency programs and truly renewable clean energy.

For more information, contact nuclear subsidies campaigner Katherine Fuchs at kfuchs@foe.org or (202) 222-0723. Or visit www.foe.org.

15 Doug Koplow. Nuclear Power: Still not viable without subsidies. Cambridge, MA: Union of Concerned Scientists, 2011.

16 Justin Bachman. “Duke Kills Florida Nuclear Project, Keeps Customers’ Money.” Bloomberg Businessweek. August 5, 2013. <http://www.businessweek.com/articles/2013-08-05/duke-kills-florida-nuclear-project-keeps-customers-money>

17 Matthew L. Wald. “Vermont Yankee Plant to Close Next Year as the Nuclear Industry Retrenches.” The New York Times. August 27, 2013. www.nytimes.com/2013/08/28/science/energy-announces-closing-of-vermont-nuclear-plant.html

18 Thomas Content. “Another Kewaunee? Entergy to shut down Vermont nuclear plant.” Milwaukee Journal Sentinel. August 27, 2013. www.jsonline.com/blogs/business/221332961.html