

# RETIRE OLD NUKES



## THE DIRTY TRUTH

**Nuclear energy is dirty energy.** It has a significant carbon footprint, and leaves a legacy of deadly radioactive material for tens of thousands of years. Continued operation and re-licensing of aging nuclear reactors leaves us at risk for catastrophic accidents. Nuclear energy is not sustainable because it is not economically viable without subsidies. Irradiated 'spent' fuel continues to collect in leaking cooling pools near major water bodies and along fault lines. Phasing out nuclear power makes sense when we replace it with 100% energy efficiency and clean renewable energy. This is the time to retire old nuke plants.

### Boiling Water to Make Electricity

The basic design of power plants is to boil water, making steam that turns the turbines to create electricity. This method is the same for nuclear, oil, natural gas or coal. The main difference in the case of nuclear is that the fuel is radioactive and becomes more radioactive during the process. After the fuel rods are irradiated or "spent", they require specialized storage to prevent exposure of people and the environment to radioactivity. The fuel needs to be safely stored forever. The elements in the irradiated fuel rods include Iodine-29, which remains radioactive and dangerous for 15 million years. When solar heat can boil the same water, or hydro-power can turn the turbine without radioactivity, why would you choose nuclear?

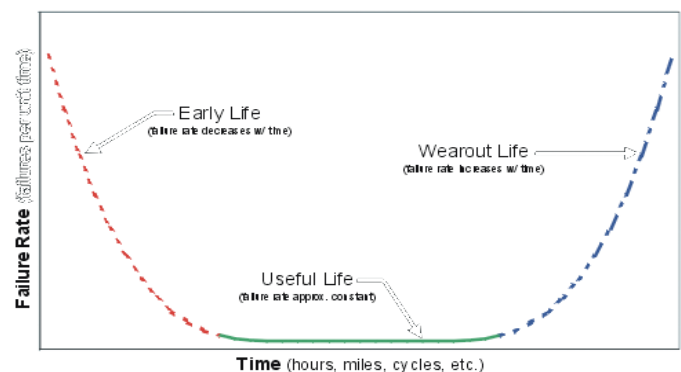
### Catastrophic Accidents



Since the beginning of nuclear power in the 1970s, there have been three devastating events. The consequences of Three Mile Island and Chernobyl are still being felt in their communities. Fukushima is an event that continues to unfold on a daily basis. The consequences for the Japanese people and the world are still developing. In the meantime, we have 23 Mark I Reactors in the U.S. that are an identical design to the plants that failed in Fukushima. There are also 12 Mark II Reactors in the U.S. that have similar vulnerable design features.

In the aftermath of Fukushima, the Nuclear Regulatory Commission continued to re-license old reactors without considering the new information about the design flaws. The NRC is considering minimal upgrades to the reactors based on the information obtained from the accident, but they aren't requiring the work to be done until 2016. According to nuclear engineers and safety experts, the proposed upgrades are not enough to protect us from future accidents. Check out this link to check on the safety hazards of the plants near you: [ucsus.org/nuclear\\_power/reactor-map/embedded-flash-map.html](http://ucsus.org/nuclear_power/reactor-map/embedded-flash-map.html)

### Bathtub Curve



Engineers use the Bathtub Curve as a common model for mechanical failure. As with any car or washing machine, when nuclear reactors get old, critical parts become more likely to fail.

### Mechanical Difficulties and Safety Issues

Many of the 103 operating US nuclear reactors have leaks and other major safety problems. The longer that we keep nuclear plants online, the more possibilities there will be for mechanical failure. San Onofre in California is under scrutiny because it has cracks in its generator tubes. Trojan, in Oregon was closed

by its operator for the same type of malfunction. Indian Point on Long Island has a history of accidents and mishaps, as well as growing concerns of corrosion in its pipe system. Vermont Yankee is leaking, and its cooling tower actually collapsed in 2007. Ft. Calhoun in Nebraska had a pump failure while the Missouri River flooded it in June 2011. The Crystal River plant in Florida has been closed since 2009 and is estimated to have a repair bill of \$3.4 billion. Davis Besse in Ohio had \$600 million dollars in repairs, but its continued safe operation is questioned. These safety issues are on top of the maintenance and repairs required as middle- and old-aged plants need replacement parts. How many solar panels could we buy with this repair money?

### Subsidies

If you and I have a car accident, normally we would be covered by insurance that we have paid premiums for based on risk. The nuclear industry does not pay premiums that measure the true risk of a nuclear accident. The Price Anderson Act was passed by Congress in the 1950s because nuclear plants weren't able to get private insurance. The Act allows the operators to pay a small amount into a self-insured pool that equals about 10.2 billion dollars of insurance covering all 103 reactors in the U.S. In addition each individual corporation is only on the hook for 2% of an accident outside of the insurance pool. It seems like a lot of money, but Chernobyl has cost \$358 billion so far and the tally on Fukushima is at least \$250 billion. This is an unfair advantage that allows nuclear power plants to sell power at a discounted price that doesn't truly reflect their overhead. The other negative is that if there is an accident, you and I will be picking up the tab.

### Re-licensing Relics to Save Money

Vermont Yankee was built 40 years ago during the building boom that was interrupted by the accident at Three Mile Island. The state of Vermont wants to shut it down, but the NRC has renewed its license for another 20 years. One of the reasons that the plant operator Entergy applied for re-licensing is that it doesn't have enough money saved to mothball the plant. Decommissioning will cost an estimated "\$400 million to one billion per reactor". The price will only rise as the equipment gets older and the amount of radioactive waste gets larger. There is a valid concern that the public will ultimately get the bill for the clean-up.

### Challenge to Waste Confidence

Anti-nuclear activists were successful in overturning the "waste confidence rule" that was used to re-license old nuclear plants and license new plants. The Nuclear industry argued that there would be a national repository for waste by a specific deadline that wasn't met. The NRC issued a

moratorium on licensing while they investigate solutions for waste storage. The Sierra Club supports hardened on site storage (HOSS). This moratorium will delay licensing but the process for licensing will continue as usual so we must remain vigilant to keep new plants out and to stop the relicensing of the old plants.



*“The sun is 93 million miles away and that’s the nearest we need to be to a nuclear reactor.”*  
– Bob Brown, leader of the Federal Greens Party, Australia

## STEPS FOR THE FUTURE

Start the discussion in your community about nuclear power. Does it make economic sense to continue to subsidize a dirty energy that continues to create waste that will be around for millions of years? Should we postpone the clean-up and pass it on to the next generation? We want the answer to these questions to be a solid no. We must take the steps to stop making nuclear waste.

Join the Sierra Club Nuclear Free Campaign to replace nuclear power with energy efficiency and clean, renewable power.

**You can join our campaign at: [sc.org/no\\_nukes](http://sc.org/no_nukes)**

Image credit: Darrin McClure

## SIERRA CLUB NUCLEAR FREE CAMPAIGN

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