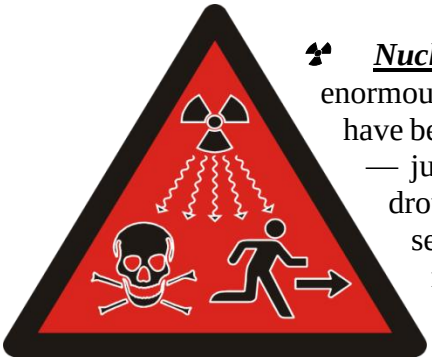
HOW NUCLEAR POWER *WORSENS* CLIMATE CHANGE

The nuclear industry has been selling the world a story that nuclear power is a solution to climate change because it does not generate carbon dioxide (CO2), a major greenhouse gas. While this is true of the nuclear chain reaction itself, the front and back ends of nuclear power generate a large volume of CO2 and leave a trail of endlessly dangerous radioactivity along the way.

☢ ***Nuclear power has a big carbon footprint.*** At the front end of nuclear power, carbon energy is used for uranium mining, milling, processing, conversion, and enrichment, as well as for transportation, formulation of rods and construction of nuclear reactors (power plants). At the back end, there is the task of isolation of highly radioactive nuclear waste for millennia—a task which science has so far not been able to address. ***Large amounts of water are also used, first in mining and then in cooling the reactors.***

All along the nuclear fuel chain, radioactive contamination of air, land and water occurs. Uranium mine and mill cleanup demands large amounts of fossil fuel. Each year 2,000 metric tons of high-level radioactive waste and twelve million cubic-feet of low-level radioactive waste are generated in the U.S. alone. None of this will magically disappear. Vast amounts of energy will be needed to isolate these dangerous wastes for generations to come.

☢ ***Nuclear power takes too long to deploy.*** Construction of the 1500 new reactors that the nuclear industry claims are needed to address global warming would mean opening a new reactor once every 2 weeks for the next 60 years. Reactors can take 10-15 years to build with an estimated cost of $12-15 billion each. In the past, cost and time needed for construction have each more than doubled from original estimates. We need to supply low-carbon energy sources *NOW*.



☢ ***Nuclear power is not suited for warming climates.*** Nuclear reactors need enormous amounts of ***cool*** water to continually remove heat from their cores. Reactors have been forced to close during heat waves due to warmth of sea, lake or river water — just when electricity is being used most. Low water levels during heat and drought have also forced reactors to shut down. In addition, cooling causes serious damage to aquatic life, killing millions of fish and untold numbers of macroinvertebrates, aquatic eggs and larvae.

☢ ***Six times as much carbon can be saved with efficiency or wind.*** Benjamin Sovacool from the Institute for Energy and Environment at Vermont Law School averaged the high and low estimates of carbon pollution from nuclear power. His study revealed that nuclear power's carbon emissions are well below scrubbed coal-fired plants, natural gas-fired plants and oil. However, nuclear emits twice as much carbon as solar photovoltaic and six times as much as onshore wind farms. Energy efficiency and some of the other renewables also beat nuclear by sixfold or more.

☢ ***Nuclear power is not flexible.*** Nuclear is all-or-nothing power. A reactor can't be geared to produce less power when electricity from renewables (like wind and solar) increases on the grid. This can make it challenging to increase renewables past a certain point.

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When a reactor shuts down due to accident, planned upgrade or permanent closure, a large amount of power has to be found elsewhere. And nuclear plants are being closed, not opened — some because they no longer are making a profit. It's important to develop renewables *NOW* to be able to replace the electricity when utilities announce plans to close reactors.

☢ ***Nuclear subsidies rob research on renewables.*** Nuclear power has been subsidized throughout most of its fuel chain. In 2011 the Union of Concerned Scientists published ***Nuclear Power, Still Not Viable without Subsidies.*** This report shows that in some cases subsidies were greater than the value of the electricity produced. Subsidies are supposed to be for new innovations — not for propping up outdated technologies like fossil fuels and nuclear. Nuclear is also a dirty extractive industry – and like coal, oil and gas, nuclear depends on a limited supply of natural resources (uranium) in the ground.

☢ ***Cost of nuclear is going up, while cost of renewables is going down.*** Estimates for new reactors are, on average, four times higher than estimates from just eight years ago. Estimates for new reactors are invariably far less than the final cost, with the final cost often doubling. Sometimes, as in the cases of the Columbia Generating Station, Cherokee, and Perry, billions were spent while the reactors were never finished. Costs of renewables continue going down while their efficiency increases.

RENEWABLES ARE THE *REAL* ANSWER!

Mitigating climate disruption demands sound investment in economical, expedient, clean and, most of all, safe technologies. Wind and solar are getting cheaper and more efficient by leaps and bounds. Advances are being made in energy storage. Geothermal energy is being tapped extensively.

Wind farms added about 13 gigawatts of new power in the U.S. in 2012. Solar photovoltaic (PV) plants added 4.2 gigawatts of electricity in 2013. And that's just solar PV. Solar water heaters have become very economic and popular. There are also concentrated solar power arrays that generate electricity directly from the sun's heat, so the total amount of solar power is actually higher than the PV number alone.

Amory Lovins of the Rocky Mountain Institute and Arjun Makhijani of the Institute for Energy and Environmental Research have written articles and books on ***how both carbon and nuclear can be replaced nationwide with renewables by 2050.*** Dr. Makhijani's book *Carbon Free and Nuclear Free: A Roadmap for U.S. Energy Policy* can be downloaded from the internet. The phasing out of nuclear power and coal is now well underway, and the switch to wind, solar and efficiency is gaining momentum.

Check out the **Nuclear Free Campaign of the Sierra Club** Facebook Group and follow **@NuclearFreeSC** on Twitter.

SIERRA CLUB NUCLEAR FREE CAMPAIGN
85 Second Street, Second Floor
San Francisco, California, 94105

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