

The Basics of Nuclear Power

Nuclear energy has increasingly been cast as a silver bullet to the realities of global warming and the pressing need to reduce carbon dioxide emissions. As memories of the accident at Three Mile Island fade and out of control cost overruns from the 1980s become more distant, nuclear energy has undergone a political makeover by its supporters. In reality though, despite the temptation to label nuclear reactors as a viable solution to global warming and meeting our electricity demands, nuclear power is a bad choice. It is significantly more expensive than cleaner options, produces waste that contributes to an unresolved problem of long-term exposure, opens the door for proliferation, and perhaps most importantly, will not solve global warming.

- **Nuclear power is expensive:** The Nuclear Energy Institute has recently stated that 17 energy companies will apply for licenses to construct more than 30 nuclear reactors¹ across the country at a cost of between \$4-6 billion per reactor.² Not only is the construction of nuclear reactors far more expensive than cleaner energy alternatives such as renewables and efficiency measures, but costs per kilowatt hour are underestimated because they do not include offline time between electricity production cycles.
- **Nuclear power produces radioactive waste:** Permanent high-level waste storage for radioactive waste is a global problem. The U.S. government has already spent \$11 billion on the controversial high-level storage site at Yucca Mountain, and total expected costs exceed \$57.5 billion.³ In addition to the exorbitant costs, many safety concerns plague Yucca Mountain, including earthquakes and other potentially disastrous disturbances. Transporting radioactive waste to Yucca Mountain will also require 22,000 rail trips⁴ leaving the waste vulnerable to terrorist attacks and spills, and will require more than \$3 billion for rail construction.⁵ In the first year of Yucca Mountain operations, the total amount of radioactive waste that would require shipping would exceed the total amount transported in the past 30 years in the U.S.⁶ Adding to the expense of storing nuclear waste is the more than \$50 billion in expected liability claims to the DOE from utility companies seeking compensation for storing high-level radioactive waste on site despite federal law mandating permanent radioactive waste storage by 1998.⁷
- **Nuclear power is dangerous:** The risks and hazards of nuclear energy are not a thing of the past – malfunctions, leaks, and severe lapses in basic safety and oversight continue to occur on a regular basis at nuclear power plants across the country. At any number of nuclear stations in the U.S. an accident could cause tens of thousands of direct or indirect deaths, and also lead to hundreds of billions of dollars in damages.⁸ Just last year in Erwin, Tennessee, a Nuclear Fuel Services Inc. reactor fuel production facility leaked more than nine gallons of highly-enriched liquid uranium. If the uranium had pooled together, it could have instigated a spontaneous chain of nuclear fission that would have released dangerous amounts of radiation.⁹ The risks involved with nuclear reactors have not disappeared since the accident at Three Mile Island—including a near-miss at the Davis Besse nuclear station in Ohio in 2002. Questionable safety procedures by operators coupled with lax oversight by the Nuclear Regulatory Commission leave nuclear safety an issue of serious ongoing concern.



- **Nuclear power will not solve global warming:** For nuclear energy to play a significant role in reducing global warming pollution, a new nuclear reactor would have to come online an average of every 15 days between 2010 and 2050,¹⁰ and storage capacity the size of Yucca Mountain would have to come online every three to four years.¹¹ Such a massive increase in nuclear reactors would exacerbate the waste problem, increase the chances for a reactor malfunction, intensify the risk for terrorist attacks, and would cost billions.
- **Nuclear power produces global warming emissions:** Currently, the life cycle of nuclear energy emits between 10-150 grams of carbon per kilowatt hour, part. These rates could reach 400 grams by 2070 due to increased energy demand from mining uranium and storing waste. This means that nuclear power plants could match the current carbon emissions of a natural gas plant.¹²
- **Nuclear power undermines non-proliferation efforts:** The Massachusetts Institute of Technology examined the number of nuclear reactors necessary to curb global warming under a “global growth scenario.” Under this scenario, just one percent of the uranium enrichment capacity would enable the annual manufacture of more than 200 nuclear weapons.¹³ The processes of enrichment and reprocessing both produce “weapons-usable” materials. In fact, North Korea acquired the plutonium for its nuclear arsenal from commercial power and reprocessing plants.¹⁴

Nuclear is not the only low-carbon energy option available to us, yet it is certainly the most costly and the most dangerous. After receiving no applications for nuclear reactor licenses since 1979, the Nuclear Regulatory Commission (NRC) recently received two construction permit applications for nuclear reactors in Texas. NRC has already started gearing up to receive an expected wave of applications for new reactors across the country in light of expanded authority for the Department of Energy to authorize loan guarantees for the construction of nuclear plants.

Scientists say that we need to address global warming now, but nuclear reactors can take more than a decade to come online. Rather than sinking government funding into this dead-end plan, we must turn toward efficient and renewable forms of energy that are available today, including a national renewable electricity standard of 15% by 2020. The truth is that nuclear energy is a bad deal for Americans, even without asking them to foot the bill for \$50 billion in loan guarantees. Congress must act now and remove language in the energy bills that would greatly expand the scope of the loan guarantee program and would give nuclear energy a blank check. We need the cheapest, cleanest, most readily available sources of energy now, and nuclear energy fails on all accounts.

¹ Nuclear Energy Institute, *New Nuclear Plants*, accessed October 2007. <<http://www.nei.org/keyissues/newnuclearplants/>>

² Public Citizen, *Congress Should Not Bow to Nuclear Industry Demands for More Than \$50 Billion in Loan Guarantees to Build Nuclear Reactors*. <<http://www.citizen.org/documents/LoanGuaranteeBackgrounder.pdf>>

³ Caterinicchia, Dan, CNBC News, *DOE Says Yucca Mountain Funding Short*, October 4, 2007.

⁴ Halstead, Bob and Fred Dilger, State of Nevada Agency for Nuclear Projects, *Yucca Mountain Transportation: Critical Issues*, July 25, 2003. <http://www.state.nv.us/nucwaste/news2003/pdf/naruc_bh_030728.pdf>

⁵ Tetreault, Steve, Las Vegas Review Journal, *Railroad cost estimates for Yucca top \$3 billion*, July 24, 2007.

⁶ State of Nevada Nuclear Waste Project Office, *Transportation of Spent Nuclear Fuel and High-Level Radioactive Waste to a Repository*, updated May 20, 1999. <<http://www.state.nv.us/nucwaste/trans/trfact03.htm>>

⁷ U.S. Senate Republican Policy Committee, *Nuclear Waste Policy Amendments Act*. <http://rpc.senate.gov/_files/13100NuclearWaster.pdf>

⁸ Smith, Brice, The Institute for Energy and Environmental Research, *Insurmountable Risks: Can Nuclear Power Solve the Global Warming Problem*, August 2006, <http://www.ieer.org/sdfiles/14-2.pdf>

⁹ Mansfield, Duncan, The Associated Press, *Tennessee Nuclear Fuel Problems Kept Secret*, August 20, 2007.

¹⁰ Smith, Brice, The Institute for Energy and Environmental Research, *Insurmountable Risks: Can Nuclear Power Solve the Global Warming Problem*, August 2006.

¹¹ MIT, *The Future of Nuclear Power*, 2003, page 10. <<http://web.mit.edu/nuclearpower/>>

¹² Oxford Research Group, *Secure Energy? Civil Nuclear Power, Security and Global Warming*, March 2007, page 43. <http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/secureenergy.pdf>

¹³ Smith, Brice, The Institute for Energy and Environmental Research, *Insurmountable Risks: Can Nuclear Power Solve the Global Warming Problem*, August 2006.

¹⁴ Makhijani, Arjun, *Carbon-Free and Nuclear-Free: A Roadmap for U.S. Energy Policy*, July 2007, page 11. <<http://www.ieer.org/carbonfree/summary.pdf>>