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Southern Alliance for Clean Energy

Nuclear Power and Global Warming

The Risks of Nuclear Power Tackling Global Warming

For over five decades, nuclear power has diverted major funds away from the development of more benign but powerful forms of energy production. But today we are facing the prospects of the most serious issue facing humankind: global warming. In order for nuclear power to make an impact on carbon reductions, official projections show that thousands of new nuclear reactors would need to be built across the globe over the next several decades. To put this in perspective, the U.S. has 104 of the 441 operating nuclear reactors in the world today. According to a 2007 Keystone Center fact-finding report on nuclear power, *just to maintain current worldwide nuclear power capacity*, seven to nine new nuclear reactors would need to be built per year until 2050. In terms of making a substantial reduction in carbon emissions in the near term, nuclear power is too slow and too costly to be a viable strategy.

Wall Street -- According to the Keystone Center's collaborative, industry-endorsed report, in order to have a significant impact on climate, nuclear power would have to sustain unprecedented growth for several decades.[1] This growth would be extremely costly. Since the Keystone report was issued, the economics of new nuclear reactors have gotten much worse. The 2009 report, The Economics of Nuclear Reactors: Renaissance or Relapse?, stated that within the past year, estimates of the cost from a new generation of reactors have ranged from a low of 8.4 cents per kilowatt hour (kWh) to a high of 30 cents. [2] For example, the costs of proposed nuclear reactors in Florida have skyrocketed. Florida Power & Light and Progress Energy of Florida cost estimates are now around $17 billion—more than double what the utilities estimated just a few years ago. Both utilities propose to use the same Westinghouse AP1000 reactor design proposed at several sites around the country including Southern Company's Plant Vogtle in Georgia, a reactor design that has never been built before anywhere in the world that is grappling with serious safety design concerns.[3] In comparison, energy efficiency is generally estimated to cost around 3 cents per kWh.[4] According to the Rocky Mountain Institute, each dollar invested in energy efficiency in the U.S. displaces seven times as much carbon dioxide as a dollar invested in new nuclear power.[5]

Water -- Water needs and water consumption rates of nuclear power plants are also problematic. According to national statistics, the electric industry is often a leading, if not the largest, water user in many southern states. Current electricity supplies threaten water resources that affect important aspects of the region's tourism, agriculture, fishing industries and sensitive biodiversity. A comparison of different energy supply technologies shows that water usage from nuclear power plants is much greater than renewable energy supplies and is, in fact, the highest water consumer among all energy technologies.[6] And the new reactor designs being pursued offer no improvement. Two proposed new Westinghouse AP1000 reactors at nuclear Plant Vogtle are estimated to use 55-88 million gallons of water per day from the Savannah River with 50-75% consumptive loss. To put this consumptive water loss in perspective, with average per capita daily water use in Georgia at 75 gallons from surface and ground water sources, this means the two existing and two proposed reactors could use enough water to supply 1.4 to 2.3 million Georgians.[7]

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[1] The Keystone Center, Nuclear Power Joint Fact-Finding Report, June 2007. A Pacala/Socolow "wedge" is defined as 25 gigatons of carbon reductions. The Keystone report stated that in order for nuclear power to achieve just one wedge of carbon reductions over the next 50 years would require sustaining the most rapid decade of historical growth in nuclear power for that entire period.

[2] The Economics of Nuclear Power: Renaissance or Relapse?, June 2009, Mark Cooper, Senior Fellow for Economic Analysis, Institute for Energy & the Environment, Vermont Law School.

[3] U.S. Nuclear Regulatory Commission, NRC Informs Westinghouse of Safety Issues with AP1000 Shield Building, press release, October 15, 2009 at http://www.nrc.gov/reading-rm/doc-collections/news/2009/09-173.html.

[4] American Council for an Energy Efficient Economy (ACEEE), Direct Testimony of Bill Prindle for Southern Alliance for Clean Energy, GA 2007 IRP, Docket 24505, May 4, 2007.

[5] Rocky Mountain Institute Newsletter, Vol. XVI, #1, Spring 2000, pp. 15, 25, available at http://www.rmi.org/images/other/Newsletter/NLRMIspring20.pdf.

[6] Hoffmann, J., S. Forbes, T. Feeley. U.S. DOE, Estimating Freshwater Needs to Meet 2025 Electrical Generating Capacity Forecasts. June 2004, p. 12 and United States Department of Energy (DOE), *Energy Demands on Water Resources, Report to Congress on the Interdependency on Energy and Water*, December 2006.

[7] Existing Vogtle nuclear reactors have similar water requirements. With water withdrawals for all 4 reactors (2 existing and 2 proposed) ranging from 110MGD to 178 MGD, that could mean the equivalent of 1.4-2.3 million residents. The average per capita daily water use in Georgia is 75 gallons from surface and ground water sources, http://water.usgs.gov/watuse/tables/dotab.st.html.

The Southeast, often considered to be a water-rich region, is predicted to face increasing threat of drought in coming years based on climate models. In August 2007, TVA had to shut down one of the Browns Ferry reactors due to thermal loading problems—water drawn from the Tennessee River exceeded a 90 F degree average over 24 hours, amid a blistering heat wave across the Southeast. A TVA spokesman commented, *"We don't believe we've ever shut down a nuclear unit because of river temperature."* And the U.S. is not alone with experiencing the unreliability of nuclear power reactors in drought conditions. Europe has already experienced the unreliability of nuclear power. During the 2006 summer heat wave, nuclear power plants had to power down across Europe because the water temperatures were too high for safe operation.

Waste -- No nation in the world has yet to open a geologic repository. Our country's proposed federal repository, Yucca Mountain in Nevada, is severely over budget and decades off schedule and may never open. At current levels of operation the U.S. fleet of reactors is expected to exceed Yucca's capacity by 2010, even if it opened, it would not be large enough to accommodate all of the waste generated from our currently operating nuclear reactors, let alone any new reactors. According to the Keystone Center report, for nuclear power to play a role in carbon reductions, it would require 10 nuclear waste repositories the size of the statutory capacity of Yucca Mountain would be needed to store 713,000 tons of spent fuel worldwide.[8] In terms of reprocessing, the Keystone report determined that the long-term availability of uranium at reasonable prices suggests reprocessing of spent fuel will not be cost-effective in the U.S. in the foreseeable future. Additionally, a fuel cycle with reprocessing and any type of separation will still require a geologic repository for long-term management of nuclear waste. Reprocessing is also highly polluting and expensive.

Weapons -- The level of growth needed to impact global warming would require a global expansion of nuclear power, greatly increasing the threat of nuclear proliferation. The safety and security culture in some countries raises concerns about further expansion of nuclear power abroad. The bottom line is that the United States is not going to export nuclear power as a solution to global warming to many in the developing world where energy needs are growing the fastest. Many of these countries, such as Indonesia and Somalia, do not have the security infrastructure to support nuclear materials. Current battles over nuclear proliferation in North Korea and Iran are only the tip of a major iceberg if nuclear power is positioned as a solution to global warming. The U.S. cannot claim nuclear power as a solution and then prevent it from being an option in the developing world. We need technologies that can be freely shared with other emerging countries while demonstrating them at home in the U.S.—truly global solutions for global warming. Nuclear power simply has too many risks in a post-9/11 world to be a credible and viable strategy.

Summary

The need for smartly designed, well-implemented utility energy efficiency and renewable energy projects and clean energy incentives is urgent. Betting on nuclear power will consume the limited financial resources needed for rapid expansion of energy efficiency and renewables. In short, nuclear power remains a problem, not a solution.

Recommended Resources

1) The Keystone Center's ***Nuclear Power Joint Fact-Finding Report***, June 2007, at http://www.keystone.org/. This report examined a number of key issues including cost, waste, security, and safety regarding the feasibility of using nuclear power as a possible global warming mitigation technology and was written by nuclear industry representatives, environmental and consumer advocates, academics and state officials.

2) ***The Economics of Nuclear Power: Renaissance or Relapse?***, June 2009, by Mark Cooper at http://www.cleanenergy.org/images/files/CooperReportonNuclearEconomicsFINALJune2009.pdf. A current, thorough analysis that shows that the additional cost of building 100 new nuclear reactors, instead of pursuing a least cost efficiency-renewable strategy, would be in the range of $1.9-$4.4 trillion over the life of the new reactors.

3) ***Carbon Free and Nuclear Free: A Roadmap for U.S. Energy Policy*** by Dr. Arjun Makhijani. This book offers a detailed plan for how the U.S. can end reliance on fossil fuels without sacrificing economic growth and without the risks of nuclear power. Visit http://www.ieer.org/carbonfree/summary.pdf.

What You Can Do

Join Southern Alliance for Clean Energy at www.cleanenergy.org and help advance clean, safe, energy solutions across the region that will responsibly address global warming.

Southern Alliance for Clean Energy, www.cleanenergy.org, P.O. Box 1842, Knoxville, TN 37901

[8] Defined as one "wedge" of carbon reductions or 25 gigatons in carbon reductions.