

No Nukes, No Coal, No Kidding!

It happens frequently: debates on climate change devolve into arguments over which is worse for the environment—coal or nuclear power—as if these are the only sources of electricity generation open to us. Mostly such charges get made by climate crisis deniers and by the large energy corporations that own **both** coal and nukes, or those funded by such corporations.

In fact, the coal vs nuclear debate is a false, outdated equation. Twenty years ago, the issue may have been real. But renewable energy sources like solar wind and geothermal, coupled with aggressive energy efficiency programs, smart grids, distributed generation and improved transmission have made coal vs nuclear an irrelevant sideshow. We need to end both coal and nuclear power if we are to solve the climate crisis and build a sustainable energy future.

Two important recent works show a clear path toward building that nuclear-free, carbon-free energy future: *Carbon Free, Nuclear Free: a Roadmap for US Energy Policy* by Dr. Arjun Makhijani¹ and *Winning Our Energy Independence* by S. David Freeman².

Coal and Nuclear are the problem

Nuclear and coal have a whole lot in common: both are **dirty energy** that we need to phase out. Both:

- result in unavoidable by-product **wastes** that threaten the long term sustainability of life;
- need vast amounts of **water** for cooling much of which is not returned to the source;
- release vast **heat** (thermal pollution);
- require **mining** and all the impacts that come with extraction of resources;
- have a large carbon **foot-print from fuel production** and distribution;
- use **steam** to generate power, therefore about 2/3 of the fuel used is wasted;
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- are large, central power plants and therefore less efficient and also less **secure**;
- require enormous **capital commitments** to build new generating capacity.

Wastes: Burning coal results in solid and gaseous wastes. The airborne wastes are changing Earth's atmosphere – and much like altering the membrane of a cell, the impacts are changing the entire planet. Waste from mining and burning coal are laced with uranium, lead and other heavy metals, and are put in “impoundments” like the one that broke spewing more than a billion gallons of water and ash into homes in Harriman, TN.

Nuclear reactors release radioactive gases, vapors, and produce the most concentrated radioactive waste on the planet—containing over 95% of the radioactivity from all waste sources, millions of times more radioactive than uranium fuel. Radiation damages DNA—threatening the integrity of the treasury of information upon which life depends. Like coal, large amounts of dangerous waste are left from mining operations, and five additional steps: uranium milling, conversion, enrichment, re-conversion and fuel fabrication. All these steps, and related materials transport, are powered with carbon fuels, adding up to the substantial carbon footprint of making nuclear fuel. More CO₂ comes from building huge concrete and steel structures. Nuclear is lower carbon than coal, but it is not carbon-free.

None of these **Dirty Energy** wastes can be neutralized, and to date there is no certainty that they can be contained for the long-term.

Wicked Wastes: deserve special mention:

Mercury – burning coal releases thousands of tons of mercury to our air each year – the single largest source of mercury pollution worldwide. Mercury causes neurological damage, especially in children and a host of health conditions result.

Plutonium – forms inside a nuclear fuel rod as a byproduct of uranium fission and is extremely mutagenic and carcinogenic. Plutonium is the primary ingredient in thermonuclear weapons.

Water: The Achilles heel of using coal and nuclear to make electricity is that both require vast amounts of water. Nuclear energy depends on water for cooling the core of the reactor. In addition, the majority of the water withdrawn from lakes, rivers and even groundwater has nothing to do with the nuclear reaction. Both coal and nuclear are really 18th century steam technology. Water is boiled to form steam; the steam pressure turns a turbine; the radial motion is used to turn a generator; the generator makes electrons flow into an electric line to your light switch and cell phone charger. Burning coal boils water, and so does splitting atoms (fission) since the energy that holds the atomic nucleus together is released to the core coolant. In both cases the goal is to generate steam.

The first steam engine (1705) was used for locomotion – and the steam used was simply released. A supply of water was carried on board the train, in addition to the fuel to boil it. Railroad stops had large water tanks to replenish the train's water tanks. Power plants have a closed "steam loop" where water vapor is condensed back into liquid so it can be boiled again. A lot of the heat is retained in the process, but the condenser requires hundreds of thousands—in the case of nuclear millions--of gallons of water *per minute* to cool the condenser.³ This cooling water carries massive heat, and in many cases is released as steam, thereby not replenishing the water source.

Steam cycles are only 33% efficient; two-thirds of the fuel used does not actually deliver power. This is because phase transition from liquid to a gas requires a lot of energy, and when the gas (steam) is condensed, all the heat that was put in, comes back out (Second Law of Thermodynamics). It is a sad truth that only 1/3 of the uranium and coal actually makes electric power. *Two thirds of the CO₂ in the atmosphere, the acid and mercury in the waters, and two thirds of the radioactive waste*

¹ Makhijani, Arjun, 2007. *Carbon Free, Nuclear Free: A Roadmap for US Energy Policy*, Institute for Energy and Environmental Research Books, full text also available on-line at no charge. www.ieer.org

is generated to power phase transition, not to power our homes and work.

This hard truth about steam is one of the chief reasons that we must embrace a whole new model in this new millennium. Using the power of our Sun and the winds the Sun causes to blow, and the evaporative cycles that can be harnessed as appropriate hydro, combined with good design and smart use of the power we make will create a new system that IS sustainable.

In 2005 NIRS joined forces with the Canary Coalition – a health-based initiative focused on air quality and fighting coal – to do the Energy at the Crossroads Tour. The Tour intersected with work in the Southeast on Climate including the Energy Action Coalition and also Rising Tide. NIRS partnered with Rising Tide to hold Southeast Convergence for Climate Action – a weeklong training for activists of all ages in 2007 and 2008. We coined the phrase **No Nukes, No Coal, No Kidding** to describe our commitment to each other and the path that does not allow ANYONE to pit the communities impacted by DIRTY ENERGY against each other. Instead we are learning to stand together and to stand up together.
- Mary Olson, NIRS Southeast, February 2009



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² Freeman, S. David, 2007. *Winning Our Energy Independence: An Energy Insider Shows How*. Gibbs Smith Publishers.

³ Lochbaum, David 2007. "Got Water?" Union of Concerned Scientists Issue Brief. Nuclear runs hotter than coal. See: http://www.ucsusa.org/assets/documents/nuclear_power/20071204-ucs-brief-got-water.pdf