

Beware putting too many energy eggs in the nuclear basket...

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An oft-repeated jibe against renewable energy sources like wind and solar power by (usually) smug nuclear power proponents is, “What are you going to do when the sun don’t shine and the wind don’t blow?”

For the umpteenth time since 1988, our organization has been forced to meet this mindless taunt with the starkly real rejoinder: “And what are YOU going to do when the rivers don’t flow?” For, just like in Illinois in 1988, 2005, and 2006; and throughout Europe several years this century, France -- the much heralded nuclear exemplar -- is again facing a river water crisis that is forcing the shutdown of one-third of its entire nuclear power fleet.

Due to the current serious drought (think: “*transient* global warming conditions”), maintenance issues, and a worker strike, 80% nuclear-reliant France is now *importing* electricity from England to meet power demand. One report indicates that “20GW (gigawatts) of France’s total nuclear generating capacity of 63GW was out of service,”¹ *exactly* when needed the most.

The reasons are easily understood. Fourteen of France’s 19 nuclear generating stations are sited on rivers. Reactors discharge heated water into these confined water systems, relying on that age-old deficient axiom that “the solution to (thermal) pollution is dilution.” Unfortunately for the French, during severe droughts, the rivers possess neither sufficient water volumes nor flow-rates to sufficiently dissipate the ever-growing heat build-up. Continuing operation would result in cooking the river biosystems locally and downstream.

Regulations exist in France (and elsewhere) preventing this. Powerplants are required to curtail operation or shut down completely when discharge water exceeds such a heat threshold – inconveniently, when demand for electricity is peaking.

The power output of reactors continuing to operate is also lessened during periods of drought due to higher river water temperatures. A Union of Concerned Scientists paper notes that, with higher ambient water temperatures in rivers and lakes, “...the effectiveness of the condenser in converting steam back into water decreases. As a result, steam is not “pulled” through the turbine as swiftly and less electricity is “cranked” out.”²

To be fair this condition applies to any steam-cycle electricity generator, whether powered by coal, nuclear or gas. But to be equally fair, this point should be held pointblank in mind when considering new sources of electricity in a difficult to model but seemingly immanent climate-disrupted world. Wherever drought becomes the norm, the steam-cycle for power generation will compete head on with more basic human needs and uses for water. And in an agricultural state like Illinois – which already uses over

80% of its surface waters for power generation³ – expanding reliance on the steam-cycle becomes a liability.

Before Illinoisans indulge in too much smirking and *schadenfreude* over France's predicament, it's worth noting that 1.) reactor shutdowns already happened in Illinois in 1988, and almost again in 2005-06; and 2.) 100% of Exelon's Illinois reactors are river-dependent.

So -- what lessons can be learned from these unfortunate experiences? Well, some in the Illinois legislature think – this is a great time to *build more* nuclear reactors! The last two Illinois legislative sessions saw proposals to repeal what is known as the “Illinois nuclear construction moratorium”⁴

The legendary American conscience and humorist Will Rogers once quipped that some people learn by reading; others by being told. And some – just have to piss on the electric fence for themselves. It seems to us that those advocating construction of new nuclear reactors in a climate unstable world -- where water will be THE ultimate constraining resource, and where we have ample historic evidence that reactors are less-efficient, vulnerable, or outright inoperable under expected severe drought conditions, and finally, where viable energy alternatives exist -- would fall in that third category.

Which would not necessarily be such a bad thing – if they didn't require that we all hold hands with them.

--635 words--

¹ “France imports UK electricity as plants shut,” The Times , July 3, 2009, http://business.timesonline.co.uk/tol/business/industry_sectors/utilities/article6626811.ece

² “Nuclear Heat,” Issues Brief, Union of Concerned Scientists, 2006. www.ucsusa.org

³ “Drought may give a taste of the future,” Kelly Kennedy, *Chicago Tribune*, July 7, 2005; and private phone conversation with Dr. Derek Winstanley, (then) Illinois State Water Survey, July 8, 2005.

⁴ Or, more accurately, Sec. 8-406.c of the Public Utilities Act, preventing the construction of new reactors in Illinois until such time as the federal government has a demonstrated and operating facility for the permanent disposal of high-level radioactive wastes (spent-fuel) by the reactors.