EDITORIAL BOARD/OP-ED PAGE BRIEFER:

THERE IS NO NEW VERSION OF NUCLEAR POWER WITH FEWER PROBLEMS

OVERVIEW

Does the fact that President Obama held a news conference to announce a loan guarantee for nuclear reactors in Georgia mean that the industry is on a roll again?

Does the U.S. nuclear industry now have a reactor design in hand that addresses the many problems – including runaway costs, radiation exposure and proliferation dangers – that are troubling the industry?

The answer to both of these questions is "no."

In reality, except for what is now happening in Georgia, no new nuclear power plants have been ordered in the U.S. since 1978. Despite incentives passed in 2005 by the Congress to provide excessive taxpayer-backed subsidies to the industry, the private sector did not invest in nuclear power. The industry is plagued by excessive costs, and cost-overruns. The latest push to create new interest in the industry is the so-called "Nuclear Renaissance," which was declared as having commenced in the early 2000s – but, in truth, has yet to materialize.

The Bush Administration began the renewed push for nuclear power. President Obama is picking up where his predecessor left off. Congress is charging ahead with promises of more taxpayer and ratepayer largesse for the failed technology in an attempt to garner enough votes to pass energy and climate legislation in 2010.

Much in the same way that unproven "carbon capture and storage" technology is viewed as a means to prop up the coal industry, so-called "Generation IV" Reactors are being presented as the salvation of nuclear power.

However, Generation IV reactors are not shaping up as much of an improvement on Generation III+ reactors, in relation to which the NRC has raised major design-related safety concerns. In addition, there are still problems with excessive cost, questionable safety, proliferation concerns remain, inevitable public exposure to radioactive emissions, deployment timelines, and design problems. In short, Generation IV reactors only work on paper; they remain a largely theoretical solution.

BACKGROUND: GENERATION IV REACTORS

The industry is now scrambling to reinvent nuclear power as the panacea for energy independence, national security, global warming, and job creation. The essence of the "new" approach is the old idea of "breeder reactors" (plutonium-fueled fast reactors) and a "closed" nuclear fuel cycle.

The stated goals for Generation IV reactors in the July 2006 10 year plan published by U.S. Department of Energy (DOE) are:

- **Sustainability** (defined in terms of not compromising the needs/environmental quality of future generations).

- **Economic Competitiveness** (defined as filling market niches, such as distributed power applications, peaking unit applications, production of hydrogen, desalination, district heating, and electricity production).

- **Safety and Reliability** (defined as simplifying systems and high capacity factors, avoiding severe accidents).

- **Proliferation Resistance and Physical Protection** (defined in the context of nuclear weapons and resistance to natural disasters, fires, plane crashes, etc.).

The idea is to design a reactor that uses up spent nuclear fuel and to shorten the time period that nuclear wastes need to be stored by reducing the radioactivity of high level wastes, known as "transmutation." This strategy involves the reprocessing of spent fuel rods to extract plutonium. The industry and DOE claim that a dry reprocessing scheme would not yield bomb grade plutonium. The plutonium is combined with uranium oxide to create a fuel, known as "MOX."

This strategy requires the creation of a plutonium economy. It requires the reprocessing of spent nuclear fuel with its attendant costs, exposure and proliferation issues. This strategy requires the resurrection of attempts to successfully design and deploy breeder reactors (now called "fast reactors"), so named because they generate more fuel through production of plutonium.

FAST REACTORS: NO SOLUTION

On its "Next Generation of Reactors" home page the DOE describes six reactor designs of interest. Although funding is provided for a number of these, the December 2006 strategy document picks the Sodium-Cooled Fast Reactor (SFR) because of experience with this design. DOE considers this design to be at the "proof of performance" stage, meaning that it is considered technically feasible. DOE points to 300 reactor years of experience with the SFR, including the FERMI reactor, which nearly melted down and was featured in the book "We Almost Lost Detroit."

Despite deeming SFR technology "mature," DOE laments the costs to be large, perhaps "26 percent greater than conventional [reactors]." But DOE is determined to "achieve a level of economic competitiveness for SFRs that enables deployment in accordance with market principles…"

This is a curious goal since no nuclear power technology was ever deployed "in accordance with market principles." They were built on the backs of taxpayers and ratepayers. Billions of dollars were lost through the first building binge and the so-called nuclear renaissance declared in the early 2000s has never materialized, despite a steady increase in taxpayer backed subsidies and loan guarantees. **Indeed, 60 years of taxpayer supported R&D, liability insurance, subsidies, bailouts and captive ratepayers have not reduced the unit costs of nuclear power. Instead, the construction costs of even conventional designs continue to increase.**

MISSING THE WINDOW ON CLIMATE CHANGE

For Generation IV reactors to reach the desired level of economic competitiveness, which has proven impossible with all nuclear reactor designs, we will need considerable R&D and expansion of infrastructure to support all aspects of design, testing, necessary expertise, component fabrication, etc. One such commercial-scale reactor, DOE estimates, would not be operational until 2020, which means that deployment will be excruciatingly slow in coming as with all other nuclear technology.

Indeed, Tom Chochran, of the Natural Resources Defense Council notes, with respect to plans for build-out of nuclear infrastructure, reactors, and reprocessing facilities, "Such subsidies can in fact discourage innovation, by keeping technologies in the marketplace that otherwise would be passed over in favor of more cost-effective solutions" [to climate change].

OVERSTATING THE BENEFITS

The claims of the industry and hopes of government for and about Generation IV reactors are vastly exaggerated. From the fail-safe reprocessing schemes, to the use of 100 percent of spent fuel, to the reduced storage requirements of radioactive wastes, to inherently safe reactors, these assertions seem too good to be true. And they are.

There are numerous sources that can be reviewed in describing the fallacy of the continued efforts to force a failed technology onto the American public and the extraordinary claims that rarely change but are repackaged in each successive failed attempt to rekindle the nuclear industry. This time will be no different.

As Tom Cochran of NRDC points out: "After 64 years and tens of billions of dollars it is abundantly clear that it (sodium-cooled fast reactors) is an uneconomic, unreliable, and proliferation-prone technology."

Cochran also notes that the technology "failed in the US, UK, France, Germany, Italy, and Japan." A breeder reactor operates in Russia, he says, but does not use MOX fuel, so it fails to close the fuel cycle.

Amory Lovins writes: "Every new reactor in history has been costlier, slower, and harder than projected."

He continues: “IFRs (integrated fast reactors) might in principle offer some safety advantages over today’s light-water reactors, but create different safety concerns, including the sodium coolant’s chemical reactivity (sodium catches fire if exposed to air and explodes if exposed to water) and radioactivity.”

INCREASING PUBLIC EXPOSURE TO RADIATION

No matter the type of reprocessing there are considerable concerns with environmental damage and public exposure to radiation. Cochran writes that the closed MOX fuel cycle “leads to greater routine releases of radioactivity into the environment, greater worker exposures to radiation, larger inventories of nuclear waste that must be managed, and it doesn’t appreciably reduce the geologic repository requirements for spent fuel or high-level nuclear waste.”

In a 2009 article, Jill Marie Parillo, deputy director for Security Programs at Physicians for Social Responsibility, cited the Programmatic Environmental Impact Statement (PEIS) on the Global Nuclear Energy Partnership, the countries signed on to develop fast reactors and a reprocessing scheme that ostensibly will not lead to nuclear proliferation, which underscores the problems with the “closed” fuel cycle.

Parillo stated: “The PEIS… states that cesium and strontium, which are currently embedded within spent fuel rods, would be separated out through reprocessing and ‘could be stored at the recycling center for 300 years’ or transported to a future high-level storage facility. After 30 years of operation, an estimated 7.5 billion to 12.4 billion curies of highly radioactive cesium and strontium could accumulate at such a GNEP facility. This would dwarf the 131 million curies of cesium and strontium currently stored at the Hanford Site in Washington State that the National Academy of Sciences calls ‘the nation's most lethal single source of radiation other than inside an operating reactor.’”

CONCLUSION

Generation IV reactors appear to be yet another in a long series of nuclear industry dead ends.

Both Cochran and Lovins use the example of US Navy Admiral Rickover in his statement 50 years ago to illustrate the full circle the sodium-cooled fast reactor/closed fuel cycle debate has taken. At that time Admiral Rickover referred to fast reactors as “expensive to build, complex to operate, susceptible to prolong shutdown as a result of even minor malfunctions, and difficult and time-consuming to repair.”

In response to Rickover’s observations, Lovins says, “Little has changed.”

SOURCES

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