IEER/PSR: "SMALL MODULAR REACTORS" NO PANACEA FOR WHAT AILS NUCLEAR POWER

Fact Sheet Explores Cost, Safety, and Waste Issues Glossed Over by Industry

WASHINGTON, D.C. – September 29, 2010 – The same industry that promised that nuclear power would be "too cheap to meter" is now touting another supposed cure-all for America's power needs: the small modular reactor (SMR). The only problem is that SMRs are not only unlikely live up to the hype, but may well aggravate cost, safety, and environmental problems, according to a new fact sheet prepared by the Institute for Energy and Environmental Research (IEER) and Physicians for Social Responsibility (PSR).

Titled *Small Modular Reactors: No Solution for the Cost, Safety, and Waste Problems of Nuclear Power*, the new IEER/PSR presentation is available online at http://www.ieer.org/fctsheet/small-modular-reactors2010.pdf.

The small modular reactor is being pitched by the nuclear power industry as a sort of production-line auto alternative to hand-crafted sports car, with supposed cost savings from the "mass manufacturing" of modestly sized reactors that could be scattered across the United States on a relatively quick basis.

The facts about SMRs are far less rosy. As the IEER/PSR document notes: "Some proponents of nuclear power are advocating for the development of small modular reactors as the solution to the problems facing large reactors, particularly soaring costs, safety, and radioactive waste. Unfortunately, small-scale reactors can't solve these problems, and would likely exacerbate them."

Co-author Arjun Makhijani, the president of IEER, holds a Ph.D. in engineering (specialization: nuclear fusion) from the University of California at Berkeley. He said: "Amidst the evaporating hopes for a nuclear renaissance, nuclear power proponents are pinning their hopes on small modular reactors without thinking carefully about the new problems they will create such as inspecting production lines in China, procedures for recalls, or the complications and costs of a variety of new forms of nuclear waste."

The supposed cost benefits of SMRs are also subject to debate. The costs of mass manufacturing would be offset at least in part by loss of economies of scale. Further, modular construction will impose much higher costs on the first units, increasing the uncertainty and risk of initiating nuclear power projects. As IEER/PSR researchers note: "The cost picture for sodium-cooled reactors is also rather grim. They have typically been much more expensive to build than light water reactors, which are currently estimated to cost between $6,000 and $10,000 per kilowatt in the US. The costs of the last three large breeder reactors have varied wildly. In 2008 dollars, the cost of the Japanese Monju reactor (the most recent) was $27,600 per kilowatt (electrical); French Superphénix (start up in 1985) was $6,300; and the Fast Flux Test Facility (startup in 1980) at Hanford was $13,800. This gives an average cost per kilowatt in 2008 dollars of about $16,000, without taking into account the fact that cost escalation for nuclear reactors has been much faster than inflation … Spent fuel management for SMRs would be more complex, and therefore more expensive, because the waste would be located at many more sites."

The IEER/PSR fact sheet also raises significant safety-related concerns. Eliminating secondary containment would decrease costs but raise safety issues, while including that containment would raise costs. As regards sodium-cooled reactors they note: "The world's first nuclear

reactor to generate electricity, the EBR I in Idaho, was a sodium-potassium-cooled reactor that suffered a partial meltdown. EBR II, which was sodium-cooled reactor, operated reasonably well, but the first US commercial prototype, Fermi I in Michigan had a meltdown of two fuel assemblies and, after four years of repair, a sodium explosion. The most recent commercial prototype, Monju in Japan, had a sodium fire 18 months after its commissioning in 1994, which resulted in it being shut down for over 14 years. The French Superphénix, the largest sodium-cooled reactor ever built, was designed to demonstrate commercialization. Instead, it operated at an average of less than 7 percent capacity factor over 14 years before being permanently shut."

The Pebble Bed Modular Reactor (PBMR) exemplifies the types of problems that SMR technology has encountered in the past two decades. The factsheet concludes that "Despite 50 years of research by many countries, including the United States, the theoretical promise of the PBMR has not come to fruition. The technical problems encountered early on have yet to be resolved, or apparently, even fully understood. PMBR proponents in the US have long pointed to the South African program as a model for the US. Ironically, the US Department of Energy is once again pursuing this design at the very moment that the South African government has pulled the plug on the program due to escalating costs and problems."

And what about SMRs as some kind of "silver bullet" for averting global warming?

The IEER/PSR fact sheet points out: "Efficiency and most renewable technologies are already cheaper than new large reactors. The long time — a decade or more — that it will take to certify SMRs will do little or nothing to help with the global warming problem and will actually complicate current efforts underway. For example, the current schedule for commercializing the above-ground sodium cooled reactor in Japan extends to 2050, making it irrelevant to addressing the climate problem. Relying on assurances that SMRs will be cheap is contrary to the experience about economies of scale and is likely to waste time and money, while creating new safety and proliferation risks, as well as new waste disposal problems."

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The Institute for Energy and Environmental Research provides policy-makers, journalists, and the public with understandable and accurate scientific and technical information on energy and environmental issues. IEER's aim is to bring scientific excellence to public policy issues in order to promote the democratization of science and a safer, healthier environment.

The Physicians for Social Responsibility Safe Energy program focuses on protecting public health, taxpayer dollars, and national security by preventing the construction of expensive, dirty, and dangerous new nuclear reactors. More than 60 years since the first civilian nuclear reactor was turned on, a mature industry is still dependent on government subsidies and economically unsound, mired in unresolved safety issues, and a threat to public health.