Occasional Essay

IS NUCLEAR POWER AS CLEAN AS THEY SAY?

In the early days of the atomic age, commercial nuclear power was promoted as clean, safe, inexpensive, and the energy source of the future. The future is here, and nuclear power has failed to live up to its promises. The safety myth was seriously damaged by Three Mile Island and then totally destroyed by the tragedy at Chernobyl. While originally billed as "too cheap to meter", the high costs of both plant construction and operation have been the biggest factor in the decline of the nuclear power industry.

The myth that nuclear power is clean has not died as easily. While the problem of dealing with nuclear waste has never been solved, the lack of major emissions from nuclear power plants allows the industry to perpetuate the clean power myth. As America's primary source of electricity, coal, falters due to air pollution concerns, the nuclear industry has found a new angle. When electricity is produced with coal, large volumes of sulfur dioxide and nitrogen oxides (the major cause of acid rain) and carbon dioxide (the primary greenhouse gas), are emitted into the air. The nuclear industry argues that replacing coal-generated electricity with nuclear power will eliminate these pollutants and thus help eliminate the threats of global warming and acid rain. This idea has been heavily promoted recently in a massive advertising campaign conceived and financed by the nuclear industry. The campaign is based on the fact that nuclear power plants emit no sulfur dioxide or carbon dioxide.

But is this claim really true? No. The entire process to produce nuclear power, including the enrichment of nuclear fuel, has very high emissions of these harmful gasses. The relationship between nuclear power and air pollution is similar to that of electric cars, or so-called "zero emissions vehicles." There are no emissions directly produced by electric vehicles. But the fuel they use, electricity, usually has a significant amount of harmful emissions associated with its production. Nuclear power is very similar. While the actual nuclear power plant emits no sulfur dioxide or carbon dioxide, the fuel it uses, enriched uranium, has a tremendous amount of emissions associated with its production.

After uranium is mined, it must be enriched before it can be used as fuel in a nuclear power plant. The enrichment process increases the portion of the uranium that is fissionable, or useable in sustaining a nuclear reaction. (The sustained reaction is used to make heat, which produces steam, which turns a turbine to generate electricity.) There are only two facilities in the United States that enrich uranium. They are located in Paducah, Kentucky and Portsmouth, Ohio. Both are owned by the U.S. Department of Energy. These facilities were built in the 1950s and rely on the outdated gaseous diffusion process. This inefficient process consumes tremendous amounts of electric energy, which accounts for about 70% of the cost of enriching uranium.

The power to enrich this uranium comes from three large power plants located along the Ohio River: Clifty Creek in Indiana, Kyger Creek in Ohio and Joppa Steam in Illinois. These three large plants, totaling about 3,400 megawatts of capacity, run around the clock at full power with almost all of their output going to the enrichment plants. In 1990, the two enrichment plants consumed about 27 billion kilowatt-hours to enrich uranium. To put this amount in perspective, it is equivalent to the annual electric use of 2.4 million average households. This electricity costs the Department of Energy about $500 million annually.

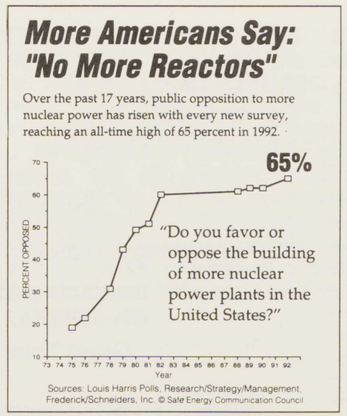
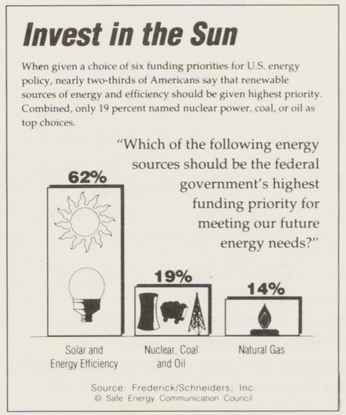
The three power plants producing this power are all old coal-fired plants built in the mid-1950s. To keep electric costs as low as possible, the cheapest and dirtiest high-sulfur coal is burned.

The cost to the environment of enriching uranium is great. An estimated 10.7 million tons of coal was burned in 1990 to enrich uranium. This resulted in 661,000 tons of sulfur dioxide and 195,000 tons of nitrogen oxides being emitted into the air to produce the electricity used to enrich uranium. About 85% of the enriched uranium is used by commercial power plants. It is estimated that 3% of all sulfur dioxide emitted into the air in the United States is associated with enriching uranium. OVEC and EE Inc., the two companies that produce power exclusively for the enrichment plants, will receive 5% of all sulfur dioxide allowance under Phase I of the new Clean Air Act.

The nuclear industry has claimed that nuclear power is cleaner than coal. But the use of high-sulfur coal in the enrichment process negates their claim. It has been estimated that the enrichment process consumes as much as 25% of the electricity produced by nuclear power plants. Using this estimate, a nuclear power plant, because of the enriching process, produces twice the acid rain emissions, on a kilowatt-hour basis, than does a new coal-fired plant with scrubbers that are 90% effective. Even after Phase I of the new Clean Air Act, a nuclear power plant will still cause about as much acid rain as a new coal-fired plant with scrubbers, on an emissions per kilowatt-hour basis.

Enriching uranium for nuclear power plants has a similar devastating effect on global warming. Uranium enrichment annually produces approximately 22 million tons of carbon dioxide, the primary greenhouse gas. Even if the acid rain emissions from uranium enrichment were greatly reduced by the 1990 Clean Air Act, nuclear power would still make a major contribution to global warming. As long as coal is used to enrich uranium, nuclear power will remain a major cause of global warming, contrary to nuclear industry propaganda.

Some nuclear advocates say that these massive emissions are not necessary for nuclear power. They claim that it is possible to use nuclear-generated electricity to enrich nuclear fuel. While this concept is possible on paper, it is not practical in the real world. Uranium enrichment already loses about a half-billion taxpayer dollars per year. The enrichment process is economically dependent on cheap electric power to keep losses as low as possible. The power presently used for enrichment costs about 1.8 cents per kilowatt-hour. Nuclear-generated power, even under the best assumptions, costs many times this amount. Thus, if nuclear fuel was enriched using nuclear-generated power, the cost of enrichment would be prohibitive, making it an unrealistic option.

The nuclear power industry is basing the promotion of their power as "clean" on only part of the facts. When the whole nuclear power picture is examined, a much different situation is revealed. The dirty coal used to produce nuclear fuel makes nuclear power a highly polluting energy source. Additional use of nuclear power will add to global warming and acid rain problems, not solve them. In the search for a clean energy source to solve the planet's pollution problems, nuclear power is not even a candidate.

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