# The Great Nuclear Power Debate (1)

# A Summary

## Is nuclear power the 'Angel of Death' (Ralph Nader) or 'The Nation's Salvation' (Rep. Mike McCormack)?

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*The debate over nuclear energy is heating up again, with opposing positions more solidified than ever. A recent Harris poll shows 63 percent of Americans favor more nuclear power plants, but another poll shows 40 percent still have no firm opinions. During this year's elections, referenda on allowing construction of more nuclear reactors will appear on ballots of at least two states, and recent Congressional hearings have highlighted the issues involved. In this first article of a two-part series, we present the contrasting, and often irreconcilable, positions of nuclear advocates and opponents. The second article will concentrate on the most controversial aspect of the debate, the breeder reactor.*

## Opponent

## Advocate

### Economics

Utilities are beginning to realize that nuclear power isn't the blessing it was thought to be. Within the last two years they have canceled or delayed orders for the equivalent of 130 large nuclear plants. Construction costs range from 10 to 46 percent higher than conventional plants. Uranium prices have tripled over the last two years. Reactors would never have gotten this far (eight percent of the country's power-generating capacity) without huge Government subsidies; before they can develop further, more huge subsidies will be needed to build new enrichment plants to transform natural uranium into the fuel used by reactors. Once built, the reactors have not performed as reliably as hoped, running at less than two-thirds capacity. The breeder reactor looks even worse: Development costs are projected to be $11 billion, but the actual cost of building a breeder demonstration project at Clinch River, Tenn., has escalated from $700 million in 1972 to $1.7 billion today.

Despite construction cutbacks caused by the recession, nuclear energy is still a bargain, generating electricity at 40 percent less than the cost of fossil-fuel plants, even after considering construction costs. In 1974, nuclear plants saved the country the equivalent of 163 million barrels of oil—some $2 billion worth. The price of uranium is such a small part of the total cost that it could quadruple again and nuclear energy would still be cheaper than conventional power. The initial Government subsidy of nuclear reactors has long since been surpassed by private investment, and the projected economic benefits of the breeder reactor are more than 12 times the cost. Of the cost increases at Clinch River, 60 percent were due to inflation and 20 percent were due to design changes. Nuclear plants are as reliable as conventional ones: From 1964 to 1973, conventional plants operated an average of eight and a half months a year; nuclear plants, around nine.

### Danger from accidents

The official Government study of reactor safety, the so-called Rasmussen report (SN: 8/31/74, p. 117 and 11/15/75, p. 310) has been severely criticized for underestimating human error (SN: 11/23/74, p. 330) and not adequately considering contamination of land areas by radioactive fallout following a major accident (SN: 5/3/75, p. 286). The study's methodology is questionable, assumptions such as adequate evacuation procedures are unrealistic, and the Environmental Protection Agency says the resulting casualty figures are too low by a factor of 10. Since the report came out, one of the "accidents that couldn't happen" did: A technician at the Browns Ferry, Ala., reactor complex set fire to the electrical control system, while using a candle to check for air leaks. The emergency core cooling system was knocked out, water in the reactor vessel dropped dangerously low, workers argued with firemen for five hours before following their advice on how to extinguish the fire, and no evacuation plans were set in motion.

The key finding of the Rasmussen report was that an individual's chances of dying from nuclear accident are about the same as being hit by a meteorite—one in 5 billion. This methodology is imprecise but is the most sophisticated available, and a factor of 10 one way or the other is practically meaningless. For workers in all aspects of the nuclear business, the most danger arises in uranium mines, not around reactors, and new mining safety regulations are improving those conditions. The Browns Ferry incident demonstrates just how well the nuclear safety systems are designed to compensate for human error. Despite a fire directly under the control room, no evacuation was needed and no damage was sustained by the reactor, core or coolant piping. Despite loss of control over some of the cooling systems, alternative methods were available and successfully employed. There were no injuries and no release of radioactivity. Regulations governing worker conduct are constantly being updated to prevent such accidents.

# Opponent

# Advocate

## Environmental effects

In the normal operation of nuclear plants, some radioactive materials will inevitably escape and expose the public. Reactors also give off more waste heat than fossil-fueled plants of the same generating capacity, and this thermal discharge has already adversely affected the ecology of rivers and lakes. The biggest problem, though, is what to do with nuclear wastes; already 200,000 tons of discarded uranium left over in spent fuel has accumulated in 20,500 steel vessels at Oak Ridge and other sites. Some wastes remain dangerously radioactive for thousands of years—long after steel drums rust away. Not only is there a danger to the public of being exposed to the cancer-causing radioactivity of these wastes, but some of them, including plutonium, are so chemically toxic that accidental ingestion of even very small amounts can cause death. Even if one assumed that secure, long-range storage of these wastes could be found, the cost—including constant guarding for thousands of years—would be very large.

The amount of radiation escaping from reactors is minuscule compared with naturally occurring radiation on earth; the average person receives one ten-thousandth as much radiation from the nuclear industry as from natural sources or medical X-rays. Thermal discharge could be used constructively—say, to heat homes, as in some other countries—if the public would accept it. Annual costs of all environmental effects associated with reactors are less than half those associated with coal-fired plants. Nuclear wastes are really not as much of a problem as some have claimed: Long-lived wastes are only half a percent of the total wastes, and these are now molded into insoluble solid masses. By 2010 the total volume of these solid wastes could fit comfortably into a single abandoned salt mine (a very stable geologic formation) at negligible cost. The spent uranium at Oak Ridge is being saved for use in the breeder reactor, where its value could be *trillions* of dollars. Plutonium is less toxic than many industrial chemicals in common use.

## Terrorism

Even if the problems of normal reactor operation, occasional accidents, waste transportation and storage could be overcome, no way has been found to calculate the impact of nuclear terrorism, or to adequately prevent it. A nuclear bomb can be made from only 10 to 20 pounds of plutonium, which is copiously produced in every reactor and shipped elsewhere for fuel reprocessing. On an NET television program, an undergradute student demonstrated how easy it would be to steal some plutonium and design a bomb—which experts from the Swedish Defense Ministry said would explode. But the aim of the American nuclear industry is not just to build reactors here, where some safeguards do exist, but rather to export its technology, inevitably to countries whose obvious political instability will virtually assure nuclear weapons proliferation. To prevent nuclear theft and terrorism in the United States will require establishment of what some have called a "garrison state;" to prevent it abroad, nothing can be done.

Relative to the nuclear power debate, the issues of terrorism and proliferation are simply red herrings—there are much easier ways to go about either. In the first place, the "10 to 20 pounds" of bomb material refers only to the weapons-grade, metallic plutonium-239, which never exists as such anywhere in the whole nuclear fuel cycle. It would take from 200 to 900 pounds of unprocessed nuclear fuel to make a very crude bomb, or 25 to 70 pounds of the reprocessed plutonium oxide—a much more difficult substance to handle than the weapons-grade metal. Designing a bomb may be simple (though none of the Swedish "experts" had actually ever built one), but preparing the materials requires an extensive industry, and assembling the device without cooking oneself is actually quite a trick. Conventional terrorism is a more immediate threat to civil liberties, and the best way to encourage responsibility among developing countries is through creation of a working partnership, based on such projects as nuclear power.

## Alternatives

Ultimately, the reason nuclear power development should be halted is that so many better alternatives are available, and needed development funds have been usurped by nuclear research. Some 40 percent of the energy consumption in the United States is unnecessary to begin with, according to some estimates. Savings of that amount could easily be obtained in buildings and cars, through careful redesign. The unemployment picture could be brightened if we let people take back some of the jobs machines took from them. For energy increases over the short-term, more coal could be used if the proper environmental protection devices were installed. Geothermal, solar and wind energies are waiting to be tapped in endless supply in various geographical areas, and these alternate sources have the added advantage of lending themselves to small, labor-intensive development. Finally, if one insists on nuclear energy, why not wait until the much safer fusion process is perfected, probably in the next century.

Ultimately, the reason nuclear power must be developed is that no other viable alternatives are available, despite greatly increased funding. The wasteful elements of society cannot be changed overnight; the best estimate is that conservation can hold down total energy *growth* to two percent a year—still fast enough to double demand in 35 years. Even modifying 10 percent of the country's homes to solar heat would save at most 1.5 percent of our energy needs, but would cost at least $70 billion. Energy and jobs go together—just restricting oil imports to their 1973 levels would ensure a 10 percent unemployment rate over the next 15 years, if history is any guide. Power-generating plants using solar or wind energy are now extremely expensive, causing the power they would generate over their lifetime to cost two or three times as much as that from nuclear or coal. Opening new coal mines and power plants and installing pollution devices will take years and a huge investment. Fusion is still chancy.

*We have tried to keep the antagonists honest, but clearly a resolution of their divergent opinions rests on a detailed analysis of the data. The best we can offer is a short bibliography (principally involving recent Congressional testimony) available on request. (Please enclose a stamped, self-addressed envelope.)*