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# The Failed Promise of Nuclear Power

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WILLIAM BEAVER

**F**or the past two decades, the nuclear power industry has been predicting a revival of the technology, and after all these years a revival may finally be emerging. The Southern Company, a Georgia utility, has ordered two new reactors. Moreover, utilities across the country have applied to the Nuclear Regulatory Commission for permission to construct at least twenty-six additional nuclear plants, and nuclear advocates have called for the construction of one hundred new reactors, which would nearly double the number of plants in operation (Wald 2010). The public also seems to support nuclear power. A recent Gallop Poll found 62 percent favor the technology—reportedly an all-time high. The Obama administration has altered its stance. At first, the president was somewhat ambiguous, stating only that nuclear power had a place in an overall energy strategy. However, in an attempt to gain bipartisan support for a comprehensive energy bill that would include a cap on carbon emissions, the White House announced plans to triple the amount currently allocated for loan guarantees available to utilities for construction of new reactors. Indeed, loan guarantees are seen as crucial, considering that the current price tag for a large nuclear plant is estimated to be between \$6 billion and \$8 billion (Farrow 2010).

The degree to which a nuclear revival is likely to occur is open to debate. Those promoting the technology point out that nuclear is the only carbon-free technology capable of replacing large coal-fired plants, whereas those who question the idea of a nuclear-power resurgence maintain that the costs of constructing large reactors are prohibitive. Perhaps the latter factor helps to explain why the U.S. Department of

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Energy has proposed building smaller, less expensive, “cookie cutter” plants that would serve local communities and businesses (Totty 2010).

In any event, an obvious question is posed by the availability and the need for a revival of a technology that once promised to provide abundant, low-cost energy and can help to mitigate the impact of anthropogenic global warming: Why has nuclear power languished for three decades? The 1979 accident at Three Mile Island, which resulted in a partial meltdown of the reactor’s core, certainly comes to mind. In addition, the government’s failure to open a long-promised nuclear waste repository in Nevada for which the utilities have contributed billions of dollars certainly did nothing to restore interest in the technology. Indeed, only recently did the Obama administration deem that on-site, above-ground storage of radioactive waste would suffice for the time being. However, whatever the effects of Three Mile Island and the waste-disposal question, nuclear power’s decline started before these issues came to the forefront. Consider that until recently no nuclear plant had been ordered since 1978. In reality, the technology’s decline can be traced to government policies that emerged during the 1950s. These policies attempted to promote nuclear power to the point of commercial viability, while seeking to satisfy the political needs of official Washington. In this article, I outline these policies and their outcomes, seeking to provide a clearer understanding of what went wrong and why a nuclear power revival is necessary.

## Beginnings

The major impetus for the development of civilian nuclear power occurred on December 8, 1953, when President Dwight D. Eisenhower went before the United Nations to deliver his “Atoms for Peace” speech. The president called on the nations of the world to develop peaceful uses of atomic energy. The concept of the peaceful atom had its roots in the idea that something so destructive needed to be put to positive uses. During the speech, the president pledged that the United States would “help solve the fearful atomic dilemma to devote its entire heart and mind to find the way by which the miraculous inventiveness of man shall not be dedicated to his death, but be consecrated to his life.” There is nothing to suggest that the president was not sincere. Yet he also hoped to use the technology to demonstrate U.S. technical leadership and superiority over the Soviet Union as the Cold War was being waged (Pilat, Pendler, and Ebinger 1985).

Although the tone of the speech might have been interpreted to suggest a vigorous government program of reactor development, the Eisenhower administration, along with Lewis Strauss, who chaired the Atomic Energy Commission (AEC), never viewed the matter in that way. They believed that government should play a more limited role and hoped that the speech would arouse interest among the nation’s utilities, which would then construct nuclear plants largely on their own. However, such interest never materialized. Conventional fossil-fuel technology

allowed the industry to meet the demand as prices declined owing to the construction of larger plants that took advantage of scale economies. Hence, utilities had no good economic reason to invest heavily in a largely unproven technology. This situation did not satisfy many members of Congress and certain members of the AEC, who demanded government action and often issued dire warnings even before the president's speech. For example, AEC commissioner Thomas E. Murray (the only hold-over from the Truman administration) warned, "Unless we act with vigor that produced the Nautilus [the first nuclear-powered submarine], we are in danger of losing the greatest opportunity ever given to man by a gracious and loving God" (Murray 1953). The opportunity he refers to here is atomic power's promise of abundant, low-cost energy. Lewis Strauss's phrase "too cheap to meter" expressed this vision, even though Strauss was referring to the potential of nuclear fusion, not fission (Pfau 1984). Equally important, Murray and many others believed that the United States had a "moral obligation" to outdo the Soviets in developing the peaceful atom. In this vein, Senator Bourke Hickenlooper of Iowa called the atomic power race the "battle for the minds of men" in which those of the Judeo-Christian tradition would take on the "the Soviet atheistic materialists" (U.S. Congress 1953).

In such an environment, the Eisenhower administration decided that a government response was called for. So in February 1954 the AEC announced a five-year reactor-development program, which one observer called "a technological sweepstakes quite without precedent" (Weinberg 1954). The program had no precedent because the government would attempt to develop a technology with or without private-sector participation and would put up the bulk of the funding to do it. The experimental program sought to discover which reactor design(s) held the most promise for commercialization and hence would eventually attract the industry's interest. Five designs were to be investigated, including two light water reactors and a sodium-graphite reactor, a breeder reactor, and one other type (Dawson 1976). Only a light water plant, in which ordinary water circulates through a reactor, serving both as a heat medium and coolant, was realistically capable of a large-sale demonstration, largely owing to the development of the Nautilus submarine reactor. Thus, the first commercial plant would be a scaled-up version of that reactor.

## Shippingport

The Nautilus reactor was built under the supervision of the Naval Reactors Branch (part of the AEC), headed by Admiral Hyman Rickover, in conjunction with Westinghouse, which developed and constructed the reactor. The same duo would build the country's first commercial reactor at Shippingport in southwestern Pennsylvania. Plans to construct the plant actually started before "Atoms for Peace," as pressure mounted in Washington to do something. Duquesne Light of Pittsburgh agreed to operate the plant, with the federal government paying 90 percent of the costs. The 60-megawatt (mw) reactor was made part of a five-year program and opened in

December 1957 under the oversight of Naval Reactors. Although Shippingport never produced electricity at competitive rates owing to the high cost of construction, the plant was a technical success and certainly steered reactor development toward light water, which in retrospect should not have been surprising because so much of the early government funding was directed toward this design (U.S. AEC 1964). As one observer put it, “[T]he light water reactor worked best because more money was spent on it.” At the time, however, few expected light water to be the last word in reactor development because other designs promised higher thermal efficiencies (qtd. in Zinn 1957, 4).

The other reactor types being tested fared less well and experienced problems. They were truly experimental in nature and needed more time to be developed. Commercialization for anything other than light water was obviously years away. Unfortunately, however, time was of the essence if the United States were to beat the Soviets and to a lesser extent the Europeans, who were also developing reactors. In fact, the British plant at Calder Hull opened a year before Shippingport, although in later years U.S. light water reactors would dominate the European market (Bupp and Derian 1978).

In more normal times, without the Cold War’s tensions and political uproar, the first reactor-development program might have been sufficient. In the circumstances, however, soon after the initial program was announced, nuclear proponents called for a more substantial initiative in which the government would construct and operate reactors. To offset such a development, the AEC announced in January 1955 its Power Reactors Demonstration Program in which the government would partner with industry.

### **The Power Reactors Demonstration Program**

The public-private model championed by Strauss was facilitated by passage of the Atomic Energy Act of 1954, which allowed industry for the first time to own a nuclear plant. The industrial partner accordingly would have to pay for construction and plant operations in order to participate in the program. The government, for its part, would continue to perform research and development as well as offer technical assistance and waive fuel-use charges (the government still owned the nuclear fuel) and to be responsible for disposal of the nuclear waste.

The AEC received four proposals from the private sector, and three of them became part of the program. Commonwealth Edison had made a proposal, but the company eventually decided to go it alone and construct with General Electric the 200-mw Dresden I light water plant in Illinois, although the project did receive an estimated \$20 million in government subsidies. One other light water reactor, “Yankee Atomic,” proposed by a consortium of New England utilities, was constructed by Westinghouse and employed (essentially) a larger version of the Shippingport reactor. Both Dresden and especially Yankee performed well, but the other reactors

constructed did not. For example, a Nebraska utility wanted to construct a sodium-graphite reactor. The AEC, in a move that was surprising but that would become common, approved the proposal even though its own experimental sodium-graphite reactor would not go online until 1958. An accident damaged the reactor's core soon thereafter. Besides the design's technical problems, the utility involved did not have sufficient resources to complete the project. To avoid embarrassment, the AEC stepped in and put up about 70 percent of the construction cost. Operations began in 1960, but the plant was plagued with such extensive technical difficulties that it proved to be the last sodium-graphite reactor ever constructed in this country (Perry 1976). If nothing else, the episode illustrated that not all reactor designs or utilities were ready for commercialization.

The final proposal of the Power Reactors Program deserves special mention because it would begin to generate serious environmental concerns about nuclear power and raise questions about the government's nuclear-power partnerships with industry. Detroit Edison proposed construction of a liquid metal fast breeder reactor called Fermi I. To many, breeder reactors represented the ultimate achievement—a literal perpetual motion machine. During nuclear fission, the atom splits, and two or three neutrons are released. One of the neutrons continues the chain reaction; if the others could somehow be captured, a new fissionable atom would be created, keeping the chain reaction going, and hence the reactor would never run out of fuel. Under the AEC's direction, General Electric had constructed an experimental breeder (EBR-I) in 1951, which was the first reactor actually to produce electricity. The other significant event associated with the EBR-I was a meltdown in 1955, but the damage luckily was contained within the core. A more general problem with breeders (and with sodium-graphite reactors) is the use of liquid sodium as a coolant. Liquid sodium allows for higher operating temperatures, hence more thermal efficiency. Nonetheless, it is highly corrosive and may explode when exposed to air or water, so any leak can have serious consequences (Dawson 1976).

Despite all of these issues, the AEC approved the construction of Fermi I even though its own advisory committee on reactor safeguards opposed it. Chet Holifield, a congressman from California and a rabid supporter of nuclear power, called the decision "reckless and arrogant" (qtd. in Roundup 1956, 6). Why was the decision made? First, Detroit Edison agreed to finance 90 percent of the costs. Second, Strauss and the Eisenhower administration desperately wanted industrial partners in order to avoid a totally government-driven program. After a series of legal battles (the state of Michigan tried to stop construction), Fermi I went critical in 1963, but because of various technical issues it did not reach full power until 1966. Shortly thereafter, the flow of liquid sodium was somehow cut off, and the lack of coolant caused temperatures to rise and the nuclear fuel to melt, but the accident was contained within the reactor. Not until 1970 did the reactor go back on line; it operated until 1972, when the AEC chose not to renew its license (Mazuzan 1982). In all, Fermi I had operated less than thirty days at full power, and no breeding had occurred. The meltdown



prompted the book *We Almost Lost Detroit* (Fuller 1975). Detroit was never close to being lost, but, as mentioned, the entire episode did spur concerns about reactor safety.

## Second and Third Rounds

Soon after the initial round of proposals was announced in 1955, the AEC initiated a second round designed to meet the needs of smaller publicly owned utilities, which resented being left out. Smaller reactors were to be constructed, with the AEC agreeing to finance significant portions of their construction cost. In all, seven proposals were received, two were accepted, and two more were added in later years. Neither of the two reactors initially constructed proved successful. A unique type of light water reactor was constructed in Minnesota. Construction ran four years behind schedule, and owing to a number of technical problems the plant was closed in 1968. The other reactor, an organic moderated design constructed in Ohio, lacked sufficient research and development and never operated.

About the same time that the second round was being announced, pressure mounted in Congress to drop the partnerships with industry and to begin a crash government program of “nuclear TVAs [Tennessee Valley Authorities].” As one member of the powerful congressional Joint Committee on Atomic Energy put it, “The AEC’s program is not adequate if we take into account the objective of world leadership in reactor technology” (U.S. Congress 1956). During the 1956 presidential campaign, Adlai Stevenson accused President Eisenhower of “torpedoing his own [Atoms for Peace] program” by not supporting a major government initiative (qtd. in Salisbury 1956). The Gore-Holifield bill was introduced soon thereafter, which called for construction of six large-scale reactors, including a light water reactor, a sodium-graphite reactor, and a breeder (U.S. Congress 1956). Although Gore-Holifield passed the Senate, it was defeated in the Republican-controlled House after intense lobbying by Strauss and the White House. In retrospect, the legislation made little sense. Both Shippingport and Dresden I would serve as demonstration plants for light water, whereas the sodium-graphite and breeder reactors were clearly not ready for large-scale demonstrations. A more general issue that often haunts government technological initiatives is sustainability. The initial enthusiasm for most programs may fade over time as political and economic realities change. Gore-Holifield would have taken years to come to fruition, with technical problems and increased costs almost assured. Would Congress have continued to provide the necessary funds? That scenario seems unlikely, particularly given that the Kennedy administration made space its technological domain of choice in the ongoing ideological struggle with the Soviet Union (McDougall 1985).

After the defeat of Gore-Holifield, the AEC made one final attempt to attract more industrial partners. In January 1957, Strauss announced a third round of the Power Reactors Program. He made it clear that he wanted only commercial-type reactors, to be financed largely by the utility industry and completed by June 1962.

Both Strauss and the White House were clearly frustrated by the lack of sufficient utility response. The president declared, "If acceptable proposals for non-federal construction of promising reactor types don't materialize in a reasonable amount of time, a request will be made to Congress for funds for direct construction by the federal government" (qtd. in Blair 1957). The Eisenhower administration obviously believed that it had fought hard to protect private interests, and now it was time for those interests to step up. Although the president's warning did not have much immediate impact, the fear of "nuclear TVAs" remained in the minds of utility executives (Sporn 1971).

The third round attracted some interest, with industry putting up roughly two-thirds of the costs. However, the 1962 deadline was only a pipe dream. Round three and then a modified third round would last into the 1970s. Of the six plants that eventually came on line, three were of the light water variety and experienced no significant problems, further establishing this design's reliability. Of the remaining types, only the Carolina-Virginia heavy water reactor constructed by Westinghouse worked well enough to be considered a success. It would be used in Canadian nuclear plants (Perry 1976). However, the AEC decided not to pursue this design any further. In the mid-1960s, the commission began to direct its attention to breeder reactors, which it believed represented the next generation. Further development of light water reactors would be left largely to the private sector.

### Technical Momentum and Competition

Although the AEC's various initiatives had failed to prime the utility industry's pump to a great extent, such was not the case with the reactor manufacturers. Westinghouse in particular benefited greatly from its involvement with the federal government. As discussed, both the Nautilus and Shippingport reactors were designed and developed by Westinghouse in conjunction with naval reactors. During this period, many problems were solved, and the technology was improved in areas such as heat transfer, corrosion resistance, and fuel elements (Hewlett and Duncan 1974, 244–46). Such knowledge was eventually transferred to the company's commercial reactors. Equally important was the transfer of manpower from Westinghouse's government work to its commercial reactor division. These men came to occupy important positions and brought with them expertise in light water technology that established a technical momentum within the company, allowing it to forge ahead with its commercial program.

Besides gaining momentum, Westinghouse made a determined effort to avoid the mistakes of the past. Following World War II, the company had emerged as one of the leaders in jet engine technology. Rather than invest large sums in development, however, the company waited on government contracts. General Electric, in contrast, plowed ahead, committing significant resources to jet engines. When the government contracts eventually came, Westinghouse's engine was judged to be inferior to



General Electric's. Not only had the company lost out on lucrative government contracts, but it had also lost to its arch rival, as it had done in other product lines, prompting *Fortune* to dub this series of competitive failures Westinghouse's "G.E. complex" (Reiser 1958, 90).

Westinghouse was therefore determined to avoid such an outcome with nuclear power and to establish preeminence. "We had to be number one," stated one Westinghouse executive. In that regard, the initial government contracts gave the company a leg up on the competition, but this time the company also made substantial investments of its own. As early as 1953, two of every five Westinghouse employees were on its atomic power payroll. The company then established a commercial reactor division and constructed a nuclear materials-testing reactor, the first such device built by private industry. In essence, Westinghouse was making a significant nuclear gamble, and the only way for it to pay off was for the firm to sell reactors.

Unfortunately, sales were poor in Europe and the United States. The company sold only three reactors in Europe and the Yankee Atomic reactor in the home country. Westinghouse for the most part blamed the abundant supply and stable prices of fossil fuels for the lack of business, which also meant that profitability remained years away. In an attempt to turn things around, the company announced in 1959 that it was willing to construct nuclear plants at a fixed cost. *Business Week* called this announcement "startling" because nuclear power production was still years away from becoming a "routine industrial process" ("Calling the Shots" 1959). At the time of the offer, Shippingport was the only relatively large reactor in operation. Perhaps even more surprising was that two of the reactor designs, a combination nuclear and fossil-fuel plant and an "integrated boiling and superheated reactor," had never been constructed. To no one's surprise, no utility placed an order for these new designs, although the company did begin construction of an experimental superheated reactor in Pennsylvania.

The reactor that Westinghouse really wanted to sell was a 330-mw light water reactor, with construction and operating costs supposedly competitive with those of coal-fueled plants. When some questioned the cost claims, a Westinghouse official admitted, "We have not actually demonstrated economical nuclear power. We have demonstrated it on paper" (U.S. Congress 1959). Once again, no utility placed an immediate order. The company managed to sell two reactors, however, one in Southern California and the other in Connecticut, but only with government assistance. Both 330-mw plants went online in 1967, with the AEC putting up about 10 percent of the costs, making these projects part of the third round of the agency's Power Reactors Program (Dawson 1976).

General Electric was also deeply committed to the development of commercial reactors. Like Westinghouse, the company took advantage of government contracts, but in a more limited way. As mentioned, it constructed the first breeder reactor in the early 1950s and the reactor for the Seawolf submarine, which was launched in 1955. In addition, General Electric developed in conjunction with Argonne National

Laboratories a small light water reactor as part of the AEC's first experimental program. The reactor went on line in 1957 in Idaho and performed well ("Good News on Atomic Power" 1958). More important, it provided valuable information that greatly assisted in the construction of Dresden I, the company's first commercial light water plant, which opened in 1961. Dresden I represented a dramatic scale-up of the technology. The experimental reactor in Idaho had a 5-mw capacity, Dresden a 200-mw capacity. All of these actions demonstrated that General Electric had a great deal of confidence in its ability and was also determined to sell the technology, but it was also aware that the utilities were interested only in larger reactors, to achieve scale economies. Like Westinghouse, however, General Electric found that business was slow in those early years. But things were about to change.

### The Turnkeys

In 1963, General Electric made what became known as the first "turnkey offer." Unlike Westinghouse's earlier attempt to attract business, this fixed-price offer had the desired effect. The company agreed to construct for Jersey Central a 515-mw plant at Oyster Creek for \$66 million. In essence, all the utility had to do was to walk in and begin to operate the plant. Moreover, Jersey Central calculated that the cost to produce electricity in this plant would be competitive with coal-fueled production. Although some questioned the Oyster Creek figures, made once again without the benefit of much experience, many wanted to believe that the long-awaited economic viability of nuclear power had finally arrived (Bupp and Derian 1978).

General Electric's Oyster Creek offer set off a "turnkey war" with Westinghouse and to a lesser extent with Babcock and Wilcox as well as Combustion Engineering, which also manufactured reactors. For its part, Westinghouse felt compelled to match General Electric's generosity. Altogether, thirteen turnkeys were built. It has been estimated that General Electric and Westinghouse lost between \$850 million and \$1 billion on these plants, although neither company has ever revealed the exact figure (Perry 1976). Critics charged both firms with opportunism and wishful thinking in their attempt to create a market. However, the turnkeys certainly helped to create the long-hoped-for rush to nuclear power. Utility executives obviously believed that if the manufacturers felt confident enough to build plants at a fixed cost, the economics involved must be favorable. After the turnkeys, the utilities placed orders for forty-nine reactors in 1966–67 alone, but this time with cost-plus contracts. In what was termed the "Great Bandwagon Market," utilities were purchasing reactors several times larger than anything in operation. Of course, the problem was that no one had experience with scale-ups of this magnitude. As a result, construction costs escalated so greatly that for all of the plants ordered in the mid- to late 1960s, these costs were underestimated by a factor of two, even though the manufacturers and the AEC continued to promise cost stabilization (Seaborg 1965). Long construction delays also became common. By the mid-1970s, fifty plants were operating, but none

ordered after 1968 had gone on line (Bupp and Derian 1978). These difficulties eventually scared the utilities, which then began to cancel orders. Between 1978 and 1985, seventy-five plants were cancelled, twenty-four of which were already under construction. The costs of the plants that were completed averaged \$800 million more than originally estimated, which resulted in higher utility bills for consumers but large profits for the manufactures and consultants. At the time, James Cook, writing in *Forbes*, called these events “the largest managerial disaster in business history” (1985, 81).

There was certainly plenty of blame to go around, as has been well documented. Government regulation of plants became more onerous as environmental and safety concerns mounted. Lack of standardization of equipment did not occur as manufacturers continued to make design changes into the 1980s. For their part, the utilities were in no position to question the manufacturers’ cost claims. The utility industry had historically been “vendor oriented,” depending on architect-engineering firms, consultants, and manufacturers to design, construct, and equip power plants—an arrangement that worked well with conventional technology. As a result, utility managers felt little need to employ large engineering and technical staffs (Sporn 1968). Unfortunately, relying on vendors would not work with nuclear power, where the right questions needed to be asked and the answers analyzed. Unlike conventional technology, nuclear power was in a state of continuing regulatory and technological change, and the utilities could protect their interests only by tightly controlling all aspects of plant construction. The few utilities that did so tended to keep costs under control; for the others, costs escalated.

## A Retrospective

The crux of the nuclear dilemma can be traced to the 1950s, when the federal government attempted to speed the development of nuclear power to achieve technological leadership and to demonstrate nuclear power’s commercial feasibility. Technological leadership was achieved in that the U.S. light water reactor became the standard in most Western countries, superior to any Soviet technology. The economics of nuclear power was another matter. Might another policy have produced an economically viable product? Looking back, we can see that the most prudent course of action was along the lines of the AEC’s first five-year program, in which several different reactor designs were constructed. With a technology as potentially dangerous as nuclear power, the government must take responsibility to ensure the relative safety of each design. Fermi I clearly demonstrated the hazards of attempting to build a commercial plant with a technology that was still in the experimental stage. If an experimental reactor design does not perform satisfactorily, it can be dropped, or further research and development can take place, depending on the potential for success. However, if a reactor proves itself at the experimental or prototype stage, the government’s role should shift from its limited promotional role to essentially a

regulatory one. This procedure allows the government to avoid the difficult job of trying to play promoter and regulator at once, as the AEC found itself doing. In essence, then, once the AEC had shown a reactor's technical reliability and safety, its job should have been done. Larger plants would then have been constructed by industry, subject to careful and sensible regulations.

The major advantage of such a policy is that it would have left the decisions about nuclear power in the hands of those who must ultimately decide on its economic potential. If industry assumes the burden of technical advancement beyond the experimental stage, it is likely to move more slowly and cautiously, given all of the uncertainties involved. Along these lines, research by Edwin Mansfield (1968) points to the relative slowness of technical adoption in American industrial history where decisions rested largely on investments required and the chances of profitability. Similarly, in *Inside the Black Box* (1982) Nathan Rosenberg explains that technical innovations in the past have been determined by demand-side forces, not for the most part by government stimulation and prodding. A government nuclear program more in line with the country's innovative traditions, without excessive government stimulation (roughly \$7 billion in today's dollars by 1960), would have allowed the technology to become integrated into the American economic system. Decisions would have been made more on the basis of market conditions and less in response to political needs.

Had this course been followed, General Electric, Westinghouse, and other manufacturers would have developed commercial reactors, but at a much slower pace. Nuclear power desperately needed time to mature. Consider that the last two 330-mw demonstration plants of the Power Reactors Program did not go on line until 1967, and by that time the manufacturers were taking orders for twice that capacity with little or no construction or operating experience. As Rickover told Congress when asked about scale-up, "The minute you make a change in size you run into all sorts of problems" (U.S. Congress 1962). In this regard, one Westinghouse official who headed the company's nuclear program at the time related that the entire industry needed a "pause" to assimilate the experience gained by 1967 and to think about the future. Unfortunately, the rush to nuclear power was on and would not begin to slow for another decade. By that time, however, the damage had been done.

## Conclusion

Nuclear power has never totally recovered from its troubled beginnings, when the federal government attempted to craft policies to ensure U.S. technical superiority and at the same time economic competitiveness. The latter, in retrospect, was probably an impossible task. Technological prominence was achieved because the government committed significant resources to development over a relatively short period. The same haste unfortunately militated against economical nuclear power, which required time to mature and become a routine industrial process. Perhaps the country

asked too much from the technology—a resurgence of national vitality during the Cold War, along with the enhanced prosperity that inexpensive energy helps to achieve. The end result was that nuclear power has been largely on hold for three decades and only now can reasonably anticipate a resurgence.

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