

Decentralization of Control in U.S. Nuclear Energy Policy

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When President Dwight Eisenhower launched the Atoms for Peace in 1953, he declared that "the atom stands ready to become man's obedient, tireless servant, if man will only allow it."¹ Three decades later, a credible source ranked the civilian U.S. nuclear power program as "the largest managerial disaster in business history."²

The failure of American nuclear power to deliver economical and socially accepted energy has found various explanations. David Collingridge stresses the "inflexible" quality of nuclear technology itself, such as long lead times, high capital intensity, and large unit size, which rendered the political control over nuclear development impossible.³ James Morone and Edward Woodhouse argue that at a critical decision-making juncture in the mid-1960s the dramatic scale-up of reactor sizes and the shift in safety strategy from the containment to the prevention of accidents conjured up the public debate over safety, which then undermined the viability of nuclear power.⁴ In a similar historical vein, James Jasper emphasizes that the mindset of "technological enthusiasm" prevailed too long among nuclear power's industrial and political promoters, thus blocking the

¹ "Atoms for Peace," *New York Times*, 9 August 1955.

² James Cook, "Nuclear Follies," *Forbes*, 11 February 1985.

³ David Collingridge, *The Social Control of Technology* (London: Pinter, 1980); Collingridge, *Technology in the Policy Process: Controlling Nuclear Power* (New York: St. Martin's Press, 1983).

⁴ James Morone and Edward Woodhouse, *The Demise of Nuclear Energy?* (New Haven: Yale University Press, 1989).

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timely intervention of economic cost-benefit rationality.⁵ In a more structural thrust, John Campbell argues that the institutional fragmentation of the American polity and economy did not allow the comprehensive planning that would have been necessary for the success of the complex technology.⁶

The following analysis combines structural and historical elements, and demonstrates that at a critical juncture the decentralization of political control undermined the stabilization of nuclear power in America. While decentralized control is a structural feature of the American political system, it became a major hindrance to the implementation of nuclear power only after the accident at the Three Mile Island (TMI) plant near Harrisburg, PA in 1979. In the wake of TMI, firm leadership in nuclear policy was lastingly foreclosed, public confidence reached a minimum, and electorally accountable local and state governments won more influence on nuclear regulation.

Decentralization of control obstructed the stable environment and the institutional homogeneity needed for the successful implementation of the nuclear program. The three predominant issues of the U.S. nuclear power controversy in the 1980s—emergency planning, utility rate regulation, and waste disposal—are all similar in this regard. In each case, local citizen groups formed effective alliances with local and state authorities in opposition to particular nuclear facilities or federal regulatory agencies. The three issues emerged only at the back end of the nuclear policy cycle, when considerable investments had already been made, and nonanticipated consequences springing from the high risk profile and inflexible structure of nuclear technology became salient.

The previous successes of the U.S. antinuclear movement reinforced the trend toward the decentralization of control. During the Carter administration, the movement won official recognition as a legitimate political actor.⁷ President Jimmy Carter appointed many prominent movement leaders to high political offices and his opposition to commercial plutonium reprocessing and the fast breeder reactor project was in line with major movement goals.⁸ These successes at the national level, along with the apparent economic decline of the industry, shifted the focus back to the concrete backyard plant at the local level, where the early citizen opposition had started in the late 1960s.⁹ The crisis of public

⁵ James Jasper, *Nuclear Politics: Energy and the State in the United States, Sweden, and France* (Princeton, NJ: Princeton University Press, 1990).

⁶ John Campbell, *Collapse of an Industry: Nuclear Power and the Contradictions of U.S. Policy* (Ithaca, NY: Cornell University Press, 1988).

⁷ Christian Joppke, *Mobilizing Against Nuclear Energy: A Comparison of Germany and the United States* (Berkeley: University of California Press, 1993), chap. 4.

⁸ Michael J. Brenner, *Nuclear Power and Non-Proliferation* (Cambridge, England: Cambridge University Press, 1981); Walter Patterson, *The Plutonium Business and the Spread of the Bomb* (San Francisco: Sierra Club Books, 1984).

⁹ Richard S. Lewis, *The Nuclear-Power Rebellion* (New York: Viking Press, 1972); Steven Ebbin and Raphael Kasper, *Citizen Groups and the Nuclear Power Controversy* (Cambridge, MA: MIT Press, 1974).

confidence after Three Mile Island made it too costly for electorally accountable local and state authorities to ignore continuous grievances around particular facilities.

Decentralization of control did not alone cause the demise of nuclear power in the United States. Before Three Mile Island, skyrocketing construction costs, shrinking rates of energy demand, and severe political difficulties had stalled the expansion of the nuclear program.¹⁰ But decentralization of control prevented nuclear power's recovery after TMI. In regard to emergency planning, post-TMI rule changes by the Nuclear Regulatory Commission (NRC) increased the local and state leverage in nuclear regulation. The financial problems of the nuclear utilities after TMI were aggravated by the unwillingness of Public Utility Commissions (PUCs) at the state level to allow rate increases. Finally, in regard to waste disposal, the participatory thrust of the waste policy initiated by the Carter administration first of all invited local and state opposition, which turned into obstruction in the wake of the TMI-induced acceptance crisis.

Decentralization of control explains the paradoxical coincidence of a faltering national protest movement in the 1980s and continuing political difficulties in the implementation of nuclear power. The national antinuclear energy movement withered rapidly after its post-TMI mobilization high. In the early 1980s, in response to the demise of geopolitical détente, public concerns at the national level shifted from the issue of nuclear energy to the issue of nuclear weapons, and in the social movement sector the new antinuclear disarmament movement overshadowed the opposition to civilian nuclear power.¹¹ Yet nuclear power remained in a state of permanent siege. Alliances between local citizen groups and municipal, county, and state authorities in the fields of emergency planning, utility regulation, and nuclear waste policy wrecked newly completed nuclear plants, increased the financial crisis of nuclear utilities, and prevented the closing of the nuclear fuel cycle.

As I shall argue, the federal fragmentation of authority became both the central barrier to the economic and political recovery of American nuclear power and the nuclear opposition's major opportunity to compensate for the parallel decline of public interest in the energy issue in the 1980s. This analysis contradicts older theories of "interest-group liberalism"¹² and "corporate liberalism,"¹³ which saw the American political system dominated by powerful producer interests. The case of nuclear power supports instead the more recent view that countervailing

¹⁰ Irvin C. Bupp and Jean-Claude Derian, *Light Water: How the Nuclear Dream Dissolved* (New York: Basic Books, 1978).

¹¹ Victoria Daubet and Sue Ellen Moran, *Origins, Goals, and Tactics of the U.S. Anti-Nuclear Protest Movement* (Santa Monica, CA: Rand Corporation, Report No. N-2192-SL, 1985); Frances McCrea and Gerald Markle, *Minutes to Midnight: Nuclear Weapons Protest in America* (Newbury Park, CA: Sage, 1989); Christian Joppke, "Social Movements During Cycles of Issue-Attention," *British Journal of Sociology* 42 (March 1991): 43-60.

¹² Theodore J. Lowi, *The End of Liberalism* (New York: Norton, 1969).

¹³ Fred Block, *Revising State Theory* (Philadelphia: Temple University Press, 1987).

consumer and public interests have found a stable institutional representation.¹⁴ Especially during nuclear policy implementation at the local and state levels, the fragmented and decentralized American polity proved highly permeable to nonproducer groups.¹⁵ The fate of the nuclear industry is also a telling example of the power of American democratic institutions to thwart a project that had lost its societal legitimation.

THE IMPACT OF THREE MILE ISLAND

Some close observers have remarked that the accident at Three Mile Island did for the antinuclear movement what the Tet offensive had done for the anti-Vietnam war protests: cast doubt on the long-standing convictions of the expert proponents, spread skepticism among public supporters, and redouble the efforts of opponents.¹⁶ The burden of proof, which up to then had rested with the nuclear critics, shifted to the promoters of nuclear power.¹⁷ The Kemeny Commission, which President Carter created to investigate the causes of the accident, included members from a wide cross-section of society and several outspoken nuclear critics. The accident posed the fundamental question of public acceptability. "Technological enthusiasm"¹⁸ had previously motivated the nuclear experts to compare the opposition to nuclear power with the luddism and superstitious hysteria that had accompanied the historical introduction of electricity, the power loom, or the automobile.¹⁹ In the long run, according to this view, the deep-seated fear of the lay public would be appeased by simply accustomation or the trickling-down of the expert theory of comparative risk assessment — which states that car driving and cigarette smoking are more dangerous than nuclear power.²⁰ Three Mile Island made evident that the catastrophic potential of nuclear technology set it apart from other civilian technologies. Twenty years after its commercialization, public opposition to nuclear power had not been quieted; on the contrary, TMI pushed it to new heights.

TMI hit the nuclear industry in the midst of expansion, increasing the economic

¹⁴ Anthony King, ed., *The New American Political System* (Washington, DC: American Enterprise Institute, 1978); James Q. Wilson, ed., *The Politics of Regulation* (New York: Basic Books, 1980); David Vogel, *Fluctuating Fortunes: The Political Power of Business in America* (New York: Basic Books, 1989).

¹⁵ Campbell, *Collapse of an Industry*, 73–91.

¹⁶ J. X. Kasperson et al., "Institutional Responses to Three Mile Island," *Bulletin of the Atomic Scientists* 35 (October 1979): 1232–1238.

¹⁷ Irvin C. Bupp, "Nuclear Power: The Promise Melts Away" in Robert Stobaugh and Daniel Yergin, eds. *Energy Future* (New York: Vintage, 1983).

¹⁸ Jasper, *Nuclear Politics*.

¹⁹ See, for instance, Robert Dupont, "The Nuclear Power Phobia," *Business Week*, 7 September 1981, 14–16.

²⁰ The classic statement is Chauncey Starr, "Social Benefit versus Technological Risk," *Science* 165 (September 1969): 1232–1238.

and political turmoil in which the industry had been caught since the mid-1970s.²¹ American public opinion turned antinuclear, a trend which would increase rather than decrease in the following years.²² The antinuclear movement reached its all-time mobilization high, with a chain of mass demonstrations throughout the country. After Three Mile Island, firm political support for the faltering nuclear power sector was lastingly foreclosed. Under the attentive eyes of the public, the NRC tightened regulatory controls. No new licenses were granted for more than a year, and the NRC promulgated hundreds of new safety rules to cope with contingencies ranging from earthquakes to missile strikes. Most troublesome for the industry, private investors opted out, and the stocks of nuclear utilities dropped under book-value. The resulting financial impasses forced nuclear utilities to cancel an array of half completed plants in the early 1980s. The Three Mile Island impact of public acceptance crisis, withering political support, and financial drought made the further decline of U.S. nuclear power inevitable.

However, in the face of nuclear's self-inflicted decline, the protest movement also withered rapidly. By 1982, the movement had ceased to exist at the national level. The obvious decline of nuclear power weakened further societal mobilization. But maybe more important, the new Reagan administration's massive nuclear rearmament policy and parallel events such as the Soviet invasion of Afghanistan stirred public concerns about nuclear war, thereby marginalizing the nuclear energy issue.²³ The evening of the nuclear age finally seemed to have set; but collective anxieties and survival fears were now directed towards the threat of nuclear war, not the comparably small risk of nuclear reactor explosion. As MIT-physicist Henry Kendall, leader of the Union of Concerned Scientists and a pioneer of expert opposition to civilian nuclear energy, put it: "The dangers of nuclear power are so small compared with nuclear war. It seemed to me like a tangential issue."²⁴ The cultural motif of angst and survival fears shifted from the issue of nuclear energy to the related yet distinct issue of nuclear weapons.²⁵ The very notion of antinuclear came to denote the new disarmament movement. Suffering from the loss of its semantic identity and the shift of nuclear discourse from energy to weapons, the nuclear energy opposition disintegrated, and barely three years after TMI it no longer existed as an organized movement.²⁶

²¹ In March 1979, seventy commercial nuclear power plants were operating, and another ninety-two were in various stages of construction. By the same token, the impact of the Chernobyl accident in 1986 remained minuscule, because by that time the nuclear program was essentially completed, if only at greatly reduced size.

²² William Freudenburg and Eugene Rosa, eds., *Public Reaction to Nuclear Power* (Boulder, CO: Westview Press, 1984); Christopher Flavin, *Reassessing Nuclear Power: The Fallout from Chernobyl* (Washington, DC: Worldwatch Institute, Paper 75, 1987), 67.

²³ See the survey data presented by Tom Smith, "The Polls: Nuclear Anxiety," *Public Opinion Quarterly* 52 (1988): 557-575.

²⁴ Quoted in Fox Butterfield, "Anatomy of the Nuclear Protest," *New York Times Magazine*, 11 July 1982.

²⁵ Spencer Weart, *Nuclear Fear* (Cambridge, MA: Harvard University Press, 1988).

²⁶ Joppke, "Social Movements During Cycles."

CITIZEN-STATE ALLIANCES IN THE 1980s

In the early 1980s, energy virtually disappeared as a public concern, while there was rising concern about nuclear war.²⁷ Parallel to this, the opposition to nuclear power ceased to be a social movement riding on the crest of an eminent public policy conflict. The remnants, which neither joined the disarmament bandwagon nor simply disbanded, gathered under the banner of safe energy. Although nuclear power fell into the shadow of media interest and the moving social struggles of the time, it remained a subject of intense controversy. The focus of conflict only shifted to the local and state levels, where the economic, technological, and sociopolitical infrastructure of already existing nuclear power plants offered multiple targets of attack.

After all, it was concrete communities, counties, and states that had to bear the costs of badly managed, carelessly constructed, or overly expensive nuclear power plants. While the phase of nuclear expansion had come to an end, the completion of old projects became the contested stake of the day. Municipal, county, and state governments advanced as key actors, driven by the pressure of local citizen groups.

The trend toward decentralization of control should have been welcomed by the Reagan administration, which had set out on a crusade for free markets, federal deregulation, and increased state autonomy. However, in the particular case of nuclear power, the administration bracketed its ideological leanings. Besides lifting the ban on commercial reprocessing (which had been imposed by the Carter administration) and pushing for legislation to speed up the licensing of nuclear plants, Ronald Reagan encouraged massive governmental support of nuclear power, especially in the fields of waste disposal and fast breeder development. Ridiculing energy conservation as “hot in the summer and cold in the winter,” he practically eliminated federal research and development (R&D) funding for solar and renewable energy sources and conservation, revoking earlier successes of the pro-solar public interest movement.²⁸

However, the pro-nuclear stand of the Reagan administration did not prove strong enough to reverse the fate of the ailing industry. The free market approach removed energy questions from the political agenda, and the focus of the minimized energy policy under Reagan was on domestic oil and gas increases, not on nuclear power.²⁹ Skyrocketing development costs and technical difficulties forced the cancellation of the Clinch River fast breeder project in 1983. As of today, no commercial reprocessing facility is operating, planned, or being constructed; no

²⁷ Allan Mazur, “Media Influences on Public Attitudes Toward Nuclear Power” in Freudenburg and Rosa, *Public Reactions*.

²⁸ Nuclear research increased from 37 percent of the Department of Energy’s 1981 R&D budget to 86 percent in the fiscal year 1983. James Everett Katz, *Congress and National Energy Policy* (New Brunswick, NJ: Transaction Books, 1985), 163.

²⁹ Stobaugh and Yergin, *Energy Future*, 287–289.

incisive regulatory reforms have been enacted;³⁰ and the search for a high-level nuclear waste dump had to be postponed several times. As the Congressional Office of Technology Assessment (OTA) adequately summarized the situation of nuclear power in the mid-1980s, “without significant changes in the technology, management, and level of public acceptance, nuclear power in the U.S. is unlikely to be expanded in this century beyond the reactors already under construction.”³¹

The trend toward decentralization of regulatory control has been under way since the old nuclear subgovernment of Atomic Energy Commission (AEC) and Congressional Joint Committee on Atomic Energy (JCAE) were dissolved in the mid-1970s.³² Besides these changes at the top, the federalist structure of the American polity began to have an effect. Since the late 1970s, local and state governments tried to limit the expansion of nuclear power within their boundaries. Following the example of California, by 1984 eleven states had enacted laws that restricted or prohibited the construction of new nuclear plants as long as certain prerequisites were not fulfilled, most notably the federal installation of a repository for high-level nuclear waste.

This was a serious attack on the doctrine of federal preemption as laid out in the Atomic Energy Act of 1954, which made the federal government alone responsible for the regulation of nuclear power. But a landmark Supreme Court decision of 1983 unanimously upheld the right of states to say no to new plants, provided their objection was based on economic grounds, not radiation hazards. This decision peeled back the blanket of federal protection and exposed nuclear plants to the chillier winds of state and local interests. To be sure, the impact of the Supreme Court ruling was largely symbolic, since it applied only to *new* plants. There had been no new plant orders since 1978, and the nuclear industry rightly considered the rule no threat to the sixty plants then still under construction.³³

But the push for local and state control did not stop at this point. On the contrary, it extended to the already existing nuclear power sector. For instance, more than thirty states passed what the Reagan administration termed “provincial” laws or regulations restricting the transportation or disposal of nuclear wastes within their borders. Not only in respect to nuclear waste, but also in the crucial areas of economics and safety, the local and state levels offered unexpected points of inroad for the nuclear power opposition. The latter, now sometimes identifying itself as the “safe energy” movement, formed successful alliances with

³⁰ The recent introduction of the one-step licensing process, which was part of President George Bush’s post-Gulf-War energy bill, still leaves a plethora of other regulatory obstacles unremoved. See “Energy Measure Passed by House,” *New York Times*, 28 May 1992.

³¹ OTA, *Nuclear Power in an Age of Uncertainty* (Washington, DC: U.S. Government Printing Office, 1984), xi.

³² James R. Temples, “The Politics of Nuclear Power: A Subgovernment in Transition,” *Political Science Quarterly* 95 (Summer 1980): 239–260; Barry R. Weingast, “Congress, Regulation, and the Decline of Nuclear Power,” *Public Policy* 28 (Spring 1980): 231–255.

³³ *New York Times*, 26 April 1983.

municipal, county, and state authorities to phase out particular nuclear plants or lay bare the open wounds of the industry's infrastructure.³⁴ In the following, I will look at citizen-state alliances in emergency planning, utility regulation, and nuclear waste policy.

Emergency Planning

The issue of evacuation and emergency planning is a telling example of previous policy negligence, which became visible so late that remedies had to be extremely costly. In most cases, the siting of nuclear power plants had never been subject to public policy controls. Even though land use and zoning questions were under the formal jurisdiction of state governments, only a few had coherent siting policies. The nuclear industry alone picked the reactor sites. As a result, most nuclear plants were built in the vicinity of major population centers, in order to minimize the costs of electricity transmission. Because the possibility of serious accidents was not really considered then, workable off-site emergency evacuation plans were virtually nonexistent.

The accident at Three Mile Island made emergency planning an issue of high priority. Congress now directed the NRC to make the continuation of operating licenses dependent upon the preparation of emergency evacuation plans. Since 1980, the NRC mandates utilities to develop plans for evacuating all residents living within ten miles of a nuclear plant. This requires the close cooperation of state and local governments, because otherwise traffic control, medical, and other emergency services could not be provided. If the local authorities refused to participate, the NRC was unable to license a plant.

Exactly this happened in a number of prominent cases. For the Indian Point nuclear power plants, located in a densely populated region just twenty-five miles north of New York City, Rockland County (one of the four counties within the ten-mile radius) withdrew its cooperation, because it found the utility-written emergency plan unworkable. In response, the NRC, in a highly publicized move, temporarily threatened to close the plants.³⁵ Even more striking examples are the Shoreham and Seabrook nuclear power plants. Completed in 1985 and 1986, respectively, both plants were refused operating licenses because of the evacuation issue. In the case of Shoreham, Suffolk County and the State of New York have unequivocally stated that no evacuation plan would ever work for this (also in financial regard) troubled facility on Long Island, not far from New York City. In the case of Seabrook, located in New Hampshire near the Massachusetts border, the governor of Massachusetts, Michael Dukakis, categorically refused to participate in emergency planning procedures, thus preventing the completed plant from going on line.

³⁴ Joseph Kriesberg, *Shutdown Strategies: Citizen Efforts to Close Nuclear Power Plants* (Washington, DC: Critical Mass Energy Project, 1987).

³⁵ *New York Times*, 6 May 1983.

The list could be easily extended. The opposition to nuclear power had found its snail darter:³⁶ the refusal of bus drivers, volunteer firemen, and emergency workers to take part in the required emergency planning procedures caused more than a handful of newly completed \$4 billion plants to lie idle, costing their owners sometimes more than \$1 million each day of nonoperation. By mid-1983, only thirty-seven of the nation's fifty-three nuclear plant sites had formally approved evacuation plans, indicating that the issue had suddenly gained national significance. State and local governments won a powerful means of indirect regulatory control.³⁷ Also, the nuclear opponents had found a weak point within the regulatory framework, and they vigorously pressed local authorities to use the loophole.

As Kai Erikson argues, the nuclear evacuation issue (if strongly interpreted) poses an incorrigible safety impediment.³⁸ First, in case of an accident, panic is likely to break out, inducing many more residents than necessary to leave the area and thus inevitably causing the collapse of the local transportation system. Second, emergency personnel, driven by conflicting obligations, may feel a compelling need to evacuate their relatives and families first and to abandon their public responsibilities. Taken together, both points indicate that evacuation is a generic dilemma that provided the nuclear opposition with a surprising new argument to phase out already existing nuclear plants.

To be sure, as of today the NRC has never lastingly revoked an operating license because of lacking evacuation precautions, and a rule change in 1988 allowed the federal government to draft emergency plans if local officials refused. But the issue ignited new and still ongoing efforts to enhance the rights of states in the safety-related regulation of nuclear power, which in the past had been the exclusive prerogative of the federal government.

Utility Regulation

Because energy as a single issue could no longer attract public attention, it became important for the remaining nuclear opposition to link the energy issue with more pressing concerns. The cost explosion of nuclear power opened up the possibility to build alliances between nuclear opponents and consumer groups at the state level. Antinuclear movement leader Ralph Nader had emphasized early on that the "joint action by environmental and consumer groups fighting for utility rate reform . . . is essential if either is to succeed."³⁹

The rates charged by private electric utilities in the United States are determined

³⁶ The snail darter is the famous little fish that held up the construction of the Tellico Dam in Tennessee for years until courts decided that the fish was not threatened.

³⁷ In many cases, local governments used the evacuation issue only to squeeze public funds in return for participating. See *New York Times*, 12 May 1983.

³⁸ Kai Erikson, "Nuclear Evacuation," *New York Times*, 23 April 1983.

³⁹ *Critical Mass Newsletter*, April 1975.

by state regulatory commissions (often called Public Utility Commissions or PUCs). Accordingly, the direct impact of rising nuclear power costs is mainly felt at the state level, where PUCs usually pass on higher operating and capital costs to consumers in the form of higher electricity bills. The rates charged to consumers include two components: the first category is for everyday operating and maintenance expenses, which are transferred to consumers without profit; the second category involves capital investments that are included in the utility's rate base. The second category is decisive, since the utility may earn a fixed profit (usually 12 to 16 percent) only on its rate base. Consequently, the larger the rate base, the larger the profits.

The PUCs are exposed to the countervailing pressures by electric utilities to increase the rates to be charged consumers, and by consumers to keep these rates as low as possible. In the 1960s, the triangular relationship between PUCs, utilities, and consumers was unproblematic.⁴⁰ Economies of scale, short lead-times for the construction of central power stations, and low fuel costs even brought a 40 percent drop in real electricity prices for industrial and residential consumers between 1960 and 1970.⁴¹

The benign era of utility rate regulation abruptly ended in late 1973, when the Arab oil embargo turned the positive-sum into a zero-sum constellation. Skyrocketing fuel prices caused huge increases in electricity rates. In response, irate consumers crowded into the once-sleepy public hearing rooms of PUCs to voice their opposition against further rate increases. In the era of seemingly unlimited resources, planning and pricing decisions were largely made by the industry itself and only rubberstamped by the state regulators. In the post-energy crisis era, the role of state utility commissions became suddenly politicized. Caught in the double bind of consumer protests and industry demands, the state regulators were forced to make independent and adverse decisions. Consumer and antinuclear groups aimed at reversing the utility rate structure, which had previously benefited commercial and industrial users through decreasing unit prices for high consumption (the so-called declining block structure). As the introduction of alternative "lifeline" rates in California and "peak-load pricing" in New York demonstrates, these reform efforts often succeeded.⁴² These measures subsidize low-level energy consumption and impose higher rates during hours of peak use.

The second round of the conflict over utility rate regulation opened up in response to the capital cost explosion and the post-TMI financial impasses of the nuclear utilities.⁴³ In most states, nuclear utilities may include in their profit-

⁴⁰ Leonard Hyman and Ernst Habicht, "State Electric Utility Regulation: Financial Issues, Influences, and Trends," *Annual Review of Energy* 11 (1986): 163-185.

⁴¹ John C. Moorhouse, ed., *Electric Power. Deregulation and the Public Interest* (San Francisco: Pacific Research Institute for Public Policy, 1986), 4.

⁴² Douglas Anderson, "State Regulation of Electric Utilities" in Wilson, *Politics of Regulation*.

⁴³ Richard Rudolph and Scott Ridley, *Power Struggle* (New York: Harper and Row, 1986).

generating rate base only those plants completed and producing electricity.⁴⁴ Since the cost overruns for many plants completed during the early to mid-1980s were often 1,000 percent or more, 35 million private households in twenty-five states were suddenly confronted with electric rate increases of 25 to 50 percent — a phenomenon aptly described as “rate shock.”⁴⁵ Arguing that construction cost overruns mostly resulted from bad utility management and, moreover, that cheaper energy alternatives in the form of conservation, solar, or coal were available, safe energy and consumer groups urged the state utility commissions to disallow rate increases.

Beleaguered by well-organized consumer/safe energy coalitions and an angry public, state utility regulators now took a tough stand toward industry pleas for rate increases. No longer could utilities expect to be granted generous Construction Work in Progress allowances or to pass on to consumers the full construction costs of new nuclear power plants. For instance, the New York PUC disallowed \$1.4 billion of the more than \$4.7 billion cost of Long Island Lighting Co.’s (Lilco) Shoreham plant to be included in the utility’s rate base, reproaching the company with severe construction mismanagement.⁴⁶ State Governor Mario Cuomo himself orchestrated a relentless anti-Shoreham campaign: “Lilco rips off the people of Long Island.” Cuomo articulated the region’s populist distemper, “Now we are coming after you.”⁴⁷ Repeated refusals to grant rate increases brought Lilco to the edge of bankruptcy, and in 1989 the besieged utility saw itself forced to hand over its completed nuclear plant to the state of New York, which has vowed to scrap and dismantle the state-of-the-art facility. In the case of the Seabrook plant, the refusal of an emergency rate increase for its partial owner, the Public Service Company of New Hampshire, led to the company’s bankruptcy in early 1988—the first private utility bankruptcy since the Great Depression.⁴⁸

The adverse posture of the state utility commissions fueled the economic crisis of the American nuclear power industry. Between 1982 and 1984 alone, thirty-two plants under construction were scrapped, some of them more than 50 percent completed, but their owners were without cash to proceed with construction. By 1988, about \$30 billion had been wasted on nuclear plants abandoned before they were ready to operate; the costs for plants finished at excessive cost totalled another \$70 billion.⁴⁹ Reactors coming on line during the 1980s cost between

⁴⁴ To ease the financial problems of the nuclear utilities, some states allow the inclusion of so-called Construction Work in Progress (CWIP) costs into the rate base. CWIP means that consumers pay through their monthly electricity bills for nuclear power plants still under construction.

⁴⁵ Allan Noguee, *Rate Shock: Confronting the Cost of Nuclear Power* (Washington, DC: Environmental Action Foundation, 1984).

⁴⁶ *Wall Street Journal*, 2 October 1986.

⁴⁷ David McCaffrey, *The Politics of Nuclear Power: A History of the Shoreham Nuclear Power Plant* (Dordrecht, Netherlands: Kluwer, 1991), 224.

⁴⁸ *New York Times*, 29 January 1988.

⁴⁹ “Nuclear Plant Drain Put At \$100 billion for U.S.,” *New York Times*, 1 February 1988. In

\$1,100 and \$3,500 or more per kW in 1983 dollars, compared with the average of \$600 per kW for the fifty-seven reactors completed before 1981.⁵⁰

To protect consumers from paying the nuclear power bill, and to offer a viable alternative, safe energy groups (such as Ralph Nader's Critical Mass) increasingly promoted the strategy of least-cost energy planning.⁵¹ Least-cost rules, which can be adopted either through legislation or regulation at the state level, require utilities to meet electricity demand by using the cheapest resources available. If least-cost rules are effective, utilities must develop resource plans that fully examine all energy sources, including conservation, renewable energy, and small power facilities. Utilities are then required to invest in the cheapest options first, and state regulators in the PUCs maintain oversight to ensure that all investments conform to each utility's resource plan.

By the late 1980s, ten states, including California, Wisconsin, and Nevada, adopted least-cost planning rules. As in the case of California, least-cost rules can cause a dramatic shift toward conservation and renewable energy sources. The latter now supply over 20 percent of the state's power, completely extinguishing the need for new central power stations (coal or nuclear) in the next decades.⁵² With the Public Utility Regulatory Policy Act of 1978 (PURPA), state regulators disposed of an effective tool to move away from central power to renewables, conservation, and cogeneration. This allowed regulated utilities to discover the economic virtues of "flexible specialization,"⁵³ while evading the political heat that had obstructed efficient management and business operation in the past.⁵⁴

Nuclear Waste Policy

In addition to the safety related issue of emergency planning and the cost related issue of utility regulation, nuclear waste disposal is the third major stake of U.S. nuclear power struggles since Three Mile Island. As in the previous two cases, local authorities and states are pitted against the federal government, demanding in unison with citizen groups more autonomy in the regulation of nuclear power. Similar to emergency evacuation and utility regulation, the problem of waste

comparison, the costs of the space program and the Vietnam war totalled \$100 billion and \$111 billion, respectively.

⁵⁰ Alvin Weinberg et al., *The Second Nuclear Era* (New York: Praeger, 1985), 6.

⁵¹ Critical Mass Energy Project, *Least-Cost Electrical Planning Compendium* (Washington, DC: Critical Mass, 1987).

⁵² Christopher Flavin, "A Moratorium That Has Paid Its Way," *New York Times*, 31 July 1983; Stanley Hulett, "Promoting Independent Power: The California Experience," *Public Utilities Fortnightly*, 16 February 1989, 13-17.

⁵³ Michael Piore and Charles Sabel, *The Second Industrial Divide* (New York: Basic Books, 1984).

⁵⁴ Matthew Wald, "Utility's Strategy for Life in a Nonnuclear Age," *New York Times*, 11 September 1992.

disposal emerged at the back end of the nuclear policy cycle, consigning the costs of the technology's precarious infrastructure to concrete localities and states.

When President Carter announced the nation's first comprehensive radioactive waste management program in February 1980, he stressed the pivotal importance of public participation: "It is essential that all aspects of the waste management program be conducted with the fullest possible disclosure to and participation by the public and the technical community."⁵⁵ Nuclear power's credibility melt-down after Three Mile Island turned participation into obstruction, since the gap between localized costs and diffuse national benefits widened ever more. A survey in 1986 found that 67 percent of the American public was "very concerned" about nuclear waste disposal,⁵⁶ and by 1991 89 percent considered this a "very serious" issue.⁵⁷ With the gates for participation wide open, nuclear power in a credibility crisis since TMI, and public sensitivity to nuclear waste issues particularly high, local and state-wide not-in-my-backyard campaigns spread like wildfire.

The federal waste program of 1980 had two components – the disposal of low- and high-level nuclear waste. The disposal of low-level waste became an acute problem after Three Mile Island, when the previous host states of Nevada, South Carolina, and Washington no longer accepted waste shipments from other states. In response, Congress passed the Low-Level Radioactive Waste Policy Act in 1980, which made each state responsible for the disposal of its low-level waste and urged the formation of regional interstate compacts. The result was political warfare between states. States with high waste quantities – such as California and New York – were effectively denied membership in any of the new interstate compacts. Instead of balancing regional risks, the paradoxical outcome of the delegation of low-level waste responsibilities to the states seemed to be the hazardous proliferation of dump sites throughout the nation, an outcome particularly problematic in the heavily populated and geologically unsuited Northeast.⁵⁸ However, by 1992 not a single prospective dump site in the United States could escape the specter of legal gridlock. Typical is the case of California's Ward Valley project, which until 1991 seemed to be the only low-level waste dump poised for opening according to schedule,⁵⁹ but which then succumbed to fierce citizen resentment and subsequent legal obstruction by state agencies bowing to public pressure. Citizen-state alliances such as the one in California have effectively stalemated the implementation of the Low-Level Waste Policy Act, with no solution currently in sight.⁶⁰

⁵⁵ Jimmy Carter, "Presidential Message of February 12, 1980" in William Colglazier, ed., *The Politics of Nuclear Waste* (New York: Pergamon Press, 1982).

⁵⁶ Michael Kraft, "Evaluating Technology Through Public Participation: The Nuclear Waste Disposal Controversy" in Michael Kraft and Norman Vig., eds., *Technology and Politics* (Durham, NC: Duke University Press, 1988).

⁵⁷ "Time to Choose," *Time*, 29 April 1991, 60.

⁵⁸ Donald Barlett and James Steele, *Forevermore: Nuclear Waste in America* (New York: Norton, 1985), 196–249.

⁵⁹ "Only California is on Track for Nuclear Dump," *Los Angeles Times*, 20 May 1991.

⁶⁰ "Temporary Nuclear Waste Storage May be Expanded," *Los Angeles Times*, 11 January 1992.

While most experts agree today that the disposal of high-level nuclear waste poses no unsolvable technical difficulties, its main impediment arises from concerns of political equity and societal acceptability—quite similar to the issue of low-level waste, yet on a magnified scale. In a time when the clear majority of the public is opposed to nuclear power, no electorally accountable state government is willing to host a repository for the nation's high-level nuclear waste. The three major state concerns arise from the inherent costs and risks of high-level waste, which has to be isolated from the ecosphere for hundreds of generations; the fear of unfairness in siting decisions which would impose a disproportional share of the waste disposal burden on certain states; and low credibility of the federal government, which in previous nuclear waste decisions did not live up to its promise to respect state autonomy.⁶¹ By 1982, more than twenty states had passed restrictive legislation banning various types of federal waste management activities on their territories, and more than forty municipalities had imposed bans on radioactive waste transports.⁶²

In the early 1960s, David Lilienthal, one of the major architects (and early critics) of U.S. nuclear power, had emphasized that the future of nuclear power depended on the safe handling of radioactive waste.⁶³ Over the next fifteen years, this early warning remained unheard. Federal research attention focused almost exclusively on reactor development, neglecting the less glamorous back-end of the nuclear fuel cycle.⁶⁴ Not until 1972 did waste management exist as a distinct bureaucratic entity with its own independent budget, and not until fiscal year 1977 did the program receive substantial funding, when President Carter formed the Interagency Review Group that would prepare the first comprehensive waste disposal program of 1980.

In reaction to the reprocessing ban under Carter, which forced on-site storage of burned nuclear fuel-rods, and in response to several state moratoria on new nuclear constructions pending a solution to the waste problem, the industry pushed hard for the installation of a high-level waste dump—a task for which the federal government was legally responsible. The result was the High-Level Nuclear Waste Policy Act of 1982. It took more than two years to complete the act, because Congress became locked in a controversy over the state demand for a veto right. This veto right was finally granted, to be overturned only by an unlikely majority in both Houses of Congress. As a Democratic legislator gloomily predicted the likely impact of the state veto provision, “we will never see the day in which a permanent repository is built.”⁶⁵

⁶¹ OTA, *Managing Commercial High-Level Waste* (Washington, DC: U.S. Government Printing Office, 1982), 34–36.

⁶² Edward Woodhouse, “The Politics of Nuclear Waste Management” in Charles A. Walker et al., eds., *Too Hot to Handle?* (New Haven: Yale University Press, 1982).

⁶³ David Lilienthal, *Change, Hope, and the Bomb* (Princeton, NJ: Princeton University Press, 1963), 137.

⁶⁴ Carroll Wilson, “Nuclear Energy: What Went Wrong,” *Bulletin of the Atomic Scientists* 35 (June 1979): 13–17.

⁶⁵ Quoted in Barlett and Steele, *Forevermore*, 168.

The act originally required the Department of Energy (DOE) to build a first permanent high-level waste repository by 1998 and to begin the preliminary search for a second one.⁶⁶ Political difficulties in the implementation of the act soon forced the Department of Energy to postpone the expected opening date of the first repository well into the next century. In principle, the Nuclear Waste Policy Act called for "consultation and cooperation" between the Department of Energy and the potential host states. In fact, each of the thirteen states at one point or another considered a possible choice has mounted its decided resistance, from spontaneous citizen outrage to state-initiated legal intervention.

To secure political equity, the first repository was to be built in the West (which is less populated but geologically better suited), whereas the second repository should be in the East (which has more nuclear power plants and therefore produces more high-level waste). To save time and money, and beleaguered by wide-spread protests from citizen groups and state governments especially in the Northeast,⁶⁷ the Department of Energy made a momentous decision. In May 1986, it narrowed down the list of candidate sites for the first repository to three states in the West (Texas, Nevada, Washington), and indefinitely postponed the site screening for a second repository in the East. This was a serious attack on the delicate balance and political equity reached between the West and the East, and all three western states subsequently filed law suits challenging the decision. When Congress finally picked Nevada as the only disposal site, the choice fell to the state with the least political clout at the federal level. The state governor called the decision a "monstrous injustice," chiding the lack of fairness toward "the country's nuclear wasteland."⁶⁸

The first high-level waste repository in Yucca Mountain, Nevada, is now scheduled to open for business in 2010. But continuous expert controversy over the geological suitability of the site and constant legal maneuvering by Nevada's state government suggest further delays, if not the eventual cancellation of the project.⁶⁹

CONCLUSION

In his seminal assessment of the state of the nuclear enterprise, Alvin Weinberg lamented that "the absence of positive leadership has allowed the technology to drift into an uneconomic mode, turning off the future growth of the industry,"

⁶⁶ Luther J. Carter, *Nuclear Imperatives and Public Trust: Dealing with Radioactive Waste* (Washington, DC: Resources for the Future, 1987).

⁶⁷ See, for instance, Laura Haight, "Waking Up to High Level Waste," *The Waste Paper* (New York) 8 (1985): 10-12.

⁶⁸ *Las Vegas Review Journal*, 19 September 1987.

⁶⁹ William Broad, "A Mountain of Trouble," *New York Times Magazine*, 18 November 1990, 37ff.

adding that “overall leadership must come from the government.”⁷⁰ In a similar vein, Irvin Bupp described the nuclear policy stalemate after Three Mile Island as a “breakdown of the American democratic political process.”⁷¹

This analysis suggests that the TMI-induced crisis of societal acceptance prohibited firm leadership in nuclear policy and reinforced an unescapable trend toward the decentralization of control, which undermined the political and economic recovery of American nuclear power. While this outcome may be dysfunctional in terms of delaying the closing of the nuclear fuel cycle and thwarting the future of an industry, this may also be a necessary price paid for American democratic institutions at work. From this angle, the demise of nuclear power reflects not the *breakdown* but the very *functioning* of the democratic process. As James Madison planned, the conflict was internalized within the federal system. The protest movement skillfully intensified the fragmentation of authority between the federal and state levels, thus undermining the institutional homogeneity required for the successful implementation of a highly inflexible and complex technology. As a movement leader pointed out, “from our perspective it is Westinghouse and their allies versus local interest and our friends, mainly state legislators and attorneys general.”⁷²

Obviously the implementation of nuclear power depends on a broad consensus that is not easily provided by polities in which conflict is the reigning principle. Not by accident, the nuclear enterprise succeeded only in political systems characterized by centralized control, most notably France, Japan, and South Korea, while it became embroiled in continuous controversy in federally fragmented political systems, such as the United States or West Germany.⁷³

The conflicts over emergency planning, utility rate regulation, and waste disposal reflect the three major stakes in the overall U.S. nuclear controversy: safety, economics, and the distribution of externalities. These conflicts emerged only at the back end of the nuclear policy cycle, when irreversible investments had already been made and previously ignored key aspects of the infrastructure of nuclear power became problematic, distributing the costs to concrete localities and states. The outcome of these conflicts indicates that the complexity of nuclear technology is at odds with the fluidity and fragmentation of authority in the American polity. The crisis of acceptance after Three Mile Island and the belated recognition of certain consequences of this large-scale technology, such as the necessity of emergency precautions or the safe disposal of waste, activated the vertical division of authority in the American political system, thus undermining the stabilization of nuclear power in the 1980s.

More than a decade after Three Mile Island, the 108 nuclear power plants

⁷⁰ Weinberg, *Second Nuclear Era*, 80, 83.

⁷¹ Irvin Bupp, *Nuclear Power*, 162.

⁷² Marvin Resnikoff, “When Does Consultation Become Co-Optation?” in William Colglazier, *Politics of Nuclear Waste*, 190.

⁷³ Joppke, *Mobilizing Against Nuclear Energy*.

now operating in the United States produce about 20 percent of the nation's electricity—a far cry from the 1,000 plants projected by the old Atomic Energy Commission in the early 1970s. Few new plants are still expected to be completed, and the current glut of inexpensive alternate fuels makes it unlikely that utilities will order new reactors in the near future. The most recent trend is to send relatively young and fully operable nuclear plants into early retirement, because cheaper energy alternatives exist.⁷⁴ To be sure, the current debates over acid rain, greenhouse effect, and air pollution have given increasing leverage to the plea for a “second nuclear era,” which is supposed to be based on a smaller, more flexible, and “inherently safe” reactor design.⁷⁵ It remains to be seen if this will rejuvenate the nuclear option in America.*

⁷⁴ Matthew Wald, “Cheap and Abundant Power May Shut Some Nuclear Plants,” *New York Times*, 14 April 1992.

⁷⁵ Weinberg, *Second Nuclear Era*.

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