

Institutional Responses to Different Perceptions of Risk

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Three Mile Island presented dramatic proof to U.S. society and the world that nuclear reactors can fail. That nobody died is largely irrelevant to this realization; what matters is that for the first time millions were able to see clearly the anatomy of a nuclear disaster. In the ten days after 28 March 1979 the Reactor Safety Study's prediction of a part-in-a-million probability of such a disaster occurring (U.S., Nuclear Regulatory Commission 1975), as well as other assurances, were largely forgotten. The institutional response rapidly gathered force: President Carter mandated a special commission; Congress rejected a broad moratorium on nuclear-power-plant operation but considered a narrower moratorium linked to emergency preparedness; the Nuclear Regulatory Commission (NRC) alone sponsored 130 projects related to the accident; and the nuclear industry began to reassess its future.

In the aftermath of Three Mile Island, one of the key questions is how institutions can best respond to the accident and to the new reality it has wrought. We start with the following premises, many of which remain unaltered by the accident itself.

- Speaking broadly, the public perceives the danger of nuclear power to be substantially greater than that suggested by most experts' assessments, and the extent of the public's departure from the experts' opinion is unusually great as compared with other technologies and other risks. This does not mean that there is not a substantial minority of experts who sides with the public, nor that there is not a large fraction of the public that agrees with the majority of experts.

- The sources of this hypercritical public response lie partly in the nature of the risks (particularly their catastrophic and involuntary character), partly in the social history of nuclear power (especially its origin in weapons of destruction), and partly in the inadequacy of past risk management (notably with regard to radioactive wastes).
- The rancorous debate that divides experts is a special source of public concern and quite likely amplifies public anxiety and fear.
- Other social issues, in addition to health risks, are increasing public concern. Prominent among them are the dissociations of risks and benefits over generations and regions (all people and regions will not receive equal benefits and risks) and the possible threats to democratic institutions.
- An organized opposition, anchored in the environmental movement, adamantly opposes nuclear power as a technology, and the movement's focus shifts according to available targets.
- Institutions charged with the management of nuclear safety suffer from a substantial lack of credibility and public trust.

We structure our analysis in terms of three major questions: (1) Is nuclear power compatible with democratic institutions? (2) Should institutions consider the large differences between the public's and the experts' assessment of risk? If so, how is this best done? (3) Is a societal consensus on nuclear power possible? If not, what are the institutional implications? After considering each of these questions, we propose one possible pathway out of the impasse on nuclear energy.

Is Nuclear Power Compatible with Democratic Institutions?

In August 1979 the American Civil Liberties Union (ACLU) circulated a letter that it described as (perhaps) "the most critical alert ACLU has released in your lifetime." This extraordinary action reflects the ACLU's perception of the threat that nuclear energy poses to democratic process and civil liberties. The letter, dated September 1979, cites these issues:

- Suppression of information concerning the exposure of servicemen to the fallout from testing of nuclear weapons;
- Restraint on publishing information in *The Progressive* about building a nuclear bomb;
- Lack of due process in the licensing of nuclear-power plants;
- Surveillance by several law-enforcement agencies of political opponents of nuclear energy;

- Threats posed by the evolving security system for nuclear materials; and
- Screening procedures for employment in the nuclear-power field that threaten to discriminate against controversial persons.

To this list can be added other issues that have arisen in the past: the centralization of decision making involved with a complex technology that few understand and the priesthood role that could develop for specialized managers and guardians of safety. Common to all of these issues is the fear that there is a fundamental incompatibility of this technology with democratic institutions.

Several points must be stated. First, statements such as the ACLU's characteristically tend to group weapons with electricity production and other uses of nuclear energy. As a result, problems primarily related to the growth of modern weapons systems and militarism are attributed to this particular form of energy production. Second, the problems cited appear to be shared with—and often dwarfed by—other technologies espoused by society. Indeed, communications technology has undoubtedly done more to foster centralized institutions than nuclear power ever will. Electronics and computer technology appear to pose much graver threats of surveillance and invasion of privacy; the control of biological and nuclear weapons requires a more complex need for extensive security arrangements. Third, we are not aware of a convincing analysis that demonstrates the unhappy side effects to be an intrinsic product of meeting nuclear-power needs. In short, although we recognize points of tension with democratic institutions, we do not see nuclear energy as being intrinsically more incompatible with them than are other technologies or societal functions.

Having said this, we think it is significant that the ACLU list presents an impressive prima-facie case of past wrongdoings and infringements of democratic processes and that a wide variety of environmental, religious, and civil liberties groups share the ACLU's concerns. Though it should be possible to minimize at least some of the strains, whether the institutions responsible for managing nuclear power can do so is an unanswered question.

Post-TMI responses may be dangerous. In our zeal to "fix" nuclear energy, we may make choices in the name of safety that exacerbate rather than reduce the tensions between nuclear energy and democratic institutions. If the repair leads to greater dominance by experts, exclusion of the public in the decision-making process, quasimilitary professionalism, and injudicious security precautions, then the fears of the ACLU will be justified. The net result—whatever the safety gains—will be to link nuclear-power production and nuclear weapons, to enlarge the contrast with "soft" energy paths (e.g., solar power), and to deepen the public distrust of nuclear technology.

Should Institutions Consider the Large Differences Between Public and Expert Assessment?

Institutions already consider differences between lay and expert opinions in relation to the issues of nuclear power and other technological risks. A guideline for safety measures in nuclear plants has been the \$1000-per-rem or \$1-10-million-per-life expenditure, a sum that far exceeds expenditures in non-nuclear energy systems. The Delaney Amendment and the war against cancer (and not heart disease) are institutional responses to the public dread of cancer. Society already demands more in exchange for taking certain types of risks than others, a situation not restricted to nuclear power alone. Because institutions depend upon public support, they respond to these social realities.

However, gearing safety policy to public assessment of risk raises problems. Should public officials knowingly expend enormous public funds to realize only small increments of safety? Should regulations be based on public fears rather than on the best available scientific understanding of risk? Will even enormous expenditures allay public concerns at all, given that these concerns are anchored in the catastrophic potential of nuclear technology?

The problem is exemplified by a pending decision on waste-acceptance criteria for the low-level and TRU (transuranic) wastes to be delivered to the proposed WIPP (Waste Isolation Pilot Plant). Current analyses suggest that despite a very substantial multimillion-dollar expenditure and increased worker exposure, processing and compacting the waste will achieve little, if any, additional safety. Yet it is unclear whether the unprocessed waste will gain public acceptance in New Mexico, and the failure to do so may endanger the development of the repository and a waste-management program, which is already in jeopardy.

How confident can we be of experts' assessments based on an emerging state of the art? Such assessments require the projection of fatalities in the distant future, using unvalidated or partially validated computer models as well as judgments about which risks to estimate, how to ensure completeness, how to anticipate changes in technological and social contexts, and how to determine the meaning of the numbers generated.

There are at least two routes open to institutional response. The first is an acceptance of the double standard for nuclear energy. If this energy source is to have a future, then for the foreseeable future there must be safety investment that many experts will regard as inappropriate or even irrational. To invest endlessly in making what is already safe even safer is indeed irrational. Still, as the double standard finds its wellspring in the catastrophic nature of nuclear power, and as catastrophes are extremely costly for society and are poorly understood, substantial investments in prevention may not be

irrational. What is needed is a safety program that discriminates carefully among risk-reduction goals.

Second, institutional response will require a significant investment in procedures used to consider, debate, and establish policy. The departure between the public's and the experts' assessment inflicts special burdens on the procedures that institutions use to air and make decisions about risks. To counteract the legacy of managerial expediency and lack of candor—and to enhance institutional credibility—procedural reforms must go well beyond the mandated legal procedures and requirements. Extraordinary efforts are needed to help the public think out the difficult value issues that permeate nuclear-power decisions, to come to terms with risk and equity considerations, and to assure itself of the honesty and openness of the safety guardians. There is, in short, a double standard for process as well as safety.

Is a Societal Consensus on Nuclear Power Possible?

In the last five years there have been impressive efforts to win a consensus on nuclear power:

- An extensive use of citizen study groups, involving some 10,000 people in all, in an educational campaign in Sweden in 1974;
- Special parliamentary inquiries, such as the Windscale Inquiry in England, the Fox Inquiry in Australia, and the planned Gorleben Inquiry in Germany;
- The "burgerdialog" program of information dissemination (by the West German Ministry of Science and Technology) in operation since 1975;
- National referenda in Austria and Switzerland and one planned in Sweden in 1980;
- The Danish Experiment that circulates "dialectical" information on general energy issues;
- State referenda in the United States and extensive dissemination of information by contending forces; and
- Mediation efforts, such as those used by the Keystone Group or the Swedish KBS 1 and KBS 2 reviews, designed to separate areas of contention and areas of agreement.

Although the specific outcomes of the efforts are quite diverse, all failed to win consensus and all increased the politicization of the nuclear issue. It is not even clear that the profusion of information helped to eliminate confusion, reduce concerns about risks, or clarify the major issues of debate.

If by the term *consensus* we refer to a diminution in activist opposition and to a very substantial majority support by the public, even a pre-TMI

consensus was probably not possible over the short term (the next five years). The TMI accident has decreased public support of nuclear energy, hardened the opposition, and conferred increased legitimacy on nuclear opposition. Nuclear power will continue to be one of society's worrybeads—errors will be amplified by the mass media, delay and conflict will characterize decision-making processes, and new areas of contention will appear. In the short term we foresee no events that will quiet vocal opposition and eradicate the deep public distrust of nuclear power.

Whatever the response to the TMI accident, future accidents or acts of terrorism in the United States or elsewhere would exacerbate the present societal conflict. There are 219 nuclear-power plants outside the United States. Although beyond U.S. control, an accident or act of terrorism would nonetheless reverberate strongly in the United States, just as the TMI accident has caused major repercussions elsewhere.

Beyond Impasse

Having stated what we believe to be the bleak realities confronting the use of nuclear energy today, we turn our attention to possible solutions to the impasse.

First, the continuing energy crisis may produce a *de facto* resolution. Higher prices of fuel, long gasoline lines, and energy shortfalls may heighten the public valuation of nuclear-energy benefits; simultaneously confronting the prices of other energy technologies (strip mining, the catastrophic potential of liquified natural gas, the CO₂ problem from coal burning, and the enormous financial drain involved in synthetic-fuel development) may also influence people's opinions. In such a context, a relatively low profile for nuclear energy could easily contribute to a public reassessment of its role.

A second pathway involves active institutional intervention. Increasingly, the Vietnam analogy is being applied to the nuclear-power conflict. Alvin Weinberg, for example, warns that nuclear energy is being *Vietnamized*, by which he means polarized. Actually, it has been Vietnamized or polarized for some time. We first employed this analogy several years ago in pointing out that a major reactor accident could do for the nuclear conflict what the Tet offensive did for the Vietnam debate: cast doubt on the long-standing convictions of the expert proponents, introduce substantial doubt among public supporters, and redouble the efforts of the opposition.

But the Vietnam War did end, and that ending may provide lessons for the impasse on nuclear energy. The decision by the administration to terminate the U.S. role in the war, to withdraw our military forces in stages, and to provide extensive postwar support for South Vietnam succeeded in producing a workable societal consensus (if not unanimity). The strategy worked for three reasons: it eliminated the open-ended nature of the conflict; it limited

the scale of operation; and it made substantial concessions designed to de-escalate social conflict in order to realize short-term goals.

Drawing upon that precedent, we offer a two-part strategy for compromise on nuclear energy—one aimed at policy, the other at process. In regard to policy, we perceive the following four elements.

Recognizing nuclear power as a transitional energy source. This view will limit the role of nuclear energy to the period required to develop and deploy long-term renewable energy sources. It rules out fuel recycling and deployment of the breeder reactor, because a byproduct of this kind of reactor is plutonium, which can be used to produce bombs.

Limiting the total size of the commitment. No nuclear-power plants beyond those currently on order or under construction will be built. The open-ended total scale of the nuclear enterprise is a key ingredient in the nuclear debate and is not resolved by limiting the number of sites (as opposed to plants). Considered with item 1, this obviates the plutonium-economy anxiety.

Pruning the existing commitment. There is wide variety in the performance of nuclear plants, as indicated by capacity factors, safety inspections, and worker exposure. Locating plants near densely populated areas (e.g., Zion, Illinois, and Indian Point, New York) amplifies the catastrophic risk potential. A searching safety reexamination of all reactors should be conducted; those not qualifying and not amenable to rectification should be closed permanently, and others whose faults are not easily rectified should be closed pending completion of necessary changes.

Solving the radioactive waste problem. The current concern about reactor accidents should not obscure the depth of public concern over waste transport and disposal. The problems regarding waste disposal are primarily institutional, but they are amenable to resolution if effective congressional and executive leadership is forthcoming.

Such a policy compromise will satisfy neither nuclear proponents nor opponents. In the Vietnam situation many "hard-core" supporters of the war were more frustrated and embittered as a result of the course followed to end the war. As with Vietnam, however, a nuclear compromise offers a chance for a workable consensus to de-escalate the current conflict sufficiently to permit the completion of a 150-Gwe nuclear program.

The second component of the strategy recognizes that current institutions and processes are deeply flawed, that they constitute a significant part of the conflict. To a great extent the nuclear controversy has raged outside established institutions. Formulated in a period when a closed expert community presided over nuclear fortunes, these institutions—despite continuing reorganization and shuffling—have been unable to respond to the elements of the debate. For example, it is significant that the Keystone mediation effort (comprised of industrialists, environmentalists, and academics) could so quickly point to the Department of Energy's (DOE) lack of credibility as a major

obstacle to a successful radioactive-waste program. The demise of the Joint Committee on Atomic Energy has resulted in a fragmented congressional presence; the Nuclear Regulatory Commission is still struggling to act as an independent commission; and the Interagency Review Group on Nuclear Waste speaks of the need for ad-hoc institutional arrangements if requisite credibility is to be achieved.

Institutional reform designed to gain credibility for nuclear energy must begin with the recognition that

1. Nuclear opposition is legitimate and its leaders must be accorded full representation at all levels of institutions and at all stages of processes. This concept of pluralism, often used in multinational societies, has already begun to be accepted.

2. The value conflicts that permeate nuclear-power issues cannot be resolved by managerial or regulatory institutions or by an outpouring of technical reports and factual data. This fact suggests the need for a much more substantial presidential and congressional role and for their willingness to abandon otherwise desirable programs if a value consensus cannot be achieved.

3. A double standard is required in terms of process as well as policy. What is good enough for other technological decisions is not good enough for nuclear ones. It is time to stop fighting (or ignoring) this truth and to accept the unique burden of nuclear energy. Specifically this means that the substance of governmental research and efforts should square with the oft-repeated statements that the primary obstacles to nuclear power reside in the acceptance of the problems by institutions and the public. This acceptance will be demonstrated by such things as an overhaul of licensing procedures for nuclear facilities, institutional reform, the reduction of fiscal inequities in facility location, new ventures in public education and participation, and improved candor and honesty in decision making.

We are unsure whether these changes will suffice to produce the historic compromise required for nuclear energy. However, we are convinced that in the absence of major redirections, the acrimonious debate about nuclear energy will continue to sap our efforts to fashion an overall energy policy.

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