

OVERVIEW AND FINDINGS

Without significant changes in the technology, management, and level of public acceptance, nuclear power in the United States is unlikely to be expanded in this century beyond the reactors already under construction. Currently nuclear powerplants present too many financial risks as a result of uncertainties in electric demand growth, very high capital costs, operating problems, increasing regulatory requirements, and growing public opposition.

If all these risks were inherent to nuclear power, there would be little concern over its demise. However, enough utilities have built nuclear reactors within acceptable cost limits, and operated them safely and reliably to demonstrate that the difficulties with this technology are not insurmountable. Furthermore, there are national policy reasons why it could be highly desirable to have a nuclear option in the future if present problems can be overcome. Demand for electricity could grow to a level that would mandate the construction of many new powerplants. Uncertainties over the long-term environmental acceptability of coal and the adequacy of economical alternative energy sources are also great and underscore the potential importance of nuclear power.

Some of the problems that have plagued the present generation of reactors are due to the immaturity of the technology, and an underestimation by some utilities and their contractors of the difficulty of managing it. A major commitment was made to build large reactors before any had been completed. Many of these problems should not reoccur if new reactors are ordered. The changes that have been applied retroactively to existing reactors at great cost would be incorporated easily in new designs. Safety and reliability should be better. It is also likely that only those utilities that have adequately managed their nuclear projects would consider a new plant.

While important and essential, these improvements by themselves are probably not adequate to break the present impasse. Problems such as large cost overruns and subsequent rate increases, inadequate quality control, uneven reliability, operating mishaps, and accidents, have been numerous enough that the confidence of the public, investors, rate and safety regulators, and the utilities themselves is too low to be restored easily. **Unless this trust is restored, nuclear power will not be a credible energy option for this country.**

It appears possible, however, that additional improvements in technology and the way nuclear power is managed and regulated might be sufficient to restore the required confidence. **Technological improvements, while insufficient by themselves, can nevertheless be very important in that effort.** One approach would be to focus research and development (R&D) on improving current light water reactor (LWR) designs. The goal would be standardized designs representing an optimal balance of costs, safety, and operability. Private industry is unlikely to undertake all the R&D needed, so a Federal presence is probably necessary.

It is also possible, however, that even greatly improved LWRs will not be viewed by the public as acceptably safe. **Therefore, R&D on alternative reactors could be essential in restoring the nuclear option if they have inherently safe characteristics rather than relying on active, engineered systems to protect against accidents.** Several concepts appear promising, including the high temperature gas-cooled reactor (HTGR), the PIUS reactor, and heavy water reactors. Such R&D should also be directed toward design and developing smaller reactors such as the modular HTGR.

Improvements in areas outside the technology itself must start with the management of existing reactors. **The Nuclear Regulatory Commission, as well as the Institute for Nuclear Power Operations, must ensure a commitment to excellence in construction and operation at the highest levels of nuclear utility management.** Improved training programs, tightened procedures, and heightened awareness of opportunities for improved safety and reliability would follow. If some utilities still prove unable to improve sufficiently, consideration could be given to the suspension of operating licenses until their nuclear operations reflect the required competence, perhaps by employing other utilities or service companies. Similarly, certification of utilities or operating companies could be considered as a prerequisite for permits for new plants in order to guarantee that only qualified companies would have responsibility. These are drastic steps, but they may be warranted because all nuclear reactors are hostage, in a sense, to the poorest performing units. **Public acceptance, which is necessary if the nuclear option is to revive, depends in part on all reactors performing reliably and safely.**

Nuclear safety regulation also can be improved even without substantial new legislation. **Several utilities recently have shown that current regulatory procedures need not preclude meeting construction budgets and schedules.** The regulatory process, however, is more unpredictable than necessary, and there is no assurance that safety and efficiency are being optimized. Encouraging preapproved standardized designs and developing procedures and the requisite analytical tools for evaluating proposed safety backfits would help make licensing more efficient without sacrificing safety.

The improvements in technology and operations described above should produce gains in public acceptance. Additional steps may be required, however, considering the current very low levels of support for more reactors. Addressing the concerns of the critics and providing assurance of a controlled rate of nuclear expansion could eliminate much of the reason for public disaffection. An important contribution to restoring public confidence could be made by a greater degree of openness by all parties concerned about the problems and benefits of nuclear power.

If progress can be made in all these areas, nuclear power would be much more likely to be considered when new electric-generation capacity is needed. Such progress will be difficult, however, because many divergent groups will have to work together and substantial technical and institutional change may be necessary.