

# Powerful reactions

Nuclear power has taken a meandering route, but it is here to stay.

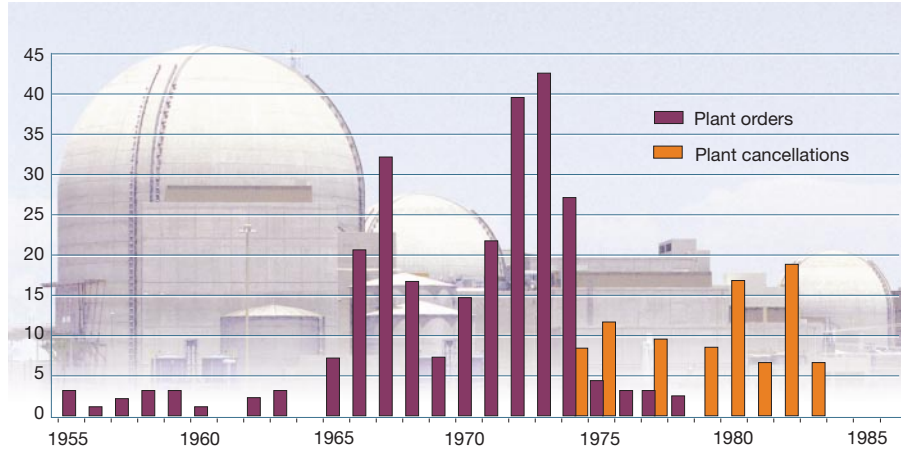
Chauncey Starr

Of all the seminal scientific discoveries, that of nuclear fission in 1939 had uniquely rapid consequences. As in a good mystery story, natural fission had always lurked undetected in the baffling chemistry of radioactive elements. Its discovery opened several doors, the most portentous leading to the first new primary energy source in human history. But a world war made weapons the first intensive US development, causing a massive geopolitical shift. In peacetime, there came radioactive elements for use in medicine and research, and early prototypes of the exciting new energy source, nuclear power.

The task of making nuclear power useful fell to the new US Atomic Energy Commission (AEC), the country's repository of nuclear knowledge. The first half-century of power development was led by physicists and chemists, and by innovative engineers who gradually assumed leadership. Although nuclear power meets many energy needs and is a major option for avoiding greenhouse gases, its growth is constrained by public fear of radiation and by opposition from anti-nuclear environmentalists. Public acceptance is slowly growing as these constraints are discussed and negotiated. In the long term, nuclear power will inevitably be a significant part of our global energy resources, but the social and political trends of today shape its immediate future.

During its first two decades, the AEC benefited from a positive public image and from President Dwight Eisenhower's "Atoms for Peace" promise in 1953. The agency's close ties to the Congress's Joint Committee on Atomic Energy (JCAE) made a team that initiated broad research and

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Hot and cold: since the mid-1970s, public and government enthusiasm for nuclear power has waned.

century-long plans for nuclear power. Except for the electric utilities, external public and non-scientific policy bodies were generally not invited to participate, for reasons including military security, the arcane sciences involved, and concern with time delays. The AEC/JCAE aimed to help the public understand the fundamentals, and promoted its vision, but treated public input brusquely. This stemmed from the group's belief that its policies were right for society.

It is not surprising, therefore, that the AEC/JCAE was seen in the 1970s as an arm of big government and big industry, and thus a target for the anti-establishment opponents of the Vietnam War. This was the seed of the anti-nuclear dogma that is now uncritically embedded in many public-interest movements. Waning public support for the once-powerful AEC/JCAE moved Congress to dismember it in 1974. In the following five years, the Energy Research and Development Agency absorbed the AEC, and in turn was swallowed up by the Department of Energy, its nuclear budget shrinking at each step.

During this period, the US electric utility industry had a minor role in the first-of-a-kind demonstration plants, sharing the financial risks with the AEC. By the late 1960s, the utilities were confident that nuclear plants were reliable, and placed orders for more. But during the late 1970s and early 1980s many of these orders were cancelled, because national electricity growth slowed, cheap natural gas was released (in 1987) from federal restrictions on power plant use, and government and public support for nuclear power had dwindled. In the 1990s, the energy department became politically anti-nuclear, dominated

by environmentalists, and delayed indefinitely its commitment to store spent nuclear fuel. This remains an unsolved problem for the roughly 100 nuclear power plants now operating in the United States.

Looking back, I believe that there were two strategic mistakes. The first was the AEC's discouragement, verging on disdain, of public participation in planning. In a democracy, elucidation, debate and negotiation with public groups must occur before governments commit to large programmes, so that the public is a responsible party in strategy and risk acceptance. This requires openness, patience and disclosure of objectives — all rare in politicized agencies.

The second misstep was the electric utilities' convenient acceptance of the by-products of weapons materials as a source of fuel. To the utilities, this seemed a cheap option. But this compromise with the military has left the nuclear industry with two problems: a costly hybrid fuel cycle, and a link with weapons in the public mind. The companies in the nuclear enterprise have an annual income of hundreds of billions of dollars; a small fraction of this could have funded reactor concepts and fuel cycles more productively, more cheaply and more quickly.

The relevance of this experience to other new sciences may be limited, but the genetic manipulation of food and drugs is now facing a similar attack from anti-gene environmentalists, who resemble the anti-nuclear movement. It will be interesting to follow that industry's response.

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