

# Book Review: 'Light Water'

## A Tale of Nuclear Narcissism

*'Extravagance of Prophecy' Paved Way to Atom Power's Downfall*

By Charles Komanoff

The most influential critique of nuclear power costs yet published was produced not by the anti-nuclear movement but by a team of Harvard - Massachusetts Institute of Technology academicians who support nuclear power as a necessary energy source. Their late-1974 study, *Trends in Light Water Reactor Capital Costs*, established that the final cost of building nuclear plants averaged twice the costs projected at the start of construction. Those costs were escalating twice as fast as coal costs, largely owing to the expense of mediating concerns over safety.

Surfacing a year after the OPEC oil-price rise, at the crest of the energy panic in the industrial countries, this pessimistic report helped begin the deflation of nuclear power that continues today.

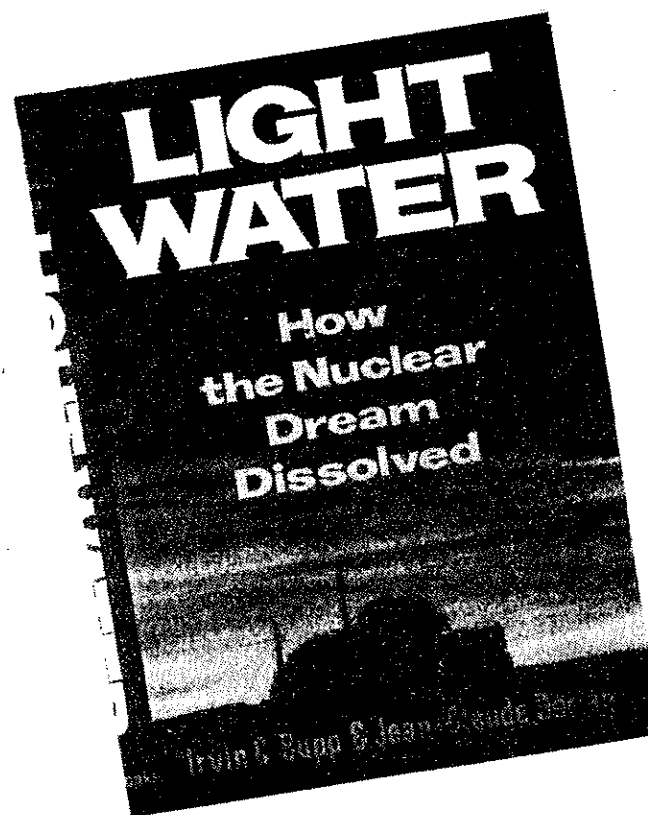
Four years later, the study-team leaders, Irvin Bupp of Harvard and Jean-Claude Derian, have written *Light Water* — a history of the effort to develop nuclear fission in Western Europe and the United States. Their account extends from the emergence of the American light water reactor as the dominant nuclear technology in the 1950s, through the binge of reactor orders in the late sixties and early seventies, to the "dissolution of the nuclear dream" now in progress.

Bupp and Derian boast 30 years of combined experience working with or studying nuclear power, including stints

in the American and France Atomic Energy Commissions. The insider's viewpoint which marked their Harvard - M.I.T. study is again evident. *Light Water* is rich with insights into both nuclear power's rise and fall.

A major theme in *Light Water* is the "extravagance of prophecy" by the supporters of nuclear power. This was the confusion of promise with performance that raised unfulfillable expectations and led to tactical blunders. The result was reduced credibility and greater opposition. This theme is familiar — if the Atomic Industrial Forum had a dollar for each time the "Too Cheap to Meter" prediction has been thrown back in its face, it could give up reactors and retire to the Riviera. But Bupp and Derian provide a fascinating account of the nuclear industry's self-mesmerization, and the resulting consequences.

An example is the precipitous scale-up of reactor size. By 1968, the reactor vendors were accepting orders for 1100-MW units, when the largest operating reactors were only 200 MW — notwithstanding the traditional belief that anything over a doubling of plant size was too risky. The rationale was the supposed economy of large units. The vendors and the Atomic Energy Commission expected that the five-fold increase in reactor size would cut costs in half, based on theoretical engineering models which ignored the longer construction times and stronger safety systems that large reactors



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would require.

Apparently, the nuclear community was too impressed by its own publicity to see that nuclear power was not mature enough for drastic scaling-up. As it turned out, the scale economies of the large units were marginal, and were outweighed by greater downtime, higher financing needs and more distant planning requirements. Today, slower demand growth and technical problems call for smaller (500-MW class) power plants. Instead, the vendors can only offer 1200-MW reactors which are too massive to market and are dragging the industry, dinosaur-like, into the ooze.

Another aspect of the industry's promising the impossible — and believing it — was the push to develop the fast breeder reactor. Bupp and Derian argue that the commitment to the breeder diverted the AEC's regulatory staff from the safety problems of light water reactors in the mid-1960s. This was when the first generation of commercial LWRs was being licensed. These neglected problems would later surface as reactor mishaps, helping destroy the public confi-

dence necessary to a large nuclear program. Moreover, though not mentioned in *Light Water*, the breeder commitment broadened the anti-nuclear movement by adding plutonium and proliferation to the public's concern, and by delaying solutions to waste disposal by tying the fuel cycle to reprocessing.

The original rationale for the breeder — limits to world uranium resources — has disappeared with the decline in projected nuclear capacity. Had the nuclear community been more realistic a decade ago about the market for its product, it might have downplayed the breeder and avoided some of the opposition that has crippled the LWR program.

*Light Water* also shows that the industry's impatience with critics did not start with the anti-nuclear movement. Bupp and Derian recount the lonely dissent of Phillip Sporn, chairman of the American Electric Power Company and a champion of coal-fired generating technology. Throughout the 1960s, Sporn challenged as unproven the claim of economic superiority for nuclear power. In one exchange before the Congressional Joint Committee on Atomic Energy, Westinghouse dismissed Sporn's criticisms as "unsupportable, badly distorted and inaccurate" — strong words to stick to a leading utility spokesperson, and a harbinger of the more polarized exchanges with the anti-nukes in the seventies.

Bupp and Derian are less successful in their treatment of the anti-nuclear movement. There is no quarrel with *Light Water's* other major theme, that the movement has played havoc with reactor licensing, safety criteria and fuel cycle logistics, and ultimately with nuclear power scheduling, economics and credibility. But Bupp and Derian's explanation for what motivates the movement is confused and stereotyped.

"The cause of the nuclear safety controversy is a difference in values, not a lack of information," say the authors. "To many in Western society, science and technology are now identified with dete-

rioration in the quality of life. Nuclear power has become for many of those people a powerful symbol of all that is wrong with science and technology."

These statements err in suggesting that nuclear opponents are "anti-technology." In fact, the movement's primary posture is skepticism, admitting technologies that work and are democratic (e.g. passive solar) and shunning those that are grandiose in impact and complexity. Moreover, the explanation of why nuclear power should have come to symbolize the abuse of technology is unsatisfactory. Bupp and Derian attribute this development to the lingering image of mushroom clouds and the vague sense that "there is something enormously unpleasant about nuclear power."

This characterization sidesteps the key issues and incidents which have generated such widespread fear of nuclear power. The discussion of radiation does not mention that ionizing radiation is a carcinogen, and falsely asserts that "the overwhelming majority of technically qualified opinion" supports current federal exposure standards. The discussion of fuel cycle hazards ignores the blunders in nuclear waste handling at Hanford and West Valley and downplays the gaps in needed scientific knowledge to reduce risks in disposal. The discussion of reactor safety was written too early to cite the Lewis panel's critique of the Rasmussen report (see Nov. 1978 *CMJ*, p.4 and Jan. 1979 *CMJ*, p. 1) but there is no excuse for failing to mention the Browns Ferry fire, which almost initiated a meltdown through an accident sequence omitted in Rasmussen's "exhaustive" list of failure modes. Perhaps most remarkable, the discussion of weapons proliferation makes no mention of India's 1974 nuclear weapon test which sparked the current concern over proliferation.

Then there is this outright gaffe: Bupp and Derian cite the Sierra Club's erstwhile endorsement of nuclear plants as preferable to coal as evidence that "Not all environmentalists are opposed to nuclear

power." In fact, the Sierra Club reversed this position five years ago.

What seems to have escaped Bupp and Derian is that nuclear power's multiple threats have touched many disparate constituencies. People concerned with cancer, long-term poisoning of the biosphere, catastrophic accidents, worker safety, rising energy costs, unemployment, monopoly utilities, big business, bureaucratic authoritarianism, government surveillance and nuclear war all have reason to oppose nuclear power. To this recipe for a broad-based opposition movement, the nuclear industry contributed political hubris and technical failures. The failures — the accidents, radiation leaks, and high costs — have probably been indispensable to building the movement, but in retrospect there seems little the industry could have done to avoid them. High costs and gaps in safety appear to be intrinsic to nuclear power; press hard on one, and you lose control of the other.

The industry's arrogance has also catalyzed the anti-nuclear movement. The more interesting question, which is not treated in *Light Water*, is whether the industry would have advanced as far as it has, if it had been less arrogant.

The Lewis critique is a case in point. In return for overstating reactor safety in 1974, Rasmussen and his colleagues have been repudiated in 1979. It is unclear whether the nuclear industry gained more in those five years, by spreading Rasmussen's conclusions, than it will lose in the years ahead from the report's repudiation. This is the kind of question that *Light Water* might have examined but didn't. Instead it harps on the industry's (and the AEC's) obstinacy about the problems of nuclear power, without weighing whether openness about those problems might have doomed nuclear power at the outset.

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*Light Water: How the Nuclear Dream Dissolved*, by Irvin C. Bupp and Jean-Claude Derian. Basic Books, Inc., New York. 241 pp. \$10.