ple, has dropped from around $40 in late 1980 to less than $18 now.

The government began funding the breeder more than 10 years ago on the premise that a boom in the demand for nuclear power would create a shortage of uranium fuel. The breeder would produce more fuel (plutonium-239) than it used, and was envisioned as an alternative energy source to be tapped when uranium prices reached a high level. Like the market in which synfuels are supposed to be competitive with natural oil, the situation in which breeder fuel becomes competitive with uranium has been an elusive and ever-receding vision. Recent studies have estimated that the "breakeven price" for a pound of uranium and breeder viability is between $120 and $280 in 1980 dollars. The DOE estimates that the price of uranium fuel will only be $48 in 1995. And a recent Congressional Research Service review of the technical literature concluded: "Recent analyses would seem to indicate that it is quite unlikely that breeder reactors will be economic before 2020, but there is a reasonable probability that they may become economic within 20 years after that date."* Thus, as fuel prices deflate, the rationale for the breeder deflates with them.

The Administration's policy for funding technical projects, as explained by presidential science adviser George Keyworth, is to reserve support for economically promising, innovative research only. To the extent that cuts must be made, they will be focused on demonstration projects, which are designed to move a concept out of the laboratory into a commercial setting.

The paradox of the breeder is that it is a demonstration project for which no commercial setting exists. The concept has been established and continues to be researched at the DOE's Fast Flux Test Facility in Hanford, Washington. The debate now centers on the issue of when, if ever, there will be a market ready to incorporate the breeder. As now conceived, the reactor will require many ancillary services (plutonium fuel fabrication plants, spent fuel processors, and new safeguards against diversion of supplies to weapons makers), none of which are in existence. Their costs are unknown, although some recent analyses, including Ottinger's, try to incorporate a figure for them.

Thus the breeder appears vulnerable. But President Reagan has made it plain that he intends to invest in a nuclear electric system for the future, and that he views the breeder as an essential part of the portfolio.

Some astute critics in Congress have tried to show that it is possible to invest in advanced nuclear systems without splurging on this particular demonstration project. The breeder can come later, they say. Representative Ottinger made a survey of some alternative prospects in hearings last October (*Uranium Efficiency Improvements*, House Energy and Commerce Committee, publication 97–94). Among other things, he learned of DOE-funded research indicating that light water reactor cores may be altered slightly to extend the life of uranium fuel. Technology now within reach could reduce spent fuel output by 40 percent and cut uranium demand by 15 percent. As though to confirm this potential saving, Westinghouse announced in July that it has joined with Mitsubishi and five Japanese utilities to design and build an advanced pressurized water reactor using 20 to 25 percent less uranium. The French nuclear program is aiming for similar, but not quite as great efficiencies. Thus Ottinger was surprised to find that the Administration this year requested a cut from $13 to $4 million in the DOE's research budget in this area. The cut has been reversed in the House Appropriations Committee, which set the funding level at $15 million. The issue will come to a vote when the energy and water appropriations bill comes up in December.

As the likelihood of a uranium shortage becomes more remote, the benefits of the breeder seem less attractive, especially in light of the high initial investment costs. Supporters of the breeder these days tend to stress its value as an asset to national security. Other nations are beginning to work on commercial plutonium reactors, and so, it is argued, the United States cannot afford to fall behind. Even this argument is being undermined by changed circumstances. The German consortium for funding the Kalkar breeder has come apart, and the Bundestag must decide soon whether to increase the federal subsidy or let the project die. The French program, often cited as an example of what the United States could do, has run into financial problems. French electric rates are due to rise sharply this year (by about 30 percent), and the backlash is expected to take its toll among the more speculative projects, like the Super-Phenix breeder.

The overall impact of these changes is to make this year's vote the most difficult test yet for the Clinch River breeder.—ELIOT MARSHALL

*"The Economic Competitiveness of Breeder Reactors Compared to Light Water Reactors," by Robert L. Civiak, Congressional Research Service, 13 September 1982.

ICSU Accepts China and Psychology

The International Council of Scientific Unions (ICSU) has finally recognized psychology as a legitimate scientific discipline. It has also found a way to admit the People's Republic of China into its fold without severing ties with Taiwan.

ICSU, which is regarded as the world's premier international scientific organization, took these two steps at its meeting last month in Cambridge, England. Both were preceded by years of negotiation.

Psychologists have been trying to join ICSU for more than a quarter-century, but their organization, the International Union of Psychological Science, has had its application rejected several times.

They got a foot in the door 2 years ago, when ICSU granted the psychology union second-class status as a scientific associate. This year, they tried again for full membership, and finally won approval. But it wasn't easy. The admissions committee spent an hour probing the scientific basis of modern psychology before passing the application along to the general assembly. Neither the committee vote nor the general assembly vote was unanimous, according to Mark Rosenzweig, professor of psychology at the University of California at Berkeley, who represented the psychologists' union at the meeting. In contrast, the International Union of Microbiological Societies was accepted without opposition.

One tangible result of the election is that the International Union of Psychological Science has had to change its acronym to IUPsyS to avoid confusion with the International Union of Physiological Sciences.

As for China's membership, a formula has been sought since 1972 to bring the People's Republic of China into ICSU without abandoning Taiwan, a longtime member. This year, a compromise was finally reached. The Chinese Association of Science and Technology, from Beijing, was elected to membership, while the Taiwan Academy of Science remains a full voting member. One potential result is that Chinese scientific societies will now be accepted more readily as

members of ICSU unions, and Chinese scientists are likely to be more numerous at international meetings.—***Colin Norman***

Soviets Clamp Down on Dissident Groups

These are dark days for dissidents in the Soviet Union. On 8 September, a prominent Soviet human rights group, whose members include Andrei Sakharov, announced it was disbanding in the face of continuing pressure from Soviet authorities. A fledgling unofficial peace group, composed of several scientists, has also been the target of harassment. The group's leader, Yury Batovrin, was detained for almost 2 months at a Moscow psychiatric hospital where he was reportedly forcibly drugged and threatened with electric shock treatments.

In the late 1970's, the human rights group, known as the Moscow Helsinki Watch Group, led the Soviet human rights movement, monitoring violations of the Helsinki accords. But one by one, members were deported. Sixteen are now serving terms in labor camps and internal exile.

Only Sakharov, his wife Yelena Bonner, lawyer Sofiya V. Kallistratova, 75, and physicist Naum Meiman, 70, remained active. The termination of the group was apparently precipitated when authorities said they were planning to charge Kallistratova with slander against the state. Dorothy Hirsch, spokeswoman for the Committee of Concerned Scientists, said that the others probably feared for the elderly lawyer's health. The disbanding "puts an official seal on the fact that the group is now impotent," Hirsch said.

Soviet authorities are also clamping down on the 17-member disarmament committee that calls itself the Group for the Establishment of Mutual Trust Between the United States and the U.S.S.R. Batovrin, a 25-year-old artist, announced in early June the establishment of the group, which includes two engineers, three physicists, four mathematicians, a biologist, a psychiatrist, and two postdoctoral geographers. Most of the members are in their late 20's to mid-30's.

State harassment has been virtually continuous since June, according to the latest edition of *Freedom at Issue*, a journal that monitors human rights. For example, the committee announced that to coincide with the massive peace rally in New York City on 11 and 12 June, it would monitor its phones to receive suggestions from other Soviet citizens. The group's phones were cut off that weekend. When Scandinavian peace activists were scheduled to march in Moscow in July, authorities stepped up the pressure. Yury Khronopulo, a physicist, was told he would be dismissed from his institute if he did not quit the committee. He and another member were arrested on 16 July for "petty hooliganism" and sentenced to 15 days in jail. When the Scandinavians arrived, other members were kept under police surveillance or ordered to leave town. Two group members have been permitted to emigrate, however. Mikhail Ostrovsky, a dental technician, and his wife, Ludmilla, a linguist, are now in the United States.

The most serious action against the group so far came on 6 August when Batovrin was sent to Moscow Hospital No. 14, on the very day American disarmament activists were to visit him. Batovrin's detention provoked an outcry from 20 prominent American advocates of arms control. In a letter to Soviet leader Leonid Brezhnev, they called for Batovrin's release. They also criticized the Soviet double standard of "applauding widespread public debate in the West, while crushing the most benign form of free expression at home." Among the cosigners were Helen Caldicott, president of the Physicians for Social Responsibility; Hans Bethe, physicist and Nobel laureate; Henry Kendall, chairman of the Union of Concerned Scientists; Frank von Hippel, chairman of the Federation of American Scientists; and Herbert Scoville, Jr., president of the Arms Control Association. The protests may have helped. According to a recent unconfirmed press report, Batovrin was released from the hospital last month and is now an out-patient.

Joel Lebowitz, a co-chairman of the Committee of Concerned Scientists, remarked in an interview that Soviet intolerance of dissidents is much harsher than it has been for several years.—***Marjorie Sun***

Shultz Names Kennedy Nonproliferation Chief

Secretary of State George P. Shultz has asked Richard T. Kennedy to concentrate full-time on nuclear nonproliferation and energy matters at the State Department. Kennedy has been wearing two hats as Under Secretary for Management and U.S. representative to the International Atomic Energy Agency in Vienna.

Critics within the department have complained that Kennedy's dual role caused him to slight his management and personnel duties. Kennedy, a former Nuclear Regulatory Commission member, will have the title of ambassador for nonproliferation.

Shultz's action goes beyond changes sought by former Secretary of State Alexander M. Haig. In March, Haig acted to move Assistant Secretary of State for Oceans and International Environment and Scientific Affairs (OES) James L. Malone, who was at least nominally in charge of nonproliferation issues, to ambassador of the Law of the Sea Conference (*Science*, 26 March, p. 1594). The nomination was withdrawn after it encountered opposition on conflict-of-interest grounds from members of the Senate Foreign Relations Committee. They felt that Malone had breached a commitment to the committee by involving himself in negotiations for a loan by the Export-Import Bank to the Taiwan Power Company which Malone had represented when he was a Washington lawyer. Malone remained at OES, but Kennedy assumed the role of spokesman on nonproliferation matters at State. Kennedy's new post requires Senate confirmation.

Richard T. Kennedy

—***John Walsh***

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