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sanctioned by the federal government years ago," Sun believes. Twenty countries now permit some use of the process, developed during the 1950s; several international agencies, including the World Health Organization, have certified the safety of medium-energy irradiation. But in this country, the U.S. Food and Drug Administration (FDA) has barred all but a few uses. Food prepared for U.S. astronauts in space and for people suffering from immune system deficiencies, for example, is sterilized by irradiation. The FDA restricts radiation because it fears that the treatment may create harmful chemical by-products in foods, though none have yet been found.

Last summer, the FDA granted permission to food processors to begin low-energy irradiation of spices, and more foods may be added to the list soon. The trouble is, says Sun, such low-energy treatments are powerful enough to kill insects, but not bacteria. A 1958 decision by the U.S. Congress to classify irradiation as a food additive rather than a process (such as canning) largely accounts for the restriction. It is difficult to design laboratory tests of irradiation to meet the strict safety standards for additives: Laboratory animals can be fed huge quantities of additives like saccharin but not of irradiated foods.

A bill now pending in Congress would change the 1958 classification and make it easier for the FDA to allow food processors to use higher energy treatments. The next hurdle for food producers would then be convincing consumers that irradiated fruits will not glow in the dark.

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The Psychology of Saving Energy

"Saving Energy: The Human Dimension" by Paul C. Stern, in *Technology Review* (Jan. 1984), Room 10-140, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

The federal government's efforts to encourage Americans to save energy in their homes have been a disappointment [see *WQ*, Autumn 1983, p. 30]. One reason, suggests Stern, a U.S. National Research Council analyst, is that Washington's emphasis on "market forces" neglects the "human factor."

High energy prices do spur people to conserve, he says, but not necessarily in logical fashion. Most consumers simply have inadequate information: They overestimate the electricity used by lights and TV sets, for example, and overlook big but "invisible" energy users such as hot water heaters.

But even providing information may not help matters, Stern notes. The source must be credible. In a 1978 experiment, Cornell researchers Samuel Craig and John McCann mailed out two batches of identical pamphlets containing energy-saving tips, one under the letterhead of the local electric utility company, the other under that of the New

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York Public Service Commission (PSC). The people who received the PSC version cut their electricity use by about seven percent; those who received the utility's version, not at all. A 1979 U.S. Department of Energy mailing to every household in New England achieved significant results by including a plastic showerhead flow restrictor with each pamphlet. Apparently, Stern says, the flow restrictors were like a "foot in the door." Once people used them, they were more receptive to other conservation measures.

Consumers also seem to be willing to conserve as long as they feel that they are not losing control over their surroundings. In 1975, for example, the U.S. Army installed gasoline regulators in some vehicles to prevent rapid acceleration and reduce fuel consumption. The experiment backfired when resentful drivers removed about 10 percent of the devices. But Princeton University researchers found that consumers would readily accept similar equipment if it were designed so that users could temporarily override the system.

In general, Stern believes, an energy policy that equates conservation with sacrifice and loss of freedom will not work (as President Carter discovered). In direct appeals, stressing efficiency and "energy independence" is a better formula. Depending only on high fuel and electricity prices to foster conservation at home is doomed to produce disappointing results.

Why Acid Rain Still Falls

"Can We Stop Acid Rain? And Who Should Pay the Bill?" by James Krohe, Jr., in *across the board* (Feb. 1984), The Conference Board, 845 Third Ave., New York, N.Y. 10022.

Acid rain has left hundreds of lakes throughout the American Northeast and parts of Canada devoid of fish life. It threatens many others with the same fate. Yet relief may be a long time coming. How acid rain is created is no mystery; *where* it is created is another question.

Coal combustion is the chief source of acid rain. Sulfur oxides released during burning are transformed in the atmosphere into sulfates and then into sulfuric acid, which falls in raindrops, explains Krohe, an *Illinois Times* editor. Every year, coal-fired factories and power plants spew 28 million tons of sulfur oxides into the atmosphere. In 1981, the National Academy of Sciences (NAS) estimated that a 50 percent reduction in the acidity of Northeastern rain would be needed to revive the region's ailing lakes, but could not say what reductions in sulfur oxide emissions would be needed to meet that goal.

Nor can it be established for certain *whose* sulfur oxide pollution should be curbed. Midwestern industry is the obvious culprit, especially since it is heavily reliant on the high-sulfur coal that is so plentiful in Illinois, Indiana, and Ohio. But a 1983 NAS study concluded that wind and weather patterns make it difficult to pin the blame for a lake's death on any pollution source more than 350 miles away.

Scientists' uncertainty has stiffened Midwesterners' resolve to fight