attempting to recycle much of this aluminum, but we could save even more by legally mandating reusable deposit bottles as has been done in some states. Of course, the most rational solution would be to convince people to abandon their peculiar habit and drink water from the tap. In the same vein people will have to learn to live closer to their place of work, make use of public transportation, travel shorter distances on vacations, live in smaller houses, with less window area and greater ratio of volume to surface area, and generally make due with less throwaway plastic junk. Physicists can set an example by moderating their strident demands for more and larger particle accelerators, by far the most-energy-intensive scientific instruments.

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Marc Ross makes some statements about combined heat and electric power generation that appear contrary to experience in this field. He states (on page 27 that "The heat provided by cogeneration cannot be transported far, so the best opportunities for cogeneration are largely at industrial sites rather than at central power stations." One of the most successful applications of cogeneration is district heating, which is widely practiced in many European countries. In district heating systems, heat from central combined heat and power stations is distributed over distances up to 20 miles in cities and suburbs. Intercity heat transmission up to 60 miles is under consideration in Sweden.

The statement would be correct if the author had said that *steam* cannot be transported very far economically, the practical limit being scarcely over one mile. Steam extraction systems are commonly used in industrial in-plant power generation, because steam for process is normally the primary product, and electricity the by-product. In district heating, the reverse is true: electricity is the primary product, and heat is the by-product. Both are produced and distributed, with great economy in money and energy, from central stations linked by electric transmission lines and heat transmission mains. In modern systems, the heat distribution medium is invariably hot water, not steam, and the heat is commonly produced from back-pressure turbines, not by steam extraction. The energy consumed in pumping power and line losses is small: only a few per cent.

Some older district heating systems (especially in the US) use steam as the heat distribution medium. These are mostly obsolescent systems, which suffer from poor economy, and employ little cogeneration.

The author states that "the main impediment to a resurgence of cogeneration is regulation." The everyday exploration of in-plant generation by industrial and engineering companies has shown over and over that unfavorable economics (such as, too long a payback period) stops projects from being developed, before any consideration is given to regulatory matters.

Lastly, the statement "Cogeneration . . .is being rediscovered" is surprising. Engineers have been designing in-plant generators and district heating systems for many years. The only thing new is the use of the vogue word "cogeneration." When physicists begin to learn about something that is common knowledge among engineers, does that constitute rediscovery?

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THE AUTHOR COMMENTS: As I wrote in "Efficient Use of Energy Revisited," I find it fascinating that technological change can make energy use much more efficient and cost effective and in so doing can completely alter energy-supply issues. Robert Yaes advocates instead, or in addition, lifestyle change. I also favor certain lifestyle changes, but saving energy is not the primary consideration in these changes. Thus deposit laws for beverage containers are good because they sharply reduce litter, as shown in my state of Michigan, while requiring very little effort. Public transit is good because it provides mobility for disadvantaged people, and it can lead in the longer run to improved urban design. In neither case is energy the primary issue.

Particle physics requires a lot of energy, as pointed out by Yaes. It is already being influenced by the increasing cost of electricity. Accelerators are being turned off at times of peak electricity use. Use of superconducting magnets is an important longer-term adjustment. As in other areas of energy use, the problem of high energy costs can be met by making the equipment, accelerators and detectors, much more efficient and by adapting operations to the new cost realities.

I find Richard Tourin's comments of interest. My remarks about combined production of heat and electricity were aimed at industrial process steam applications.

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Correction

May 1980, page 71—Jack Baldwin, the AAS Pierce Prize winner for 1980, received his PhD from the University of California, Santa Cruz. □