letters

New thoughts on energy

Laura Nader, in her Guest Comment ("Barriers to thinking new about energy," February, page 9) writes that, after noticing in her first energy conference that safety was not mentioned in connection with nuclear power, she was told that safety wasn't mentioned because "it's built into the design." As an anthropologist she found that statement interesting enough to write down.

As an anthropologist Nader is probably unaware that nuclear power is unique in the number and stringency of the environmental and safety regulations applied to it. My work, radiation protection and shielding, is to ensure that safety is indeed built into design. How would Nader react if analogous stringent regulations were applied to all energy production, including "soft paths" like windmills and wood burning? Did the California soft paths study, in which she participated, consider public safety when it decided that people could create their own wind and electrical systems? I'd be willing to bet that they didn't.

Consider the windmill. For each windmill there is a wind speed that will tear the blades away and send them flying through the nearby population like giant knives or saws. There is also a wind speed, or earthquake, that will topple the windmill structure and cripple or kill the people under it. Did Nader suggest that such accidents be considered in the design of windmills for individual home installation?

Consider the wood stove or the fireplace. Environmental pollution from these has caused Vail, Colorado, to limit new houses to one wood stove apiece and caused London to ban wood fires completely [Science, Vol. 211, p. 914 (27 Feb. 1981)]. Would Nader require regulation and monitoring of individual wood-burners, or would she prefer to throw the Clean Air Act up the chimney?

Nader wrote, "We must build technologies that recognize human frailty- ... people make mistakes ... Build that into the technology and accept or reject technologies on that basis." If she follows this precept with regard for environmental and human safety, and if she studies the facts, for example, Draft Environmental Impact Statement, N. Y. State Energy Master Plan (August 1979) and "Radiological Quality of the Environment in the United States, 1977," EPA 520/1-77-009, Sept. 1977, she may find reasons to examine her own "mind-set."

JAMES H. RAY
Irvington, New York
3/81

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The article by Laura Nader was very interesting and thought-provoking, especially with respect to the lack of response on solar energy. Solar energy is a low-density source and more cut out to be handled in a de-centralized manner, which is really not in a direction conductive to the career goals of those who control centralized power sources or centralized research.

I do not fear nuclear power, and feel that nuclear power should be part of the supply picture, if it is cost-effective. (I have a hard time accepting the sincerity of the vociferous anti-nuclear types who rant and rave about its dangers as they blow cigarette smoke in my face.)

Solar, wind power, earth homes, conservation and so on have, in my opinion, an even more important place in the energy equation. They promise a great reduction in energy cost to the consumer without reducing the standard of living. In fact, extensive use of alternative energy sources on a decentralized basis should increase our quality of life. Implementation of such systems is happening now for the simple reason that they happen to be cost-effective.

A simple passive solar system can heat half of the hot water needed in our area (northern Washington), and the payout is such that commercial companies are able to market various systems. Some commercial wind-generating systems are presently being offered which reportedly have a ten-year payout at the present cost of energy in the Northwest. (The simplest way to determine cost-effectiveness is for someone to build something and see if he can sell it at a profit. If he can, it is

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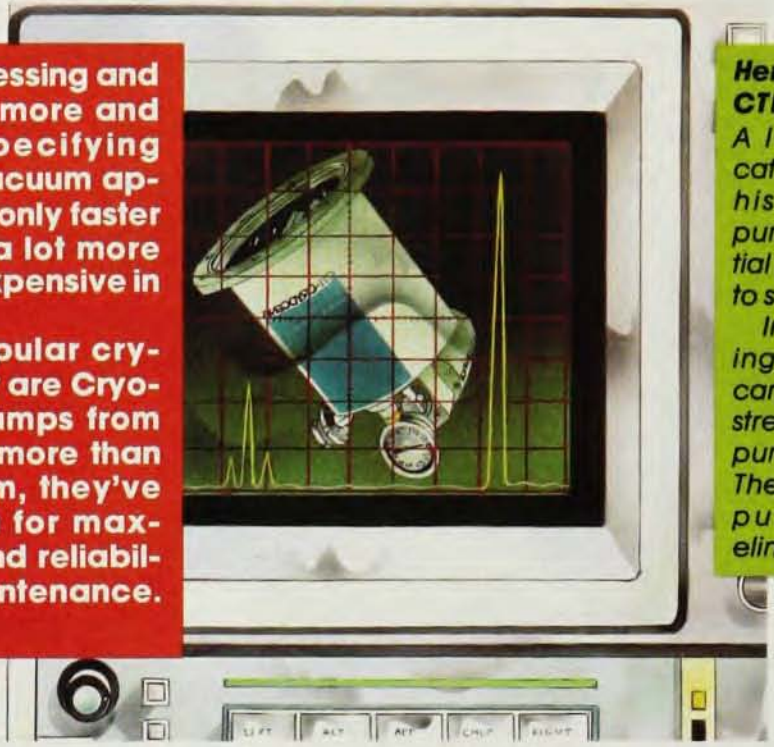

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cost-effective.)

We should hope that those with whom Nader worked on CONAES continue to ignore simple alternative energy systems because the last thing we need is a gold-plated, over-engineered, extremely costly government-designed system. It is interesting to note that while Department of Energy experts were stating that alcohol as a fuel was just too expensive, farmers were putting up their own stills and making fuel at a cost much less than that which the DOE had estimated.

I am on a subcommittee in Spokane County in which we are suggesting revisions in the county zoning ordinace which would encourage solar energy and allow variances in the zoning law to optimize solar access without a detrimental effect to the neighbors. This is happening throughout the country. While those at the top argue, those at the bottom build. Dr. Nader, I am very thankful that the CONAES and other such groups continue to ignore alternate sources of energy. We can then continue to enhance the use of those decentralized sources without the interference and orthodoxy of power centralizers.

ROBERT L. DUNNING
Spokane, Washington
3/81

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Laura Nader's article in the Guest Comment column in the February issue of PHYSICS TODAY illustrates clearly, albeit unintentionally, why our progress toward sensible national energy policies has been so slow. She scolds physicists and engineers for their lack of enthusiasm about solar energy and other "soft" energy technologies as a universal prescription for the solution of our energy problems. In discussing their recalcitrant attitudes, she refers to "the number of taboos" that seem to inhibit their thought.

The fact that physicists and engineers have no monopoly on these taboos surfaces later, when she laments that "the possibility of dropping nuclear power . . . wasn't discussed." It soon became apparent that the anthropologists have a well-defined set of taboos of their own, which shares no common ground with those assigned so generously to the physical scientists and technologists.

Nader complains later that physicists and engineers can't seem to "entertain obvious solutions." It's obvious to me that nuclear and solar technologies are both useful, and that each can contribute in different but important ways to our future energy needs. It's also obvious to me that though conservation is useful, adequate *production* of energy at reasonable cost will also be needed if the problems we now have are not to become much worse. Finally, it's obvious that continuing research in all the sciences is needed to provide for long-term energy needs. The trouble with this is, I guess, simply that it makes too much sense. Indeed, it is *too* obvious to warrant serious consideration among those who are wedded to trendy taboos rather than independent thought, rational judgment, and reasonable assessment of risks and costs versus benefits.

JOHN P. MCKELVEY
Clemson University
Clemson, South Carolina
3/81

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Quoting provocative statements without revealing who made them makes me "head for the shower before I would greet my children." Could you ask Laura Nader to identify the persons who made the statements she quoted.

ALFRED THELEN
Optical Coating Laboratory
Santa Rosa, California
3/81

THE AUTHOR COMMENTS: To date I have received 9 phone calls and 36 letters from your readers about my Guest Comment. The letters sent directly to me came from physicists, chemists, astronomers, geologists, engineers, urban planners, biologists, zoologists, and from three science and technology publications.

The responses to my commentary indicate that there are a good number of people who are concerned with thinking new, who are concerned with the use of scientific knowledge in improving the quality of life, and who are just plain curious about "homo scienticus." The authors of the letters printed above are concerned as well.

Robert Dunning is concerned that power centralizers might interfere with the development of energy technologies from the bottom, a perspective I share. John McKelvey comments on my scolding, lamenting, and complaining and misses the point which is that open debate on national energy policies have been censured by cultural and organizational factors built into what one of the letter writers called the natural habitat of "homo scienticus." James Ray, who as a specialist in radiation protection would not be expected to understand about cultural and organizational factors, is correct in expecting consistency on safety concerns, although his comparison of nuclear safety and wind safety is like talking of onions and oranges.

Finally, I remind Alfred Thelen that attribution of the remarks I quote, which could be forthcoming from myself or a number of other CONAES participants, would serve to personalize an issue which I argue is structurally and culturally determined—that is, it is

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LAURA NADER
University of California, Berkeley
Berkeley, California
4/81

Future of nuclear energy

In what was a most informative article, I would like to take exception to one sentence of Alvin Weinberg's "The future of nuclear energy" (March, page 48). Comparing environmental concerns to the fear of witches, Weinberg writes: "Perhaps most striking was the *hysterical fear* (my emphasis) exhibited by Middletowners when the Nuclear Regulatory Commission proposed to vent 60 000 curies of Kr 85 from Three Mile Island; the maximum beta skin dose per person would have been 11 millirem, the whole body gamma dose 0.2 millirem."

I object to the phrase "hysterical fear exhibited by Middletowners." As a Middletowner, I resent not having the sense that my willingness to participate responsibly is being met seriously by government and industry officials. When the venting of the Kr 85 was proposed there were several alternatives suggested. The one the utility opted for was not the method many of Middletown residents wanted. Once again, many of us felt the same kind of sensation following the March 28 accident. As Thomas Pigford wrote in *Nuclear News* (March 1981, page 41): "Serious fright and trauma resulted from technical errors and public announcements based on these errors a few days after the accident."

In short, one of the real hazards of the TMI accident is to replace decisions made by an informed electorate with *faits accomplis* handed down by technocratic fixers. If Weinberg wishes to label this as "hysteria," so be it.

The way GPU Nuclear deals with this "hysteria" is clear from their "Newsline" (March 1981). At the time of the TMI accident they had only one public information specialist at the plant. Now, they have a Communications Division at TMI staffed by 30 people. From this, I conclude that the way GPU Nuclear deals with residents' concerns is not to fix the damaged plant, but to fix public opinion. Is Weinberg's label designed to fix us in a like manner?

JACOB L. SUSSKIND
The Pennsylvania State University
Middletown, Pennsylvania
4/81

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I read with interest Weinberg's article. He references on two occasions, as a possible solution to presently perceived problems with nuclear energy, the introduction of a new type of "forgiving reactor." By chance is he referring to the HTGR?

HAROLD M. AGNEW
General Atomic Company
San Diego, California
4/81

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One point Weinberg makes is that many of the somatic and delayed effects, and most of the genetic effects of radiation, result from rather small exposures to very large numbers of people. He notes that in the BEIR Committee, Radford argued that the linear dose-response curve for gamma rays is not conservative, while Rossi argued that the linear response overestimates the efforts and that only a quadratic response is consistent. I think you ought to point out to your readers the recently published book by T. D. Luckey, *Hormesis with Ionizing Radiation* (CRC Press, Inc., 1980), in which he compiles data related to effects of low levels of radiation.

These data show that in low doses of radiation, instead of being harmful as the linear curve predicts or nearly benign as the quadratic curve predicts, low levels of exposure to ionizing radiation are really stimulating and beneficial to life. Luckey in his conclusions states, "The argument that low doses give harmful effects in proportion to the dosage is invalid." These conclusions, when accepted, should markedly change the attitude toward the safety of nuclear reactors.

ROBERT M. BRUGGER
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Columbia, Missouri
3/81

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Numerous authors have attempted to pursuade a reluctant public to accept nuclear power generation by demonstrating that the risks associated with fission reactors are of the same magnitude as many of civilization's commonly accepted accoutrements, such as automobiles, airplanes, cigarettes and hydroelectric dams. This procedure is known as "putting nuclear risks in perspective." Alvin Weinberg's lucid article on the future of nuclear energy is significant in that in it he recognizes that the proponents of nuclear power must address themselves not simply to the quantitative probabilities of harm, but to the more subtle aspects of risk *perception* if they are to find a "perspective" in which nuclear power can be seen as acceptable. His citation of Lundberg's observations on air transport are, in this regard, quite apt.

Unfortunately, Weinberg, like many before him, improperly laments the

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