Letters

More Power—More Pollution

Sporn's editorial (31 Oct., p. 555) was a welcome and timely call for the establishment of a national power policy. . . . I must disagree, however, with the value that he has placed on the use of energy by man: "no obstacles in the way of providing adequate energy" as the first priority, "compatibility between expanding use of energy and environmental health" as the second priority. Environmental health might, in fact, be an obstacle to the expanding use of energy. While man probably has the ingenuity to generate electric power without pollution of the air by sulfur dioxide or radionuclides, for example, this does not necessarily solve the environmental problem. In 1965, utility electricity accounted for only 21 percent of the total energy resources consumed in the United States (*1*). The remainder was consumed by the household, commercial, industrial, and transportation sectors, which in many cases contribute to pollution which is less readily controllable than that of power plants. On a global scale, the energy released artificially by man is now 1/2500 of the radiation balance of the earth's surface and is increasing at 4 percent per year (*2*). The environmental compatibility of power generation, therefore, is associated with the heat balance of the earth, as well as pollution of its air, water, and crust.

We must entertain the possibility that the environment cannot support the unlimited growth of power generation and energy release desired by man. The role of the scientific and technological community is to find the limits.

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References

1. W. E. Morrison and E. L. Reading, *An Energy Model for the United States* (Dept. of Interior Circular 8384, Washington, D.C., 1968).
2. G. J. F. MacDonald, *Tech. Rev.* **72**, 27 (1969).

On what assumptions is our estimate of "needed growth in the energy supply" based? No one is in favor of brownouts. . . . However, as one who seems to be placing "obstacles in the way of providing adequate energy," I must emphasize that, to me, the issue concerns *rates* of growth. When our local utility issues a statement that "during the past 30 years our peak electric load has doubled every 6 years and the prediction is that this steady growth will continue," I view its plans of expansion with the same alarm voiced by Abelson in his editorial "The inexorable exponential" (11 Oct. 1968, p. 221). I am concerned with the effects of direct pollution by power plants. However, far more serious are their secondary, only partly predictable, effects on industrial and population growth rate and thus on environment. What is needed is reasoned assessment of the options that are open and their consequences, to the extent that they can be foreseen, rather than veiled threats of a "catastrophic situation." For all we know our choice is between different catastrophes. This should not blind us to the existence of a choice.

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Although Sporn gives no details, one may presume that the impending "catastrophe" is much worse than continued air pollution, release of radioactive substances, thermal pollution, or further devastation of the landscape. I cannot agree that the public is too concerned about the environmental impact of industrial operations. On the contrary, we are just beginning to recognize the damage that industry can do.

The mischievous demands of the electric power industry are illustrated by Seattle City Light, which proposes to raise Ross Dam by 125 feet. This action would flood the cedar stands in Big Beaver valley, which are of special scientific and educational interest, and destroy a maze of beaver dams and ponds. It would also flood the eastern and Canadian entrance valleys to the newly created North Cascades National Park, drowning the major level campground site. The flood waters would also create a mile of mud and stumps along a state scenic highway and extend 9 miles into Canada, drowning Vancouver's best fly-fishing stream. In return for all of this, what are we offered? At a cost of nearly $45 million, City Light would obtain enough power to supply the increased peaking power needs of the next 28 months. After this, the demand will again exceed the supply and other sources of peaking power will be sought.

What is the solution? The immediate answer is that City Light can purchase the needed power from Bonneville Power Administration, but the ultimate answer is much deeper. In order to survive on this planet, with its fragile and finite resources, we must begin to question the sacred belief in unlimited consumption. If the demand for power continues to grow at an exponential rate, we shall some day stop worrying about ecology and start pondering the second law of thermodynamics.

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. . . Time has run out on the age-old idea that human progress means more people and more energy. This is the very crux of what has put the youth of the world in revolt against science and technology. Until the establishment recognizes that first priority must be given to rigid birth control, the total elimination of war, and preservation of what remains of our environment, no amount of "vigor and determination" will see us through our dilemma.

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. . . It is not "Man" of Sporn's title, but *men* and women and children who expand the use of energy; as the number of men, women and children expands unchecked, the problem eventually becomes totally insoluble by any technology. With how many Americans will we stop?

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. . . As far as power generation is concerned, most of the available hydroelectric potential in this country is already developed, with a concomitant severe reduction in anadromous fishes and wild habitat. Thus any significant increase in energy production must come from fossil fuel or nuclear power

plants. The burning of fossil fuel pollutes the atmosphere; even if the solids are removed from the smoke, gaseous pollutants escape. Nuclear and fossil fuel plants liberate tremendous amounts of heat, either via cooling water discharge or cooling towers. Air pollution control authorities are quite concerned about the long-term effects of heating the atmosphere with cooling towers. Thus all known economical forms of large-scale power generation pollute the environment in one form or another. . . . If the demand for energy exceeds the supply, then the supply must be rationed, either through the existing free enterprise price system, or by regulation if serious inequities arise. I believe that "cheap and plentiful" electrical energy is a luxury our environment can no longer tolerate. This of course implies a slowdown and eventual stoppage of expansion in some industrial and domestic power consumption. . . .

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Angel makes three points, the first two of which are essentially straw men he has set up. Thus, there is no basis for his presumption that I consider the impending catastrophe is worse than continued air pollution. Although he chides me for stating that the public is too concerned about the environmental impact of industrial operations, what I said was "this concern has solid basis, and in the long run can prove to be socially beneficial." Finally, he cites in condemnation of the whole power industry the proposal of his local utility—which represents one-half of 1 percent of the industry—to carry out the raising of a power dam of dubious validity. This discussion of his particular local peeve has little bearing on the broad subject of the editorial.

Although Berkowitz says I give first priority to creating no obstacles in the way of providing adequate energy, he neglects an earlier statement in which I said, "A major effort is called for to make possible continuing and expanding use of energy by man and to assure compatibility of this energy with a healthy environment." In my book this ranks the two in a parallel effort, with neither given precedence. His particular straw man raises the specter of unlimited growth of power generation and energy release desired by man. But why unlimited growth? I suggested a continuing and expanding use, but not necessarily at the present rate. Certainly with time, and this may not be so far off, saturation factors will make themselves felt in the demand for energy.

I thoroughly agree with Frank that "what is needed is reasoned assessment of the options that are open and their consequences, to the extent that they can be foreseen. . . ." As to veiled threats, I believe that if the opposition to expanding electric energy supply continues we are going to bring about a catastrophic situation because it will result in an energy shortage and a disruption of our industrial production and, in general, adverse consequences to an economy that is currently bedeviled by a galloping inflation, one of the cures for which is continued and expanding production. I disagree with his singling out the rate of growth of energy use as the cause for alarm. It seems to me that the issue is a double one. We need to be concerned from the pollution standpoint with the absolute amount of energy we produce and also with the rate of growth. Certainly as long as our population continues to increase, we need to expand our energy use so that the coming generations will at least have the same amount of energy per capita to build as good a living world for themselves as the current generations have. Regardless of what Frank's local utility may think, I do not believe we are headed toward an unlimited expansion of energy at the rate of doubling every 6 years. Such a rate continued for the next 60 years would result in increasing the amount of energy a thousand-fold, and well before it has reached 1 percent of that value there are certainly going to be introduced into the growth factors heavy saturation influences.

Finally, I do not agree that our choice is between different catastrophes. I believe we have a choice, but it is between permitting the development of a catastrophic situation and finding how to bring about full compatibility between man's requirements for expanding use of energy and its production and use in a healthy environment.

I am heartened by the communications of Emerson and Walter and their plea for population control. In a recent report of the Committee for Economic Development on a program of assistance to underdeveloped countries, I stated that "the overwhelmingly most important item is population con-

trol; without it all the potential effectiveness of an intelligent and generous aid program will be wiped out." I am not certain that population control is as immediately pressing in the United States as it is in the underdeveloped countries, but that we have to embrace population controls to solve the problems of exhausting resources, pollution, transportation, and general ecological balance I am firmly convinced.

I find the final part of Weston's statement very hard to take. Our problem is to expand supply to meet any demand in the interest of enhancing man's and society's welfare. This includes compatibility with a healthy environment. Weston's ex cathedra judgment that "cheap and plentiful" electrical energy is a luxury our environment can no longer tolerate is most certainly not based on facts heretofore disclosed and is far, far premature. I stand on the conclusion given in the final two sentences of my editorial: "Neither is there any need to doubt the feasibility of obtaining both increased energy for man and environmental protection. It may be difficult, but the two are, or can be made, compatible."

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Environmental Problems

Many believe that scientists concerned about the alarming and accelerating deterioration of our environment can do very little personally about these enormous problems. This viewpoint is dangerous because it leads to inaction and misleading because one cannot predict effectiveness. Biologists are especially qualified by training and knowledge to evaluate dangers to health and well-being. We have the right and responsibility to try to influence the public and government.

To provide effective channels for communication, I propose the establishment of a series of permanent commissions (composed of commissioners with 3- to 5-year appointments), each assigned to deal with one area of human ecology and public health—such as radiation hazards, new methods of contraception, the impact of chemical and biological warfare on public health, pollution, conservation of natural resources, novel sources of food, man-made changes in ecological patterns, toxic additives in food and drugs, and medical ethics. These commissions would publicize problems in their areas and develop positive innovative measures. Unlike the committees of the National Academy of Sciences, they would be autonomous and permanent and would have great independence and influence, even though their functions would be fact-finding and informational in nature. Selection of commissioners, experts in their fields, would be by their peers, perhaps by the various professional societies. Commissioners would be expected to devote considerable time to this activity, including public lecturing, contact with congressmen and other government officials, the press and television, with some research activity within the framework of the commission.

The importance of establishing permanent commissions should be stressed. Continuity would be improved if a permanent secretariat were provided to assist each commissioner. It is hoped that the modest costs could be borne by the participating professional societies, with perhaps an additional direct contribution from individual scientists.

Many of these problems do not stop at national boundaries. A plan for an international center for the environment to include 14 areas of concern is being considered by the International Council of Scientific Unions. It is very important that the United States participate fully in that program. The commissions clearly could provide a well-developed base from which to coordinate activities.

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Venus: A Joint U.S.–U.S.S.R. Exploration Program

In their comprehensive article, Hunten and Goody (26 Sept., p. 1317) make a strong case for a more ambitious program of exploring Venus. The study of the earth's "sister" planet holds great promise toward understanding the origin and evolution of the earth's atmosphere, and the two planets are similar in size and distance from the sun, but the question persists—why does the earth not have a hot, dense atmosphere as Venus does?

The exploration of Venus may have another very important tangible benefit to mankind. It could serve as the object of a cooperative planetary ex-