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COVER  Parallel dendritic drainage pattern. A reduced transparency of this drawing was analyzed on an optical diffraction analysis (ODA) system incorporating a standard petrographic microscope. Results were almost identical with those results obtained by using a conventional ODA system. See page 234.
Global Effects of Man's Production of Energy

Until recently consumption of energy was expanding rapidly. At the moment the increase is at a slower rate. However, there are great unsatisfied wants in many lands. When it becomes feasible to produce larger amounts of energy the former rate of increases might be resumed and even exceeded. Man now produces energy at the rate of 500 x 10^17 calories per year. This represents 1/20,000 of the total energy received by the earth from the sun, 1/5,000 of the total energy received by the earth's land mass. Man was increasing his production of energy by about 5 percent a year; within 200 years, at this rate, he would be producing as much energy as he receives from the sun. Obviously, long before that time man would have to come to terms with global, climatological limits imposed on his production of energy. Although it is difficult to estimate how soon we shall have to adjust the world's energy policies to take this limit into account, it might well be as little as 30 to 50 years.

Unfortunately, the science of climatology is unable to predict the ultimate consequences for the earth's climate of man's production of energy. At what rate of energy production would the ice caps melt? Will the carbon dioxide or dust thrown into the atmosphere by the burning of fossil fuel threaten the stability of the weather system? How does the geography of man's energy production affect weather in various parts of the world?

Some attempts to answer these and similar questions have been made, for example, by computer modeling at the National Center for Atmospheric Research. Not enough is known to place too much confidence in such studies; yet answers to these questions may eventually dominate long-term energy policy. In the absence of such answers, how can we formulate intelligent policy?

Two things should be done. First, climatologists should recognize the profound implications of this question and do the basic research in global modeling, in the dynamics of atmospheric circulation, and in increasing our general understanding of our global climate so that, say 20 years from now, we can base our energy policy on a much sounder understanding of this limit than we now possess.

But this is not enough. The problem of global effects of energy production, like so many long-range environmental problems, is everyone's problem, and therefore no one's problem. I propose, therefore, that an institute (or even institutes) of climatology be set up with a long-term commitment to establishing the global effect of man's production of energy. Such an institute should be assured long-term stability, since the question is a long-range one that simply will not go away. The institute would naturally serve to focus the efforts of smaller groups of climatologists, working on more general, basic aspects of climatology; but the institute itself would also contribute to our general understanding of the dynamics of the world's climate.

I would hope that as part of our newer appreciation of the necessity for truly long-range planning in energy, a strong, long-term effort along the lines I suggest will be launched.—Alvin M. Weinberg, Director, Energy Research and Development Office, Federal Energy Administration, Washington, D.C. 20461