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Bad Science and Good Policy Analysis

This space recently carried a compelling argument on the social penalties of bad science.* Bad science, it was argued, especially in the environment and health area, is leading to unwarranted public concerns, unjustified and costly regulatory action, and serious public misunderstanding. One way to combat the effects of bad science is to actively promote good science through traditional vehicles such as peer review and newer vehicles such as the science court. But another, equally important way to reduce the social penalties of bad science is through the promotion of good policy analysis.

Good science and good policy analysis are not the same thing and do not serve the same ends. Many traditional scientists find policy analysis alien. Good science has as its objective the discovery of physical truth. Opinions, preferences, and values play a limited role in the exercise of good science. Except as it contributes to the design of future experimental and theoretical research, good science does not engage in speculation. It waits for full understanding.

But with or without full understanding, society and its policy-makers make decisions. For example, fossil fuel–fired power plants release sulfur air pollution, which *may* produce sulfate aerosols, which *may* cause health damage. They release CO_2, which *may* contribute to higher atmospheric CO_2 concentrations, which *may* lead to planetary warming and other global climate change. These processes will probably not be fully understood for many years, but society will act today. It will decide whether it will continue to operate existing plants; whether it will build new plants and, if so, how many it will build; and what regulatory policies, if any, it will apply.

Good policy analysis recognizes that physical truth may be poorly or incompletely known. Its objective is to evaluate, order, and structure incomplete knowledge so as to allow decisions to be made with as complete an understanding as possible of the current state of knowledge, its limitations, and its implications. Like good science, good policy analysis does not draw hard conclusions unless they are warranted by unambiguous data or well-founded theoretical insight. Unlike good science, good policy analysis must deal with opinions, preferences, and values, but it does so in ways that are open and explicit and that allow different people, with different opinions and values, to use the same analysis as an aid in making their own decisions.

Regulatory actions can carry substantial social penalties, both in the form of direct costs and through the limitation and complication of private and public choices and actions. Hence, good policy analysis should not focus solely on factors such as health and environmental risks but should strive to assess the full social implications of alternative actions.

Examples of good policy analysis are much harder to find than examples of good science. There are too many problems and too few skilled and qualified practitioners. This is particularly true for many problems involving science and technology, where good policy analysis requires a thorough understanding of the technical issues involved and an ability to sort out good science from bad.

We must begin to pay more attention to the problem of training good policy analysts who are also good scientists and engineers. The handful of Ph.D. programs for training such people today must be strengthened, and others must be developed. Through research and peer-reviewed publication, improved methodologies and more generalizable analytical insights must be developed. Organizations that engage in applied research in technology and public policy must pay greater attention to institutionalizing quality control. And scientists who find policy analysis alien must strive to understand its value and importance, even if they cannot bring themselves to engage in its practice.—M. GRANGER MORGAN, *Head, Department of Engineering and Public Policy, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213*

*C. Comar, *Science*, 16 June 1978, page 1225.