Letters

Federal Research Funding: Open Competition

In his Perspective of 21 March (p. 1351), Frank Press advocates an open competition, including a broader peer review process, so that all agencies support the best basic research regardless of the performer or the origin of the resources—an idea I can heartily endorse.

The projects and research and development (R&D) at all the Department of Energy (DOE) laboratories are already extensively reviewed (sometimes several times per year). If the broad review Press suggests can replace (not add to) existing reviews, it would be most welcome by everyone because it could increase productivity and it might take less time.

The review that Press suggests might take the form of the extensive study that was performed by DOE in 1981 (*1*). This review of basic energy sciences covered 129 projects selected at random. Outside panelists (about four on each project) thoroughly reviewed the materials sciences, chemistry, mathematics, nuclear sciences, and so forth performed by a broad spectrum of investigators in universities, industry, and national laboratories. The study showed that DOE research ranked among the best done in the country. It also indicated that the work done at the national laboratories had a slight edge over work awarded to others. Such a review process, although expensive, might be a suitable model for Press's suggestion.

To ensure success of the technical missions like fusion, fossil energy, or conservation, the mission orientation has required that DOE and the national laboratories maintain some basic research with the applied research. To maintain those basic sciences at a high level, extensive reviews are undertaken periodically and competition among the laboratories, as well as with outside groups, ensures that the work is of high quality, as the assessment report found.

I welcome open competition. Not only is it healthy for everyone involved but, as Press suggests, the tighter economy may make it absolutely necessary. However, open competition also carries with it the necessity to be truly open and to remove existing constraints. When the R&D is appropriate to the laboratory and complementary to DOE's mission, truly open competition ought to have several consequences. It should mean that investigators at DOE laboratories have the right to compete for money from the National Science Foundation (heretofore the almost exclusive province of university research). It also would mean the end of the DOE university set-aside program. It would include lifting the restriction currently placed on DOE laboratories of limitations on the amount of work they can do for other agencies. Like universities and industries, the laboratories ought to be permitted to respond to Requests-for-Proposal (RFP's) or, at the very least, the laboratories could join with industries (on a nonexclusive basis) to compete for RFP's and thereby use all of the nation's R&D capabilities. If there is to be truly open competition, as is suggested by removal of all of these constraints, the science and technology of this country would certainly benefit and, as Press suggests, research productivity would increase through better and more effective resource allocation. I would work strongly to cause that to happen.

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1. Office of Program Analysis, *Assessment of the Basic Energy Sciences Program* (DOE/ER-0123, Department of Energy, Washington, DC, 1981); A. Zucker, testimony before the Science and Technology Committee, U.S. House of Representatives, 25 March 1982.

I found Press's recent Perspective to be unnecessarily pessimistic about the outlook for future budgets. The scientists and engineers of this nation have been told by politicians and leaders that they have to contribute to solving the nation's current and future financial crisis. I can't imagine what is more fundamental to increasing productivity and increasing international competitiveness than those activities in which scientists and engineers are engaged. So why should these activities decrease? The present complement of federally funded research programs needs to be better managed and built upon. We should not be suggesting the rearrangement of budget categories or the pitting of one segment of the community against another, since there is no basis for believing that will achieve the needed results.

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NAS Acid Rain Study

The National Academy of Sciences (NAS) study on acid rain (*1*) does not "dispel doubt," as stated in Majorie Sun's briefing (News & Comment, 28 Mar., p. 1500), but adds to the complexity of the subject. While the study suggests a causal connection between sulfur emissions and acidified lakes, the published data do not support any quantitative relation that would allow us to specify the consequence of further pollution control actions.

- With respect to SO_2 emissions, the NAS study reports increasing trends during the 1970's, while recent Environmental Protection Agency (EPA) data (*2*) show the opposite. For example, for the eastern United States the report shows an increase of over 20 percent, EPA a decrease of nearly 20 percent (*1*, p. 88). The explanation given is not helpful for reaching policy decisions: "These differences undoubtedly arise from the different assumptions employed in deriving the estimates" (*1*, p. 87).
- With respect to acid deposition, no trend data are shown, only a "snapshot" of acid precipitation for an unmarked year (probably 1980) (*1*, pp. 24–26). Interestingly, the report shows the center of gravity of maximum emissions to the *east* of that of acid precipitation, suggesting little if any transport from west to east (*1*, p. 23). In the absence of acid rain data, the study develops historical trends on atmospheric visibility, a phenomenon only partly related to the atmospheric concentration of sulfates. The title of the NAS study is therefore misleading.
- Using ingenious and original analyses, the study shows not only that "acidity changes among lakes in the same region may be different," but that they are often of opposite sign; for example, in Wisconsin most lakes have become less acid in the last 50 to 60 years. Clearly, something more than acid rain is involved in lake acidification.

The NAS report contains valuable scientific contributions and has the additional virtue of not making any policy recommendations. Implicitly, however, the conflicting data show an urgent need for further research to remove the uncertainties linking emissions, acid deposition, and ecological effects.

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2. G. Gschwandtner, K. C. Gschwandtner, K. Eldridge, *Historic Emissions of Sulfur and Nitrogen Oxides in the United States from 1900 to 1980*, vol. 1, *Results* (EPA-600/7-85-009a, Environmental Protection Agency, Washington, DC, 1985).

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