Office of Science
Notice 00-08

Integrated Assessment of Global Climate Change Research

Department of Energy
Office of Science

Office of Science Financial Assistance Program Notice 00-08: Integrated Assessment of Global Climate Change Research

Agency: U.S. Department of Energy

Action: Notice inviting research grant applications.

SUMMARY: The Office of Biological and Environmental Research (OBER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications for the Integrated Assessment of Global Climate Change Program. This notice is a follow on to five previous notices published in the Federal Register. The program funds research that contributes to integrated assessment of global climate change, including specialized topics to improve specific features. The research program supports the Department's Global Change Research Program, the U.S. Global Change Research Program, and the Administration's goals to understand, model, and assess the effects of increasing greenhouse gas levels in the atmosphere on climate and within that framework to evaluate the options to mitigate the long term rise in greenhouse gases.

DATES: Applicants are encouraged (but not required) to submit a brief preapplication for programmatic review. Early submission of preapplications is suggested to allow time for meaningful dialogue.

The deadline for receipt of formal applications is 4:30 p.m., E.D.T., April 24, 2000, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2000 and early Fiscal Year 2001.

ADDRESSES: Preapplications, referencing Program Notice 00-08, should be sent E-mail to john.houghton@science.doe.gov.

Formal applications, referencing Program Notice 00-08, should be sent to: U.S. Department of Energy, Office of Science, Grants and Contracts Division, SC-64, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Notice

00-08. This address must also be used when submitting applications by U.S. Postal Service Express Mail or any other commercial overnight delivery service, or when hand-carried by the applicant.

FOR FURTHER INFORMATION CONTACT: Dr. John Houghton, Environmental Sciences Division, SC-74, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, telephone: (301) 903-8288, E-mail: john.houghton@science.doe.gov, fax: (301) 903-8519. The full text of Program Notice 00-08 is available via the Internet using the following web site address: http://www.sc.doe.gov/production/grants/grants.html.

SUPPLEMENTARY INFORMATION: Integrated assessment of climate change is defined here as the analysis, including costs and benefits, of climate change from the cause, such as greenhouse gas emissions, through impacts, such as changed energy requirements for space conditioning due to temperature changes. Integrated assessment is sometimes, but not always, implemented as a computer model. A description of integrated assessment may be found in Chapter 10: "Integrated Assessment of Climate Change: An Overview and Comparison of Approaches and Results," in Climate Change 1995: Economic and Social Dimensions of Climate Change, edited by Bruce, James P.; Lee, Hoesung; and Haites, Erik F., Cambridge University Press, 1996.

The results of research in integrated assessment of global climate change help the U.S. Global Climate Change Research Program (USGCRP) in several ways. First, this program sponsors research that focuses on the connection of two or more different aspects of the entire analysis of global climate change. This research can lead to insights that would be otherwise unavailable if investigating a more narrowly focused aspect of climate change. Second, results from integrated assessments can be used to highlight high priority research topics for the rest of the USGCRP. A representation of the salient aspects of climate change, from emissions through impacts, is able to provide useful information regarding the degree to which underlying uncertainty in specific topics influence the results. And third, the models may be used outside this research program by the policy community to evaluate specific options. The research described in this notice provides a foundation so that others may analyze benefits and costs, not necessarily measured monetarily, in a policy context. This research will be judged in part on its potential to improve and/or support the analytical basis for policy development. Policy analysis will not be funded.

The program is narrowly focused and will concentrate support on the topics described below. Applications that involve development of analytical models and computer codes will be judged partly on the basis of proposed tasks to prepare documentation

and to make the models and codes available to other groups. The following is a list of topics that are high priority. Topics proposed by principal investigators that fall outside this list will need strong justification.

A. <u>Technology Innovation and Diffusion.</u> This category has been a primary focus of the Integrated Assessment of Global Climate Change Program since its inception. The research in this element is not a stand-alone activity. Its purpose is to fill critical gaps in current integrated assessment modeling.

Assumptions regarding technology innovation and diffusion are one of the most important uncertainties in integrated assessment models, especially for the prediction of greenhouse emissions over long time scales. Making good predictions and being consistent across different modules of the models are crucial to good modeling. The representation of backstop technologies; resource depletion; labor and capital productivity improvements; capital, labor and energy substitutability; and adaptation are all based on technology assumptions. Technology innovation and diffusion affects energy sector consumption and technology characteristics, carbon emissions, economic growth, and many other factors in integrated assessment.

Sometimes it is difficult to identify and separate the driving forces behind the prediction of future changes in activities, particularly greenhouse gas emissions. Information on these driving forces that direct change, such as GDP (gross domestic product), productivity, energy mix, and invention, innovation, and diffusion, are important for integrated assessment. Another way to view technology innovation and diffusion is through three aspects of learning that are relevant to integrated assessment. The first is "learning-by-doing" for manufacturing, or returns to adoption, which reduces the unit cost of manufacturing. The second is "learning-by-using" for consumers, which affects consumer hurdle rates by increasing consumers' willingness to adopt new technologies. The third is "learning through information", which affects consumer decisions through information programs.

The rate and nature of technology diffusion from the OECD (Organization for Economic Cooperation and Development) countries to developing countries is not well understood. Predicting economic structural change in those developing countries is also difficult. These issues are important for many reasons. The reasons include the impact on the rest of the world of the invention of new technologies by the OECD countries and the debate on "carbon leakage", the movement of emissions of greenhouse gases away from relatively regulated countries to relatively unregulated countries.

Other relevant questions include:

Can research and development accelerate the speed with which innovations that would mitigate climate change are moved to the manufacturing production line? What evidence is there of this and what are the relationships between R&D and adoption?

How do innovation and/or diffusion relate to measurable parameters such as public and private research and development investments or regulations?

B. Development of Metrics and Measures of Economic Costs of Climate Change Policies. There are at least five measures of macro-economic losses that are used to compare climate change policies. These include: (a) the area under a marginal cost curve plus payments for permits, (b) loss in consumption, (c) equivalent variations losses, (d) loss in potential GDP (gross domestic product), and (e) loss in real GDP. These measures are incomplete or flawed under certain limiting conditions. The purpose of this research would be to describe the pros and cons of these measures and to demonstrate the differences for actual case studies.

C. Develop Consistent International Data. Certain data sets are important to collect and distribute to the integrated assessment community so they can be used by several researchers. The focus of this research would be to fill in important integrated assessment data gaps. Past data collection programs funded by this program include improvement of energy sector and usage information, energy quantity flows, fossil fuel resource and reserve estimates, non- market energy sources in developing countries, and carbon dioxide emissions and land use changes by country.

D. Supply Curves for Non-Carbon Dioxide Greenhouse Gases. Carbon dioxide provides about two-thirds of the total atmospheric forcing potential of anthropogenic greenhouse gases. The remainder is supplied by such gases as methane, nitrous oxide, and the halocarbons. The emissions scenarios for the other greenhouse gases and particularly the cost of reducing those emissions are much more poorly understood than those for carbon dioxide. This research topic would provide information on global emissions of the other greenhouse gases under business-as- usual scenarios as well as under plausible alternative scenarios that might result from policy actions.

E. Representation of Anthropogenic Release or Sequestration of Carbon Dioxide Through Land Use Changes and Carbon Sequestration Technologies. Integrated Assessment models do not represent with desirable accuracy forecasts of carbon dioxide release or sequestration through anthropogenic activities such as land use changes and carbon sequestration. Research in this element is not a stand-alone activity. Proposed research will be judged on the use made by integrated assessment models of the results.

Research is ongoing that will improve our understanding and ability to develop innovative carbon sequestration technologies and procedures that will help reduce levels of carbon dioxide in the atmosphere. Such developments may rely on the continued use of fossil fuels with the sequestration of carbon in the terrestrial biosphere, in underground formations, and in the ocean. New modes of supplying and using substantial amounts of energy, such as hydrogen and fuel cells, may alter future energy and emission parameters substantially. Research in this topic would identify reasonable technology scenarios that will guide the prediction of such integrated assessment scenarios of energy, fossil fuel use, costs, and emissions, in response to various policy options. Research funded under this topic might also develop new information on global carbon dioxide emissions from various land use change and land use management scenarios, including forests and agricultural lands. The emphasis is on global scale estimates, perhaps regionally disaggregated. What potential is there for enhancing carbon dioxide uptake? What changes in the global carbon balance could be expected from policy options?

F. Representing Adaptation in Integrated Assessment Models. The emphasis in this research topic is to generate information that will improve the analysis of impacts on most or all of the sectors in an integrated assessment model by including autonomous adaptation in the analysis. Case studies of adaptation for particular sectors, such as agricultural, water resources, or unmanaged ecosystems, may be proposed, but a criterion will be the degree to which the case study can be generalized to other sectors. The focus of this topic is autonomous adaptation, that is, either adaptation that occurs naturally in, for example, unmanaged ecosystems, or adaptation taken by individuals in response to actual or perceived climate change. The focus is not on non-autonomous adaptation, that is, adaptation that is instigated by government agency. However, research on the effectiveness of possible government-sponsored adaptation may be necessary to understand individual adaptation alternatives.

Program Funding

It is anticipated that up to $1 million will be available for multiple awards to be made in Fiscal Year 2000 and early Fiscal Year 2001 in the categories described above, contingent on the availability of appropriated funds. Applications may request project support up to three years, with out-year support contingent on the availability of funds, progress of the research, and programmatic needs. Annual budgets are expected to range from $30,000 to $150,000 total costs. Funds for this research primarily will come from the Integrated Assessment Research program; some funds may come from the Carbon Management Science program.

Collaboration

Applicants are encouraged to collaborate with researchers in other institutions, such as: universities, industry, non-profit organizations, federal laboratories and Federally Funded Research and Development Centers (FFRDCs), including the DOE National Laboratories, where appropriate, and to include cost sharing and/or consortia wherever feasible. Additional information on collaboration is available in the Application Guide for the Office of Science Financial Assistance Program that is available via the Internet at: http://www.sc.doe.gov/production/grants/Colab.html.

Preapplications

A brief preapplication is strongly encouraged but not required prior to submission of a full application. The preapplication should identify on the cover sheet the institution, Principal Investigator name, address, telephone, fax and E-mail address, title of the project, and proposed collaborators. The preapplication should consist of a one to two page narrative describing the research project objectives and methods of accomplishment. These will be reviewed relative to the scope and research needs of the Integrated Assessment of Global Climate Change Research Program. Please note that notification of a successful preapplication is not an indication that an award will be made in response to the formal application.

Merit Review

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following evaluation criteria listed in descending order of importance as codified at 10 CFR 605.10(d):

1. Scientific and/or Technical Merit of the Project,
2. Appropriateness of the Proposed Method or Approach,
3. Competency of Applicant's Personnel and Adequacy of Proposed Resources,
4. Reasonableness and Appropriateness of the Proposed Budget.

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement and the agency's programmatic needs. Note, external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Non-federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

Information about the development and submission of applications, eligibility, limitations, evaluation, selection process, and other policies and procedures may be found in 10 CFR Part 605, and in the Application Guide for the Office of Science Financial Assistance Program. Electronic access to the Guide and required forms is

made available via the World Wide Web at: http://www.sc.doe.gov/production/grants/grants.html. DOE is under no obligation to pay for any costs associated with the preparation or submission of applications if an award is not made.

The research project description must be 15 pages or less, exclusive of attachments and must contain an abstract or summary of the proposed research. On the SC grant face page, form DOE F 4650.2, in block 15, also provide the PI's phone number, fax number and E-mail address. Attachments include curriculum vitae, a listing of all current and pending federal support, and letters of intent when collaborations are part of the proposed research. Curriculum vitae should be submitted in a form similar to that of NIH or NSF (two to three pages), see for example: http://www.nsf.gov:80/bfa/cpo/gpg/fkit.htm#forms-9.

Although the required original and seven copies of the application must be submitted, researchers are asked to submit an electronic version of their abstract of the proposed research in ASCII format and their E-mail address to Karen Carlson by E-mail at karen.carlson@science.doe.gov.

RELATED FUNDING OPPORTUNITIES: Investigators may wish to obtain information about the following related funding opportunities:

National Oceanic and Atmospheric Administration: Within the context of its Human Dimensions of Global Change Research Program, the Office of Global Programs of the National Oceanic and Atmospheric Administration will support research that identifies and analyzes how social and economic systems are currently influenced by fluctuations in climate, and how human behavior can be (or why it may not be) affected based on information about variability in the climate system. The program is particularly interested in learning how advanced climate information on seasonal to yearly time scales, as well as an improved understanding of current coping mechanisms, could be used for reducing vulnerability and providing for more efficient adjustment to these variations. Notice of this program is included in the Program Announcement for NOAA's Climate and Global Change Program, which is published each spring in the Federal Register. The deadline for proposals to be considered in Fiscal Year 2001 is expected to be in late summer 2000. For further information, contact: Caitlin Simpson; Office of Global Programs; National Oceanic and Atmospheric Administration; 1100 Wayne Ave., Suite 1225; Silver Spring, MD 20910; telephone: (301) 427-2089, ext. 152; Internet: simpson@ogp.noaa.gov.

The Catalog of Federal Domestic Assistance Number for this program is 81.049, and the solicitation control number is ERFAP 10 CFR Part 605.

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for Resource Management

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