

**Office of Science**  
**Notice DE-FG01-05ER05-13**

*Integrated Assessment  
of Climate Change Research*

**Department of Energy**

**Office of Science Financial Assistance Program Notice  
DE-FG01-05ER05-13; Integrated Assessment of Climate Change Research**

**AGENCY:** U.S. Department of Energy

**ACTION:** Notice inviting 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 interest in receiving applications for the Integrated Assessment of Climate Change Research Program. The program funds research that contributes to integrated assessment of climate change, and in particular, research to develop and improve methods and tools that focus on specialized topics of importance to integrated assessments. The research program supports the Administration's Climate Change Science Program goals to understand, model, and assess the effects of increasing greenhouse gas concentrations in the atmosphere. The program places special emphasis on developing methods to evaluate economic and other costs and benefits of climate change under "what if" scenarios that include policy interventions to mitigate greenhouse gas emissions.

**All applications submitted in response to this Notice must explicitly state how the proposed research will support accomplishment of the BER Climate Change Research Division's Long Term Measure of Scientific Advancement to deliver improved data and models to determine acceptable levels of greenhouse gases in the atmosphere.**

**DATES:** Applicants are encouraged (but not required) to submit a brief preapplication for programmatic review. There is no deadline for the preapplication, but early submission of preapplications is encouraged to allow time for meaningful discussions.

The deadline for receipt of formal applications is 8:00 p.m., Eastern Time, May 5, 2005, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2005 and early Fiscal Year 2006.

**ADDRESSES:** Preapplications, referencing Program Notice DE-FG01-04ER05-13, should be sent E-mail to [john.houghton@science.doe.gov](mailto:john.houghton@science.doe.gov).

**Formal applications**

For this Solicitation, the Office of Science is using [Grants.Gov](#) for the electronic submission of applications. The Funding Opportunity Number is: DE-FG01-05ER05-13 and the CFDA Number for the Office of Science is: 81.049. Instructions and forms are available on the [Grants.Gov](#) website. Please refer to the "Funding Opportunity Announcement", Part IV - Application and Submission Information; H. Other Submission and Registration Requirements for more specific guidance on "Where to Submit" and "Registration Requirements."

**FOR FURTHER INFORMATION CONTACT:** Dr. John Houghton, Climate Change Research Division, SC-74, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 1000 Independence Ave, SW, Washington, DC 20585-1290, telephone: (301) 903-8288, E-mail: john.houghton@science.doe.gov, fax: (301) 903-8519.

**SUPPLEMENTARY INFORMATION:** An integrated assessment of climate change is defined here as the analysis of the human (including economics), physical, and biological aspects of climate change from the cause, such as greenhouse gas emissions, through impacts, such as changes in unmanaged ecosystems, sea level rise, and altered growing conditions for crops. The primary emphasis in an integrated assessment is to represent all three aspects in such a way that the costs and benefits of climate change can be evaluated. Integrated assessments are commonly based on simulated scenarios using a computer model. Integrated assessment models are used to evaluate, for example, specific climate change policy options, including those for reducing greenhouse gas emissions.

A description of integrated assessment may be found in Volume 3, Chapter 10, of the report "Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: Climate Change 2001". The reference is: Ferenc Toth, et al., "Decision- Making Frameworks," Chapter 10 in Climate Change 2001: Mitigation, Cambridge University Press, 2001, (<http://www.ipcc.ch/pub/reports.htm>) [TAR].

The IA program funds fundamental research primarily oriented toward national-level decision making on climate change policy. One driving policy question is: "What are the potential implications of alternative energy policy options on greenhouse gas emissions and climate, including the costs and benefits of the policies and of the climate change that would result from the emissions?" The research addresses information needs critical to answering policy-related questions that arise from numerous sources, including a) climate change policy considerations within the federal government, b) proposals advanced by private and non-governmental organizations, c) preparation for international negotiations related to climate change, d) consideration of legislative proposals, and e) priority setting processes for science and technology programs. [see the Strategic Plan published by the US Government's Climate Change Science Program <http://www.climate-science.gov/Library/stratplan2003/final/default.htm>].

To advance understanding of future potential benefits and costs of alternative climate change policy options by the US government, many supporting questions need to be investigated. For example, in what ways would national-level policy actions, such as a price or quantity limit on greenhouse gas emissions, influence emission scenarios, including fuel switching, economic productivity, conservation, and innovation and diffusion of climate change technologies? What is the value of improved technologies for reducing greenhouse gas emissions as a solution? How

can possible future international policies and measures that are likely to be more complex than traditional targets and timetables, taxes, and trading systems, be analyzed? How well can other countries' incentives during multi-lateral climate policy discussions be predicted? In what ways can costs of Federal policy options reliably be measured, such as jobs or equity considerations? In addition to explicit consideration of climate change policy questions, climate change questions are implicit in a large number of connected policy topics, such as general R&D policy, the allocation of R&D funds across various mitigation technologies, tax policy, transportation policy, trade policy, foreign policy including economic aid policy, and environmental policies such as regional air quality.

Research funded under this program addresses several topics discussed in the CCSP Strategic Plan. Goal 3 of the Decision Support Objective is to: "Develop and evaluate methods (scenario evaluations, integrated analyses, alternative analytical approaches) to support climate change policymaking". Appropriate research topics include investigations into the evaluation of uncertainties and into analytic approaches for integrating scientific and technical information to compare the effects of alternative response options. Question 1 of the Objective for Research into Human Contributions is: "What are the magnitudes, interrelationships, and significance of primary human drivers of and their potential impact on global environmental change?" Illustrative research topics include the role of technological change in adaptation and in energy supply and demand as well as the impact of policy options on the international movement of goods and services.

The program will concentrate support on Topics A and B described below. Research projects in these elements are intended to fill critical gaps in current integrated assessments. Topics proposed by principal investigators that fall outside this list will require a preapplication and a justification to be considered for funding. Applications that involve development of analytical models and computer codes will be judged partly on the basis of whether they include proposed tasks to document and make the models and model codes available to the community.

The research funded as a result of this solicitation will be judged in part on its potential to develop and improve integrated assessment methods and models needed to support policy analysis and development. However, policy analysis and development itself will not be funded.

**A. Improve Methods for Constructing Emission Scenarios Used to Drive Integrated Assessment and Climate Models.** A scenario is a description of a potential future situation that serves as input to more detailed analysis or modeling. Scenarios are often tools to explore "If..., then..." statements and are not predictions of or prescriptions for the future [CCSP Strategic Plan, 2003]. Scenarios published by the IPCC (Special Report on Emission Scenarios (SRES) (<http://www.ipcc.ch/pub/reports.htm#sprep>) detail various possible directions for future economic, social, land use, and energy development and include projections of economic growth, population dynamics, and technology development that vary by region. Although the SRES report was developed by the international body over several years and made considerable progress over efforts that came before it, there have been shortcomings articulated by the climate change community, including the lack of probabilities or a central case, the lack of pessimistic growth alternatives, the use of population projections that are now out of date, the lack of sufficiently detailed results to promote downscaling, and the measurement of GDP.

The users of scenarios generally make use of projections of greenhouse gas emissions as well as other parameters that are consistent with those emission projections, such as economic growth and land use, by experts for further analysis. Integrated Assessment models require scenarios as input and are used to analyze the differences implied by alternative scenarios to test a variety of conditions, such as possible future policy choices. General circulation models (GCM) are run using greenhouse gas emissions as input. Experts studying possible future impacts of climate change use information from scenarios as well as outputs of the integrated assessment models; GCMs; and regional, sector-specific, and other information.

This notice solicits research to improve on the existing methodologies for developing emission scenarios. Research is sought that will improve some of the parameters such as energy consumption by fuel, carbon intensity, and labor productivity used as input for emission scenarios. Research focusing on input parameters for projecting emissions from energy sources and economics parameters is preferable to input parameters that are primarily non-economic, such as demography or land use changes. The parameters of high priority include those required for predicting economic productivity, for example, the possible convergence over time of the disparity of productivity levels between developed and developing countries. Research is also sought on ways to represent policy instruments, such as efficiency standards, subsidies, etc., that produce potential emission reductions with marginal costs that vary appreciably across applications. Research is sought that will provide guidance on how to improve measures of uncertainty in scenarios, such as methods to assign uncertainty to integrated assessment model input parameters, e.g. demographics and productivity, and measures of quantifying the ability of a relatively small number of individual scenarios to span adequately the "uncertainty space" inherent in the parameters.

Several research topics mentioned in the SRES special report [page 11, 12] are high priority for this solicitation. These include the need to assess future developments in the driving forces for emission of key greenhouse gases in greater regional and sectoral detail, and to focus on gridded emissions that would facilitate improved regional assessment. Another high priority topic is suggested in the IPCC TAR (7.3.2) to develop baseline scenarios against which to compare alternative emission scenarios, such as stabilization levels.

**B. Technology Innovation and Diffusion.** A primary focus of the Integrated Assessment of Climate Change Research Program is developing and improving methods and models for assessing innovation and diffusion of technologies that affect the emission of greenhouse gases. Assumptions regarding technology innovation and diffusion are some of the most important contributors to overall uncertainty in predicting future emissions of greenhouse gases from human activities.

One particular difficulty in modeling technological change is in representing the penetration of new technologies. Over the 21st century, the typical timeframe simulated by the integrated assessment models, technologies need to be invented, innovated upon, and diffused to the sectors in which they are used. Applications are sought that address issues identified in the CCSP strategic plan such as: 1) understanding the ability to influence technological change and technology transfer, 2) modeling investments in research and development as policy options, 3) placing value on competing or temporary resources, such as impermanent carbon storage or land

availability for biomass, and 4) connecting the movement of goods and services across country boundaries with climate change policies. Other issues with high priority for this solicitation are identified in the IPCC Third Assessment Report on Mitigation [TAR, referenced above], including (2.6) the impacts of timing and burden sharing on mitigation costs, (3.9 and 5.6) the influence of barriers that prevent the adoption of major mitigation technologies, and (8.4.5) the role of endogenous technology change, such as induced technical change and learning-by-doing,

The rate and nature of technology diffusion from the more-developed nations to developing nations is particularly important and not well understood. Applications are sought to help a) understand how historical precedents can be used to understand the future movement of technologies across national borders, b) predict economic structural changes that influence technology diffusion in developing nations, and c) project technology changes in non-market economies.

In general, research that proposes to investigate these issues with empirical data will be preferred to the development of models that are data poor but promise insights through the modeling structure.

### **Program Funding**

It is anticipated that up to \$2,000,000 will be available for multiple awards to be made in Fiscal Year 2005 and early Fiscal Year 2006, in the categories described above, contingent on the availability of appropriated funds. Additional funds will be made available for a similar program announcement to the DOE National Laboratories. Applications may request project support up to two years, with out-year support contingent on the availability of funds, progress of the research and programmatic needs. Annual budgets for project applications are expected to range from \$50,000 to \$175,000 total costs. Funds for this research will come from the Integrated Assessment Research Program. DOE is under no obligation to pay for any costs associated with preparation or submission of applications.

### **Preapplications**

A preapplication is strongly encouraged (but not required) prior to submission of a full application. The preapplication should list the Principal Investigator's name, institution, address, telephone number, 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. A response to each preapplication, discussing the potential program relevance of a formal application, generally will be communicated within 15 days of receipt. There is no deadline for the submission of preapplications, but applicants should allow sufficient time to meet the application deadline. 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 formal merit review (peer review) and will be evaluated against the following evaluation criteria which are listed in descending order of importance 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 process 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. Both federal and non-federal reviewers will often be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

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

Martin Rubinstein  
Grants and Contracts Division  
Office of Science

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