

Office of Science
Notice DE-FG01-05ER05-10

***Poplar Genome Based Research
for Carbon Sequestration in Terrestrial Ecosystems***

Department of Energy

Office of Science Financial Assistance Program Notice DE-FG01-05ER05-10: Poplar Genome Based Research for Carbon Sequestration in Terrestrial Ecosystems

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 its interest in receiving applications for the Poplar Genome Based Research for Carbon Sequestration in Terrestrial Ecosystems program. Research is requested that could lead to strategies to improve the use of trees within the genus *Populus* (poplar), or other trees, for long-term sequestration of meaningful amounts of atmospheric carbon in terrestrial ecosystems. Specifically, applications are sought for research to use the poplar and/or microbial genomic sequences to enhance partitioning of carbon into quantitatively important recalcitrant components of trees or soil organic matter that could lead to enhanced carbon sequestration. Research should build on the recently completed genomic sequence of a female black cottonwood tree (*Populus balsamifera* L. ssp. *trichocarpa* (Torr. & Gray ex Hook.) Brayshaw, clone Nisqually-1) and, when relevant, the availability of a growing number of microbial genomic sequences to obtain the scientific understanding needed to select, breed, or manage trees to meaningfully enhance sequestration of carbon in tree biomass and/or the soil.

DATES: Applicants are encouraged (but not required) to submit a brief preapplication for programmatic review. Preapplications should be submitted by January 18, 2005, to allow time for meaningful dialogue.

The deadline for receipt of formal applications is 4:30 p.m., Eastern Time, March 8, 2005 to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2005.

ADDRESSES: Preapplications, referencing Program Notice DE-FG01-05ER05-10, should be sent by e-mail to: jeff.amthor@science.doe.gov. Use "Program Notice DE-FG01-05ER05-10" as the subject of the email.

Formal applications referencing Program Notice DE-FG01-05ER05-10, must be sent electronically by an authorized institutional business official through DOE's Industry Interactive Procurement System (IIPS) at: <http://e-center.doe.gov> (see also

<http://www.science.doe.gov/grants/>). IIPS provides for the posting of solicitations and receipt of applications in a paperless environment via the Internet. In order to submit applications through IIPS your business official will need to register at the IIPS website. **Although IIPS offers the option of using multiple files, all applications submitted in response to this Program Notice should be contained completely within a single PDF file.**

Questions regarding the operation of IIPS may be e-mailed to the IIPS help desk at: HelpDesk@pr.doe.gov or you may call the help desk at (800) 683-0751. Further information on the use of IIPS by the Office of Science is available at: <http://www.science.doe.gov/grants/IIPS-Instructions.html>.

If you are unable to submit an application through IIPS, please contact the Grants and Contracts Division, Office of Science at: (301) 903-5212 or (301) 903-3064, in order to gain assistance for submission through IIPS or to receive special approval and instructions on how to submit printed applications.

FOR FURTHER INFORMATION CONTACT: Dr. Jeff Amthor, Life Sciences Research Division, SC-72/Germantown Building, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 1000 Independence Ave., SW, Washington, D.C. 20585-1290, telephone: (301) 903-2507, E-mail: jeff.amthor@science.doe.gov, fax: (301) 903-8519. The full text of Program Notice DE-FG01-05ER05-10 is available via the Internet using the following web site address: <http://www.science.doe.gov/grants>.

SUPPLEMENTARY INFORMATION: The DOE Joint Genome Institute recently sequenced, eight times over for high quality, the nuclear genome of a female clone (Nisqually-1) of black cottonwood. This was the first, and presently only, woody plant whose nuclear genome has been sequenced. An annotation jamboree will take place December 6-10, 2004.

Populus (poplar) has advantages both as a model organism and as a potential crop for carbon sequestration. Poplar is easily mutated, has facile transgenesis, and is easily cloned. Its physiology is relatively well characterized and it has a relatively small, compact nuclear genome of approximately 480 Mbases (four times larger than *Arabidopsis thaliana* but less than 1% the size of red pine). In addition to the recently obtained full sequence of the nuclear genome of the black cottonwood clone, much is known about the genomes of poplars in general, and genetic tools exist for poplar research, including genetic linkage maps, BAC (bacterial artificial chromosome) libraries, EST (expressed sequence tags) libraries, and QTLs (quantitative trait loci) for mapping of physiological traits in poplar. Poplar is also highly productive in many environments, and has a wide ecological range or distribution (e.g., one or more poplar species is native to each state except Hawaii, and eastern cottonwood, *P. deltoides*, is native to 43 states). Moreover, poplar produces products and services of considerable value to humans and many ecological ecosystems in addition to carbon storage.

Research based on the recently sequenced black cottonwood genome might be used to improve tree breeding and forest management practices that would enable significant quantities of carbon to be sequestered in poplar and other trees. In addition, a significant fraction of the carbon associated with a stand of trees is in soil organic matter pools, rather than in aboveground

biomass or living roots. The poplar genome sequence information might be used to develop ways to enhance both the production and translocation of organic compounds from leaves and shoots to roots and soil where it might lead to long-term storage of carbon in soil.

Request for Applications

This notice solicits research that will build on the recent sequencing of the black cottonwood nuclear genome to investigate ways in which long-term, purposeful carbon sequestration in tree biomass and soil organic matter might be improved. Two general factors could be considered: (1) increased net primary production of tree stands (i.e., increased tree growth) and/or (2) increased partitioning of assimilated carbon into recalcitrant components of tree biomass and/or soil organic matter that are of quantitative importance to the carbon balance of a forest. Where soils are included in a project, it might be useful to consider the genomic sequences of important soil organisms associated with poplar or related trees. Microbially based projects should be well related to, and integrated with, the tree component of a forest ecosystem. Lists of microbes that have had, or are having, their genomes sequenced by DOE are at <http://www.jgi.doe.gov/sequencing/DOEMicrobes.html> and <http://microbialgenome.org/organisms.shtml>.

Projects that involve field demonstrations, such as field tests of carbon sequestration by different poplar clones or demonstrations of effects of different management practices on stand carbon balance, will not be considered for funding. Field deployment of any transgenic materials will not be considered for support. Projects that focus on fundamental steps of light harvesting by photosynthesis or early metabolic steps in carbon assimilation will not be considered. The focus instead should be on opportunities to use the poplar and/or microbial genomic sequences to enhance partitioning of carbon into quantitatively important recalcitrant components of trees or soil organic matter that could lead to meaningfully enhanced carbon sequestration.

Program Funding

It is anticipated that up to \$2,000,000 will be available for multiple awards to be made in Fiscal Year 2005, contingent on the availability of appropriated funds. Applications may request project support for 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 \$100,000 to \$500,000 total costs, unless there is prior approval from the Program Manager.

Preapplications

A brief (one-page) preapplication is strongly encouraged (but not required) prior to submission of a full application. The preapplication should identify the institution; the Principal Investigator's name, telephone number, and e-mail address; the title of the proposed project; and names and institutions of any proposed collaborators. The preapplication should include a narrative describing the research project objectives and methods of accomplishment. These will be reviewed relative to the scope and research needs of the Poplar Genome Based Research for Carbon Sequestration in Terrestrial Ecosystems 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 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 Merit of the Project;
2. Appropriateness of the Proposed Method or Approach;
3. Competency of the Applicant's Personnel and Adequacy of Proposed Resources; and
4. Reasonableness and Appropriateness of the Proposed Budget.

The evaluation process will include program policy factors such as relevance of the proposed research to the terms of the announcement and DOE's programmatic needs. Note that external peer reviewers are selected with regard to both scientific expertise and absence of conflict-of-interest issues. Both federal and 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.

Submission Information

Information about the development, submission of applications, eligibility, limitations, evaluation, the 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 SC's Financial Assistance Application Guide is possible via the World Wide Web at: <http://www.science.doe.gov/grants>. DOE is under no obligation to pay for any costs associated with the preparation or submission of applications if an award is not made.

In addition, for this Notice, applications must conform to the following two requirements: the height of the letters must be at least 10 point and the margins must be at least one inch on all sides. Figures, charts, tables, figure legends, etc., may contain smaller type as long as it is legible.

The application should be arranged in the following order:

- Application Cover Page (DOE Form 4650.2)
- Budget (DOE Form 4620.1) and Budget Explanation
- Abstract (one page)
- Narrative (main technical portion of the application, including background/introduction, proposed research and methods, timetable of activities, and responsibilities of key project personnel).
- Literature Cited
- Biographical Sketch(es)
- Description of Facilities and Resources
- Other Support of Investigator(s)

- Appendix (optional)
- Assurance of Compliance (DOE Form 1600.5)
- Certifications Regarding Lobbying; Debarment, Suspension and Other Responsibility Matters; and Drug-Free Workplace Requirements. Submit "Disclosure of Lobbying Activities," Standard Form-LLL, with the application only if payment or agreement to make payment has been made to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal action.
- Simpson-Craig Amendment Representation [Only 501(c)(4) Non-Profit Organizations]
- Energy Policy Act (EPA) Representation [Only companies]

Abstract (on a page by itself)

Provide an abstract of less than 400 words. Give the project objectives (in broad scientific terms), the approach to be used, and what the research is intended to accomplish. State the hypotheses to be tested (if any). At the top of the abstract give the project title, names of all the investigators and their institutions, and contact information for the principal investigator, including e-mail address.

Narrative

The narrative comprises the research plan for the project and is limited to **20 pages (maximum)**. It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities.

If any portion of the project is to be done in collaboration with another institution (or institutions), provide information on the institution(s) and what part of the project it will carry out. Further information on any such arrangements is to be given in the sections "Budget and Budget Explanation", "Biographical Sketches", and "Description of Facilities and Resources".

Literature Cited

Give full bibliographic entries for each publication cited in the narrative.

Biographical Sketches

This information is required for senior personnel at the institution submitting the application and at all subcontracting institutions (if any). The biographical sketch is limited to a maximum of **two pages** for each investigator.

To assist in the identification of potential conflicts of interest or bias in the selection of reviewers, the following information **must be provided in each biographical sketch**.

Collaborators and Co-editors: A list of all persons in alphabetical order (including their current organizational affiliations) who are currently, or who have been, collaborators or co-authors with the investigator on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of the application. Also include those individuals who are currently or have been co-editors of a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of the application. If there are no collaborators or co-editors to report, this should be so indicated.

Graduate and Postdoctoral Advisors and Advisees: A list of the names of the individual's own graduate advisor(s) and principal postdoctoral sponsor(s), and their current organizational affiliations. A list of the names of the individual's graduate students and postdoctoral associates during the past 5 years, and their current organizational affiliations.

Description of Facilities and Resources

Facilities to be used for the conduct of the proposed research should be briefly described. Indicate the pertinent capabilities of the institution, including support facilities (such as machine shops), that will be used during the project. List the most important equipment items already available for the project and their pertinent capabilities. Include this information for each subcontracting institution (if any).

Other Support of Investigators

Other support is defined as all financial resources, whether Federal, non-Federal, commercial, or institutional, available in direct support of an individual's research endeavors. Information on active and pending other support is required for all senior personnel, including investigators at collaborating institutions to be funded by a subcontract. For each item of other support, give the organization or agency, inclusive dates of the project or proposed project, annual funding, and level of effort (months per year or percentage of the year) devoted to the project.

Appendix (optional)

Information not easily accessible to a reviewer may be included in an appendix, but **do not use the appendix to circumvent the page limitations of the application**. Reviewers are not required to consider information in an appendix, and reviewers may not have time to read extensive appendix materials with the same care they would use with the application proper.

The appendix may contain the following items: up to five publications, manuscripts accepted for publication, abstracts, patents, or other printed materials directly relevant to this project, but not generally available to the scientific community; and letters from investigators at other institutions

stating their agreement to participate in the project (do not include letters of endorsement of the project).

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

Posted on the Office of Science Grants and Contracts Web Site
December 2, 2004.