

# Activities Related to “Science and Engineering for a Biobased Industry and Economy”

*November 6, 2003*

*National Science Foundation (NSF)*

**Bruce Hamilton**

Division Director, Bioengineering and Environmental Systems

Science and Engineering for a Biobased Industry and Economy

# Introductions: NSF Program Officers

- **Bioengineering and Environmental Systems Division (BES)**
  - Bruce Hamilton
  - Bill Weigand (UMCP)
- **Chemical and Transport Systems Division (CTS)**
  - Maria Burka
  - Tom Chapman
  - Dick Smith (on loan from RPI)
  - Bob Wellek

# Overview

- **NSF Mission: Advance the frontiers of science and engineering through support of research and education**
- **Major NSF research grant areas related to Agricultural and Biological Engineering:**
  - Biomass Engineering and Biotechnology
  - Metabolic Engineering (Interagency)
  - Technology for a Sustainable Environment (with EPA)
  - Integrative Plant Biology
  - Plant Genome Research
  - Project 2010 (*Arabidopsis* functional genomics)
  - Sensors and Sensor Networks
  - CAREER Grants

# Directorates/Divisions/Programs supporting related activities

## Engineering Directorate (ENG):

- **Bioengineering and Environmental Systems Division (BES):**  
Example- Biomass Engineering and Biotechnology Programs
- **Chemical and Transport Systems Division (CTS)**  
Example- Technology for a Sustainable Environment (with EPA)
- **SBIR/STTR**

## Biological Sciences Directorate (BIO):

- **Integrative Biology & Neuroscience Division (IBN):** Example-  
Integrative Plant Biology Program
- **Biological Infrastructure Division (DBI):** Example - Plant  
Genome Research Program

## Other Directorates (e.g., MPS, CISE)

# Biochemical and Biomass Engineering and Biotechnology

**Summary** - Addresses problems involved in economic processing and manufacturing of products by effectively using renewable resources.

Example grant: “Metabolic Engineering, Optimization and Control of Ethanol Production in *Escherichia coli*” (Ramkrishna, Purdue).

**Funding** – Approximately \$15 million per year for all subjects.

**Program Contact** – Fred Heineken, 703-292-8320

# Metabolic Engineering

- Explicitly cited as an area for research support in the Biomass Research and Development Act of 2000
- Sec. 307. Biomass Research and Development Initiative:
  - (d) Uses of Grants, Contracts, and Assistance
    - (2) research on technologies
      - (A) *metabolic engineering* of biological systems...to produce novel products, especially commodity products, or to increase product selectivity and tolerance, with a research priority for the development of biobased industrial products that can compete in cost and performance with fossil-based products

# Interagency Announcement of Opportunities in Metabolic Engineering

FY 2003

## Program Solicitation

NSF 03-516

*Replaces Document nsf02037*



### **National Science Foundation**

Directorate for Engineering

Division of Bioengineering and Environmental Systems

Directorate for Biological Sciences

Division of Molecular and Cellular Biosciences

Division of Integrative Biology and Neuroscience

Science and Engineering for a Biobased Industry and Economy

# Technology for a Sustainable Environment (TSE, with EPA)

**Summary** - Funds fundamental and applied research in the physical and biological sciences and engineering that will lead to environmentally-benign methods for industrial processing/manufacturing.

Example grant: “Biological hydrogen production as a sustainable green technology for pollution prevention” (Logan, PA State U).

**Funding** – Approximately \$6 million per year at NSF for all subjects.

**Program Contact** – Bob Wellek (CTS), 703-292-8370  
– Tom Waite (BES), 703-292-7499

# 2003 Environmental Technologies and Systems

## NSF/EPA PARTNERSHIP FOR ENVIRONMENTAL RESEARCH

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### Program Solicitation

NSF 03-510

*Replaces Document NSF 01-76*



**National Science Foundation**

Directorate for Engineering

Directorate for Mathematical and Physical Sciences



**Environmental Protection Agency**

**Full Proposal Deadline(s)** (due by 5 p.m proposer's local time):

February 25, 2003

**Technology for a Sustainable Environment (TSE)**

March 04, 2003

**New Technologies for the Environment (NTE)**

**Science and Engineering for a Biobased Industry and Economy**

# Materials Use: Science, Engineering, and Society (MUSES)

**Summary** - Funds research on understanding the supply, treatment, use, and reuse of resources provided by natural systems as well as the environmental effects of introducing alternative materials or new processes.

Example grant: “Developing Methods of Defining Sustainable Uses for Agricultural Products ” (Anex, U. of Oklahoma).

**Funding** – Approximately \$5 million per year for all subjects.

**Program Contact** – Delcie Durham, 703-292-8320

*An international workshop on*

# **Assessing the Sustainability of Bio-based Products**



**Thursday – Friday, 26-27 June 2003  
University of Oklahoma  
Norman, Oklahoma**

**Supported by:**



The National Science Foundation

**Organized by:**



The University of Oklahoma

**Coordinated by National Conference Logistics Center  
The University of Oklahoma  
College of Continuing Education**

**Science and Engineering for a Biobased Industry and Economy**

# Plant Genome Research Program

**Summary** - Supports research on plant genomics and on accelerating the acquisition and utilization of new knowledge and innovative approaches to the analysis of fundamental biological processes in plants. Focuses on plants of economic importance and plant processes of potential economic value.

Example award: “Consortium for Maize Genomics” (Schubert, Danforth Plant Science Center).

**Funding** – Approximately \$13 million per year.

**Program Contact** – Jane Silverthorne, 703-292-8470

# Microbial Genome Sequencing Program FY 2004

## Program Solicitation

NSF 03-603

*Replaces Document NSF 03-526*



**National Science Foundation**  
Directorate for Biological Sciences  
Division of Molecular and Cellular Biosciences

**U.S. Dept. of Agriculture**

### **Letter of Intent Due Date(s) (*optional*):**

October 15, 2003

### **Full Proposal Deadlines(s) (due by 5 p.m. proposers local time)**

December 15, 2003

# 2010 Project (Arabidopsis Functional Genomics)

**Summary** - Objective is to determine the function of all genes in the model plant *Arabidopsis thaliana* by the year 2010. Using this model plant, researchers can map out metabolic pathways that can improve plant growth in economically important crop species.

Example award: “Coordination of Multinational *Arabidopsis* Functional Genomics Research” (Sussman, U. of Wisc.-Madison).

**Funding** – Approximately \$11 million per year.

**Program Contact** – Machi Dilworth, 703-292-8470

# Integrative Plant Biology

**Summary** - Supports research on plants as functional units, integrating molecular, biochemical, and biophysical approaches to the understanding of plant form and function. Examples include work on cell wall structure and chemical transport.

Example grant: “ Role of Amino Acid Transporters in Seed Development” (Tegeeder – Washington State U.).

**Funding** – Approximately \$0.3 million per year for research on cell wall structure and chemical transport.

**Program Contact** – Bill Winner, 703-292-8421

# SBIR/STTR Biotechnology Programs

**Summary** - Supports biotechnology research at small businesses. Subtopics include agricultural and food biotechnology and biomass processing.

Example grant: “Engineering Broad Spectrum Disease Resistance in Crop Plants” (Heard, Mendel Biotech Inc.)

**Funding** – Approximately \$20 million per year for all SBIR/STTR biotechnology subtopics.

**Program Contact** – Om Sahai, 703-292-7795

# Sensor and Sensor Networks Solicitation

**Scope** - Open to all areas, including Agricultural and Biological Engineering.

**Funding** - About \$35 million in FY 2004.

**Deadline** - To be announced (probably will be Feb. 2004)

**Program Contact** - Leon Esterowitz, 703-292-7942

# Annual CAREER Grant Competition

**Scope** - Supports early career development (research and education components) of new Assistant Professors.

**Grant Amount** – Typically \$400,000 total over 5 years

Example - FY 2002 CAREER Awardee:

Jennifer Becker

Assistant Professor

Biological Resources Engineering Department

University of Maryland College Park

**Program Contact** - Cindy Ekstein (BES), 703-292-7941

# [www.nsf.gov](http://www.nsf.gov)

**Is the URL for information on:**

- **program descriptions**
- **program announcements**
- **Solicitations**
- **grant summaries**
- **Contact information**