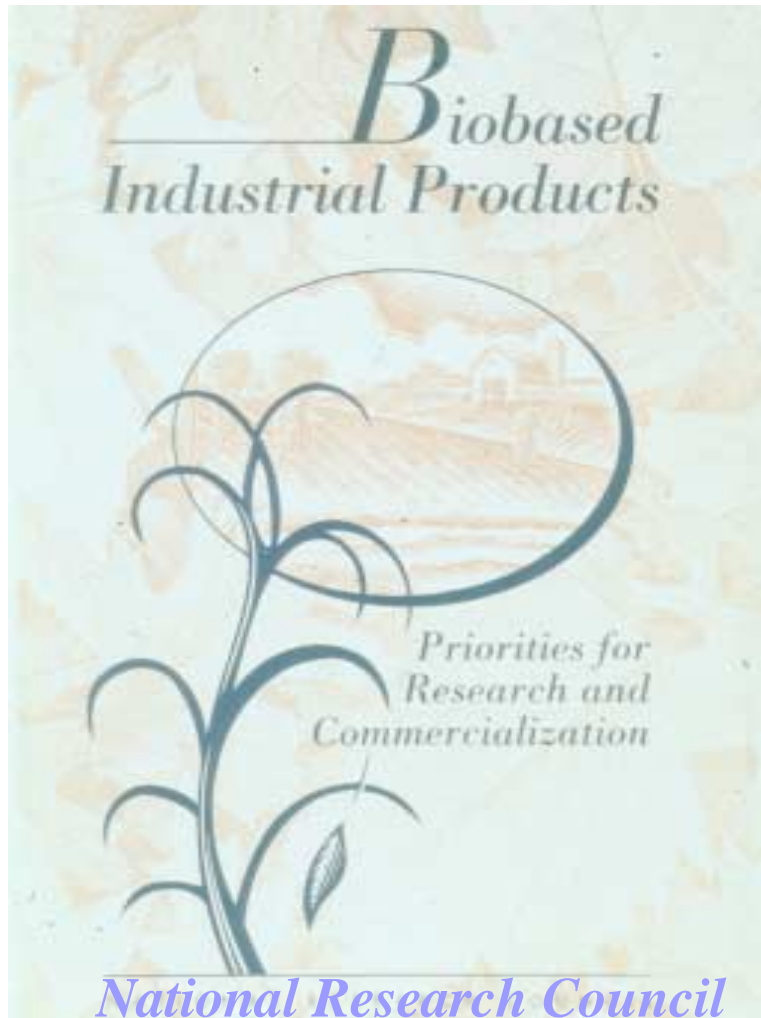


# Objective 5: Education/Training

- Overview of Presentation
  - Educational bottlenecks
  - Novel approach
    - National Resource Center for Biomass Education
  - Expertise in Education Team
  - Status of Education Team activities
  - S1007 Website

# Bottleneck: Lack of Trained Personnel



“Process engineers need to be better trained in the biological sciences, and biologists need to be trained in process engineering, so that the biologists and engineers can work together effectively to establish the technical infrastructure for developing, manufacturing, and using biobased products.”

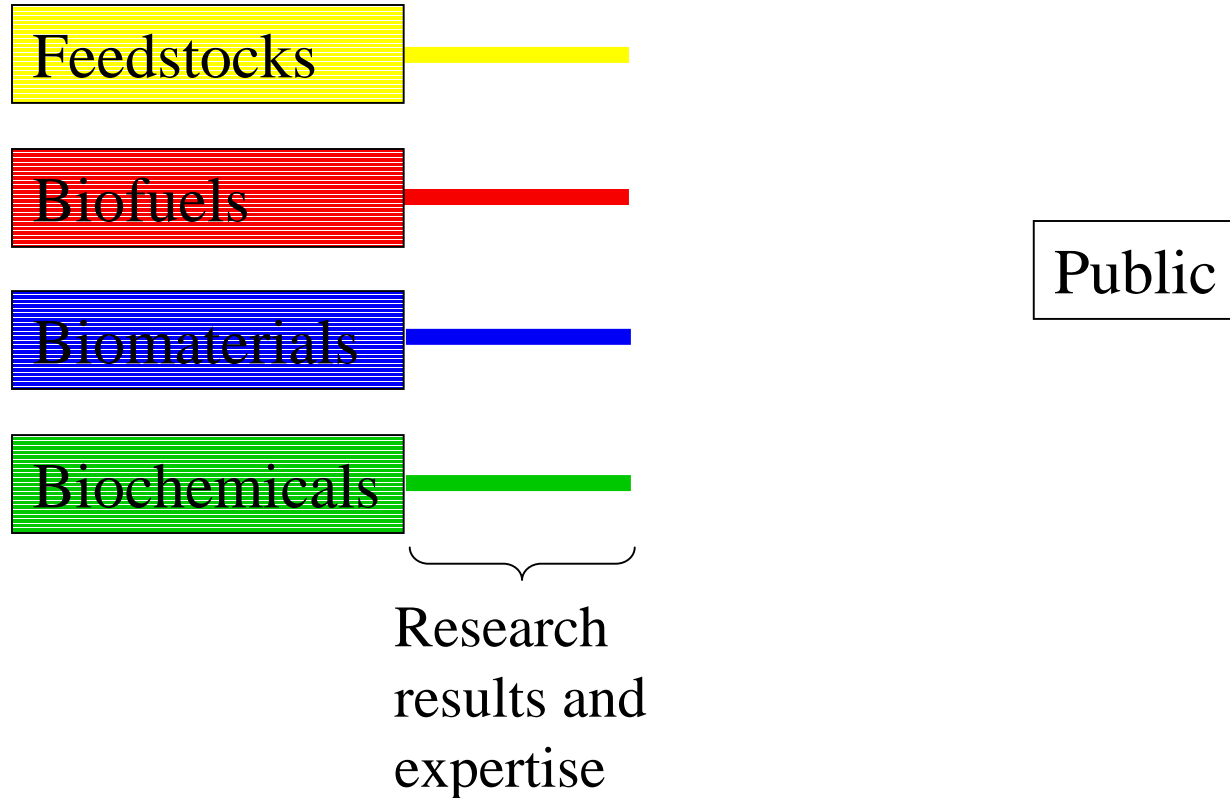
# Bottleneck: Lack of Trained Personnel

- Capabilities needed by future personnel
  - Specialized knowledge relevant to biobased products
    - Plant science
    - Plant/crop production
    - Processing
    - Utilization
  - Cross-functional training in science and engineering
  - Ability to work effectively in multidisciplinary teams
- Specialized educational programs are needed

## Novel Approach: NRCBE

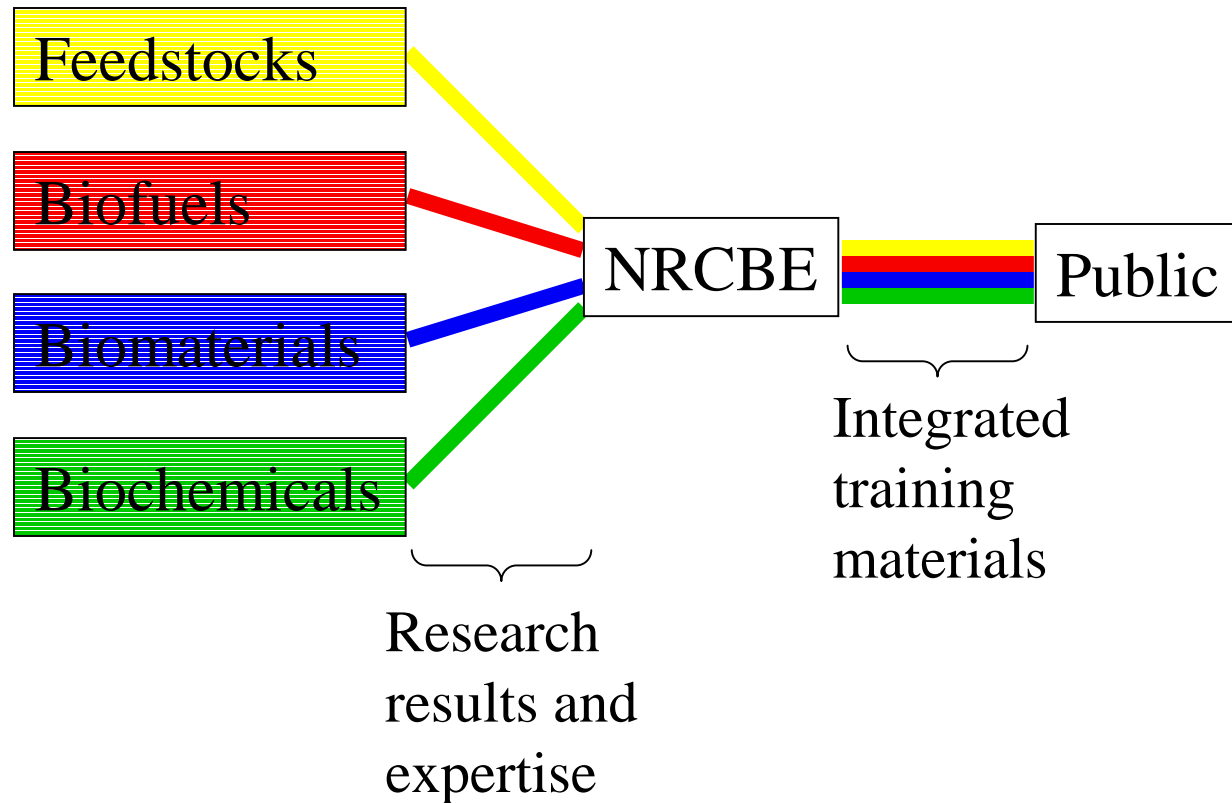
- National Resource Center for Biomass Education (NRCBE)
  - Work with industry to identify training needs
  - Recruit experts to develop Internet training materials
  - Encourage educational collaborations among experts
  - Organize workshops on biomass education
  - Assist with assessment of training materials
  - Develop website clearinghouse for training options
  - Interface with federal agencies to facilitate training

# Need to Develop Training Materials



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# Integration of Research and Training



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## Expertise in Education Team

- Developed Multidisciplinary Graduate Training Program on Technologies for a Biobased Economy
- Developed Internet course relevant to biobased products: engineering principles for non-engineers
- Developed Multidisciplinary Bioprocessing Lab course with NSF funding
- Participated in USDA/DOE National Workshop on Biomass Education (Kansas City, June, 2001)

# Status of Education Team Activities

- Submitted proposal to initiate NRCBE
  - USDA Challenge Grants program
  - Arranged in-kind match from MSU to host NRCBE
  - Considering other programs for submission
- Organized workshop on biomass education
  - “Educational Needs for a Biobased Economy,”
  - 24<sup>th</sup> Symp. On Biotech. For Fuels and Chemicals (2002)
  - Expert panel from academia and industry
  - Summarized discussions in draft paper

# Status of Education Team Activities

- Developed S1007 website (prototype NRCBE site)
  - Home
  - Announcements
  - Participants
  - Proposals
  - Presentations
  - Biomass Education
  - Relevant Websites

# S1007 Website



## Multi-Regional Project S-1007

[Home](#)

[Announcements](#)

[Participants](#)

[Proposals](#)

[Presentations](#)

[Biomass Education](#)

[Relevant Websites](#)

### Home

Investment of billions of dollars in biotechnology has resulted in an extensive technology base that is poised to make a major revolution in society. A core of researchers has emerged in recent years that is conducting essential engineering research to develop technology for this area. Much of the fundamental research that has been done will require the application of engineering technology to scale up to commercial application.

Science and engineering faculty from many land-grant universities are developing a regional proposal to address the following areas: bioreactor analysis and design, modeling of bioreactor processes, tissue-culture engineering, enhanced extraction of high-value components from agricultural byproducts, bioinformatics, bioseparation technologies, solid-state fermentation, biosensors, process scale up, new food products from GMOs, quality preservation, functional foods, and production of pharmaceuticals and nutraceuticals from renewable resources.

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# S1007 Website



## Multi-Regional Project S-1007

### Biomass Education

[Home](#)

[Announcements](#)

[Participants](#)

[Proposals](#)

[Presentations](#)

[Biomass Education](#)

[Relevant Websites](#)

|   |  |
|---|--|
| <a href="#">Primers on Molecular Biology</a>      | <a href="#">Genomics, Bioinformatics</a>   |
| <a href="#">DOE Human Genome Project</a>          | <a href="#">Nature Structural Genomics</a> |
| <a href="#">Bugs in the News</a>                  | <a href="#">123 Genomics</a>               |
| <a href="#">MIT Recombinant DNA Hypertextbook</a> | <a href="#">DNA Microarray Technology</a>  |
| <a href="#">Animated DNA primer</a>               |  |

|   |   |
|---|---|
| <a href="#">Biotechnology Education Sites</a>             | <a href="#">USDA Biotech. Educational Resources</a>           |
| <a href="#">Bio.com: Experimental Methods in Genetics</a> | <a href="#">National Center for Biotechnology Information</a> |
| <a href="#">New Hampshire Biotechnology Center Links</a>  | <a href="#">Biotechnology Glossary</a>                        |
| <a href="#">Nova: "Cracking the Code of Life"</a>         | <a href="#">Cato.com Biotechnology Directory</a>              |
|   |   |

|   |  |
|---|--|
| <a href="#">Internet Courses</a>                    |  |
| <a href="#">Foundations of Chemical Engineering</a> |  |
|   |  |

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# S1007 Website



## Multi-Regional Project S-1007

[Home](#)

[Announcements](#)

[Participants](#)

[Proposals](#)

[Presentations](#)

[Biomass Education](#)

[Relevant Websites](#)

### Proposals

One objective of the Multi-Regional Project is to generate collaborative grant proposals in the five topic areas listed below. Each link will show any draft proposals in that topic area.

[Feedstock Supply](#)

[Biofuel Production Systems and Processes](#)

[Biomaterials](#)

[Biobased Chemicals](#)

[Education and Outreach](#)

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The page linked below lists topics individuals have suggested for future collaborative proposals. It can serve as a clearinghouse to connect researchers having complementary expertise.

[Ideas for future group proposals](#)

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# S1007 Website



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[Home](#)

[Announcements](#)

[Participants](#)

[Proposals](#)

[Presentations](#)

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### Proposals

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[Biobased Chemicals](#)

[Education and Outreach](#)

The link below provides grant proposal opportunities especially relevant to S-1007 researchers.

[Funding opportunities](#)

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# S1007 Website

## MULTI-REGIONAL PROJECT S-1007 TOPIC AREAS AND PARTICIPATING RESEARCHERS

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