Bioeconomy Institute

Goal: Securing sustainable supplies of energy and carbon from biomass
ISU Specialized Facilities

Bioresewables Research Laboratory

- Provide a central location for ISU’s biorenewables related activities in research, education, and outreach
  - Bioeconomy Institute
  - Center for Biorenewable Chemicals
  - Biobased Industry Center
  - CenUSA Regional Energy Crop Project
  - NSF EPSCOR Project
- Promote collaboration
- Offer state-of-the-art classrooms and innovative laboratories supporting complex technology

BioCentury Research Farm

- First-in-the-nation integrated research and demonstration farm devoted to biomass production and processing
- A national model for developing bioenergy and biobased products
BEI Mission

• Research
  • Biomass production
  • Biomass conversion
  • Systems analysis
• Education
  • K-12
  • Undergraduate
  • Graduate
  • Continuing
• Outreach
  • Producers
  • Industry
  • General Public
Example of Biomass Production Research
CenUSA Bioenergy

Project Director: Ken Moore (kjmoore@iastate.edu)

- USDA Collaborative Agriculture Project (CAP)
- Five year, $25 million regional project to develop perennial grasses as energy crops
- Considers all aspects of the bioenergy value chain
Example of Biomass Conversion Research: ConocoPhillips* Biofuels Partnership

Program Director: Robert C. Brown (rcbrown3@iastate.edu)

- Goal is to develop advanced biofuels technologies
- $17 million partnerships since 2006
- COP funds have been leveraged to win several million dollars in federal funding

*Company reorganized as Phillips 66 in 2012
Example of Systems Analysis Research: Technoeconomic Analysis of Biorefineries

- Supports decision making in efforts to commercialize biorenewables technologies
  - Commercial-scale processing plants are simulated
  - CAPEX, OPEX, and profitability are estimated
- Recent impacts
  - Results used in 2011 National Research Council report on advanced biofuels
  - DOE EERE is funding ISU to perform “scoping studies” of new biofuels technologies
Example of Higher Education: 
Interdisciplinary Graduate Program

DOGE: Jacquelyn Baughman (jacquelyn@iastate.edu)

- MS, PhD, and Certificate programs in Biorenewable Resources and Technology
- Distance Education (serves continuing education students from industry)
Example of Industry Outreach: Biobased Industry Center

Center Director: Bruce Babcock (babcock@iastate.edu)

Research in support of commercial development of biobased companies:

- policy
- business
- economics
- infrastructure
- environment

Funded by industry partners

Feedstock Production
- Monsanto
- DuPont/Pioneer
- Ceres
- Iowa Corn Growers
- Iowa Farm Bureau

Conversion
- Cargill
- ADM
- REG
- Sundrop Fuels
- Virent

Storage and Blending
- Phillips 66

Retail
- Phillips 66

End User
- General Motors
- Toyota
National Science Foundation’s EPSCoR Program

• Experimental Program to Stimulate Competitive Research (EPSCoR)
  • "to strengthen research and education in science and engineering throughout the United States and to avoid undue concentration of such research and education."

• NSF EPSCoR Research Infrastructure Investments (RII) Track 1 Award
  • Competitive grants program provides $4 million per year for five years to an EPSCoR state to build research capacity
The **Vision** of the Iowa NSF EPSCoR project is to establish Iowa as a leader in the world-wide transition in energy supply from mining subsurface (fossil) energy stores to *harnessing renewable energy flows in the biosphere*. 

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**Iowa State University**

**Bioeconomy Institute**
Project Strategies

• Research Program
  – Focus on building capacity among junior faculty
  – Organized into four research platforms

• Broader Impacts
  – Includes diversity, workforce development, engagement, communication, cyberinfrastructure
Bioenergy Platform

- Expand research infrastructure to investigate problems in bioenergy:
  - Outdoor research facilities for investigating ecosystem sustainability of bioenergy agriculture;
  - Pilot plants for converting biomass into feedstock intermediates;
  - Laboratories to characterize biomass and feedstock intermediates;
  - Laser diagnostics laboratories for studying fundamental phenomena of thermochemical processes;
  - Cyberinfrastructure-enabled open-source computational fluid dynamic (CFD) model;
Wind Energy Platform

• Build research infrastructure to support research in wind energy:
  – Cyberinfrastructure-enabled, outdoor laboratory in wind energy;
  – Blade performance diagnostics laboratory;
  – Human capital in wind energy including hiring two new faculty in wind resource characterization (ISU) and drive-train reliability (UI);
  – Systems level research among Iowa’s universities, community colleges, and wind industry;
  – Human capital including hiring a new faculty in field studies (ISU) and multi-body dynamics (UI).
Energy Utilization Platform

• Build research capacity in social sciences and building energy science aimed at:
  • Evaluating human behaviors through the implementation of model community energy efficiency interventions;
  • Modeling and experimental studies in building energy.

Interlock House: Honey Creek State Park

Iowa State University
Bioeconomy Institute
Energy Policy Platform

• Build research and education infrastructure to address scientific challenges
  • Promote collaborations between economists and engineers on issues of energy policy;
  • Inform legislatures on the impact of energy policy research in Iowa on energy legislation.
Additional Information

IOWA NSF EPSCoR
BIOECONOMY INSTITUTE
NO. 14
TRADING CARD

www.biorenew.iastate.edu

Building Renewable Energy Systems

Infrastructure Investment
- Outdoor Labs
- Community Labs
- Pilot Plants
- Instrumentation for Fundamental Studies
- FLARE Institute
- Cyberinfrastructure
- Workforce Development
- STEM Education
- Diversity

Policy
Energy Utilization
Wind
Bioenergy

http://iowaepscor.org

Iowa State University
University of Iowa
University of Northern Iowa