IOWA STATE UNIVERSITY
Bioeconomy Institute

Bioeconomy Institute
and
Iowa EPSCoR Project

Robert Brown
BEI Director

Bioeconomy Institute

Goal: Securing sustainable supplies of energy and carbon from biomass

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ISU Specialized Facilities

Biorenewables 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

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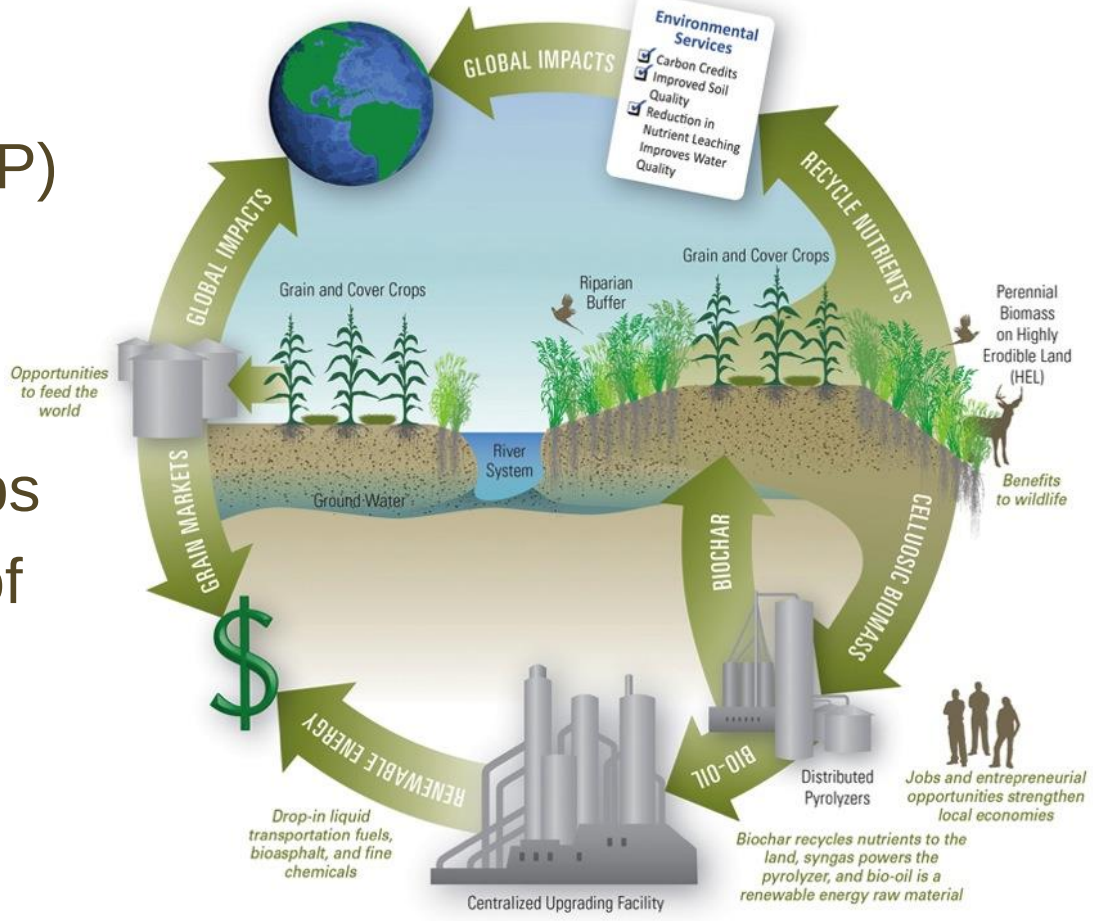
Example of Biomass Production Research
CenUSA Bioenergy

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



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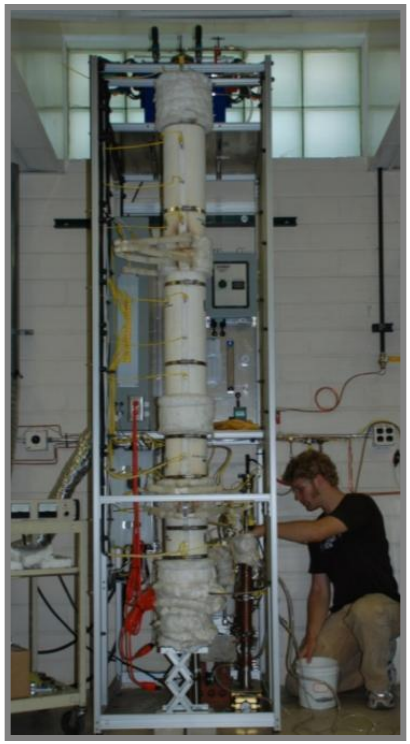
Example of Biomass Conversion Research:
ConocoPhillips* Biofuels Partnership

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



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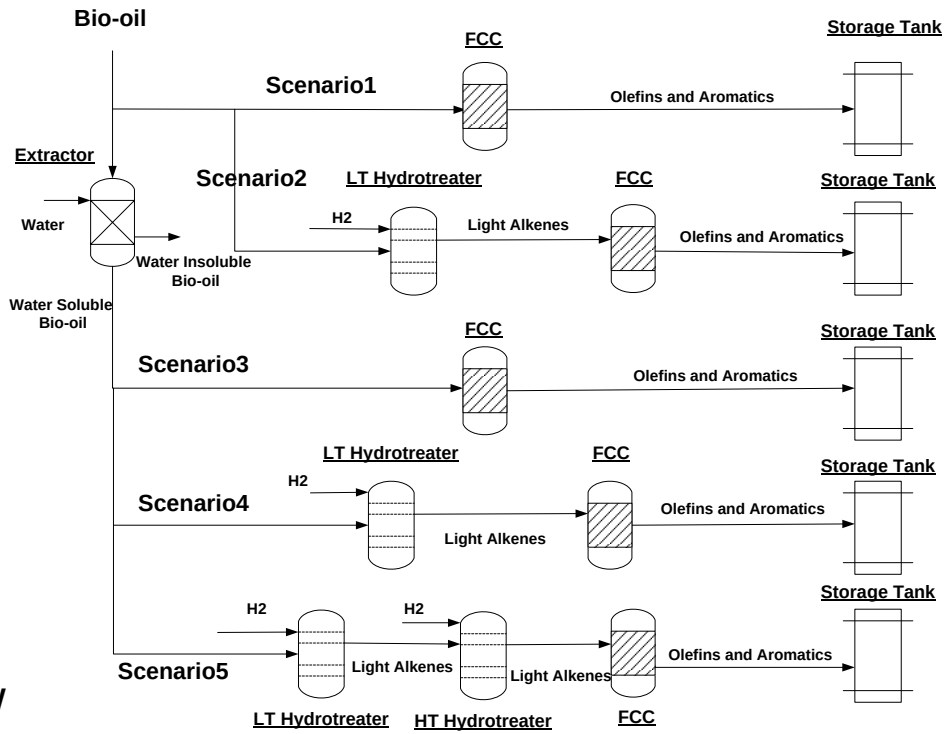
*Company reorganized as Phillips 66 in 2012

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



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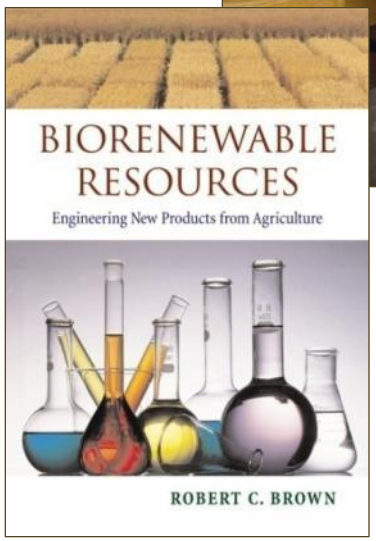
Example of Higher Education:
Interdisciplinary Graduate Program

DOGE: Jacqulyn Baughman (jacqulyn@iastate.edu)



- MS, PhD, and Certificate programs in Biorenewable Resources and Technology
- Distance Education (serves continuing education students from industry)

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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	Conversion	Storage and Blending	Retail	End User
Monsanto	Cargill	Phillips 66	Phillips 66	General Motors
DuPont/Pioneer	ADM			Toyota
Ceres	REG			
Iowa Corn Growers	Sundrop Fuels			
Iowa Farm Bureau	Virent			

IOWA EPSCoR

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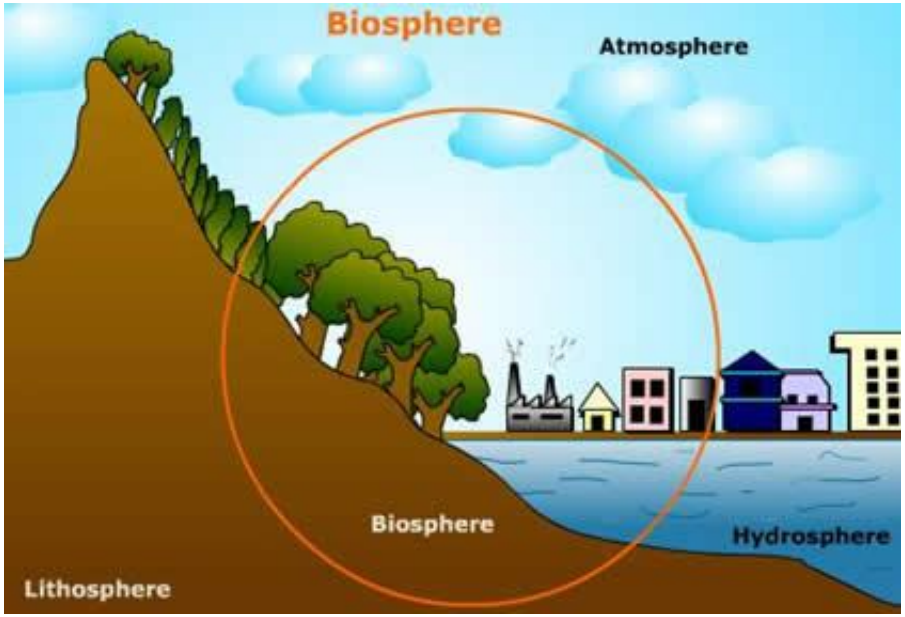
National Science Foundation's EPSCoR Program

- 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

EPSCoR Project Vision

The **Vision o**f 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*.



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

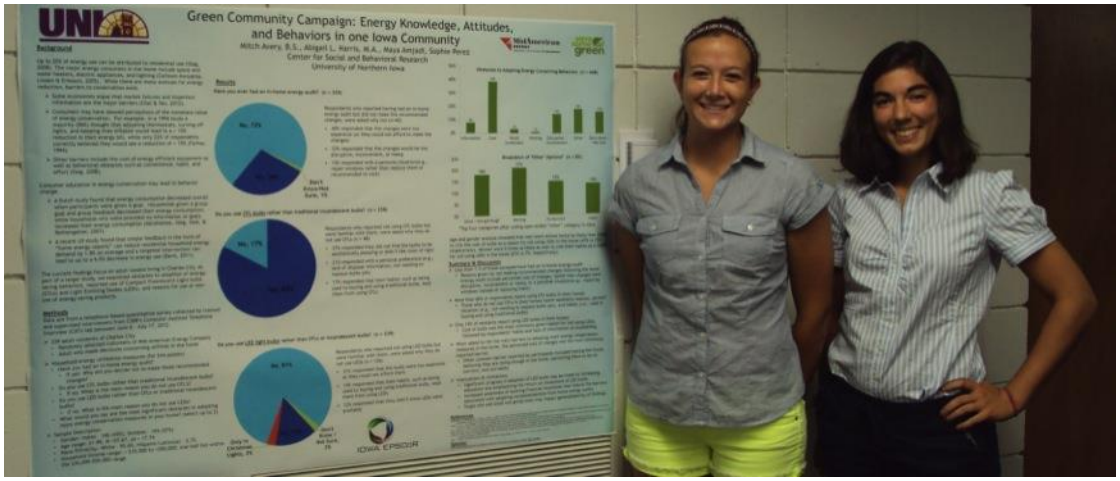
- Expand research infrastructure to investigate problems in bioenergy:
  - Outdoor research facilities for investigating ecosystem sustainability of bioenergy agriculture;
  - Pilot plants for converting biomass into feedstock intermediates;
  - Laboratories to characterize biomass and feedstock intermediates;
  - 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

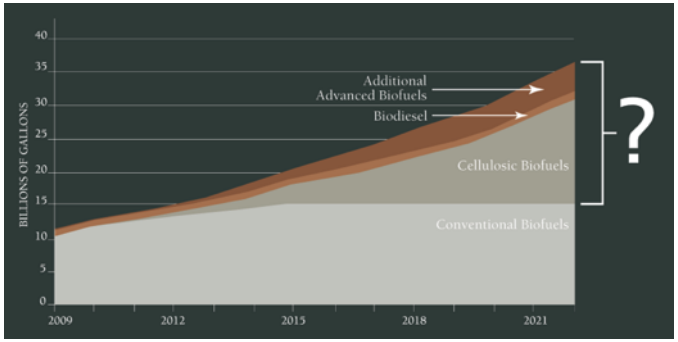
- Build research capacity in social sciences and building energy science aimed at:
  - Evaluating human behaviors through the implementation of model community energy efficiency interventions;
  - Modeling and experimental studies in building energy.



Interlock House: Honey Creek State Park

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