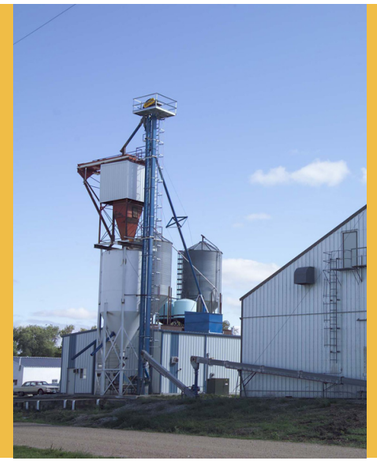
Biomass and Bioproducts Initiative

A comprehensive, integrated program taking Biomass Conversion to the next level



Biomass and Bioproducts Initiative

A comprehensive, integrated program taking Biomass Conversion to the next level

Market and Policy Analyses

Profitability of biomass and bioproduct investments depends on markets and public policies. Research by NDSU economists includes plant feasibility analyses, evaluation of alternative federal policies designed to promote biomass and bioproduct production and use, and impacts of increasing use of biomass and bioproducts on national and international food and energy markets.

Student Learning

A new course on biofuels is available for undergraduate and graduate students. Other courses increasingly include biomass and bioproduct course material.

Community Support

New crops and technologies involve new challenges for producers and businesses. NDSU economists investigate and propose new crop insurance for biomass crops previously not covered. Risk management strategies also are prepared to minimize income variability and to sustain the viability of farms and rural communities.

NDSU
NDSU Extension Service
N.D. Agricultural Experiment Station
North Dakota State University, Fargo N.D.

NDSU Disciplines

- **Agribusiness and Applied Economics**
- **Agricultural and Biosystems Engineering**
- **Animal and Range Sciences**
- **Center for Community Vitality**
- **Cereal and Food Sciences**
- **Civil Engineering**
- **Coatings and Polymeric Materials**
- **Electrical and Computer Engineering**
- **Entomology**
- **Mechanical Engineering**
- **NDSU Extension Services**
- **Plant Pathology**
- **Plant Sciences**
- **Research Extension Centers** - located at:Carrington, Dickinson, Hettinger, Langdon, Minot, Streeter, Williston
- **Soil Science**
- **Veterinary and Microbiological Sciences**

Partners

Examples of the many collaborators include:

- **Archer Daniels Midland Co.**
- **Blue Flint Ethanol Plant**
- **Dakota Skies Biodiesel**
- **MBI International**
- **Monsanto Corp.**
- **Montana State University: Eastern Agricultural Center**
- **North Dakota Biomass Energy Task Force**
- **North Dakota Energy and Environmental Research Center**
- **North Dakota Renewable Energy Partnership**
- **Northern Great Plains Research Laboratory**
- **Verendrye Electric**

D.C. Coston
VP for Agriculture and University Extension
North Dakota State University
e-mail: d.c.coston@ndsu.edu
Telephone: (701) 231-7656

Ken Grafton
Dean and Director, NDSU College of Agriculture, Food Systems, and Natural Resources and ND Agricultural Experiment Station
e-mail: k.grafton@ndsu.edu
Telephone: (701) 231-7655

Duane Hauck
Director, NDSU Extension Service
e-mail: duane.hauck@ndsu.edu
Telephone: (701) 231-8944

NDSU
North Dakota State University

Biomass and Bioproducts Initiative

A comprehensive, integrated program taking Biomass Conversion to the next level

Biomass and Bioproducts Initiative

A comprehensive, integrated program taking Biomass Conversion to the next level

Goal **The Biomass and Bioproducts Initiative will provide North Dakota and the surrounding regions with a comprehensive, coordinated and collaborative resource in research technology and economic viability of biomass and bioproducts to ensure a sustainable, healthy environment for the 21st century and beyond.**

NDSU's Natural Advantage

North Dakota is the No.1 producer of 14 crops in the United States and a major producer in many other crops. Major crops, such as wheat, canola, soybean, corn and perennial grasses will play an important role in the expanding markets for biomass and bioproducts.

Researchers at North Dakota State University have developed multidisciplinary projects that improve the quality of crops useful in biomass conversion, that develop new technologies to increase the efficiency and profitability of biomass conversion, and that assess markets and public policies important to the development of a biomass and bioproduct industry. Efforts include:

- plant breeding, and disease and insect control to ensure high-value crops
- engineering studies of bioproduct extraction technology and machinery conversion for biomass use
- economic assessments of policy alternatives and economic opportunities for North Dakota businesses.

The initiative embraces the mission of the land-grant university to provide education, research and Extension that benefit people and communities.

Objectives

The initiative will:

- develop frontier technologies
- coordinate research strategies and activities
- utilize all biomass and bioproducts to eliminate waste and increase efficiency
- energize business and industry investment in biomass and bioproducts
- stimulate student interest and learning in the bio-based economy
- revitalize communities.

NDSU Research and Extension Partnership

The NDSU Extension Service adapts new technology into information and formats that are useful and available to the state and region through the North Dakota county Extension offices, NDSU Research Extension Centers and Web sites.

Current and Developing Technologies

NDSU Oilseed Development Center of Excellence

The Center of Excellence is a multidisciplinary team research effort to evaluate canola varieties, test new lines and develop new technologies in the production of canola biodiesel and bioproducts. Two canola biodiesel plants are under construction in north central North Dakota, increasing the immediate impacts of the center's research.

The NDSU Pilot Plant laboratory is being enhanced to focus on new and innovative uses for canola meal, including construction materials, adhesives and thermoplastics; and the development of epoxy and other resins from canola oil for plastic composites.

Biomass and Nanoproducts from Agricultural Residues

Researchers are nearing commercialization of new technologies able to convert agricultural residues, such as wheat straw, into biomass, as well as strong, light-weight nanocomposite materials that could substitute for fiberglass and petroleum-based composites.

Hydrogen Energy

Hydrogen, as a fuel, leaves only water vapor as an emission and utilizes wind energy in its production process making it a clean source of energy.

Pickup trucks and farm tractors are being tested on hydrogen fuel at NDSU Research Extension Centers. Future research will determine the feasibility of hydrogen fuel in various applications and the development of hydrogen fuel cell technology.

Ethanol from Cellulosic Biomass

Production of ethanol from native grasses and other lignocellulosic materials is being investigated. Research includes economic analysis of processing the product, optimum location of processing plants, transportation requirements, and handling and storage methods.

Included in this research are efforts to improve Conservation Reserve Program (CRP) management and to investigate the effect of harvesting CRP to ensure environmental sustainability.

Alternative Crops

Researchers are studying other crops that can be processed in corn-based biorefineries.

Utilization of Coproducts

Efficient use of all coproducts is a major consideration of biomass conversion at NDSU.

- Distillers grains, a coproduct from ethanol production, and canola meal, a coproduct from canola biodiesel production, are being explored as a feed ingredient for livestock.
- Investigation into colocation of cattle feedlots near ethanol plants, and combining an anaerobic digestion processing plant to convert animal waste into methane to fuel the ethanol plant. This is being carried out at the Blue Flint ethanol plant with the aim of producing a self-sustaining biorefinery.
- Research continues to develop value-added products for new markets in biofuel, biolubricants, cosmetics, food products and nutriceuticals.