WSU Energy Initiative Summit
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Vision for A Bioeconomy in Washington

- Transportation fleet powered by electricity and renewable fuels all produced within WA
- Significant portion of the consumer products derived from WA biomass rather than imported oil
- Agriculture industry highly competitive growing crops as feedstock for bioproducts in addition to food
- State citizens live a better environment as the energy production and consumption become CO$_2$ neutral and with less other harmful emissions.
CBB Vision and Goals

• Serve as the Bioproduct and Bioenergy research and development arm of the state for transition to a bioeconomy;

• Develop systems and technologies that grow and utilize regional biomass to produce fuels, chemicals, materials, pharmaceuticals, nutraceuticals, and energy;

• Catalyze technology transfer and develop business models for establishing a bioproducts and bioenergy industry in the state;

• Establish a first-class research and education program in bioproducts and bioenergy at WSU recognized nationally and internationally.
WSU’s Opportunity to Contribute to the State

• Agriculture industry is a major cornerstone of the state economy;

• Great variety of crops and associated processing sector offer diverse biomass;

• Producing high value products from crop biomass will bring new revenues to the rural community in additional to that from grains.
WA Biomass Estimation

• Total amount currently available annually – **16.9 million tons**;
• **15.5 billion kWh** of electrical energy or 1,769 MW of electrical power;
• Equivalent to just about **50%** of Washington State’s annual residential electrical consumption;
• Alternatively, **>1 billion gallon ethanol**.
Washington State’s great potential as a leader in the upcoming bioeconomy - Biomass by County
Opportunities for Biorefining

Feedstocks
- Trees
- Grasses
- Agricultural Crops
- Agricultural Residues
- Animal Wastes
- Municipal Solid Waste
- Food Processing

Conversion Processes
- Acid/enzymatic hydrolysis
- Fermentation
- Bioconversion
- Chemical Conversion
- Gasification or Pyrolysis
- Co-firing
- Anaerobic Digestion

Bio-Products
- Fuel
- Ethanol
- Renewable Diesel
- Power
- Electricity or Heat
- Chemicals
- Plastics, resins, foams
- Phenolic resins
- Solvents, cleaning fluids
- Chemical Intermediates
- Adhesives
- Fatty acids
- Carbon black
- Paints, coatings
- Dyes, Pigments, and Ink
- Detergents
- Hydraulic fluids
Related Core Strengths at WSU

- Plant biotechnology - Plant metabolism and molecular and cellular biology
  - Institute of Biochemistry, IBC
- Biomaterial - Developing biomaterials from a range of recycled and virgin resources
  - Wood Engineering Lab
- Bioprocessing – Converting biomass to chemicals and nutraceuticals
  - Biomass Processing and Bioproducts Lab
- Agronomy, resource economics, marketing and trade, production economics, regional economics, and econometrics;
  - Collage of Agricultural, Human, and Natural Resource Science
- Education, Training and Outreach
  - Center for Sustaining Agricultural and Natural Resources
  - WSU Extension Energy Program
CBB Builds on Partnerships

**Research**
- Federal Earmark
- Industry contribution
- Federal/State Funds

**Education**
- NSF IGERT Grant
- USDA Higher Education

**Business Incubation**
- WSU/UW Proposal
- WTC/SBIR/SIRTI

**International Collaboration**
- Int. Partnership Grant

**Center**
- NSF Partners in Inn. Grant

**Congressional Delegations**
- Commodity Commissions
- Industry

**State Agencies**
- UI, PNNL, INL, CBC and NWIC

**Collaborative Research**
- Graduate Education
- Industry Collaboration
- Business Incubation

**Intellectual Property**
CBB Fits Well within WSU’s Infrastructure
The Value of the Center to WSU

• Facilitates attracting external funding for research and education;
• Facilitates developing new interdisciplinary research teams;
• Supports for graduate students, especially increasing the number of PhD students in a new field;
• Helps to maximize WSU’s contribution to the state to enhance WSU’s reputation within the state;
• Strengthens WSU’s position as a regional/national leader in this merging area.
Collaborative Investments in the Future: Integrated Bioproducts Graduate Education and Training Program

- An interdisciplinary proposal on bioproducts was developed in March 2003 in response to the Office of Vice Provost for Research and the Graduate School

Shulin Chen, Norman Lewis, Michael Wolcott, Bernie Van Wie, Luying Xun
Center Development- Current Status

- The university has made bioproducts research a high priority area;
- The new Bioproducts Engineering Science Laboratory building at WSU Tri-Cities will breakground on April 13.
- CAHNRS has approved $500,000 for a Biomass Processing and Bioproduct Lab in BSE;
- A federal request was made to support the Center;
- Bioproducts was selected as one of the two major areas of collaboration between WSU and PNNL;
- The university plans to request funding for new positions in Tri-Cities in collaboration with PNNL;
- Discussions have been initiated on an additional state budget request for Triple Bios (BioAg, Bioproduct, and Bioenergy).
Areas for WSU/PNNL Collaboration

• Technical areas of focus
  ▪ Residues to Products/Fuels
  ▪ Optimized Feedstocks for Products/Fuels
  ▪ Biobased Engineered Materials
  ▪ Analysis

• Educational Program

• Outreach/Information
CBB and the WSU Energy Initiative

• Bioenergy is a major component of the future energy supply
• WSU has been recognized regionally as the leader in anaerobic digestion research as evident by our industrial collaborations (more 8 companies and organizations)
• CBB’s bioenergy research is a major topic area of the Energy Initiative
• Priority projects need to be identified ASAP together with team building
Current Projects Related to Bioenergy

• Optimization anaerobic digestion system for reducing cost and co-products production;
• Ethanol production from wheat straw and other regional lignocellulosic materials;
• Biodiesel by-product utilization.
Near Term (2006-2010) Goal (proposed)

• Become regional leader in Bioproducts and Bioenergy research and education
• Develop a sustainable funding program
• Develop a graduate student certificate program in Bioproducts and Bioenergy
• Win a major graduate student training grant
• Fill the capability gap by collaborating with participating units to hire new faculty
• Commercialize 2-3 technologies from CBB research
• Develop unique capabilities in the focus areas identified
• Enhance the collaboration with PNNL, UI, and INL
• Conduct a national search for a Center Director
Next Steps

- Complete center organization
- Select major topics as research platform
- Get funding
- Get faculty involved
- Get state, farmers, and industry support
- Develop unique capabilities
  - Creative ideas
  - research/outreach teams
  - new positions
  - facilities
- Succeed