



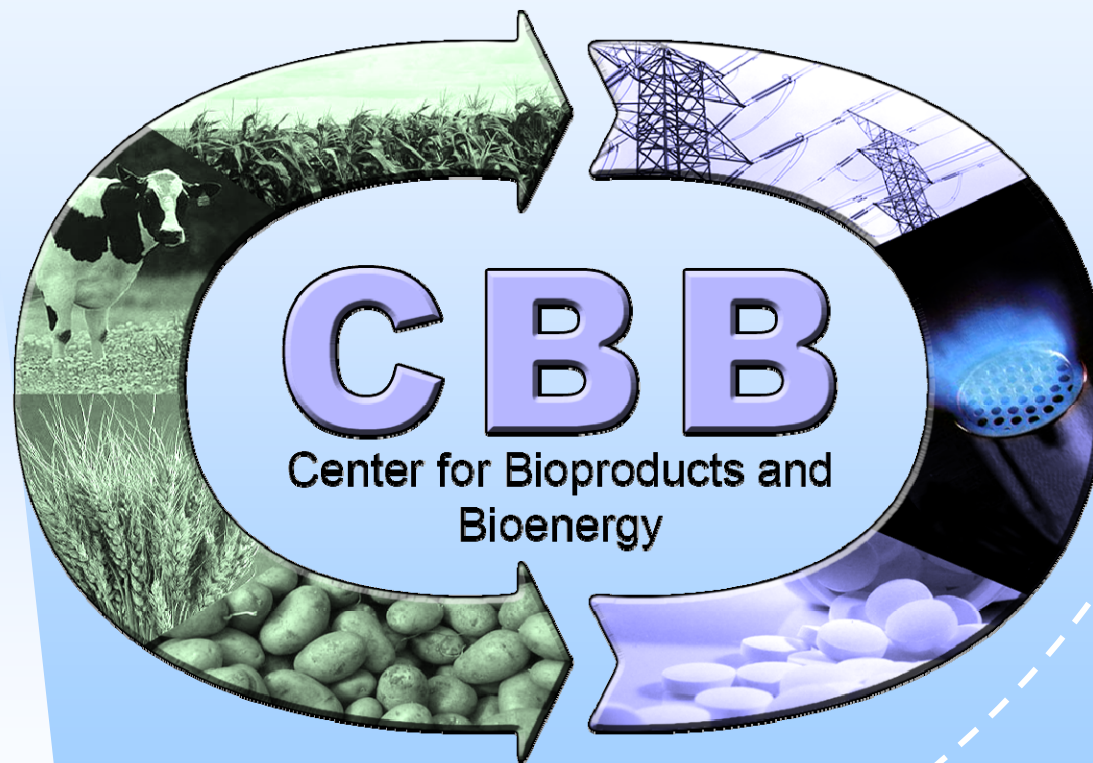
*World Class. Face to Face.*

# **WSU Center for Bioproducts and Bioenergy**

**WSU Bioenergy and Bioproduct Summit**  
**March 10, 2006**

**Shulin Chen, Professor**  
**Department of Biological Systems Engineering**  
**Coordinator, WSU Bioproducts Initiative**

# It Is Official: Approved by the Faculty Senate



# Vision and Goals

- Serve as the Bioproduct and Bioenergy research and development arm of the state;
- Develop systems and technologies that grow and utilize regional biomass to produce chemicals, materials, pharmaceuticals, nutraceuticals, fuels, 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 that is recognized nationally and internationally.

# Drivers for Bioproducts and Bioenergy

- Energy security
- Environmental benefits
- Competitiveness in global markets
- Economic development - additional revenue for the communities and new job opportunities

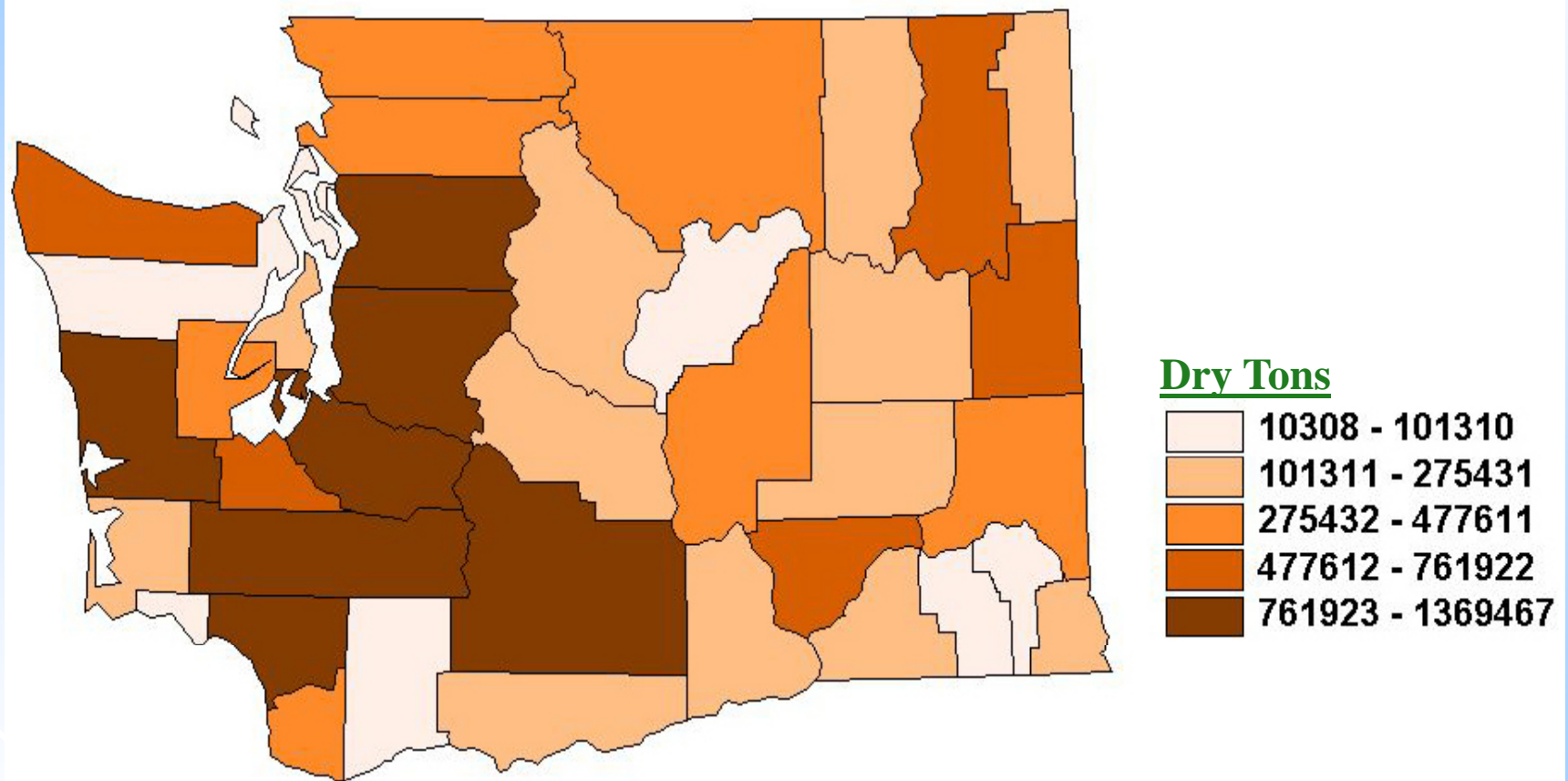
# WSU's Opportunity to Contribute to the State

- 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 addition 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;
  - College 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**

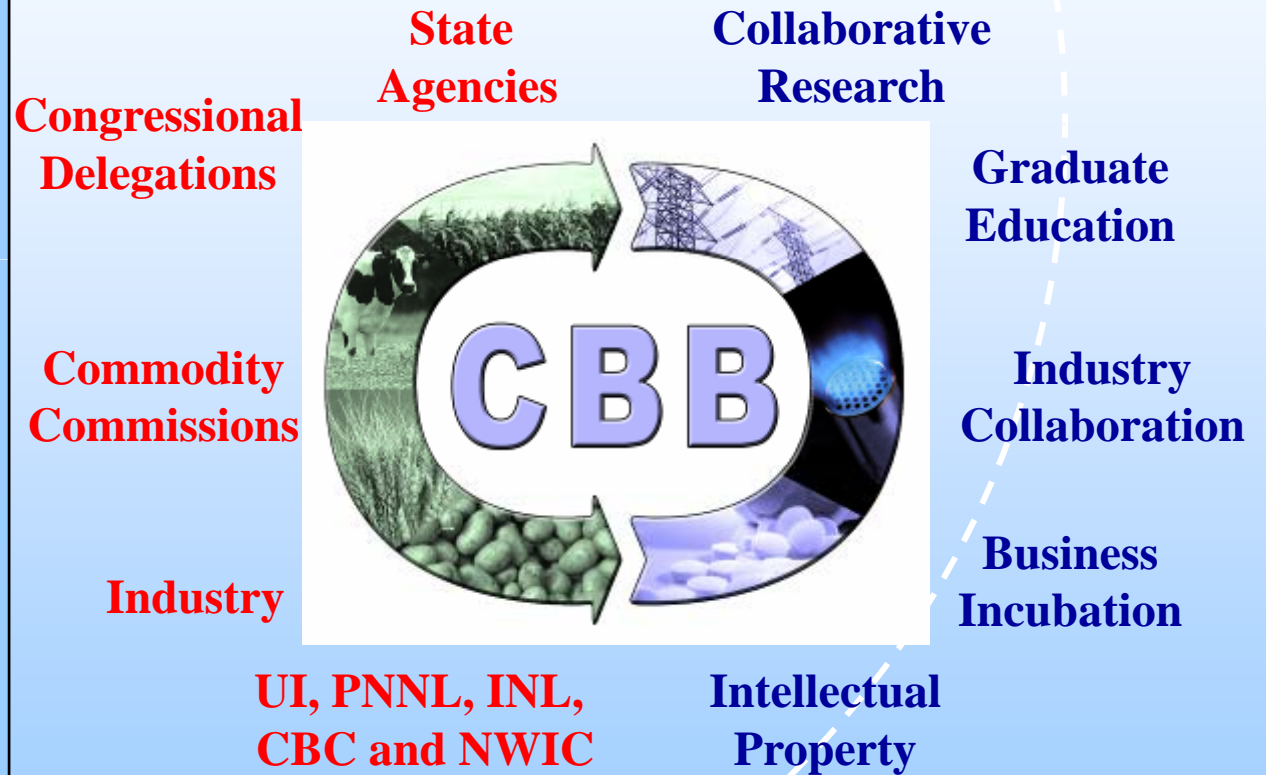
WSU/UW Proposal  
WTC/SBIR/SIRTI

## **International Collaboration**

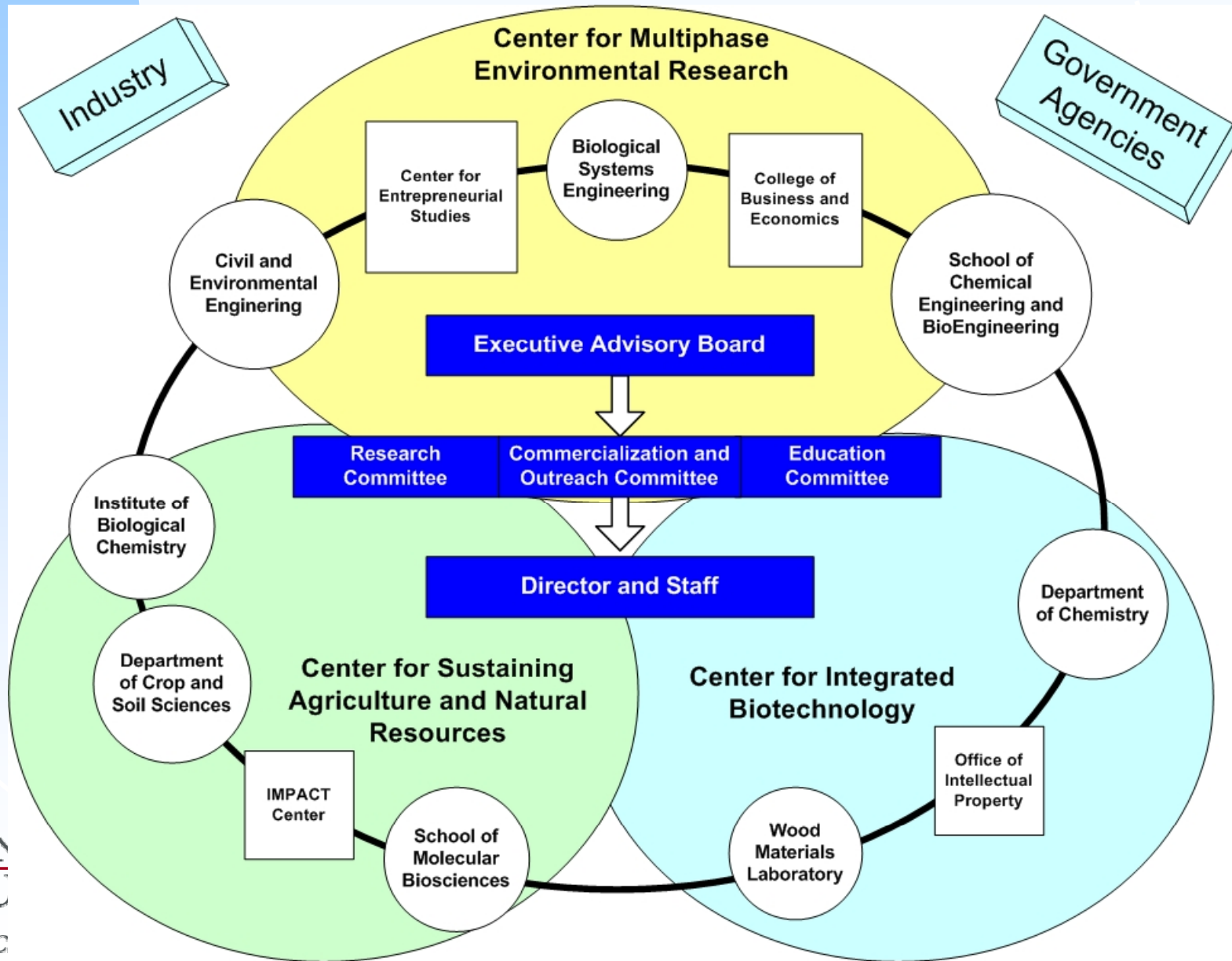
Int. Partnership Grant

## **Center**

NSF Partners in Inn. Grant



# 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.

# Center Development – History

## 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

# Major Challenges

- Solve difficult problems with short term expectations;
- Deliver examples of success so that the state and the citizens can see the benefits and capability of the center;
- Develop a research platforms/themes and capabilities that are unique and competitive at the national research competitions;
- Get funding to attract faculty's interests and involvement.

# 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 and UI
- 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
  - research/outreach teams
  - new positions
  - facilities
- To succeed