ADVANCED BIOFUELS
Technology Trends and Policy Opportunities

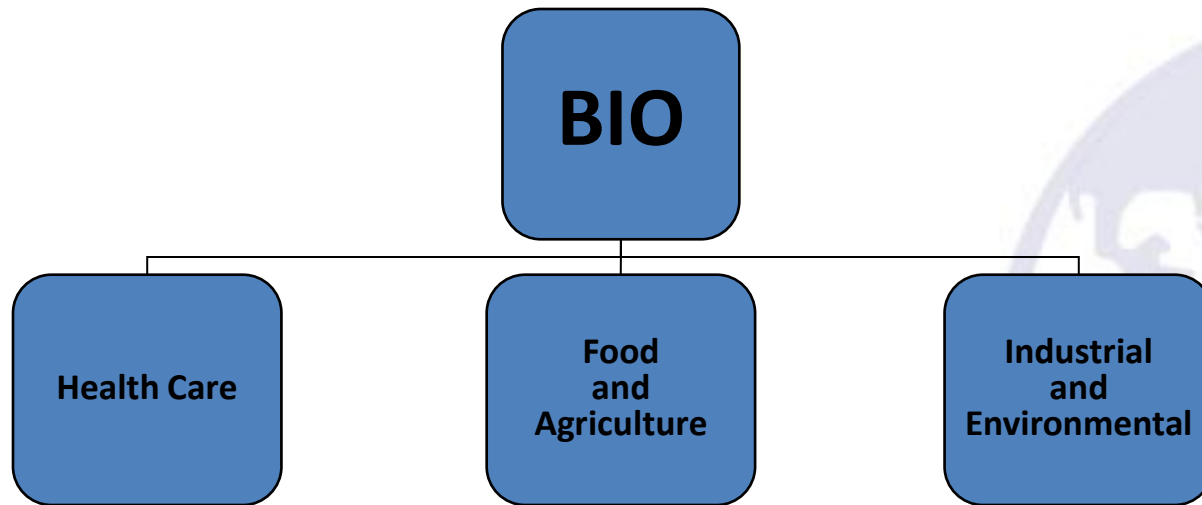Amy Ehlers
Policy Manager, Industrial & Environmental Section
Biotechnology Industry Organization (BIO)
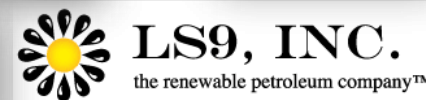March 30, 2010

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What is BIO?

❖ Biotechnology Industry Organization (BIO)

❖ Trade association based in Washington, D.C.

❖ Over 1,200 member companies

❖ Members in U.S. and 31 other countries

Some Industrial And Environmental Section Members
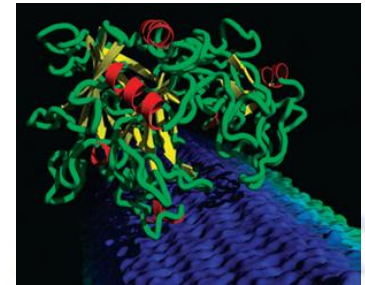
Industrial Biotechnology
Key Enabling Technology
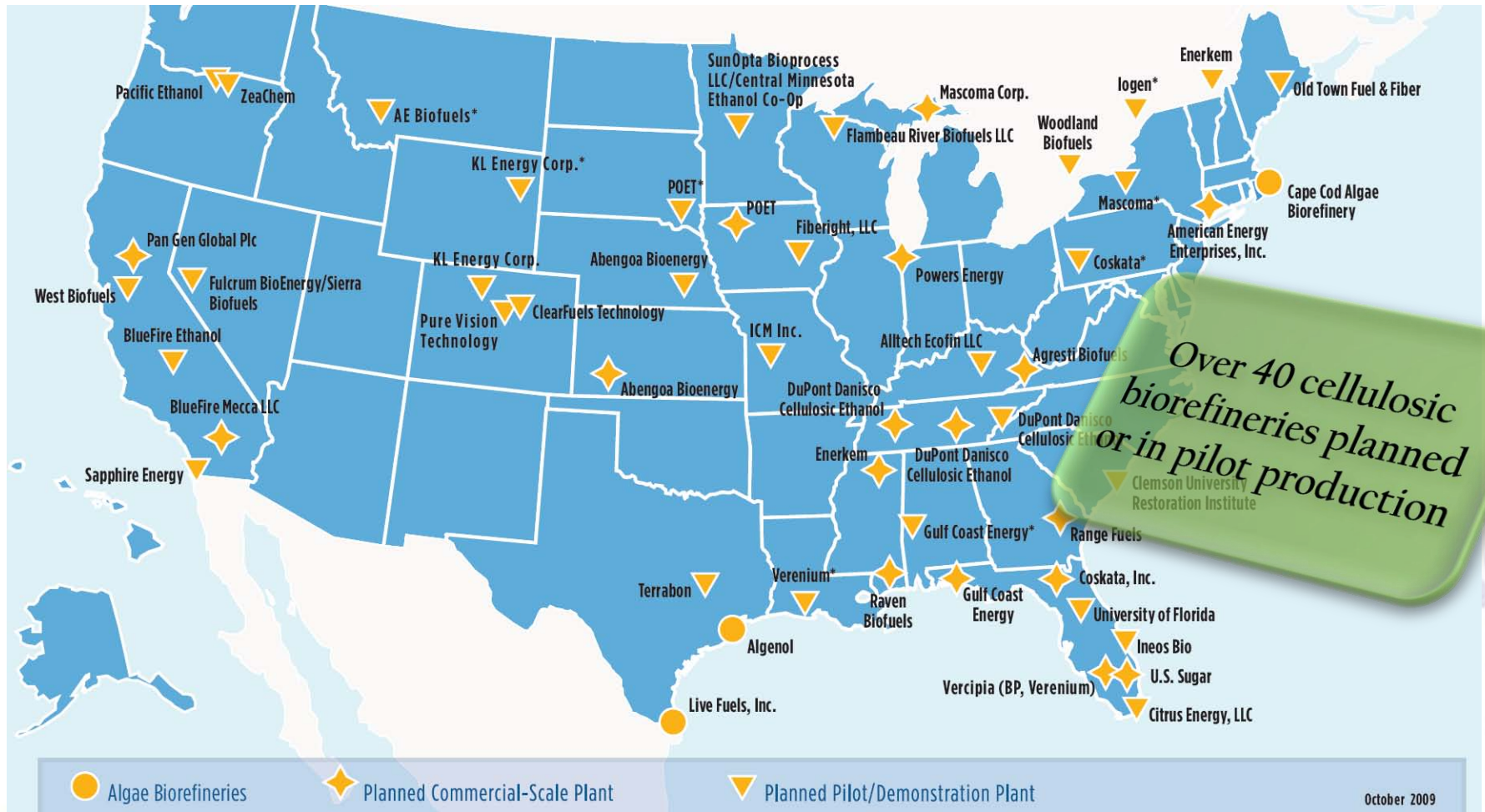
| Biofuels | Bioproducts | Bioprocessing |

➤ Application of life sciences to traditional manufacturing and chemical synthesis manufacturing processes…

   ➤ Using micro-organisms (bacteria, fungi) and enzymes (specialty proteins) to improve manufacturing processes…

      ➤ …and make new "biobased" products and materials from renewable feedstocks

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Advanced Biofuels Technology Trends

- ❖ Improved 1st Gen. Processes

- ❖ Purpose-grown Crops and Algae

- ❖ First Commercial Production of Cellulosics

- ❖ Advances in End Molecule Diversification

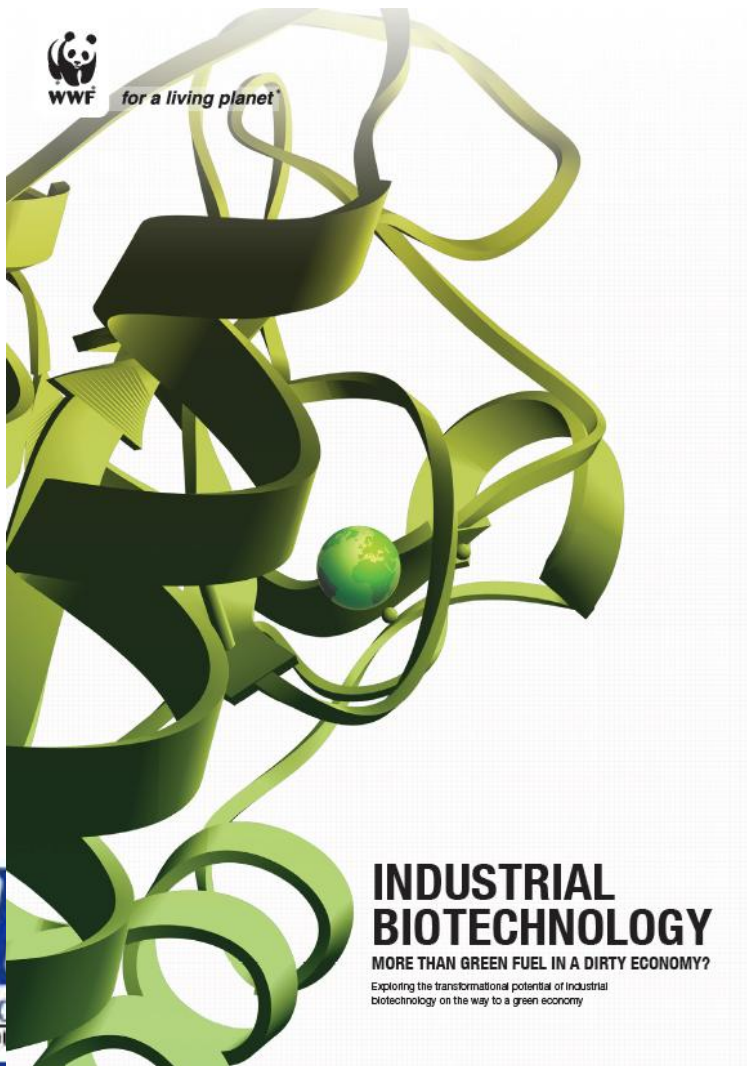- ❖ Increasing Focus on
  Renewable Chemicals / Bioproducts

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Existing/Planned Advanced Biofuels Facilities

Pacific Ethanol • ZeaChem • AE Biofuels* • SunOpta Bioprocess LLC/Central Minnesota Ethanol Co-Op • Mascoma Corp. • Iogen* • Enerkem • Old Town Fuel & Fiber • Flambeau River Biofuels LLC • Woodland Biofuels • KL Energy Corp.* • POET* • POET • Fiberight, LLC • Mascoma* • Cape Cod Algae Biorefinery • Pan Gen Global Plc • KL Energy Corp. • Abengoa Bioenergy • Coskata* • American Energy Enterprises, Inc. • Fulcrum BioEnergy/Sierra Biofuels • Powers Energy • West Biofuels • ClearFuels Technology • BlueFire Ethanol • Pure Vision Technology • ICM Inc. • Alltech Ecofin LLC • Agresti Biofuels • BlueFire Mecca LLC • Abengoa Bioenergy • DuPont Danisco Cellulosic Ethanol • DuPont Danisco Cellulosic Ethanol • Sapphire Energy • Enerkem • DuPont Danisco Cellulosic Ethanol • Clemson University Restoration Institute • Gulf Coast Energy* • Range Fuels • Terrabon • Verenium* • Coskata, Inc. • Raven Biofuels • Gulf Coast Energy • University of Florida • Algenol • Ineos Bio • Vercipia (BP, Verenium) • U.S. Sugar • Live Fuels, Inc. • Citrus Energy, LLC

Over 40 cellulosic biorefineries planned or in pilot production

● Algae Biorefineries   ◆ Planned Commercial-Scale Plant   ▼ Planned Pilot/Demonstration Plant

October 2009

Total job creation could reach 123,000 in 2012, 383,000 in 2016, and 807,000 by 2022

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WWF Report on Industrial Biotechnology

INDUSTRIAL
BIOTECHNOLOGY
MORE THAN GREEN FUEL IN A DIRTY ECONOMY?
Exploring the transformational potential of industrial biotechnology on the way to a green economy

- ➢ Industrial biotech can save the world up to **2.5 billion tons of CO2 per year**

- ➢ "WWF sees industrial biotech as an industry that can play a very **significant role** in the development of a new, green economy if developed in the right way. The world **can't afford to ignore** this opportunity," says John Kornerup Bang, Head of Globalization Programme for WWF

- ➢ The report emphasizes that **strong public policies must be in place** to help realize the potential of industrial biotech

Policy

RFS2 Regulations

EPA had a tough job and did a commendable job of involving stakeholders in the process, advanced biofuels qualify for EISA renewable fuel standard

❖ Advanced Biofuel GHG emission reduction criteria – 50% reduction from gasoline baseline, cellulosic – 60% reduction

❖ Final rule = biobutanol from corn starch meets 20% reduction criteria for renewable fuel volumes, cellulosic biofuels reduce emissions by 110%

❖ Petition process being established for new technologies and feedstocks - a party can petition EPA to consider new pathways for GHG reduction threshold compliance, EPA plans to update the regulations with new feedstock and fuel pathways periodically

❖ The EPA is not considering indirect emissions for gasoline because they were found to be insignificant and will not use marginal sources of gasoline, such as tar sands, in the gasoline baseline analysis

❖ Issues surrounding cellulosic biofuel waiver – need to ensure produced cellulosic biofuels must be purchased and the waiver should create a price floor, not a price ceiling

❖ Renewable biomass definition is restrictive

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Policy Opportunities/Threats

❖ **Indirect Land Use Change**

- Need for conclusive policy approach and across the board application

❖ **Blend Wall**

- Need short-term market to drive long-term investment

❖ **Cap and Trade Legislation**

- Carbon accounting for advanced biofuels, low carbon performace standard?

❖ **Financing Policy**

- Need programs that de-risk investment, tax incentives

❖ **Technology / Product Diversity**

- Need variety of feedstocks, conversion technologies, and products to achieve relevance and sustainability

Policy Recommendations – Climate

Biofuels

Biofuels lifecycle GHG emissions are already regulated through the RFS2, no need to double regulate, unfair burden on industry to be regulated in two different avenues, not to mention state regulations

- ❖ **HR 2454**
    - ❖ Expands biomass definition for the RFS2
    - ❖ Amends DOE LG program to include alternative fuel pipeline construction projects
    - ❖ Authorizes an open fuel standard which requires FFVs and other alternative fuel infrastructure components
    - ❖ Establishes a State Energy and Environment Development Fund for federal assistance for clean energy, efficiency and climate change grants and loans
    - ❖ Delays ILUC inclusion in RFS2
    - ❖ Creates an ag and forestry offset program to be administered by USDA
    - ❖ Had significant incentives for plug-in vehicles, $billions

- ❖ **California Air Resources Board/RGGI**
    - ❖ State Cap and Trade and LCFS

- ❖ **Kerry/Graham/Lieberman**
    - ❖ ????

- ❖ **Energy Only Bill**

Policy Recommendations – Climate

- **Biobased Products**
  - ❖ Need for recognition and equal treatment, these products provide the same GHG emission reduction benefits as fuels by replacing petroleum use

- ❖ **Biopower**
  - ❖ How will biomass feedstocks used for power/electricity be regulated either in climate legislation or and RES/RPS, ILUC?
  - ❖ How will other renewable technologies emissions be regulated in a RES/RPS? Lifecycle? ILUC?
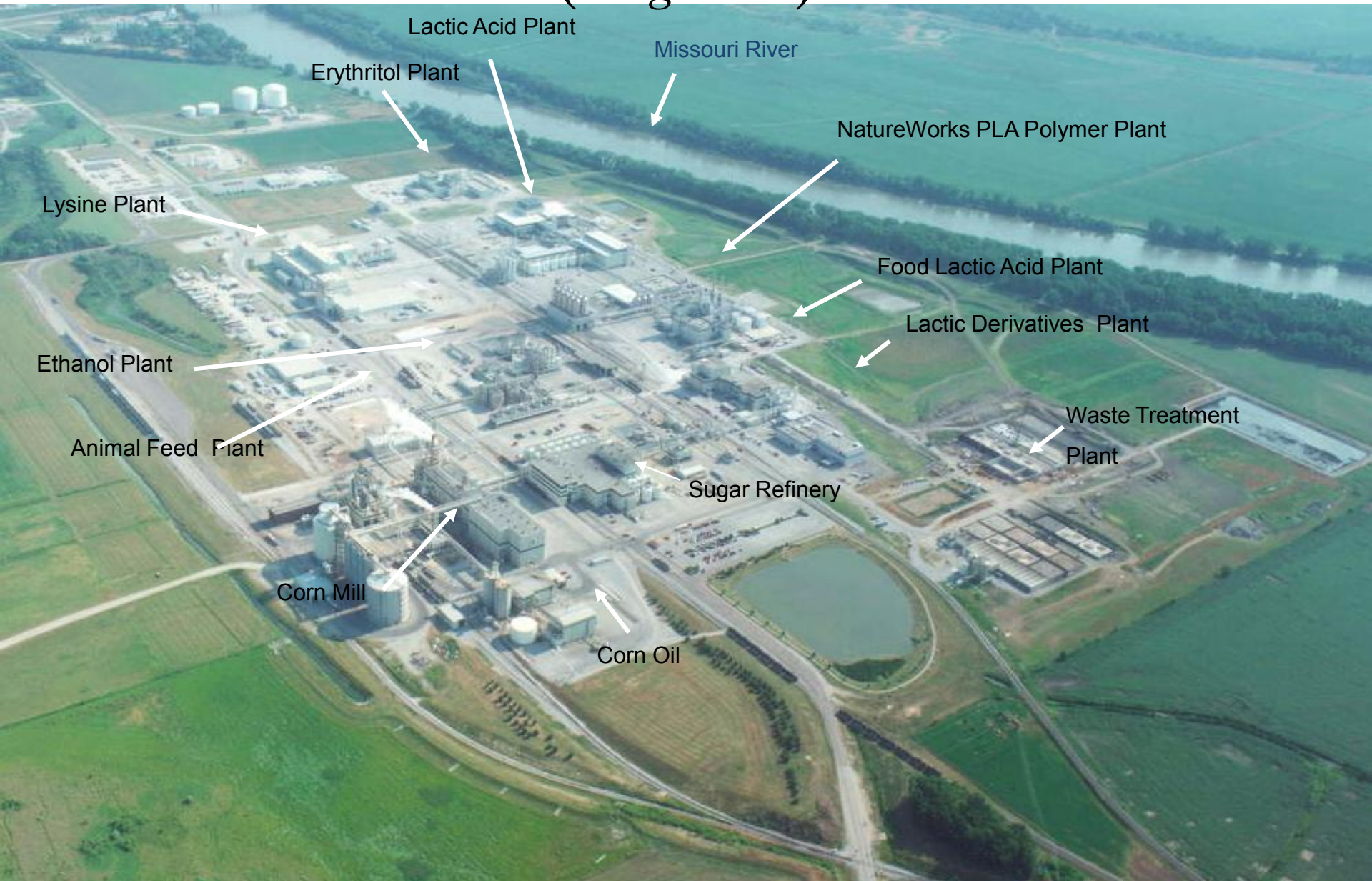
- **Farm bill**
  - ❖ A strong Energy Title in the next farm bill is needed
  - ❖ Feedstocks and supply chain infrastructure big part of picture

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The Biorefinery Concept

Example of a Biorefinery-Blair,NE
(Cargill Site)

Lactic Acid Plant

Erythritol Plant

Missouri River

NatureWorks PLA Polymer Plant

Lysine Plant

Food Lactic Acid Plant

Lactic Derivatives Plant

Ethanol Plant

Waste Treatment Plant

Animal Feed Plant

Sugar Refinery

Corn Mill

Corn Oil

What Will Result from Advanced Biorefinery Development ?

✓ Lower dependence on foreign oil

✓ Lower fuels, products and chemicals prices

✓ Regional/rural economic boost

✓ Job growth

✓ Reduced green house gases

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SAVE THE DATE!

2010 World Congress

Washington, DC
June 27-30

THANK YOU

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