What are Biofuels

- Ethanol
  - Corn, Barley, Sorghum, Cheese Whey, Sugars
  - Cellulosic: Wood Pulp, Corn Stover, etc.
- Biodiesel
  - Vegetable Oils: Soybean, Sunflower, Palm, etc.
  - Post-Consumer Oils: Yellow Grease
  - Animal Fats and Wastes

What is Ethanol

- Renewable fuel made from corn
- 10% blend needs no engine modifications
- E-85 -- alternative fuel -- defined by the U.S. Department of Energy
- Can be used in all flex-fuel vehicles

Ohio Department of Development

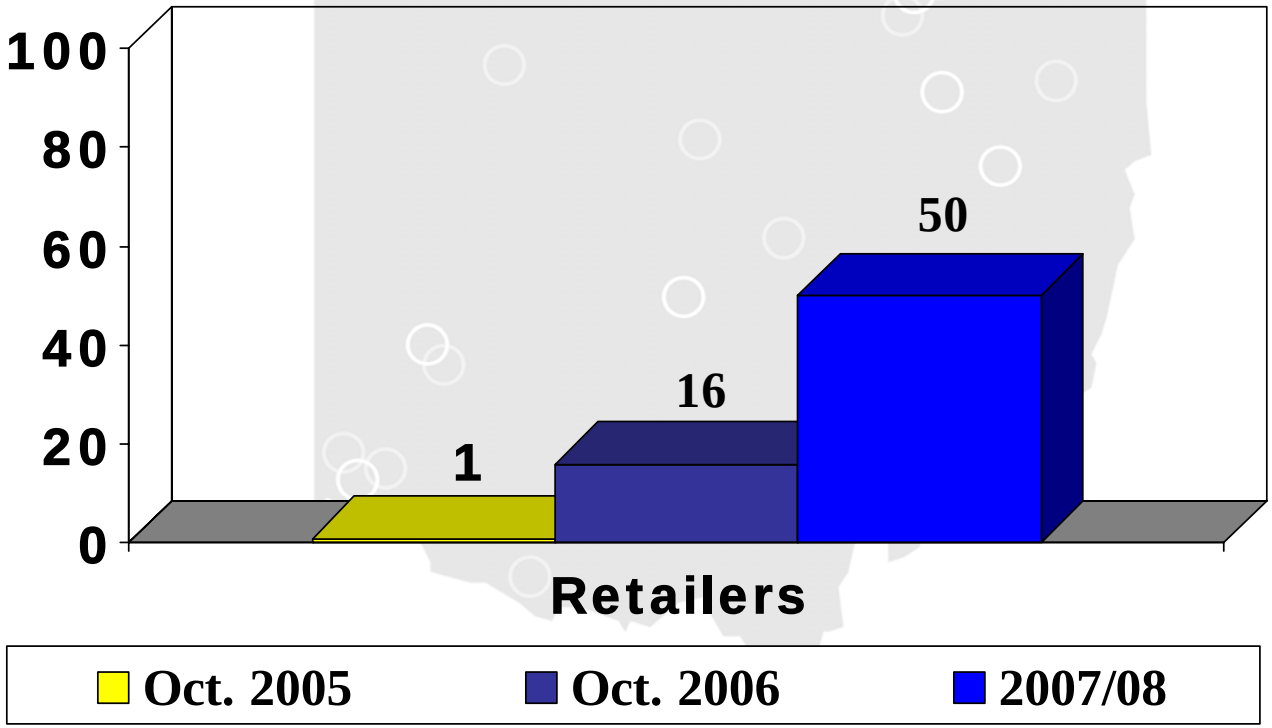
What is Ethanol

- Produced in Ohio and nationwide
- Two blends available :
  - **E10 (10% ethanol and 90% gasoline)**
    - All gasoline powered automobiles are able to use E10
    - 60 % of Ohio's gasoline is blended E10
    - Pumps are no longer labeled so you may have it in your car right now.

What is Ethanol

- Two blends available (cont'd):
  - E85 (85% ethanol and 15% gasoline)
    - Made to power Flex Fuel Vehicles (FFV's) over 4 million in the US today and 300,000 in Ohio. (Source - Ohio BMV)
    - Ohio currently has over 50 publicly accessible E85 pumps. More stations will be awarded from HB245 funds so the total is expected to reach 70 pumps by the end of the year.
    - Ohio has just been named a partner with the National Governors Association and General Motors Corporation (GM) to optimize E85 supply and its network of dealers , plants and offices to promote E-85 usage.

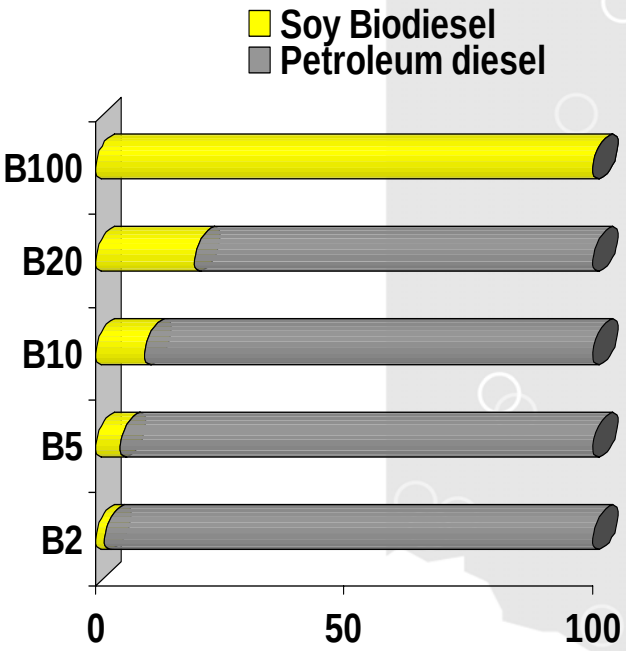
E85 Retailers



Biodiesel

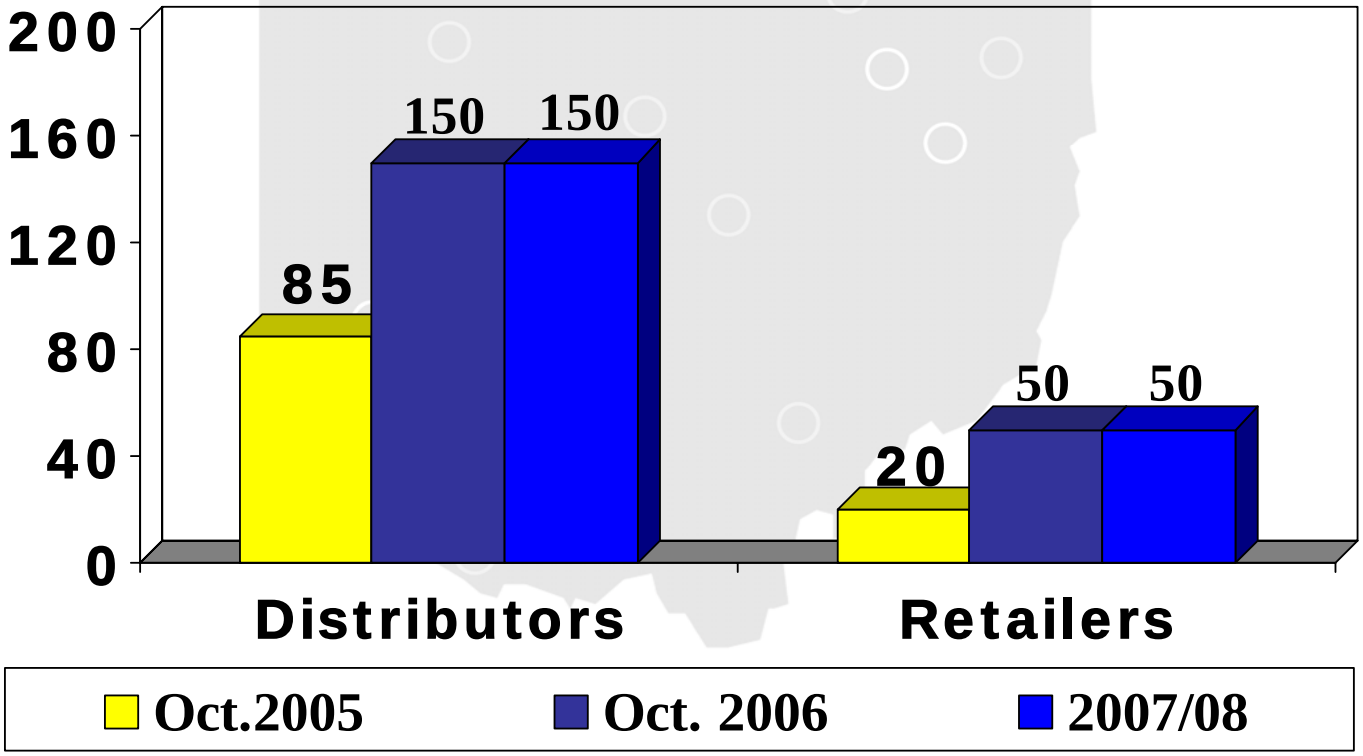
- Currently available from 150 distributors and 50 retailers in Ohio
- Multiple blends available
  - B5 and B20 most common
  - Mass Transit uses blends of B20 up to B90
    - Cincinnati Metro

Soy Biodiesel Blends



- B100 = 100% Soy Biodiesel
- B20 = 20% Soy Biodiesel + 80% petroleum diesel
- B10 = 10% Soy Biodiesel + 90% petroleum diesel
- B5 = 5% Soy Biodiesel + 95% petroleum diesel
- B2 = 2% Soy Biodiesel + 98% petroleum diesel

Biodiesel Distributors and Retail



Ohio Department of Development

Why do Biofuels Matter.

- Inputs are produced locally, increasing demand for Ohio and US production.
  - Displaces imported fuels/feedstocks.
  - Reduces trade imbalances.
- Outputs can be consumed locally.
  - In 2007, Ohio was the 5th largest ethanol user.
  - In 2009 Ohio will produce close to 500 million gallons of ethanol which will be in the 7 largest producers in the nation
  - Ohio produced 540m bu of corn in 2007.

Benefits of Biofuels

- Reduces our dependence on foreign oil (energy security)
- Creates economic development in Ohio's rural communities
- Superior performance
- Fights global warming (environmental)
- Degrades in soil and water quickly

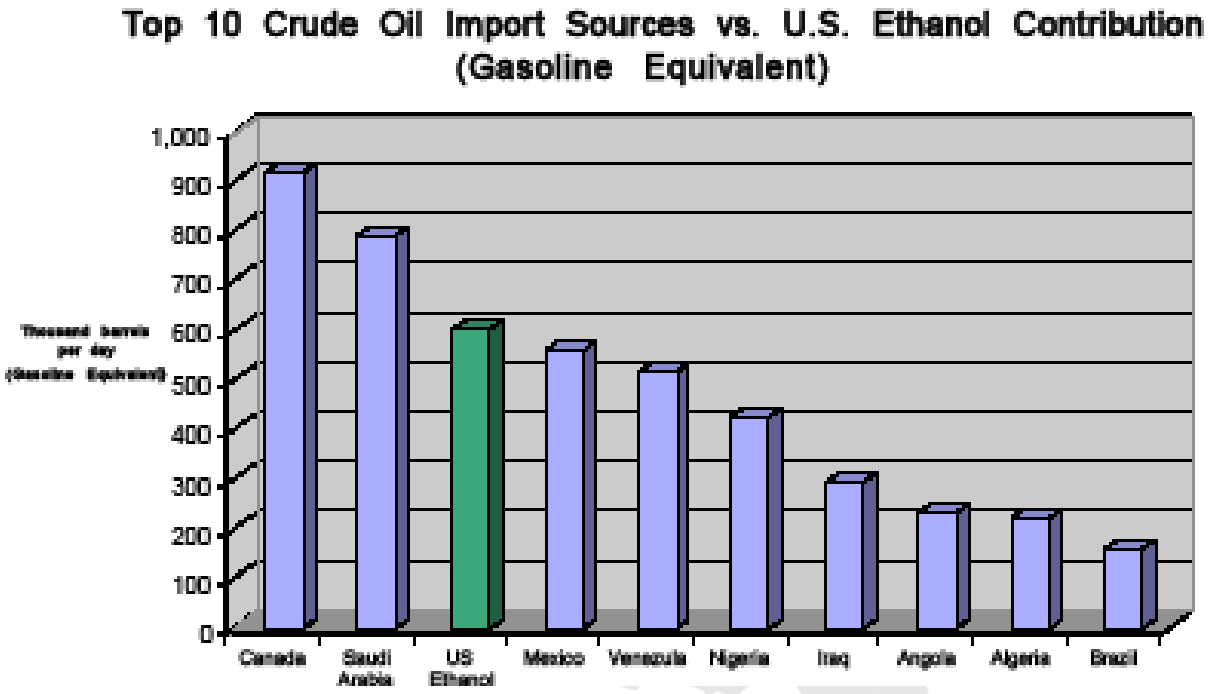
Potential Impact in Ohio

- Increased Industrial Production in Rural Areas
- Most Production Facilities are Farmer-owned:
  - Dividends remain locally, further boosting rural economies.
- Increased amount of value-add from corn & soybean processing remains in-state.
- Fuel price & price volatility is lowered:
  - Lower transport costs
  - Closer supplies

Potential Impact in the U.S.

- Increased rural development
- Decreased trade deficit
  - 1/3 of US trade deficit is oil-related
- Reduced volatility of fuel prices
- Reduced GHG emissions

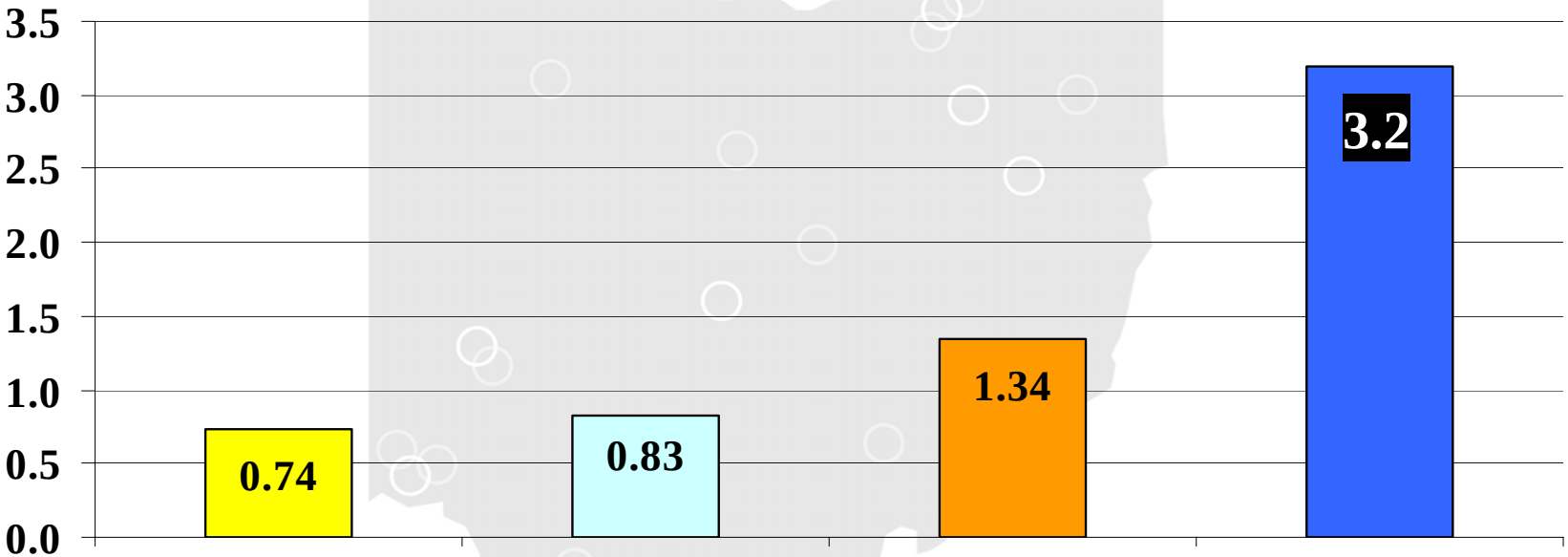
Crude Oil Sources Vs. U.S. Ethanol



Ethanol Economics

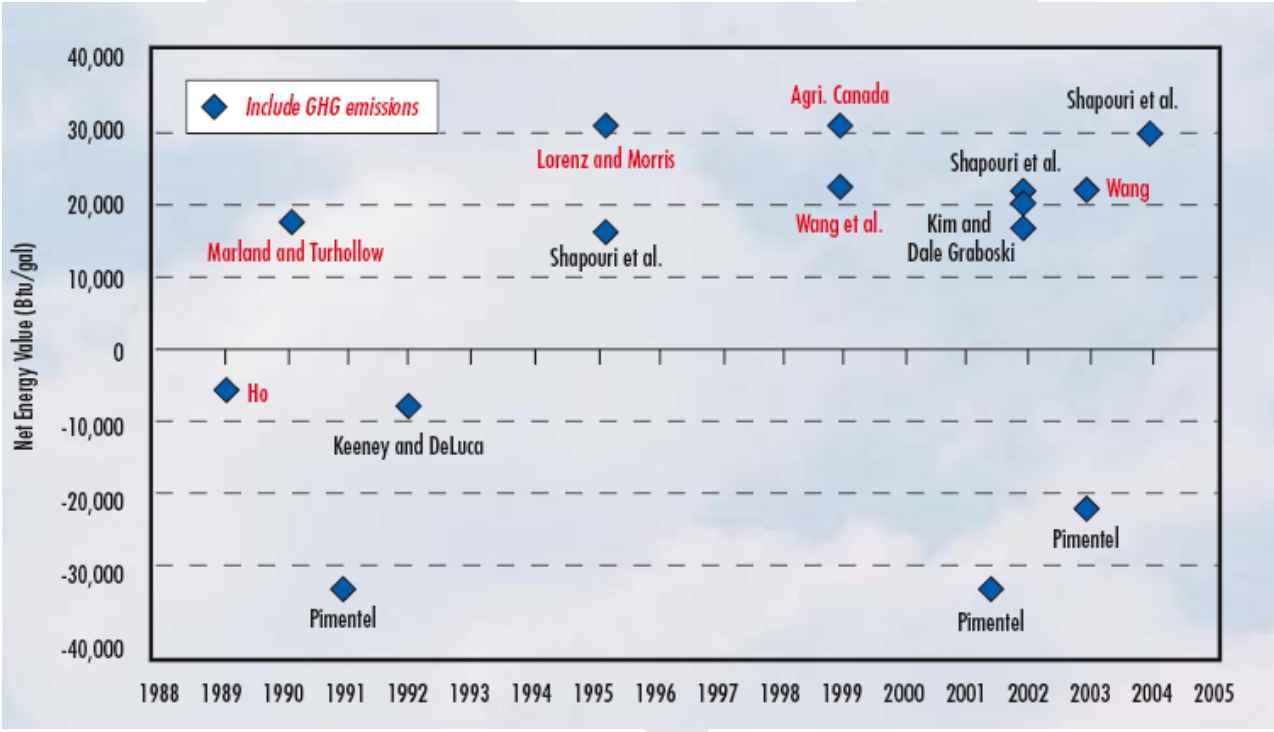
- 50 MGY ethanol plant will annually generate the following economic benefits to the community in which it is located:
  - Expand economic base by $189 million
  - Generate additional $37.5 million of household income
  - Support creation of as many as 1,106 permanent new jobs
  - Generate at least $2.2 million in new tax revenue for state and local government
  - Generate additional revenue estimated 8 to 10 cents / bushel

Energy Yield – Life Cycle Basis



Soy Biodiesel has a very favorable "Energy Yield", that is, the amount of energy gained versus the amount of energy required to produce a gallon of Soy Biodiesel

Net Energy Balance Debate



Deploying Alternative Fuels – Infrastructure Incentives

Alternative Fuels Transportation Grants

Bring ethanol and biodiesel to retail fuel stations throughout the state.

- Conversion of retail facilities: up to $10,000
- New installation of retail facilities: up to $40,000
- Promotional materials & activities: up to $5,000

Ohio Department of Development

B20 & DERG Grant Programs Administered by the Energy Office

Biodiesel B20 School Bus NOFA – Total $250,000 per year

Diesel Emissions Reduction Grant - $ 1.9 million in FY2008/09

- **Phase 1 is closed and applications were awarded**
- **Phase 2 second round expected in the fall of 2009**

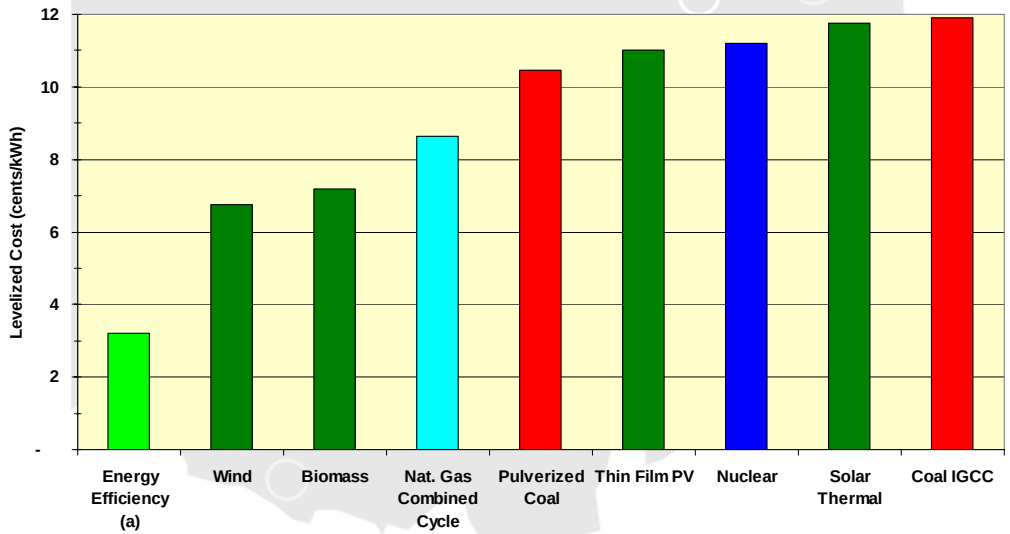
Ohio's Future

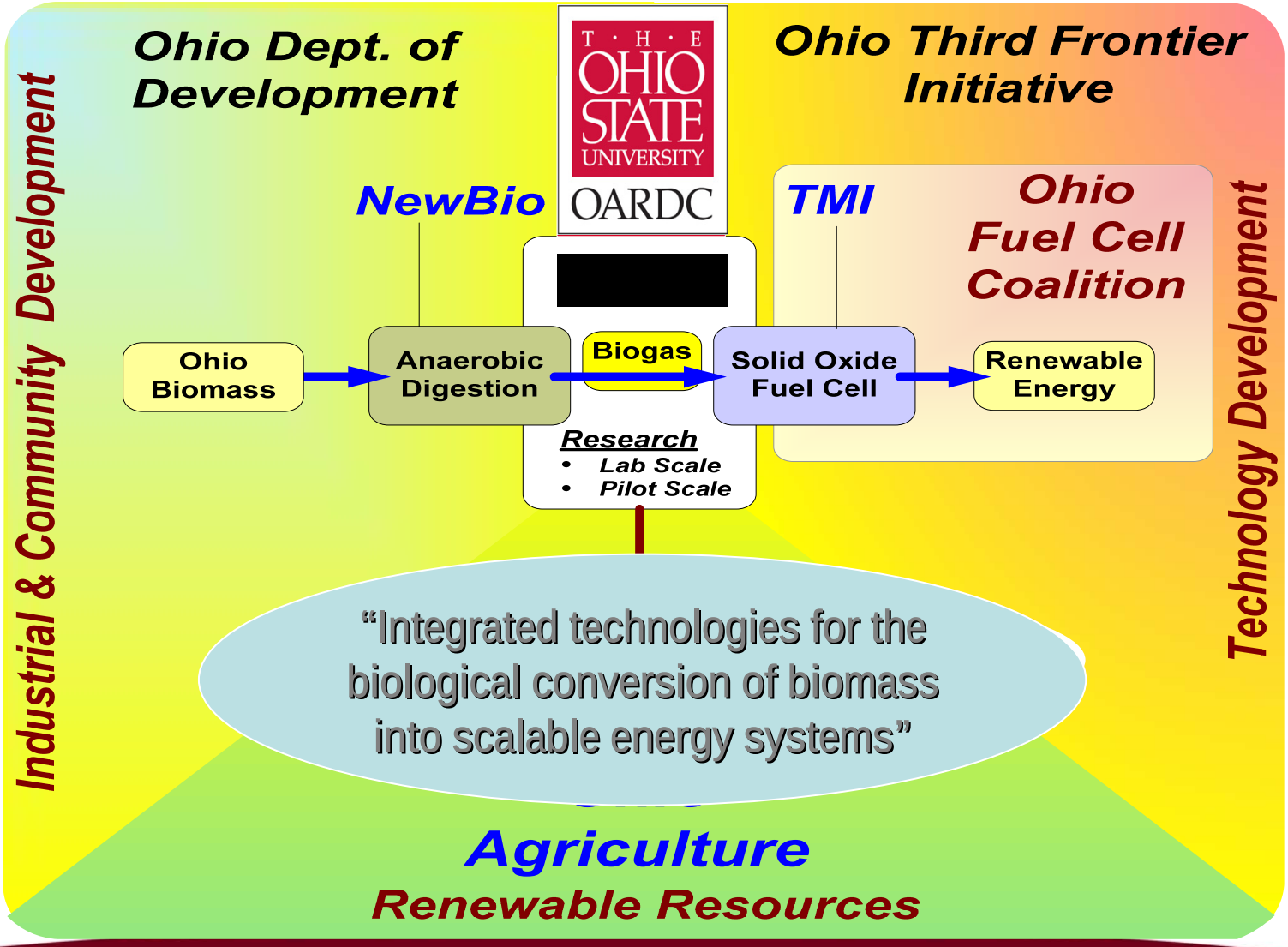
- Ohio has huge potential to provide biomass that can contribute alternative energy resources.
- Ohio has the scientific capabilities to develop technologies that convert biomass to energy efficiently.

Biomass

- Biomass can:
  - Fill the gap between energy demand and petroleum availability in the near term
  - Coupled with conservation and increased vehicle efficiency lead to sustainable fuel systems

Levelized Cost (cents/kWh)

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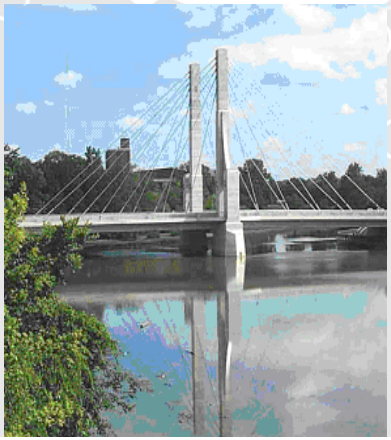
THE OHIO STATE UNIVERSITY OARDC
Ohio Third Frontier Initiative
NewBio
TMI
Ohio Fuel Cell Coalition
Industrial & Community Development
Technology Development
Ohio Biomass
Anaerobic Digestion
Biogas
Solid Oxide Fuel Cell
Renewable Energy
Research
• Lab Scale
• Pilot Scale
"Integrated technologies for the biological conversion of biomass into scalable energy systems"
Agriculture
Renewable Resources

Ohio Department of Development

Ohio In Action

Ohio Agriculture

- $79.6 billion
-



Ohio Chemicals, Plastics,Rubber

$49 Billion

OHIO BIOPRODUCTS Innovation Center

OHIO FARM BUREAU

SOY OHIO Ohio Soybean Council

THE OHIO STATE UNIVERSITY

Battelle The Business of Innovation

Ohio Department of Development

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