



# Biogas Development Opportunities in Wisconsin

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# Clarification of Terms

- Biogas –Raw product that comes from anaerobic digestion process
- Renewable Natural Gas (RNG) = biogas, that is usable in both stationary and transportation applications
- Compressed Natural Gas – transportation fuel only
  - BioCNG™



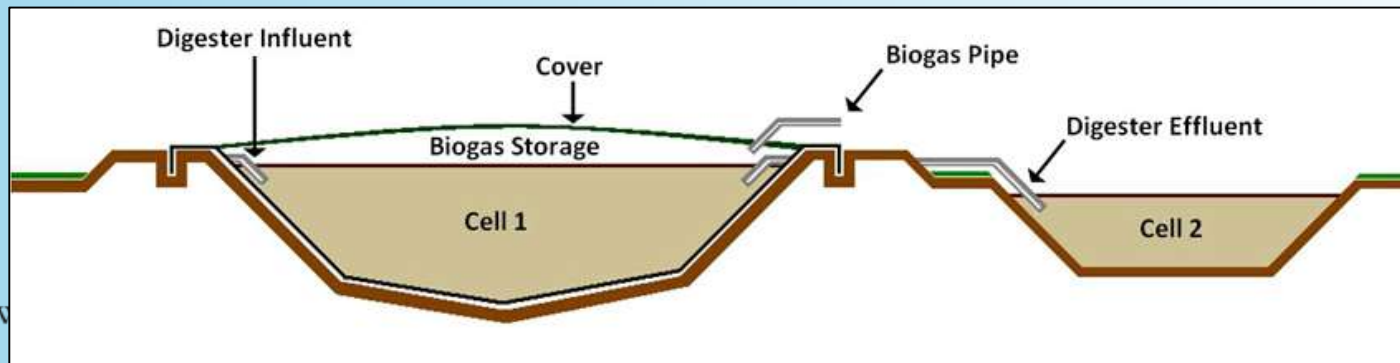
# Biogas

- 55-75% methane, 24-44% carbon dioxide
- Produced by natural bacteria which consume organic material in oxygen-free environments

**Anaerobic Digesters:** Airtight containers providing an environment for bacteria to consume organic material in the absence of oxygen



Source: Sergey Zimov in  
USEPA Methane and  
Nitrous Oxide from Natural  
Sources





## Status of Industry

- 172 anaerobic digesters
- Generate 140 MW of electrical capacity
- Primary Sources:
  - Agriculture By-products
  - Food and Cheese Processing
  - Waste Treatment
  - Manufacturing





## Industry Drivers

- Waste Use or Reduction
- Pollution control (phosphorous)
- Climate Change
- Value added/Economic benefits
  - Energy production, transportation fuel production, potential byproducts
- Policy – Low Carbon Fuel Standard, Renewable Fuel Standard



## Financial Drivers

- Investment Tax Credit
- New Market Tax Credit
- Revolving Loan Fund
- Focus on Energy
- Property Tax Exemption
- Grants



## Uses

- Heat
  - Use on-farm/in-plant
  - Nearby facilities such as greenhouses, industrial space heating
- Electricity
  - Competitive, scalable
  - Baseload renewable power
- Cogeneration (electricity + heat)
- Vehicle Fuel
  - Compressed for fleet vehicle uses

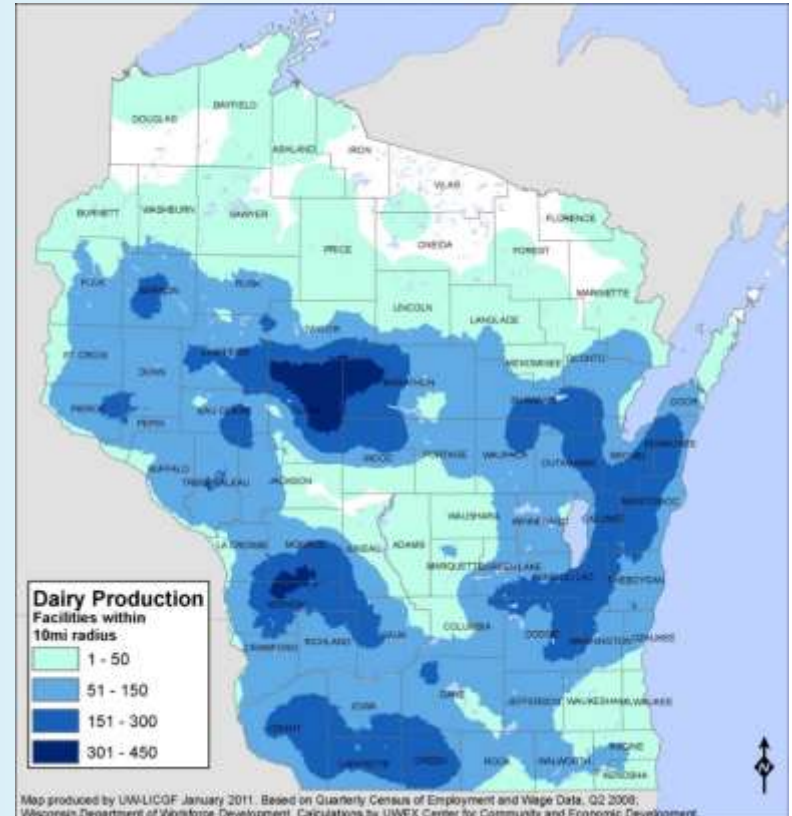




## Feedstocks

### Agriculture

- Manure
  - Pork
  - Poultry
  - Cattle
- Crops and Wastes
  - Corn Silage,
  - Hay Silage
  - Spoiled Feed, etc.



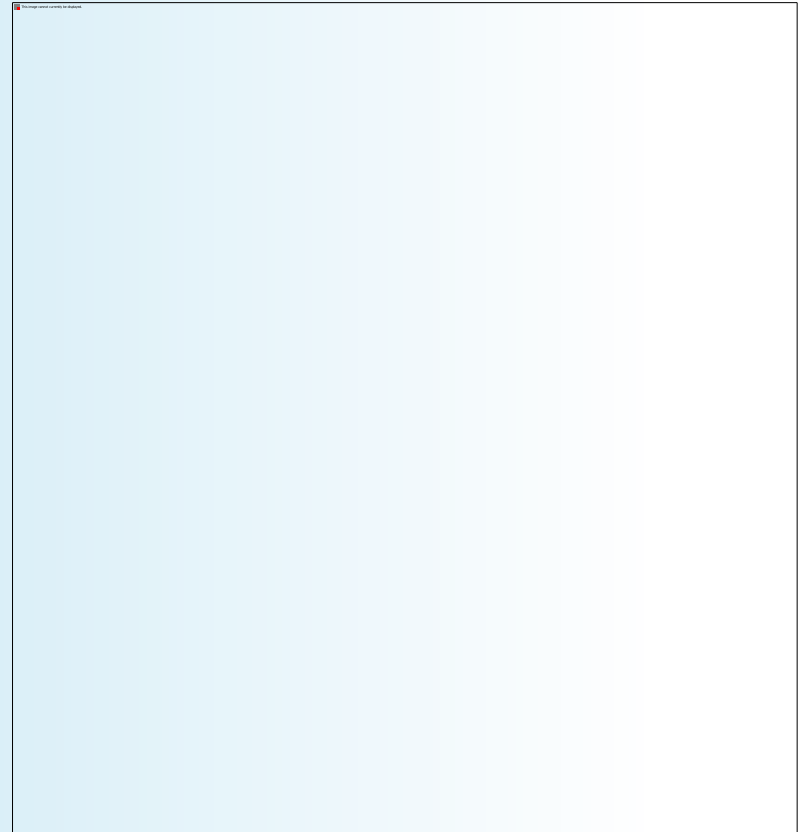




# Feedstocks

## Food Processing

- High strength waste water produced by:
  - Canning Facilities
  - Dairy Processors
  - Meat Packing and Slaughtering Plants





## Emerging Markets

- Grocery & Cafeteria Food Waste
- Small Scale





## City of Janesville

- Wastewater Treatment Facility
- Hybrid system
  - genset for power production
  - use in light-duty, heavy-duty vehicles and in custom mowing equipment (Dixie Chopper)





## Dane County

Landfill gas captured and converted to CNG

- used in 19 light-duty vehicles
- Goal to convert entire fleet to CNG over time





# Renewable Natural Gas (RNG) as a Transportation Fuel

- Renewable Fuels Standard
  - Renewable Identification Numbers
- Low Carbon Fuel Standard
- Lower Price of Fuel
- More value to producer if used as transportation fuel



## Setbacks/Challenges

- Quality of substrates
- Quantity of substrates
- Excess biogas
- Genset issues/maintenance
- Financing
- Interconnection costs



## Overcoming Challenges

- Pre-mixing tanks
- Feedstock storage
- Biogas scrubbing
- Regional, public-private collaboration
- Annual conference/info sharing
- Training
- Research and development
- Improved contaminant removal
- generate revenue outside of power generation





# State Energy Office Role

- Information Hub
- Coordinate Business Development Events
- Upgrade current facilities to be able to produce at optimal capacity
- Multi-substrate sites (i.e. multiple tanks)
- Community Digesters
- Explore and market value added end products:
  - Bedding
  - Milorganite – lawn care
  - RNG – transportation fuel





# Thank you!

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