



# Michigan Biomass Inventory



# Rationale

- Department of Energy, Labor and Economic Growth (DELEG) awarded MSU \$114,000 to conduct a biomass feedstock inventory.
- This includes an online Geographic Information System (GIS) map to locate sources of biomass
- The GIS map will allow decision makers in the private and public sector locate sources of biomass and analyze the potential for developing supply chains for alternative energy

# Definition of Biomass

- Agricultural crops and crop residues
- Animal manure
- Municipal solid waste
- Food processing waste
- Woody biomass is covered in another study
- These sources of biomass can be used to generate energy, thereby reducing CO<sub>2</sub> emissions, reduce imports, and create jobs

# Examples of Alternative Energy

- Biofuels – ethanol and biodiesel
- Generation of electricity – by sources other than coal, natural gas and oil
- Gas for heat from biomass

# Objectives of the Project

- Identify sites of residual biomass and land that can produce high energy value biomass
- Determine the gross energy theoretically available from the biomass
- Estimate energy requirements in processing biomass
- Calculate an estimated net energy balance
- Identify constraints that may impact feasibility of processing biomass at a selected location

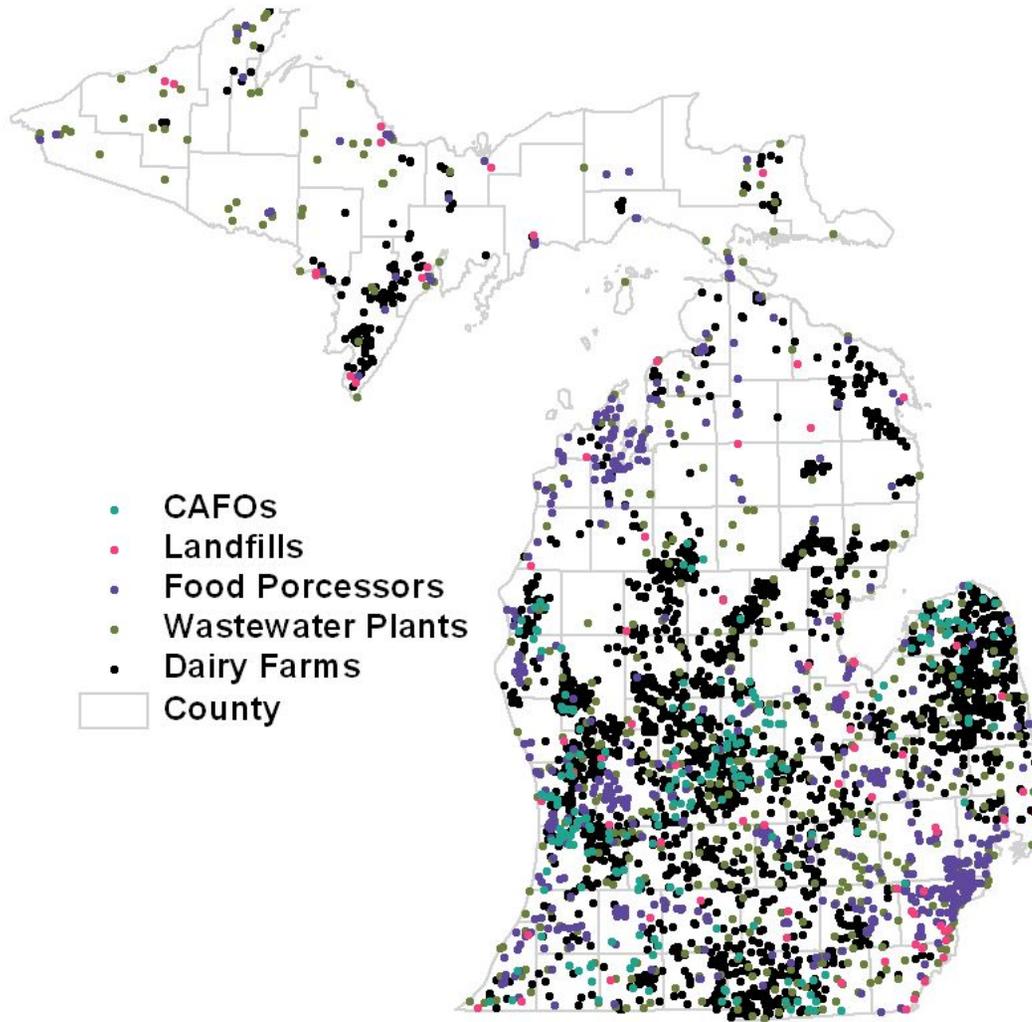
# Accessing the Information

- Online mapping and analysis
- GIS interface developed by Remote Sensing and GIS Research and Outreach at MSU
- Information can be accessed at (need website here)

# Step I: Identify Sites of Residual Biomass

- Animal manure – livestock farms
- Food processors
- Wastewater Treatment Plants
- Ethanol facilities
- Biodiesel facilities
- Landfills
- Sugar Beet Pulp from sugar processors

# Draft- Biomass Sources



# Step II: Identify Land that is a Source of Biomass

- Land that can be used for dedicated energy crops – e.g. switchgrass
- Corn stover
- Straw
- As previously noted – wood and forestry are covered elsewhere.

# Michigan Cropland Data Layer



# Step III: Identify Constraints

- Factors that may substantially impact feasibility of processing biomass at selected location
- Examples
  - Limited water resources
  - Transportation network limitations
  - Unique natural features that make it difficult to obtain feedstocks or generate energy
  - Lack of access to natural gas pipeline or electric grid

# Gross Energy Available

- From anaerobic digestion
- From gasification
- From burning
- From fermentation and transesterification

# Estimate Energy Requirements in Processing Biomass

- Develop energy requirements for each feedstock
  - Including cultivation, harvesting, transportation, and conversion
- Qualitatively estimate energy associated with the biomass product as well as energy lost as heat

# Calculate the Estimated Energy Balance

- Energy available less energy needed to create, transport and convert the feedstock

# How to Use the Data

- User can examine the energy that can be produced from a selected site on the map
- User can generate a rough energy balance to determine the net energy available
- Website:

<http://MiBiomass.rsgis.msu.edu>

# Tutorial