On-Farm Anaerobic Digestion in the United States

Energy & Climate Partnership of the Americas
MSU/UCR Kickoff Seminar
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U.S. On-Farm Anaerobic Digesters

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176 On-Farm Systems

US EPA – AgSTAR. 2/2012. http://www.epa.gov/agstar/

Common Anaerobic Digesters Types

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Green Meadow Farms, Inc (GMF)

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- Founded in 1922
- 3rd generation family farm
- Farm statistics
  - 7,500 animals
  - 2,630 hectares of cropland
  - 2 milking parlors
- Approximately 70 employees
- First operated an anaerobic digester in 1980
  - Plug flow digester
  - Operated for 6 years
  - Shut down due to mechanical issues

Green Meadow Farms, Inc

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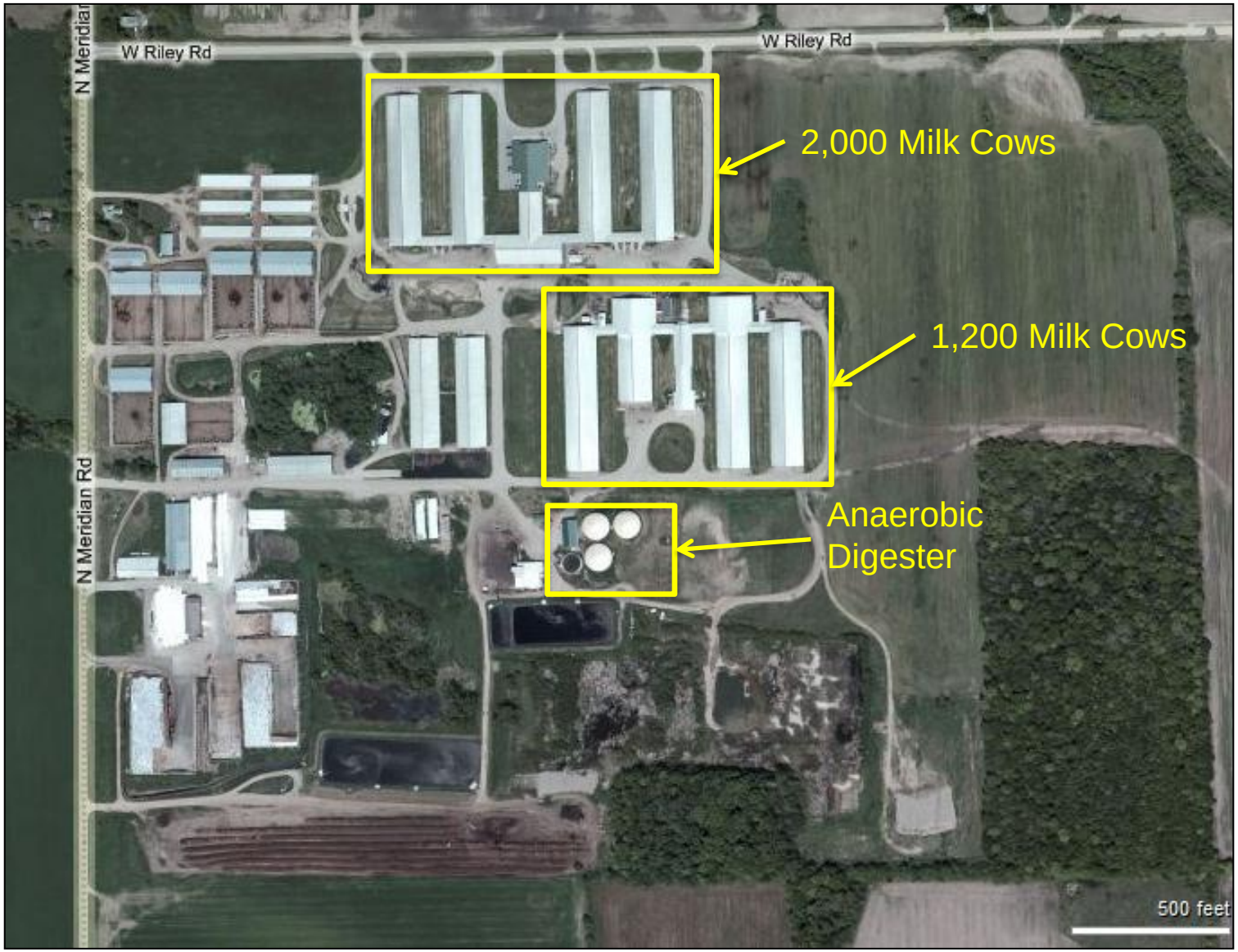

GMF Anaerobic Digester

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- Broke ground in 2006
  - Completed 2007
  - Financial support from Michigan Public Service Commission
  - Design flow rate 475 m^3/d (472 metric ton/day)
- Complete mix (3 tanks)
  - Capacity of 10,220 m^3 (3,400 m^3 per tank)
  - 22 to 26 day hydraulic retention time
  - Propeller style mixers (3 per tank)
- On-farm digester feedstock manure (2,900 milk & 300 dry cows)
- Off-farm digester feedstock
  - Ethanol byproducts (syrup)
  - Vegetable processing waste
  - Salad dressing wastewater

GMF Anaerobic Digester

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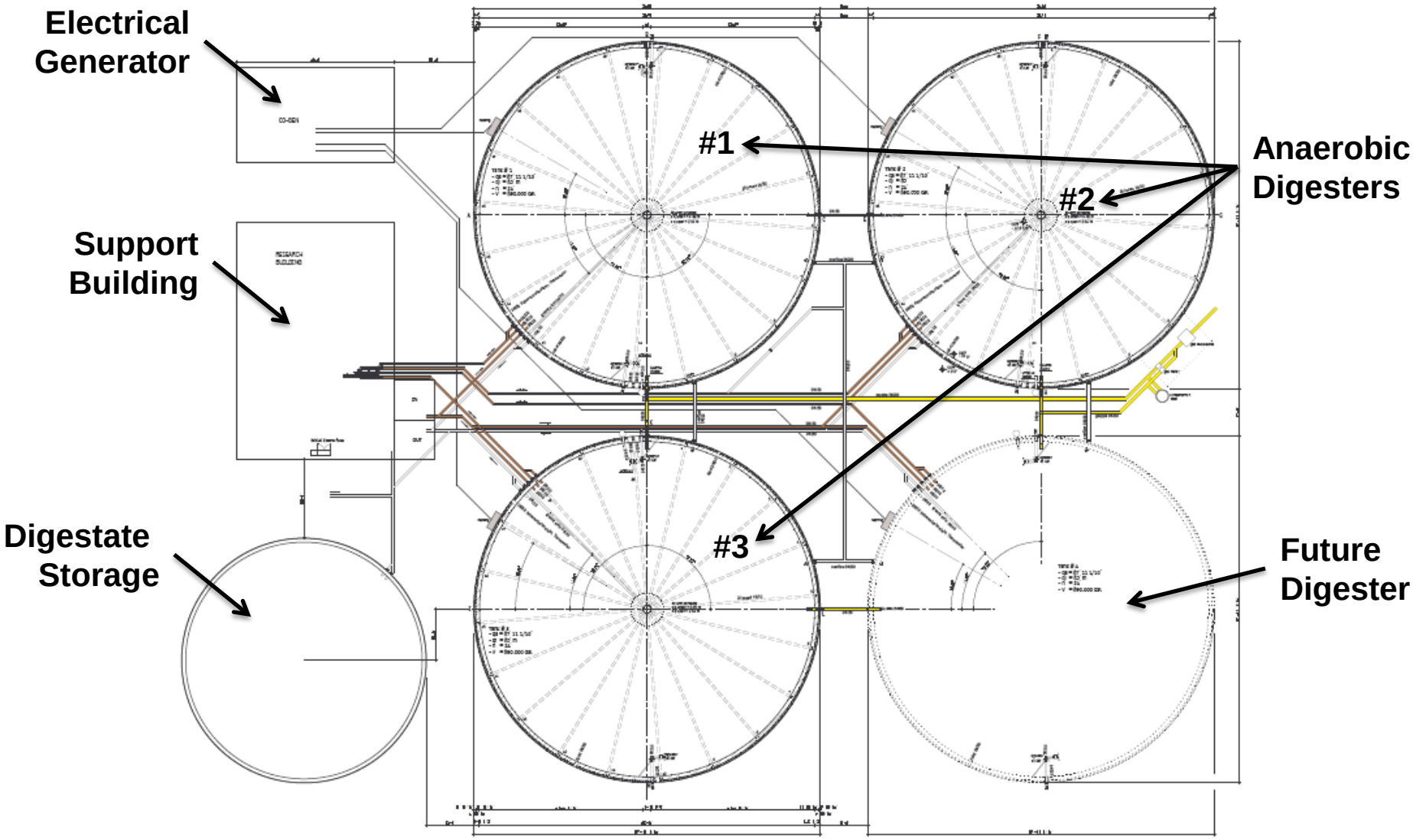

GMF Anaerobic Digester

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GMF Anaerobic Digester - construction

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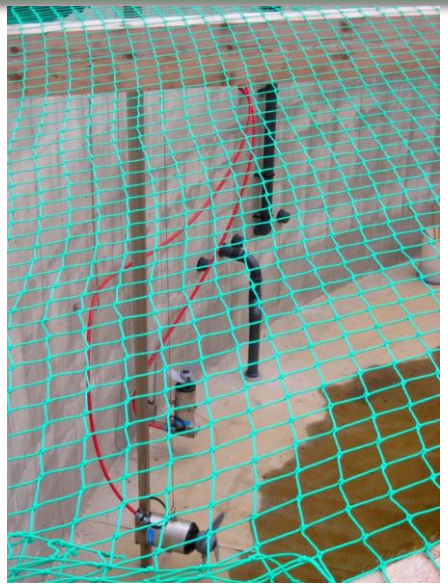

GMF Anaerobic Digester – construction

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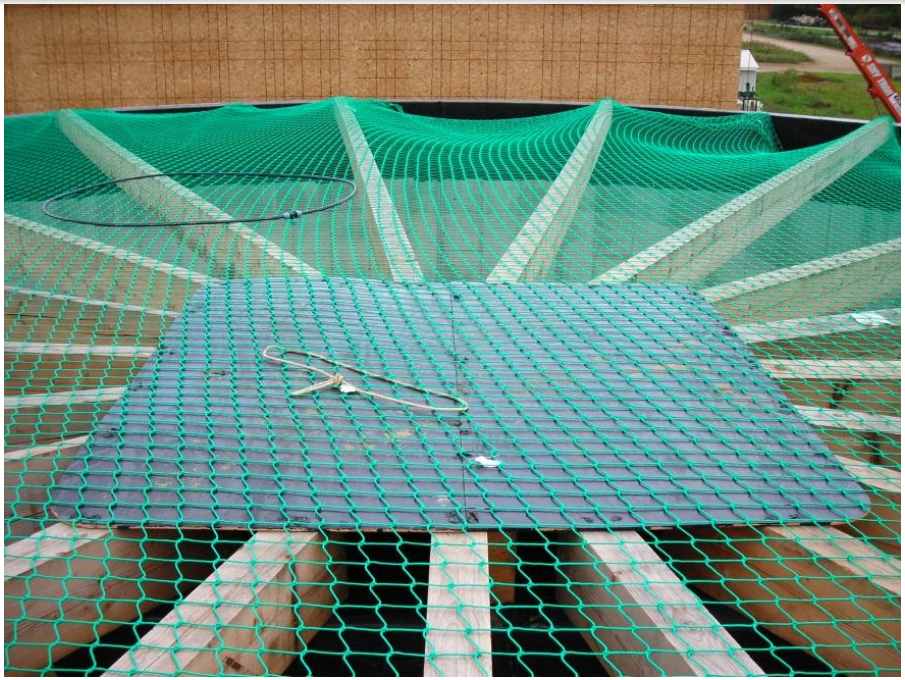

GMF Anaerobic Digester – finished

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GMF Anaerobic Digester - products

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- Biogas used for electrical production
  - Caterpillar® 3516 engine-generator with heat recovery
    - 800 kW electrical output potential
    - All electrical energy sold off farm
  - Heat recovery
    - Hot water to sludge
    - In wall & floor heat
- Digestate use
  - Fertilizer for crops
  - Compost

GMF Anaerobic Digester - products

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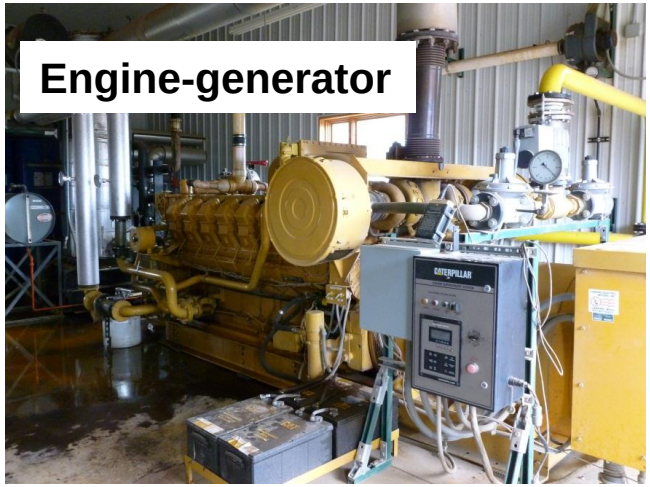

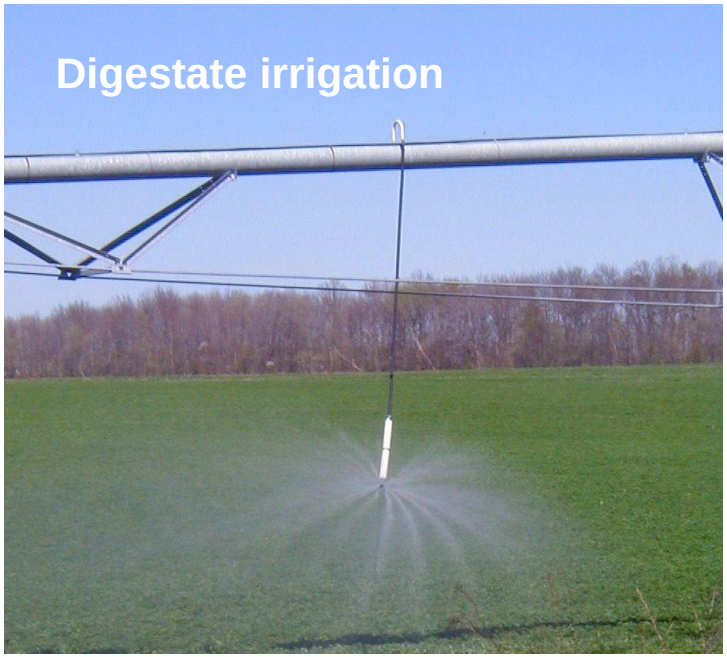

Conclusions

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- Successfully system
- Minor mechanical issues
  - Metal fatigue
  - Roof material
  - Corrosion
- One biological upset during first 5 years
- Off-farm feedstocks change over time
- Expansion still being considered

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