

On-Farm Anaerobic Digestion in the United States

Energy & Climate Partnership of the Americas
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Dana M Kirk, Ph.D., P.E.
Michigan State University
Biosystems and Agricultural Engineering
kirkdana@msu.edu



U.S. On-Farm Anaerobic Digesters



176 On-Farm Systems

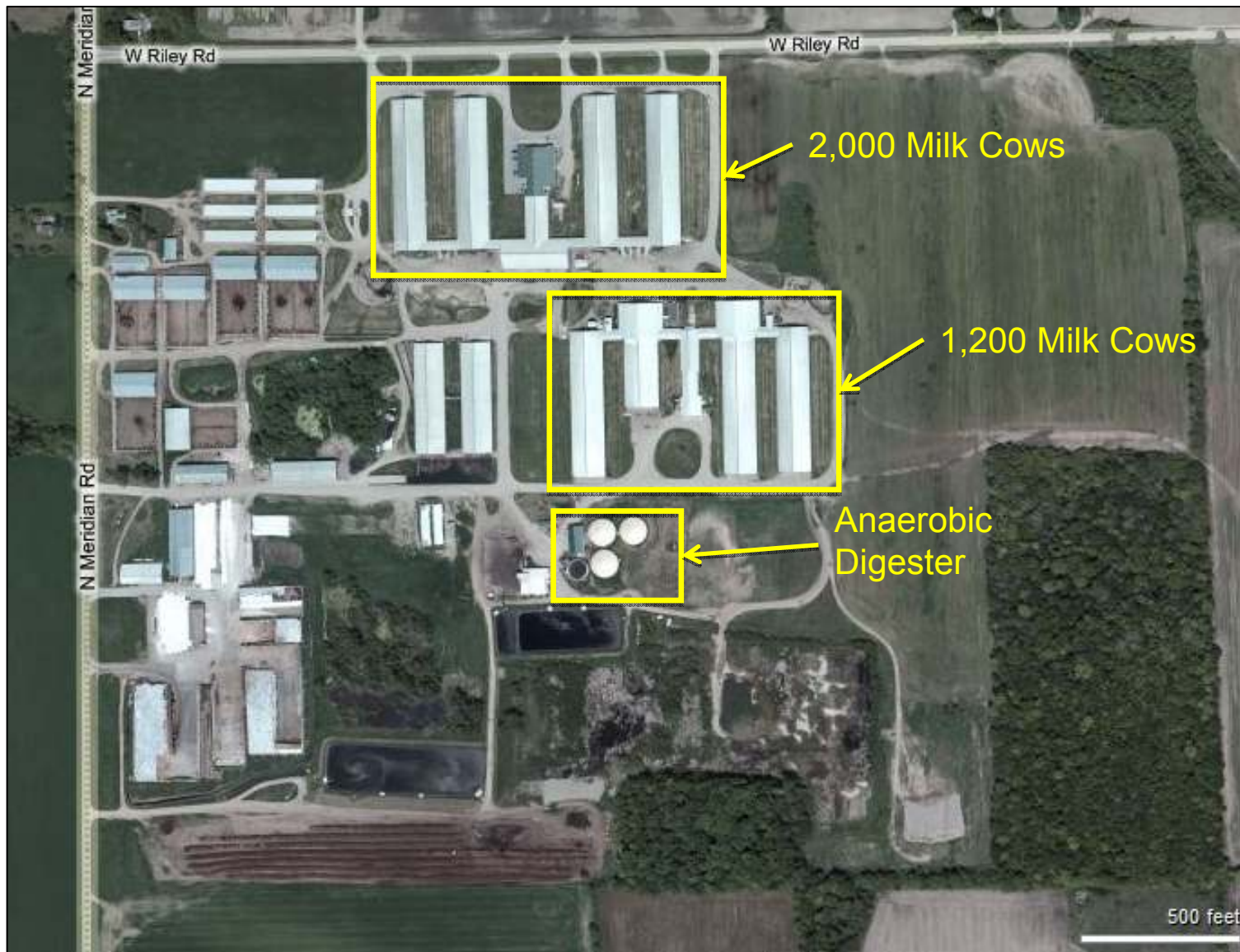
Common Anaerobic Digesters Types



- 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



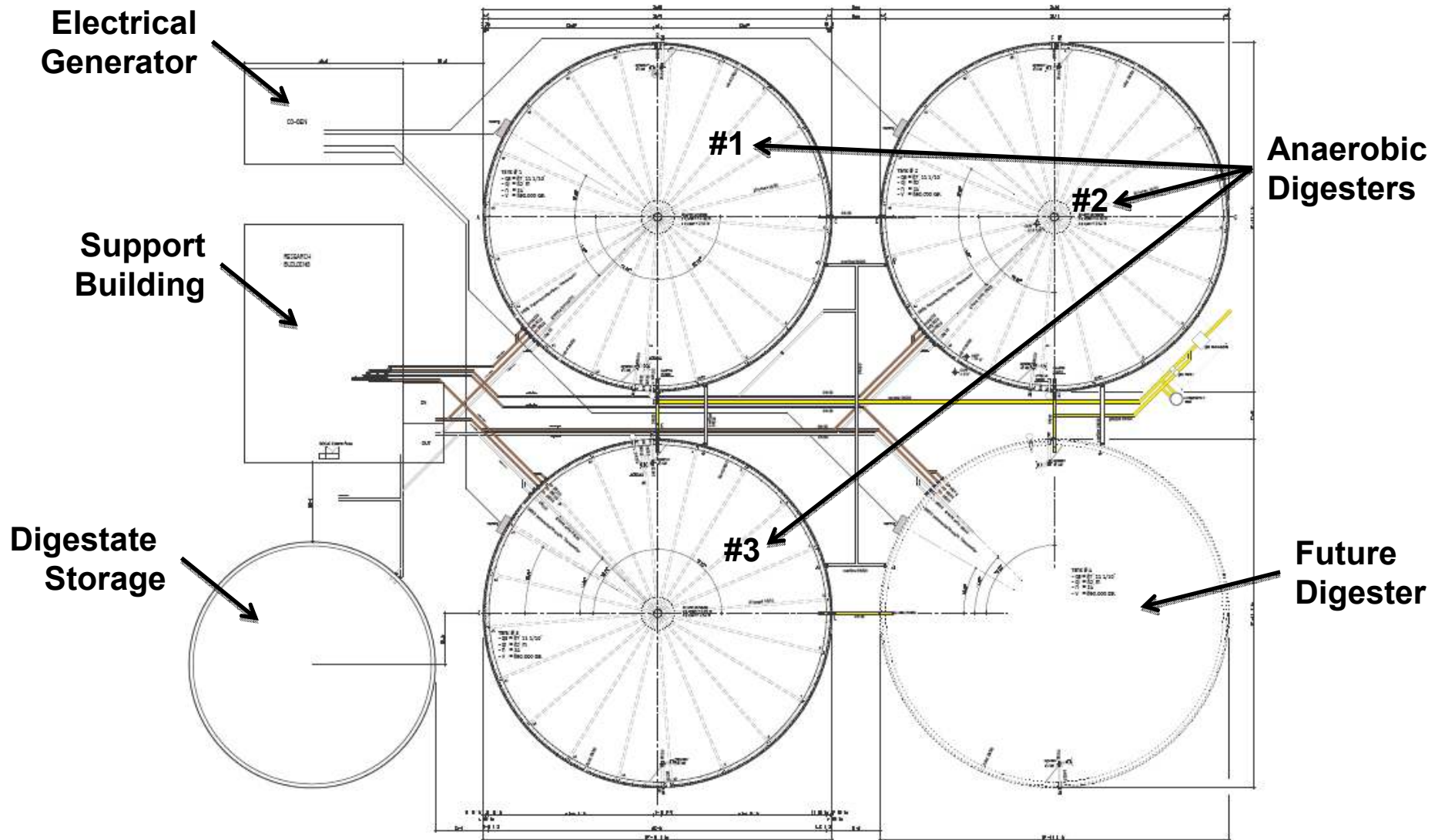
Green Meadow Farms, Inc



- Broke ground in 2006
 - Completed 2007
 - Financial support from Michigan Public Service Commission
 - Design flow rate 475 m³/d (472 metric ton/day)
- Complete mix (3 tanks)
 - Capacity of 10,220 m³ (3,400 m³ 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



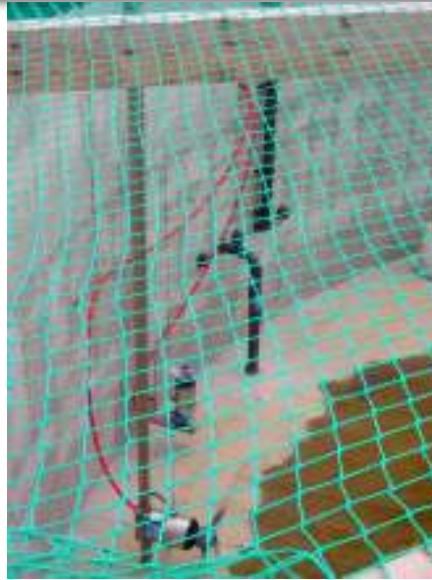
GMF Anaerobic Digester



GMF Anaerobic Digester



GMF Anaerobic Digester - construction



GMF Anaerobic Digester – construction



GMF Anaerobic Digester – construction



GMF Anaerobic Digester – finished



- 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



- 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



Dana M Kirk, Ph.D.
Biosystems and Agricultural Engineering
Anaerobic Digestion Research and Education Center
E: kirkdana@msu.edu
P: 1.517.432.6530



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