

Anaerobic digestion in Michigan: A review of where we are and a look at opportunities for the future

Dana Kirk, Ph.D., P.E.

Michigan State University

Biosystems and Agricultural Engineering Department

Anaerobic Digestion Research and Education Center





OBJECTIVES

- Research and develop novel waste-to-resource technologies capable to convert organic wastes into value-added fuel and chemical products
- Fulfill commercialization and technology transfer of new waste-to-resource concepts
- Educate the next generation of engineers, scientists and policymakers on waste utilization design and practice



Process

- Naturally occurring microorganisms
- Temperature: 100°F
- Oxygen: limited/none
- Time: 4 – 40 days

Products

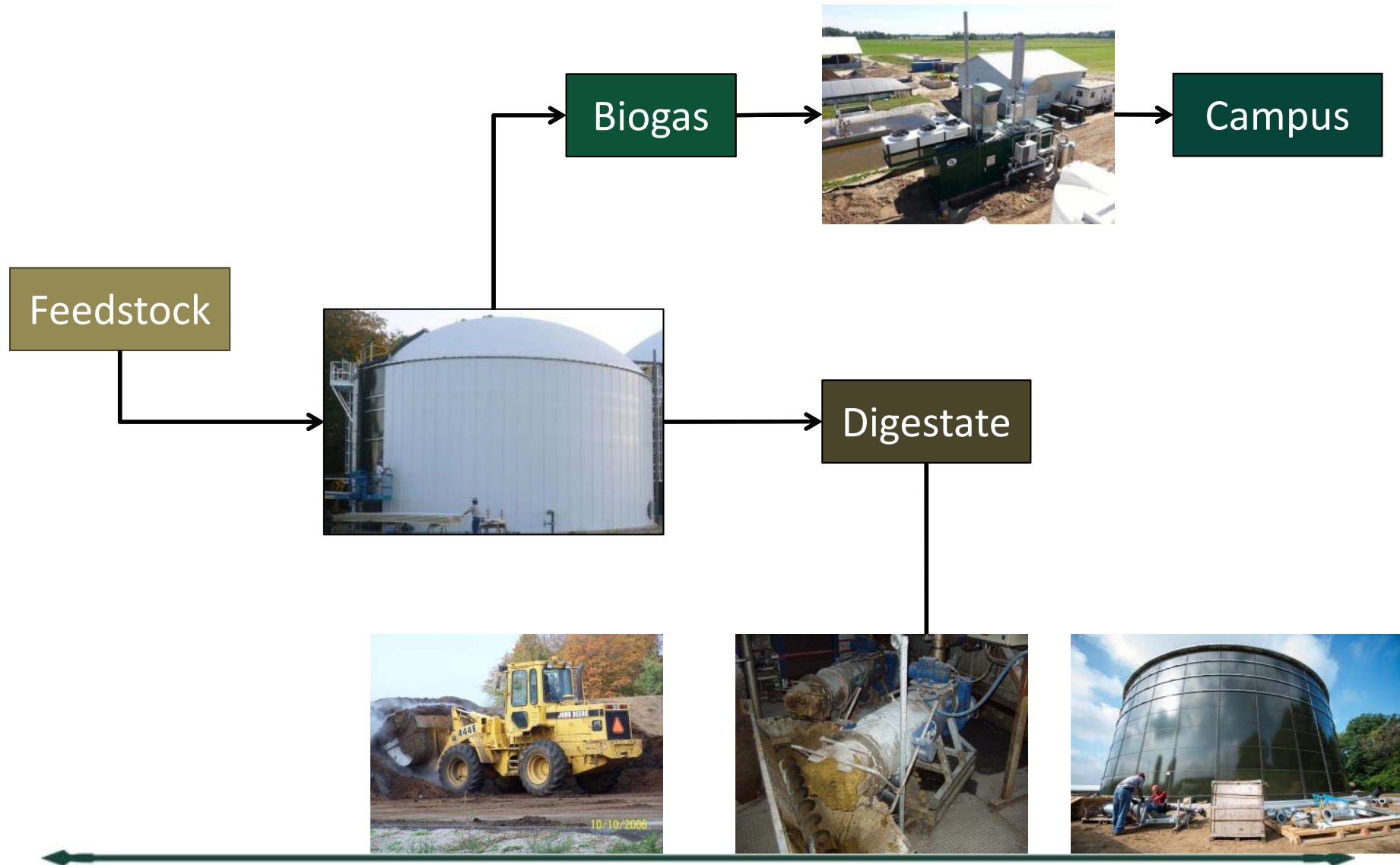
- Biogas (methane)
- Fertilizer



South Campus Anaerobic Digester



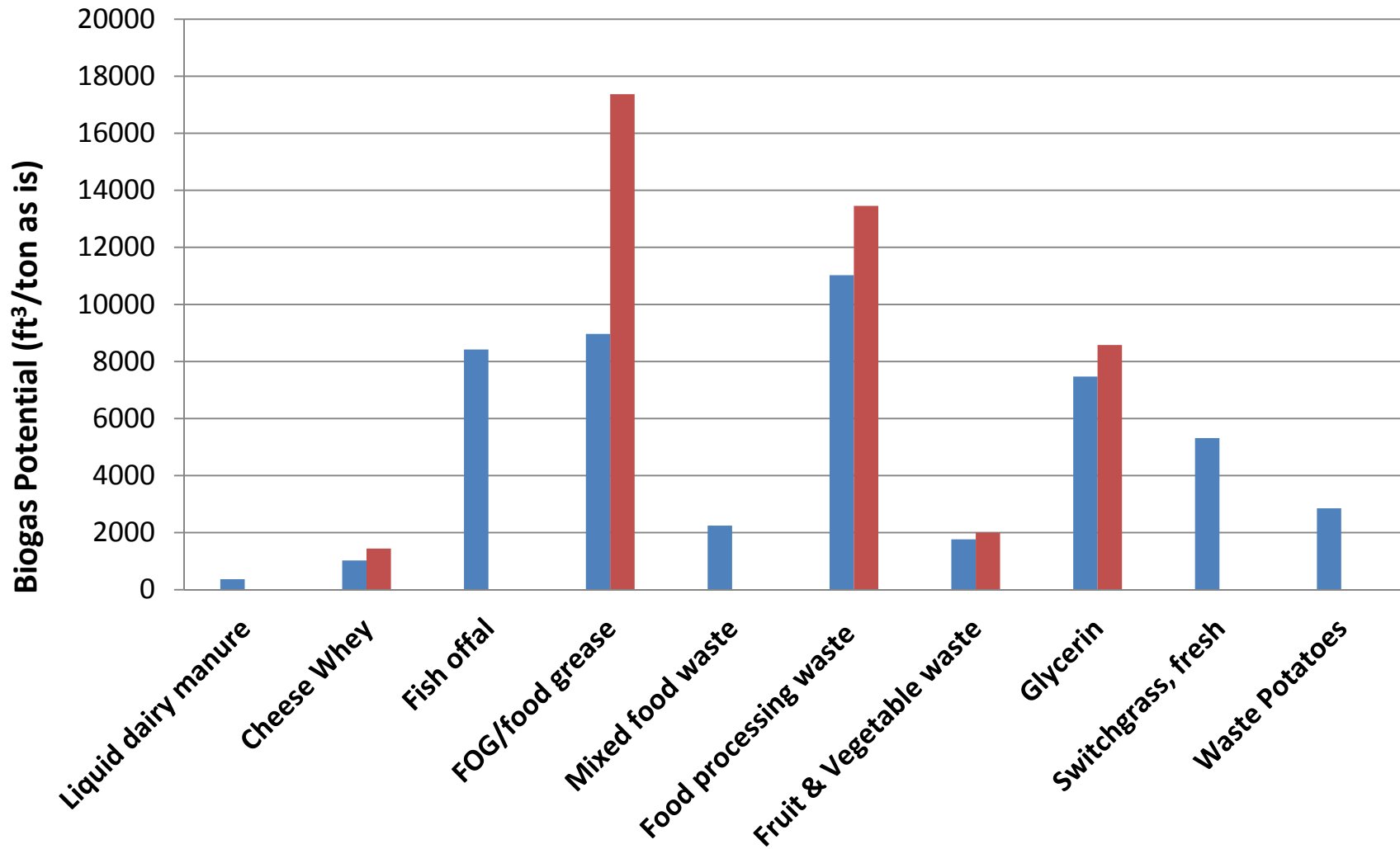
MSU South Campus Anaerobic Digester



- Agricultural – 7 operating, 1 planning
 - Animals # – 41,000 dairy & swine
 - Energy generation capacity – 3.2 to 3.6 MW
 - Methane emission reduction – 49,000 mton CO₂/yr
- Commercial (food processors) ≈ 10
- Wastewater
 - Treatment digester ≈ 60
 - Accepting outside substrate – 1 active, several evaluating
- Community – 1 not currently operating



Energy potential of potential digester feedstock



Michigan Biogas Opportunities

Source	Number	Estimated Quantity	Unit	Estimated Quantity (ton/d)
Food processors	≈600	100 to 10,000	lb/d	300
Hospitals	86	0.4 to 0.6	lb/d/meal served	14.4
Schools	?	0.4 to 0.6	lb/d/meal served	320
Correctional facilities	39	0.4 to 0.6	lb/d/meal served	26
Universities	?	0.4 to 0.6	lb/d/meal served	137
Grocery stores	≈300	200 to 600	lb/d	60
Service/Restaurants	?	?		?
Total				857



Questions

