Reducing Energy Consumption through Manure Treatment Technologies

Adrian Stocks
Wisconsin DNR Water Quality Bureau Director
Why Consider Manure Treatment?

- Reduction in hauling costs
  - Remove water from material being hauled to fields
  - Increases distance that drier materials can be hauled
- Reduction in liquid storage needs/increased cattle numbers for same sized storage
- Create segregated nutrient streams
  - Solids: P
  - Liquids: N
- Create products (e.g., bedding)
- Reduced odors?
- Water reuse
  - Water for cattle
  - Water for reuse on site
Potential Issues

How does the cost of hauling manure compare to the cost of treatment?

What level of treatment do you need to accomplish your desired goals?

- Irrigation
- Seepage Cells
- Recurring Surface Water Discharge
- On-site reuse
- Cattle watering

Maintenance of treatment equipment
Landspreading “Math” Example

How many tankers does it take?

50 acre field
5,000 gallon tankers
15,000 gallons liquid manure/acre

15,000 gallons per acre / 5,000 gallon tankers = 3 tankers per acre

3 tankers x 50 acres = 150 tankers!
Permitted Wisconsin Manure Treatment Systems

Son Bow (CAFO)
Majestic Meadows (CAFO)
BC Organics (proposed)
Emerald Dairy (inactive) (CAFO)
Springfield Clean Water
Treatment Train

Anaerobic Digestion (optional)
  Product stabilization
  Energy production/GHG offset
Solids separation
Ultrafiltration
Reverse osmosis
Air stripping (optional)
Activated carbon (optional)
Disinfection
Common Problems

Consultant inexperience with NPDES/WPDES permit requirements
  Permitting process
  CAFO TBELs vs. WQBEL
Ammonia, the small molecule
  Requires acidification to increase its size and get caught by membranes
Temperature
Discharge locations
  Wetland issues
  Low flow receiving waters
  High quality/low quality streams
  Available WLA in TMDL areas?
WET Testing Anion/Cation deficiency toxicity associated with RO discharges
Question?