



Introduction to the Topic of Co-Digestion

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Why Co-Digestion?

- Addresses 2 waste streams
- Reduces volumes and increases energy/biogas production
- Improves resiliency, self-sufficiency at WRRFs
- A CWE practice
- Financial opportunities and community benefits
- A uniquely urban solution?



WEF Definition

A circular water economy (CWE) :

Recycles and recovers resources within the water use and treatment cycle to maximize value for people, nature and businesses.



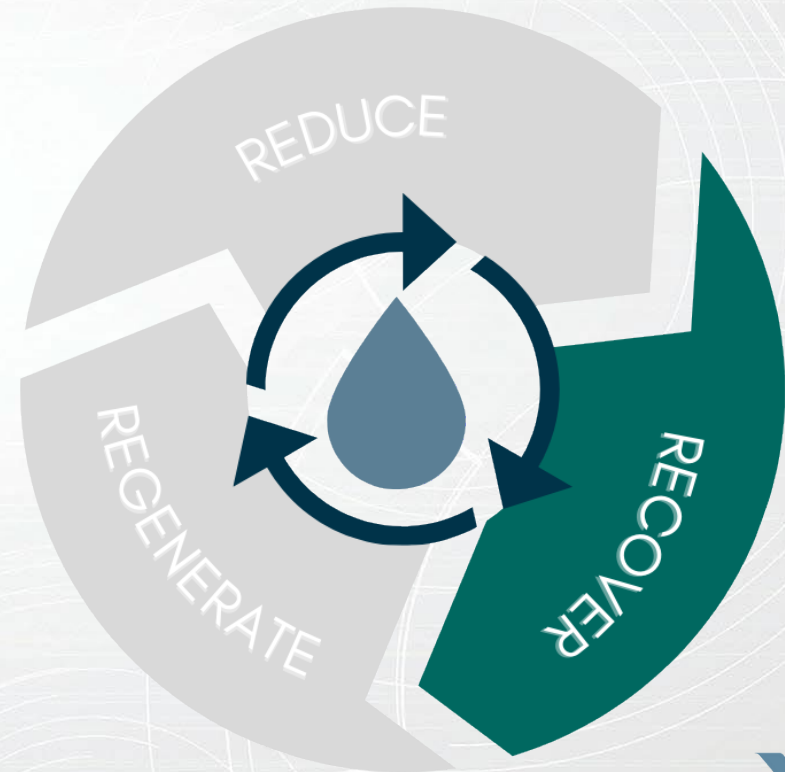
Recover

Convert waste that cannot be eliminated into valuable resources

Water Reuse - Using treated wastewater for agriculture, irrigation, and municipal purposes

Nutrients - Extracting valuable resources like nitrogen and phosphorus

Energy - Harnessing energy from wastewater



From Waste to Resource: Leveraging the Circular Economy Framework to Tackle the U.S. Biosolids Crisis (Abouhend, etal. 2025)*

PROBLEM

Linear Economic Models

Disposal Practices

- Landfilling
- Incineration
- Land Application

Challenges

- Shrinking Disposal Capacities
- Aging Infrastructure
- Rising Management Costs
- Greenhouse Gas Emissions
- Nutrient Runoff
- Emerging Contaminants
- Health Risks

Transition

Barriers & Pathway to a Circular Future

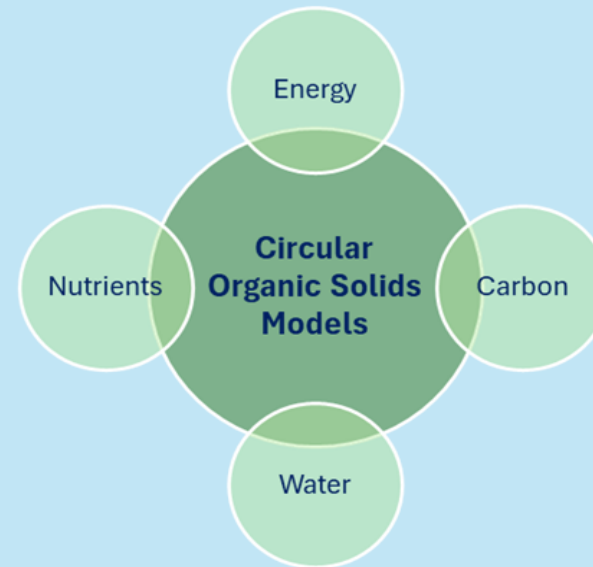
Barriers

- Regulatory Fragmentation
- Technological Gaps
- Financial Constraints

Pathway

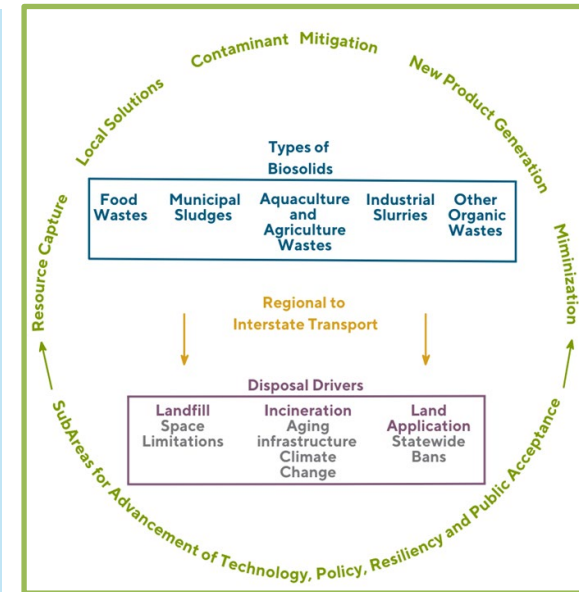
- Technological Innovation
- Innovative Regulatory Policies
- Regional Collaboration
- Changing Mindsets & Building Support

SOLUTION

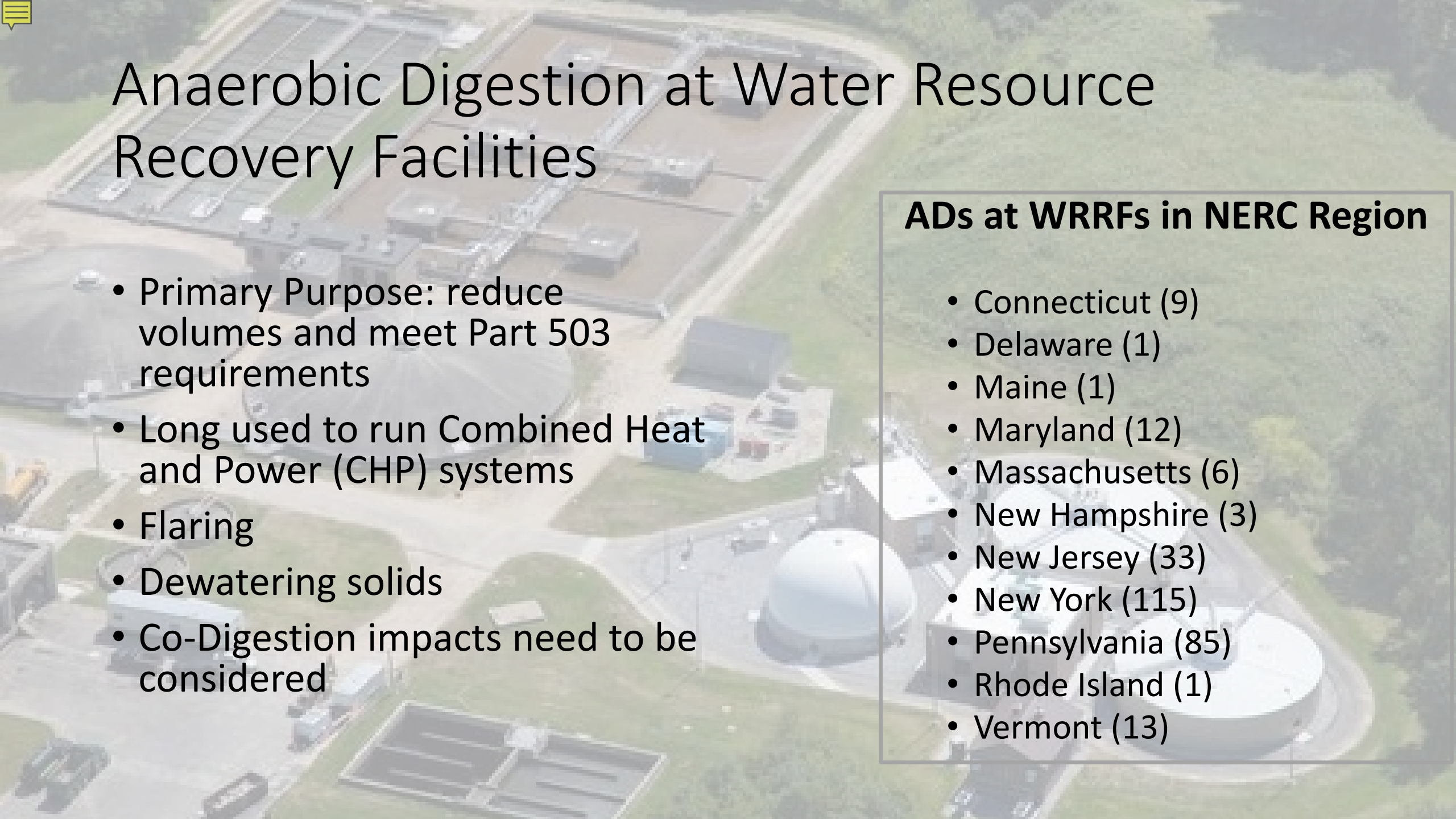


Benefits

- Generate 325 Billion kWh of Electricity/Year
- Sequester 292 MMT CO₂-eq /Year
- Fully Offsets U.S. Fertilizer Demand
- Saves \$ Billions In Disposal Costs



* Submitted for publication in *Environmental Science & Technology*, April 2025, for Circular Water Economy Special Issue



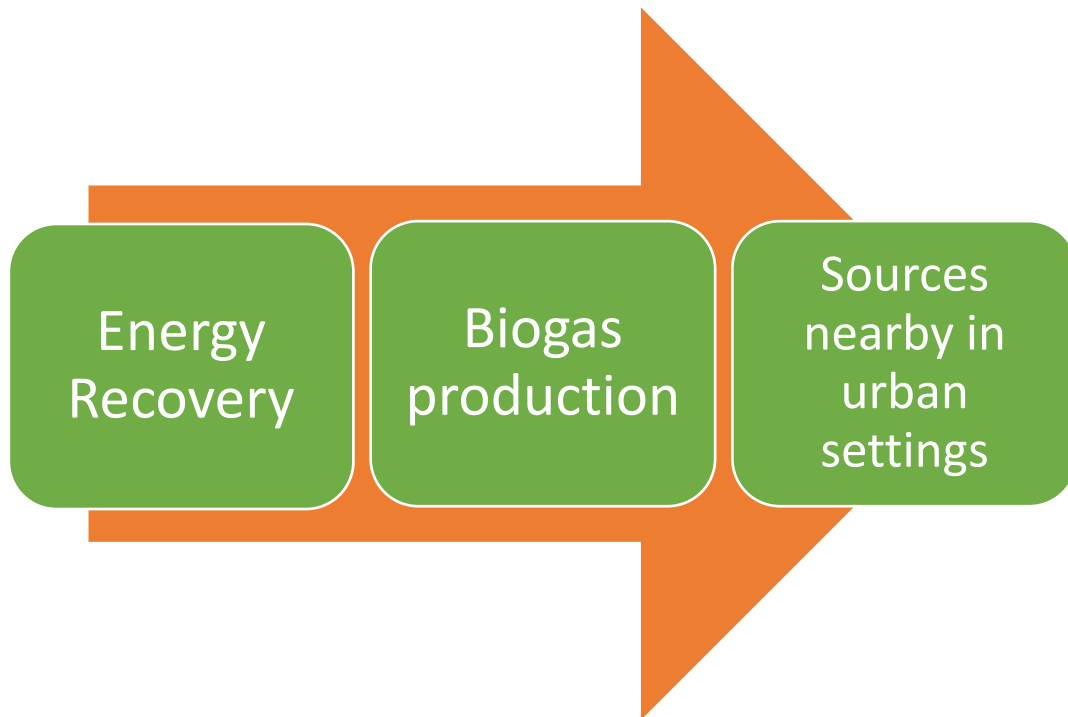
Anaerobic Digestion at Water Resource Recovery Facilities

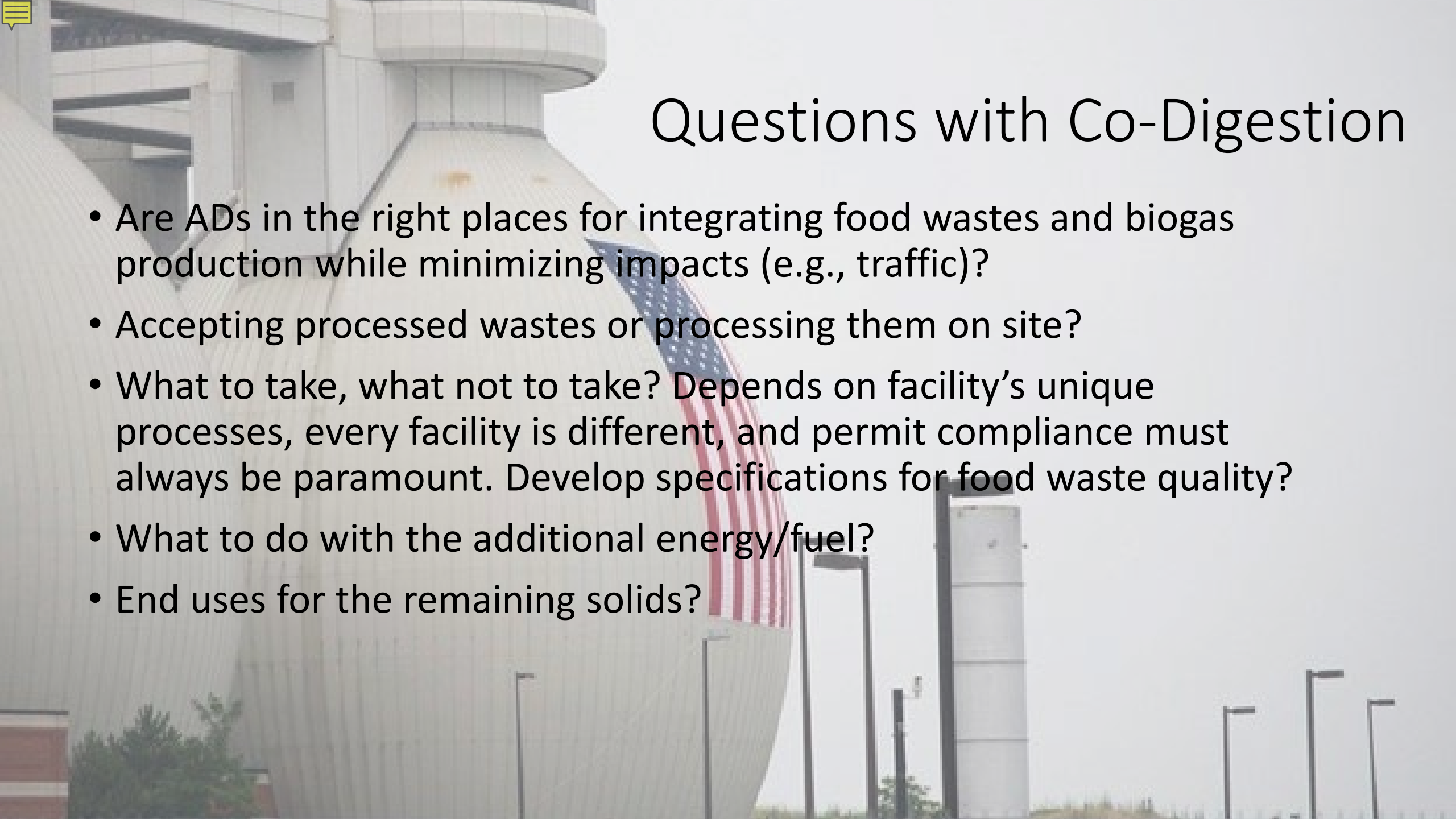
- Primary Purpose: reduce volumes and meet Part 503 requirements
- Long used to run Combined Heat and Power (CHP) systems
- Flaring
- Dewatering solids
- Co-Digestion impacts need to be considered

ADs at WRRFs in NERC Region

- Connecticut (9)
- Delaware (1)
- Maine (1)
- Maryland (12)
- Massachusetts (6)
- New Hampshire (3)
- New Jersey (33)
- New York (115)
- Pennsylvania (85)
- Rhode Island (1)
- Vermont (13)

Anaerobic Digestion on EPA's Wasted Food Scale





Questions with Co-Digestion

- Are ADs in the right places for integrating food wastes and biogas production while minimizing impacts (e.g., traffic)?
- Accepting processed wastes or processing them on site?
- What to take, what not to take? Depends on facility's unique processes, every facility is different, and permit compliance must always be paramount. Develop specifications for food waste quality?
- What to do with the additional energy/fuel?
- End uses for the remaining solids?

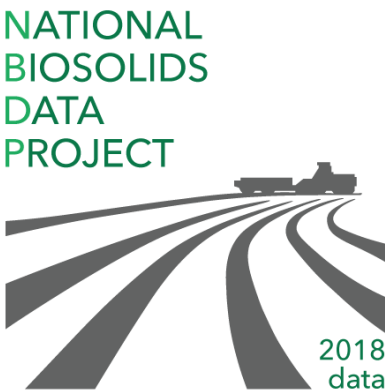


Of Interest from NEBRA

- North East Digestion Roundtable
- **Biosolids Emissions Assessment Model**
- Project with the University of Connecticut's School of Engineering on SCADA for AD

A Digitalization, Automation, and Optimization Platform for Improved Resiliency and Consistency of Distributed Anaerobic Digestion for Wastewater Resource Recovery

- International Biosolids Association
- Members who design, build, operate, and maintain ADs; latest research on co-digestion



Northeast Digestion Roundtable

Quarterly meetings to share technical/operations experiences & advance best practices on Anaerobic Digestion



Greater Lawrence Sanitary District Digester

**Second Fridays of each quarter, 12 to 1 pm
Have Lunch. Digest.**

Unit Process	Enter "x" for all applicable processes:	Scope 1	Scope 2	Scope 3	Total	Wet tons to each unit process/day	Mg (wet) to each unit process/day	Dry metric tons to each unit process/day	Electricity CODE/100 metric tons biosolids
Storage		NA	NA	NA	NA	NA	NA	NA	NA
Conditioning/Thickening	x	0	#VALUE!	117	#VALUE!	NA	NA	NA	NA
Anaerobic Digestion	x								
Anaerobic Digestion 2	x								
Dewatering									
Thermal Drying									
BFI Biodrying									
Alkaline Stabilization									
Composting									
Composting 2									
Landfill Disposal Typical									
Landfill Disposal Worst-case									
Landfill Disposal Aggressive									
Landfill Disposal CA Regulatory									
Combustion									
Pyrolysis									
Land Application	x								
Land Application 2	x								
Transportation	x	405	NA	NA	405	75	69	17	0.04
Total direct emissions		3,400	#VALUE!	(1,303)	#VALUE!				



My Take Aways. . .

- Lots of capacity for food waste could be available at these existing/abandoned facilities
- Co-Digestion is not one size fits all
- Expensive to build from scratch
- Could be affordable on smaller scales, given current market conditions
- The biosolids/sludge market is stressed, we need any/all volume reduction strategies, and AD is the best for a lot of reasons