

# Agenda

Company Overview

Wastewater Resource Recovery

Harvester Enhanced Primary Treatment Technology

Bath Resource Recovery Hub



# Who is ClearCove?



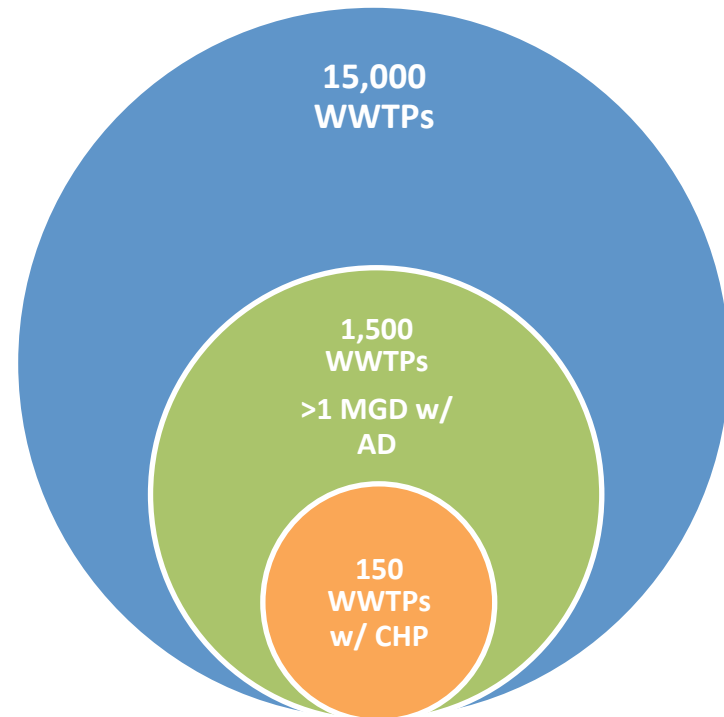
**CLEAR COVE**  
CLEAN ENERGY. CLEAN WATER.

- Renewable energy company
- Innovative enhanced primary treatment technology
- Primary goal: Capture organics in the primary treatment stage to convert plants to resource recovery facilities

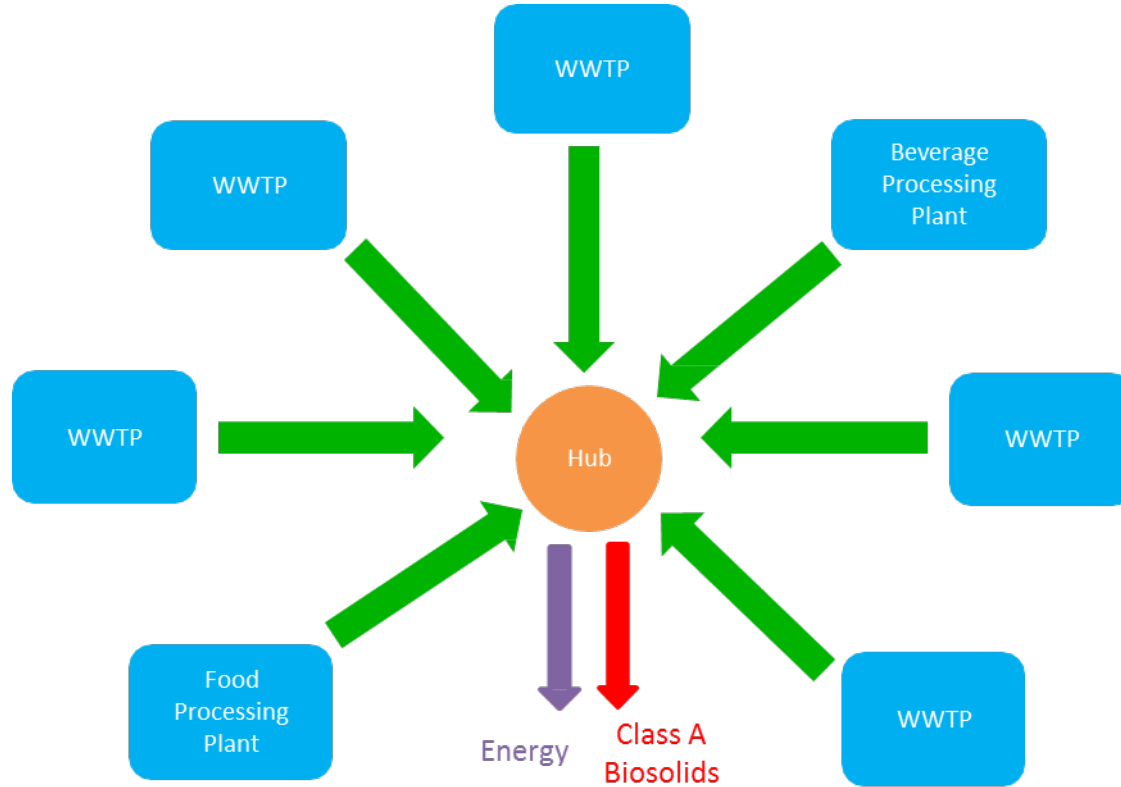


# Wastewater Resource Recovery

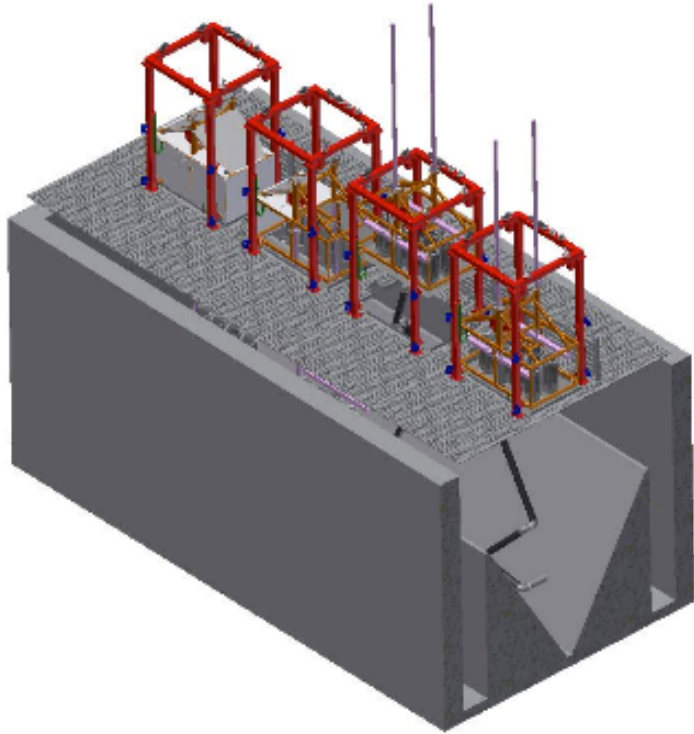
- Small fraction of facilities performing resource recovery
- \$60B needed over the next 20 years for WWTP upgrades
- Available value:
  - Energy (Electricity, Heat, Fuel)
  - Biosolids
  - Nutrients



# Hub and Spoke Model



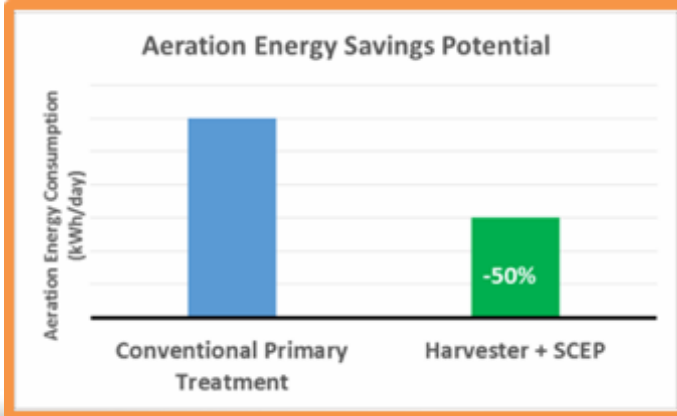
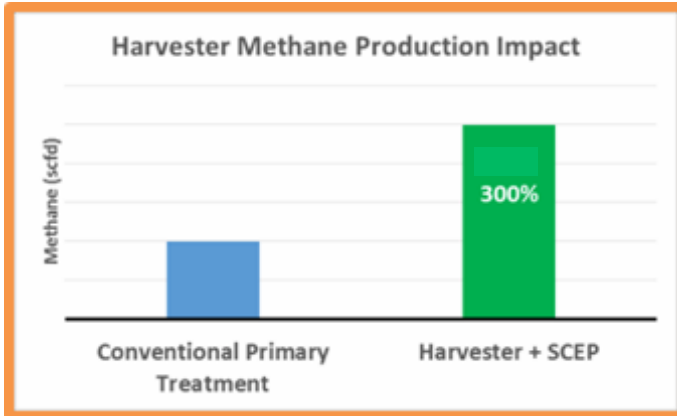
# Harvester Technology



- Primary purpose of harvesting organics for energy generation
- Complete headworks and primary treatment
- Can be operated with or without chemicals
- New build and retrofit solutions



# Harvester Benefits



- Increases methane generation by up to 300%
- Reduces aeration energy consumption by up to 50+%
- Increases secondary capacity
- Controlled phosphorous removal
- Equalization of flow or organics to secondary treatment
- Reduced O&M

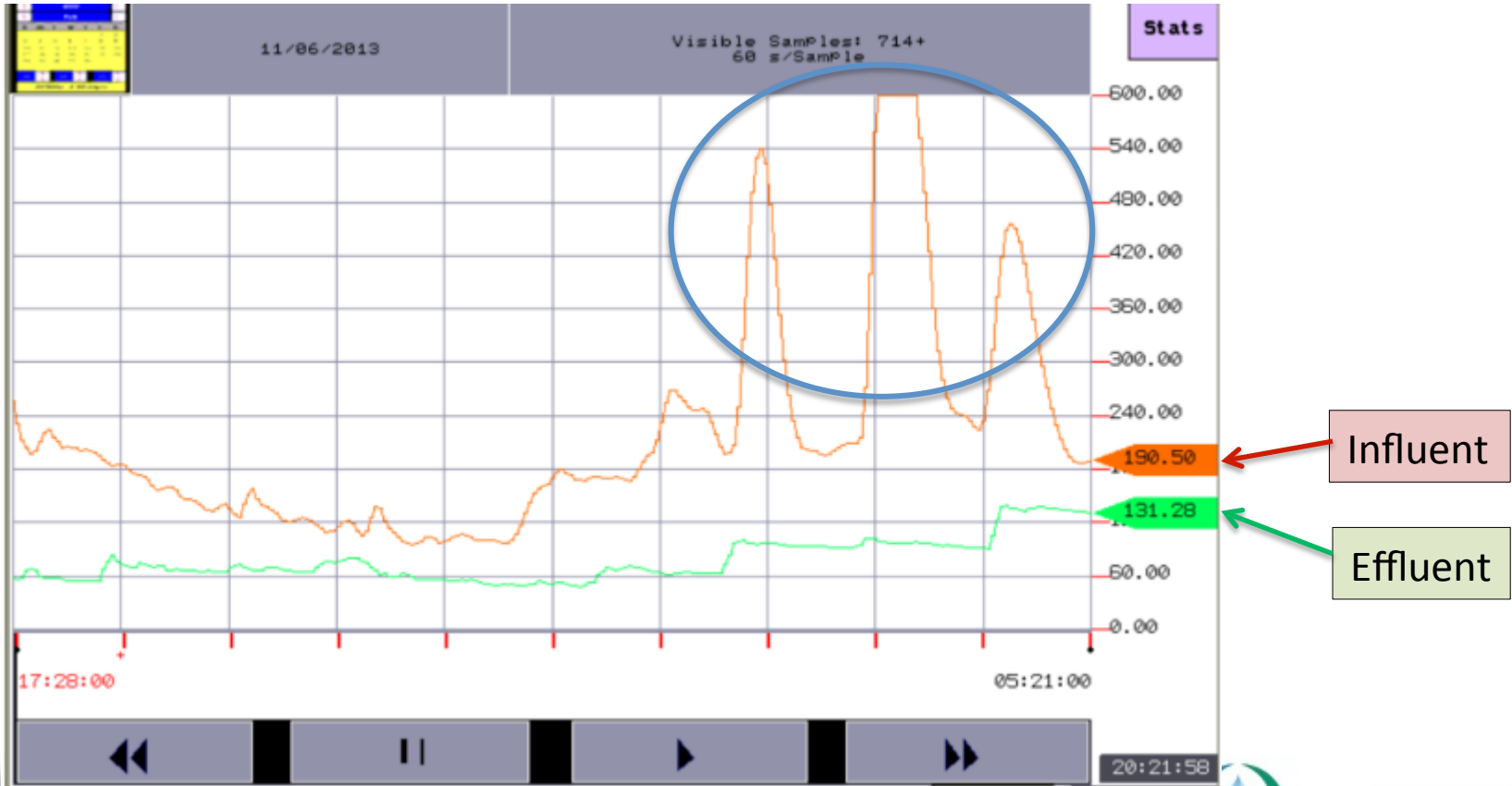


# Harvester Performance

Parameter	Conventional Primary Removal	Harvester Chemical Removal	Harvester Non-Chemical Removal
BOD	20-40%	65-85%	50-60%
TSS	50-60%	80-90%	70-80%
VSS		80-90%	70-80%
COD		55-70%	30-40%
TKN		20-40%	10-30%
TP		70-90%	30-40%



# Carbon Equalization and Control



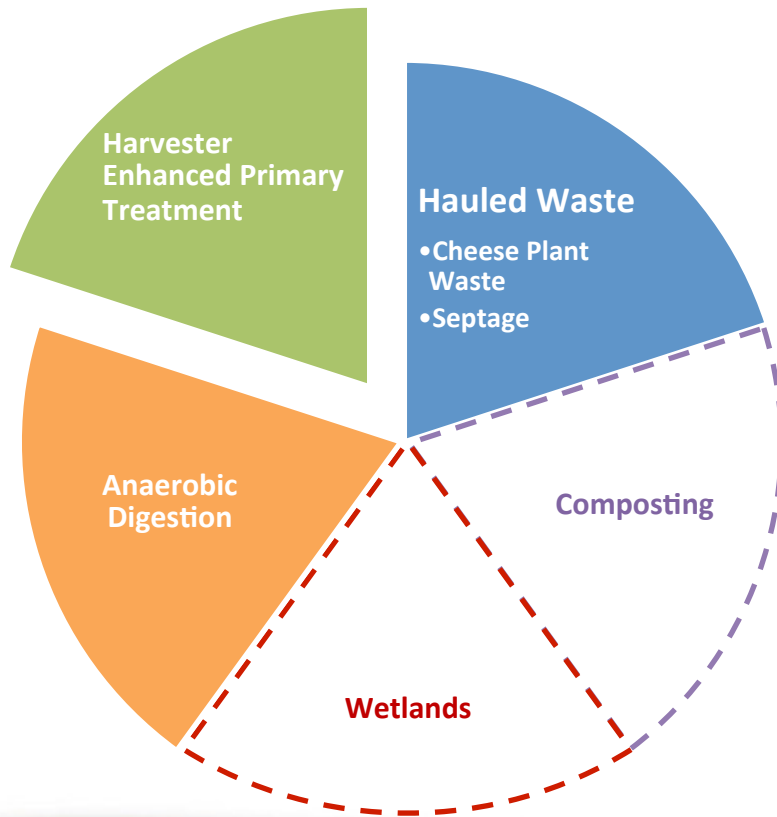


# Bath, NY

- 0.67 MGD Avg, 1.0 MGD Permit
- Operated by publicly-owned utility, Bath Electric Gas Water and Sewer (BEGWS)
- Discharges into Chesapeake
- Vision of becoming a Resource Recovery Hub
- Original upgrade plans was \$15M for secondary upgrade



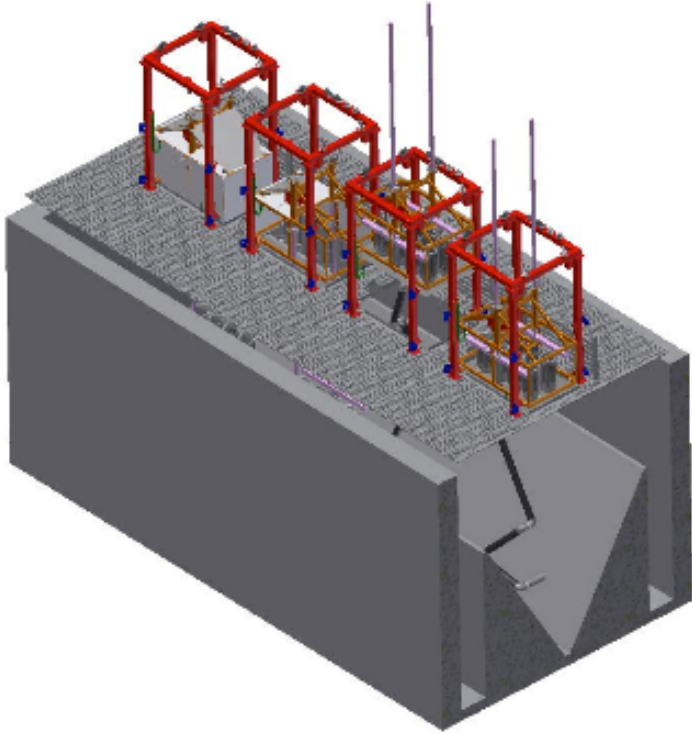
# Bath Resource Recovery Hub



- Bath RRH Upgrade to include:
  - Harvester EPT
  - Secondary Treatment Upgrade
  - Solids Processing
  - Anaerobic Digesters
  - Trucked Waste Receiving
- Future plans for:
  - Composting Facility
  - Wetlands



# Bath, NY Harvester Design

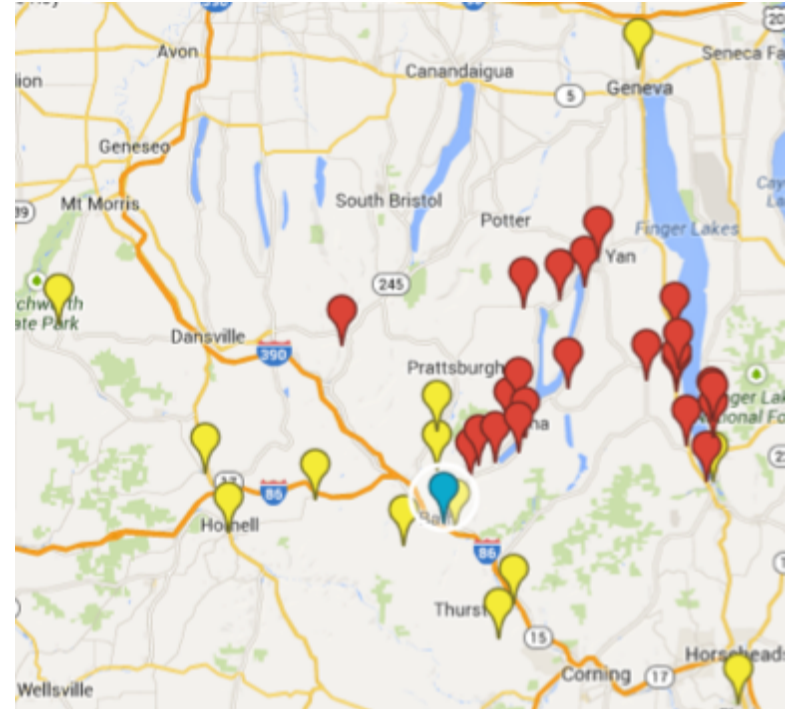


- 2 Harvester tanks, each approximately 50' long x 22' wide x 16' deep
- Sized to treat maximum monthly flow of 1.8 MGD
- 4 screen units per tank, 8 total
- Screen loading rate of 4 GPM/Sq. Ft.
- Existing primary clarifiers will be kept intact

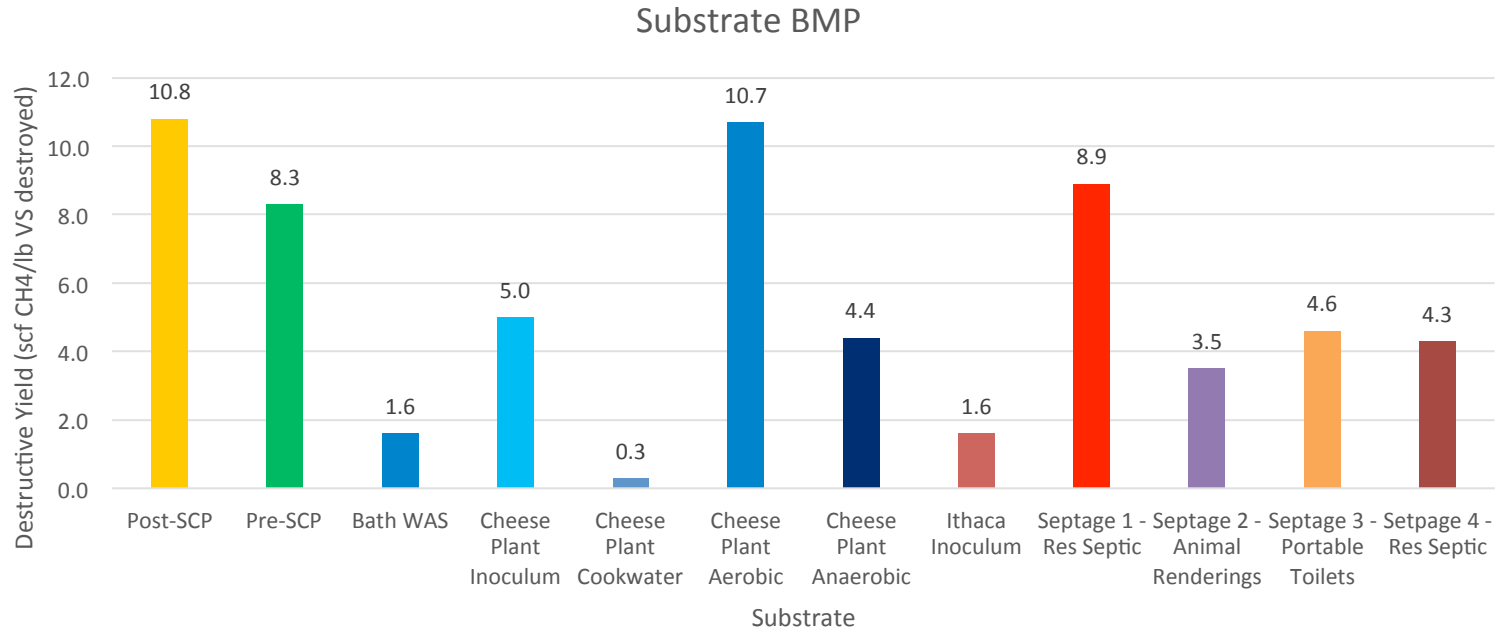


# Hauled Waste

- Kraft Cheese plant
- Residential Septage
- Numerous local organics generators
- Increased organic load enabled by Harvester system



# Biochemical Methane Potential Testing



# Secondary Process



- MLE: Modified Ludzack-Ettinger
- High C:N ratio requirement
- Harvester removal reduced to 50-55%
- Flexibility to move towards low C:N ratio process like Anammox



# Lifecycle Cost Analysis

Parameter	ClearCove Harvester	New Headworks & New Conventional Primary Treatment w/ Chemical Addition
Total Project Cost	\$19,538,000	\$17,206,000
Annual Methane Generation (Scf/yr)	8,307,000	3,147,000
Annual Electricity Value	\$40,000	\$15,000
Annual Heat Value	\$14,000	\$5,000
Annual Septage Revenue	\$291,000	\$146,000
Project O&M Cost	(\$117,000)	(\$1,000)
Proposed Annual Cost Per EDU	\$417.03	\$426.23

- Conventional upgrade does not include Flow EQ, Sludge Processing, or Influent Pump Station
- Conservative Harvester design:
  - Screen Loading Rate
  - Redundancy
- Potential for 20-25% reduction in Harvester cost



# Thank You Questions?

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