Enhancing Digester's Performance and Energy Recovery by High Solids Wet Anaerobic Digestion- Camden County High Solids AD Case Study

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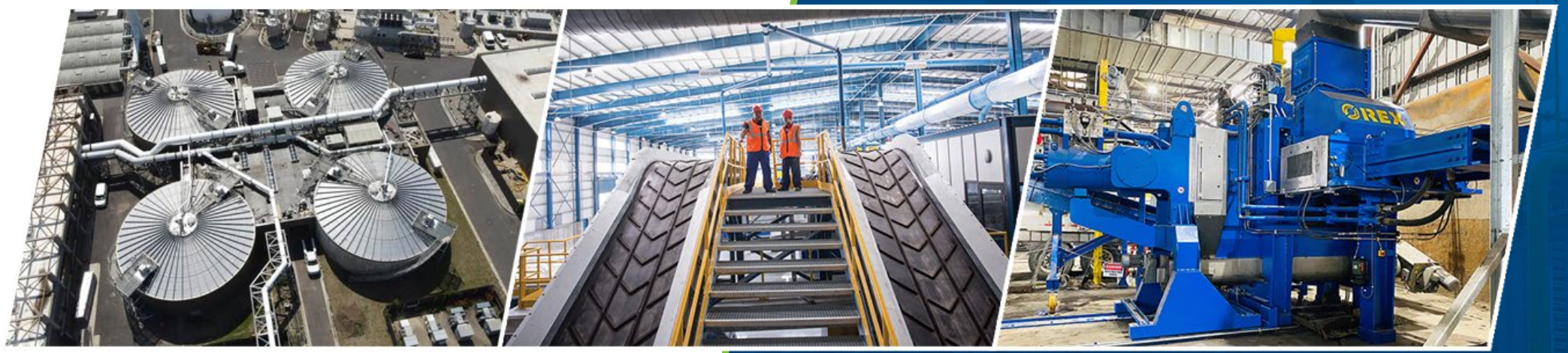

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Fueling a Sustainable World

Agenda

- **Omnivore** high solids digestion
  - High solids omnivore digestion components
- Camden County Municipal Utilities Authority (CCUMC) Case Study
  - Anaergia's key technologies in CCUMC
- Other North American and Canadian Projects
- Q & A

Introduction

Omnivore

Advanced high-solids approach to anaerobic digestion

Anaergia's proprietary **mixing system** together with its **thickening technology** increase the solids ratio in digesters

High-solids digestion enables:

- Co-digestion of: Organic fraction of municipal solid waste, food processing waste, fats, oils and grease (FOG) or other organic industrial waste together with wastewater biosolids
- Increasing biogas production from the anaerobic digestion.

https://www.anaergia.com/wp-content/uploads/2023/05/Tech-Brochure-Omnivore-Mar31.pdf

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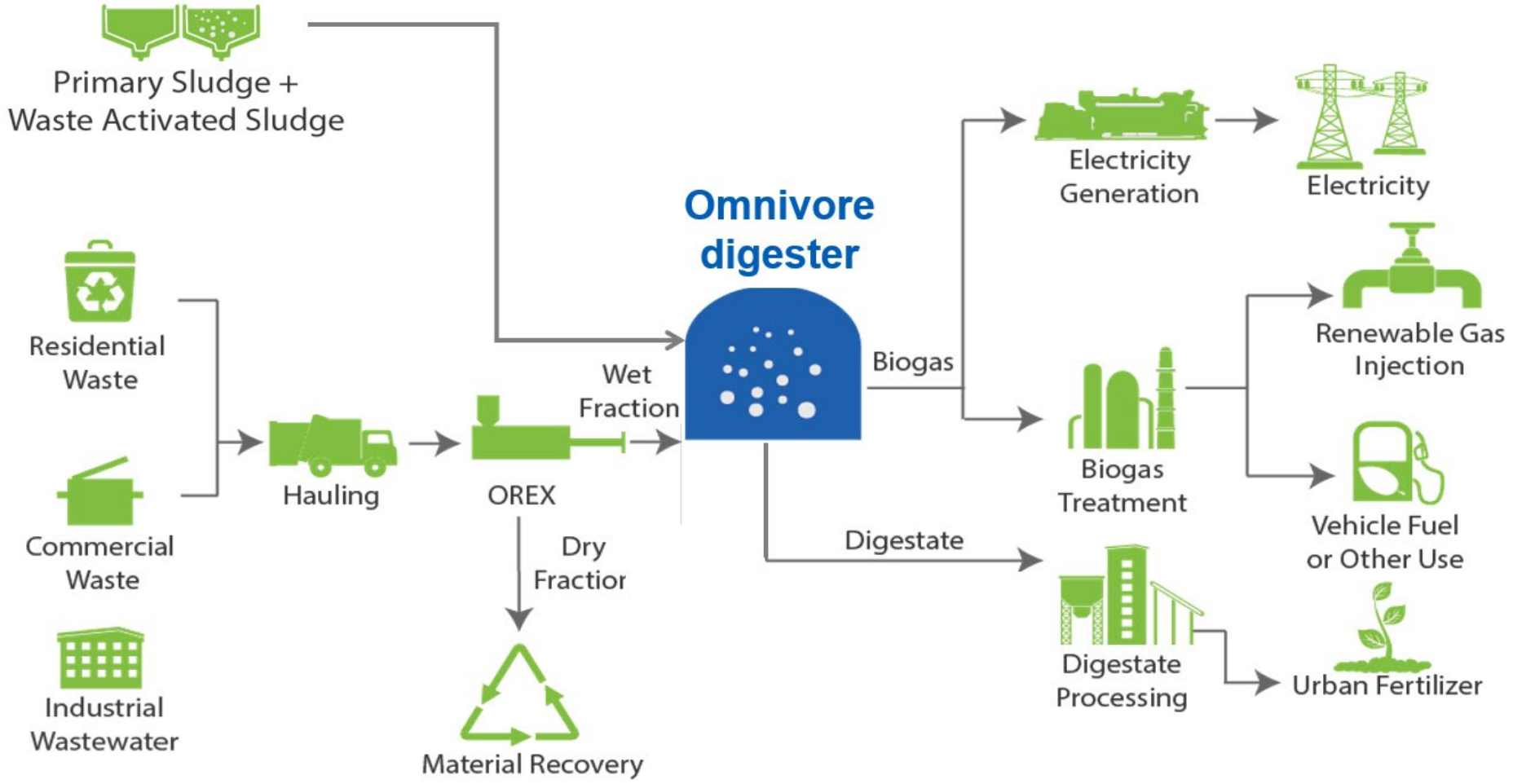
The Omnivore Process



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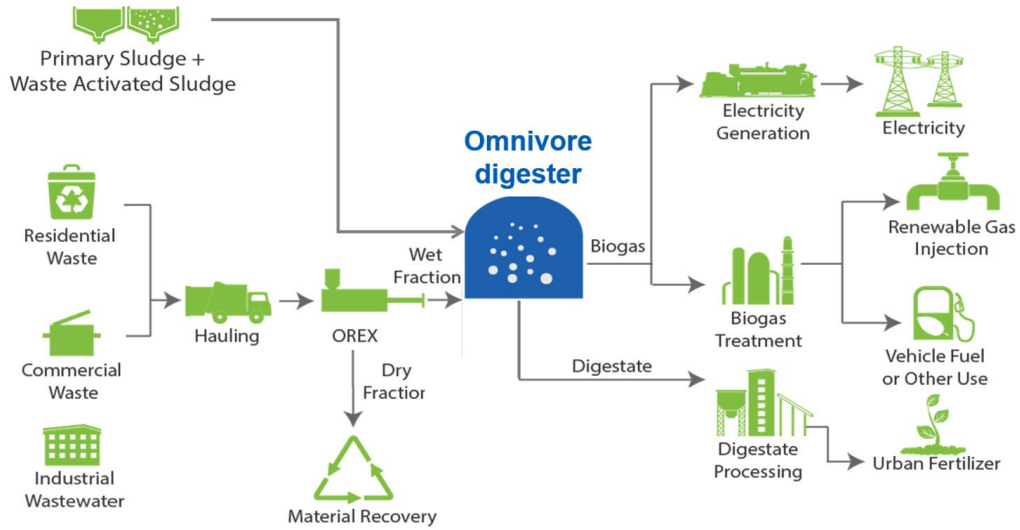
Omnivore Components

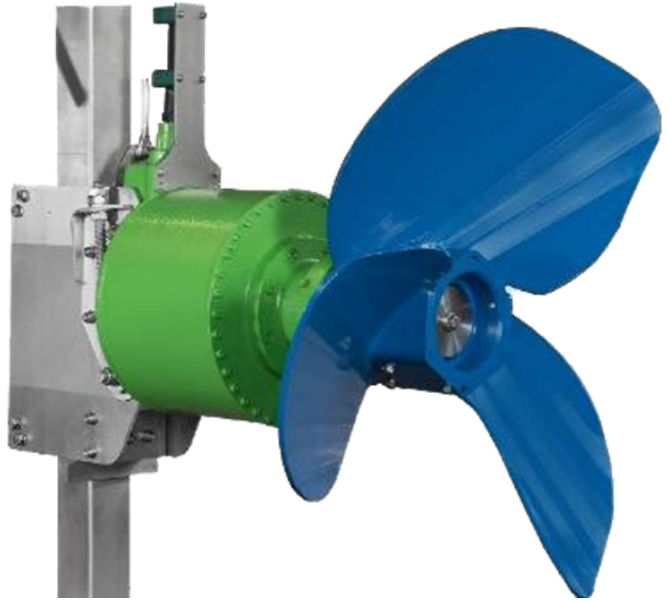
- High Solid Mixer
- Service Box
- Sludge Screw Thickener (SST)



Omnivore Components

High Solid Mixer

- Permanent Synchronous Magnet (PSM) direct drive motor – **Similar to high-efficiency motors in electric cars**
- Dynamic Mixing Control (DMC) adjusts power consumption to impart optimum mixing energy at various ranges of viscosity
- High thrust mixer delivering 30,000 GPM of flow
- More flow in 1 minute than most pump mixers deliver in 1 hour



High Solid Mixer

Advantages of High Solid Mixer:

- Decreases digester size and required space (1/3 smaller than a traditional digester)
- Low-solids digesters convert to high-solids digesters, capable of processing more waste in the same size digester
- Lowering capital and operating expenses
- Ability to adjust the mixer position to break up floating layers and re-suspend grit
- Ability to access the mixer without taking anaerobic digester out of service

Omnivore Components

Service Boxes

- Mixers can be accessed for inspection and maintenance while the digester remains in service
- Easy adjustment of mixer height and direction
- Maintenance and inspection is simplified by automated mixer retrieval
- Available with gas management system including over-under pressure device, sight-glasses and gas collection flanges.

Service Box HP with Auto-positioner

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Omnivore Components

Sludge Screw Thickener (SST)

- The Sludge Screw Thickener (SST) for throughputs of up to 60m³/h
- Increases the total solids percentage of sludge, manure, and digestate in municipal and industrial applications
- Continuous operation/high availability with non-clogging slotted screen baskets and uninterrupted

https://www.anaergia-technologies.com/en/products/separation/sst/

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Case Study-Camden Omnivore Digester

Project Location

Camden County Municipal Utilities Authority (CCMUA), NJ

Key Technologies

- Sludge Screw Thickeners (SST)
- Anaergia Mixing Solution (with PSM Mixers and Service Box)

- **AD Facility** - Design and Supply Omnivore AD Technology & Process Performance Guarantee
- **CHP Facility** - Design, Build, Operate and Maintain CHP Facility to utilize the Digester Gas to Generate Electricity for the WWTP
- Public Finance and Public Ownership

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CCUMC Project Overview

- **High-Solids Digestion**
  - 80 MGD (303 MLD) WWTP
  - New sludge holding tanks
  - Convert existing sludge holding tanks (<3 MG or <11,000 m^3) into **Omnivore Digesters**
- **High Efficiency CHP System**
  - Biogas conditioning system
  - 3.8 MW high efficiency CHP units
  - Recover waste heat to digester

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CCUMC Project Overview

Phase 1- Anaerobic Digestion (AD)	The AD is sized to process 302,800 m^3/d primary and secondary sludge produced by Camden's Delaware No. 1 Water Pollution Control Facility + up to 246 m^3/w of high strength organic waste (fats oils & greases)
Contract Awarded	2016
Plant Operational	2020

Phase 2- Combined Heat and Power Generation (CHP)	The second part of the project included the power generation CHP generating 3.8 MWe by Anaergia as a design-build-operate project with a 20-year O&M contract.
Contract Awarded	2016
Plant Operational	2019

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CCUMC Project Overview

CCMUA Provides

- Project Financing
- Construction & Operation of AD Facility
- Supply Biogas/Natural Gas to CHP
- Public Ownership and all permits

Anaergia Provides

- Design & Technology for AD Facility
- DBOM of CHP Facility (20 years)
- Performance Guarantee for AD and CHP
- Operational Savings – power and sludge management

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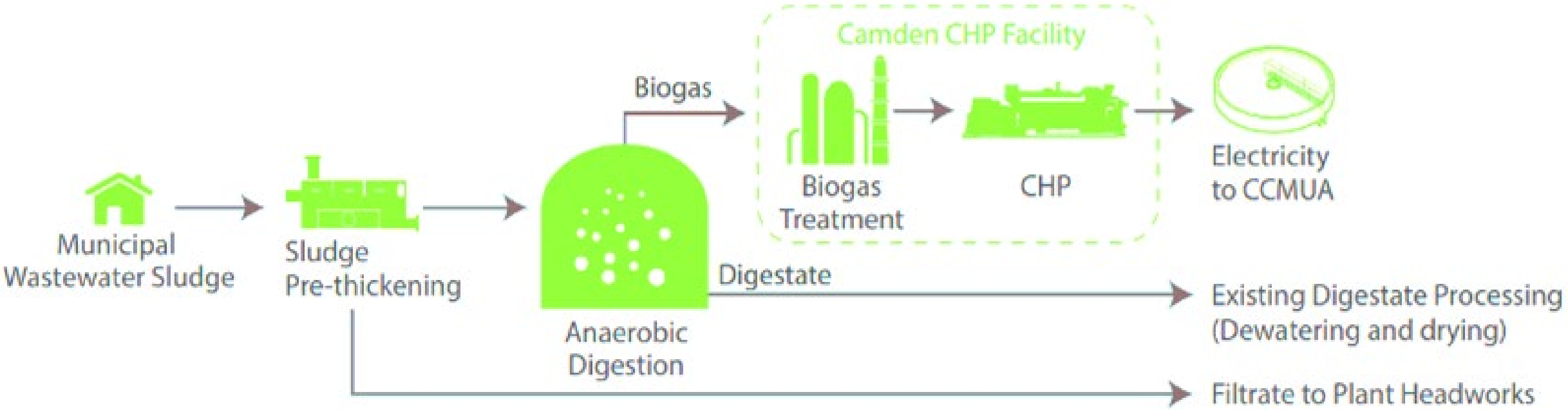
Process Summary



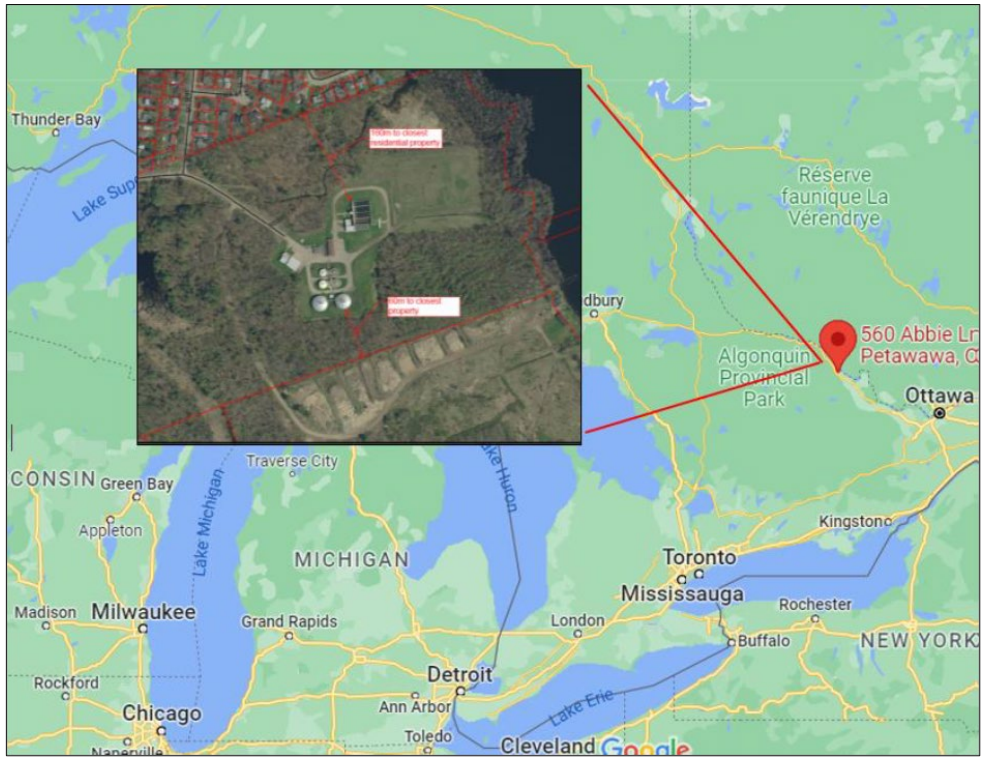
Other North American & Canadian Projects

The Petawawa Net Zero Project
Co-digestion Upgrade

Project Location: Petawawa, ON, Canada

Feedstock: Biosolids from the wastewater treatment operations along with organics from the municipal solid waste stream

Project Outcome: The digesters will produce biogas that will be used to fuel CHP, reducing WPCP's dependence on fossil energy and reducing its operating costs.



Other North American & Canadian Projects

The Petawawa Co-digestion Summary of Upgrade

- Upgrading Digester #3 for High-Solids Omnivore™ operation
  - Installation of Sludge Screw Thickener (SST) equipment
  - Installation of PSM High-Solids Mixers
  - Upgrades to existing biogas system
- Implementation of External Organics Feedstock Reception System
  - Installation of Feedstock Reception Station
  - Integration of Organics into Anaerobic Digesters
- Installation of Biogas powered Combined Heat & Power (CHP) System
- Upgrades to digestate loadout processes at the WPCP

Other North American & Canadian Projects

Quakertown WWTP Anaerobic Digestion and Cogeneration Facility, PA, USA

Feedstock from WWTP

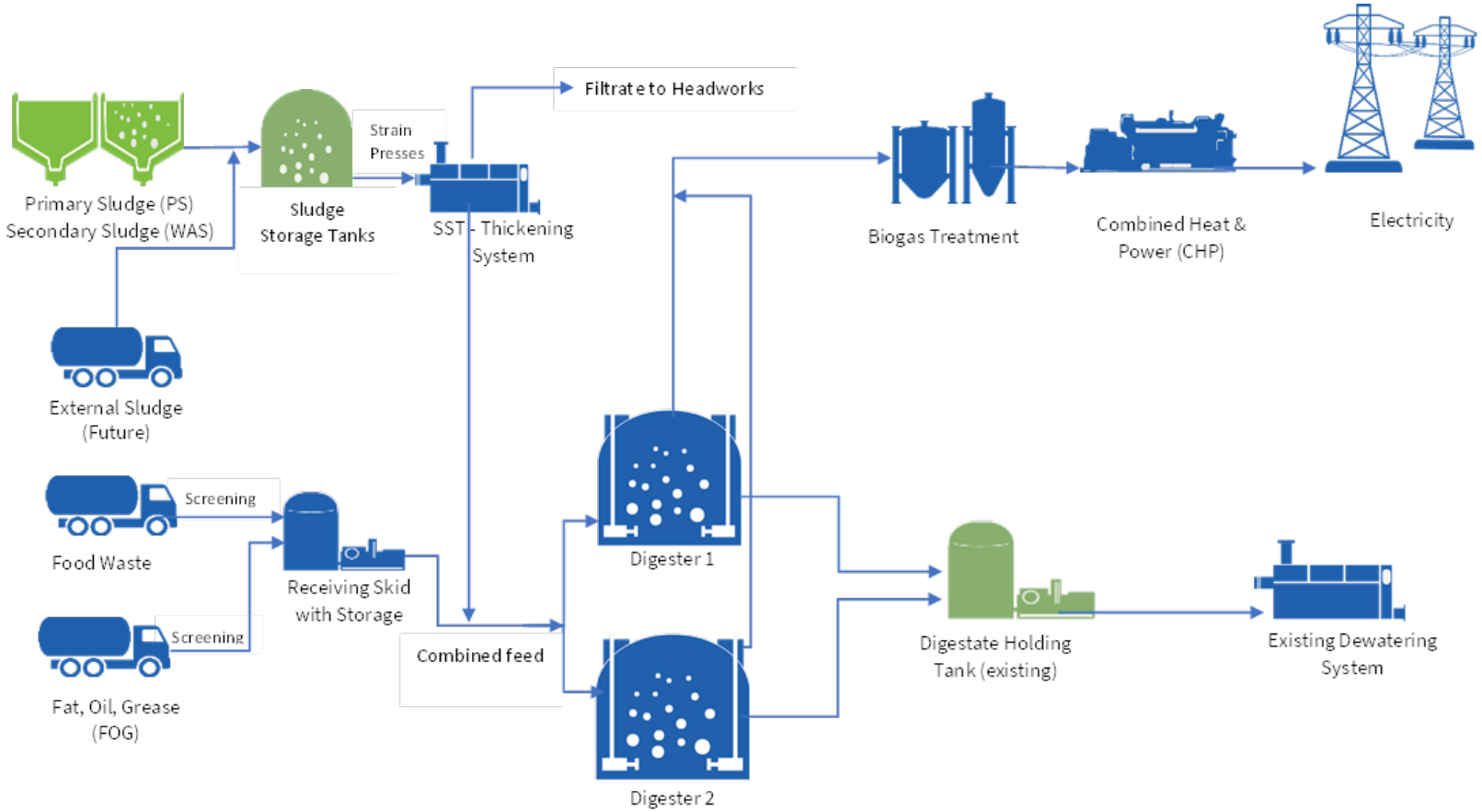
Parameters	Primary Sludge (PS)	Waste Activated Sludge (WAS)
Daily Flow (gpd)	30,270	43,513
Total Solids %TS)	3.0	2.0

Feedstock from External Source

Parameters	Food Waste Slurry	FOG
Daily Flow (gpd)	42,268	9,088
Total Solids %TS)	10.0	13.0

Other North American & Canadian Projects

Quakertown AD and Cogeneration Process Summary



Anaergia anaerobic digestion technology has been deployed at more than 1,000 locations in more than 17 countries

https://www.anaergia-technologies.com/en/industries/success-stories/
https://www.anaergia.com/reference-facilities/

Approximately 2,000 Municipal Wastewater Systems in Canada serving almost 86% of the total population (source: Environment and Climate Change Canada)
https://www.biomb.ca/news/business-wire

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