



ABCs of Anaerobic Digestion and Organic Waste Co-digestion

Anaerobic Digestion and Co-digestion; How it Works

John Banks | Energy Systems Group

Agenda

- Why Anaerobic Digestion and Co-digestion
- Anaerobic Digestion Basics
- Co-digestion Basics
- Environmental and Economic Benefits
- How Do We Get There?
- Questions

Organic Materials Needing Effective Management

- Municipal Sewage Sludge
- Fats, Oil, and Grease (FOG)
- Source Separated Organics (SSO)
 - Food Wastes
 - High Strength Organic Wastes(HSOW)
- Septage Wastes
- Wood Wastes



Photo by Robert Barker, Cornell University

Source Separated Organic Wastes

- Pre-consumer Food Waste
- Post-consumer Food Waste
- Dairy Dissolved Air Flotation (DAF)
(bottling/milk products)
- Poultry DAF
- Soft drink/beverage (juice/soda)
- Food production
- Biodiesel Wastes

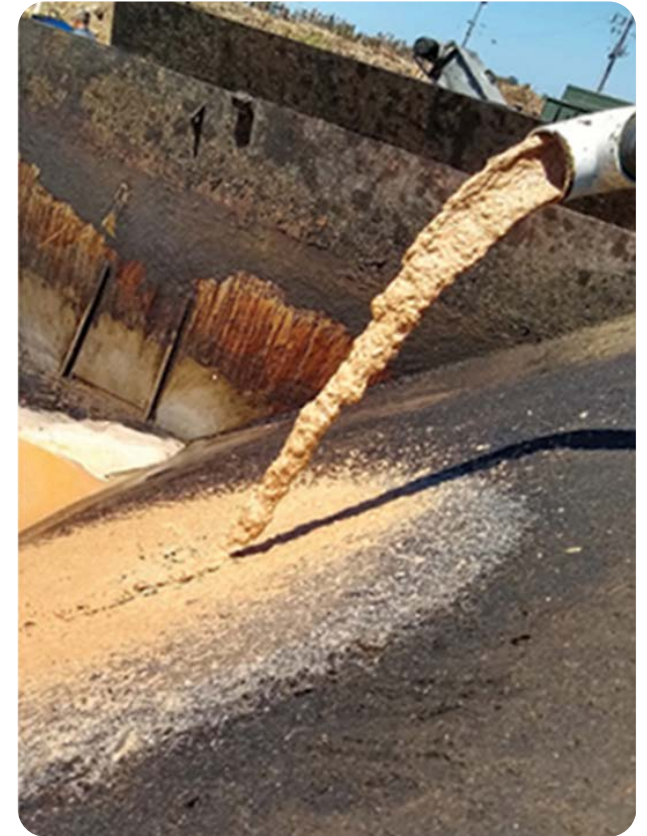


Photo Courtesy BioCycle

Current Management Options

- Land Application
- Composting
- Landfilling
- Remanufacturing
- Animal Feed
- Anaerobic Digestion



Photo by New York Department of Environmental Conservation

What is Anaerobic Digestion?

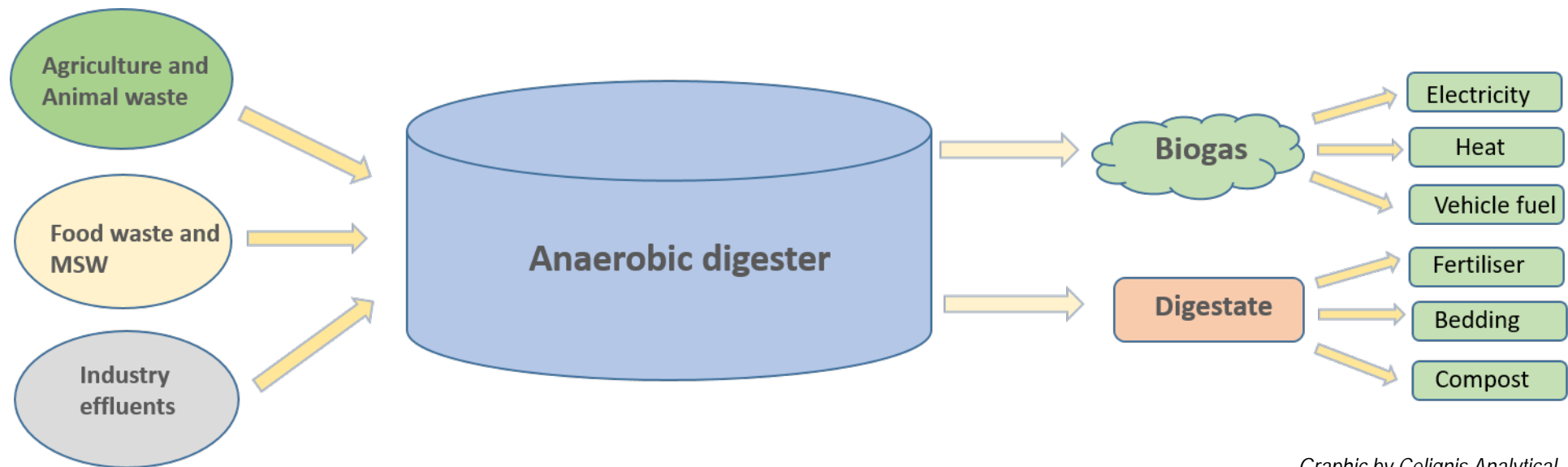
- The biological break down of organic material in the absence of oxygen.
- A natural process under controlled conditions.
- Produces:
 - methane gas,
 - residual solids, and
 - liquid side stream.
- Residual Solids are reduced in volume and volatility.



ESG Project: Frederick-Winchester Service Authority, Virginia

What is Anaerobic Digestion?

- Process Variations for Site Specific Conditions.
- Methane (Natural Gas) is captured and reused, resulting in positive energy balance.
- Various options for residual solids, Class A, B, or AA Biosolids or Class A Compost.



Graphic by Celnis Analytical


What is Co-digestion?


- WW sludge with SSO.
 - Improves AD operation, energy production, and overall system economics.
 - Excludes anything that can harm the process or impact quality of treated biosolids
 - Wastes with high metal content
 - Pharmaceutical wastes
- Increased revenues from tipping fees, additional gas production.



Photo Courtesy BioCycle

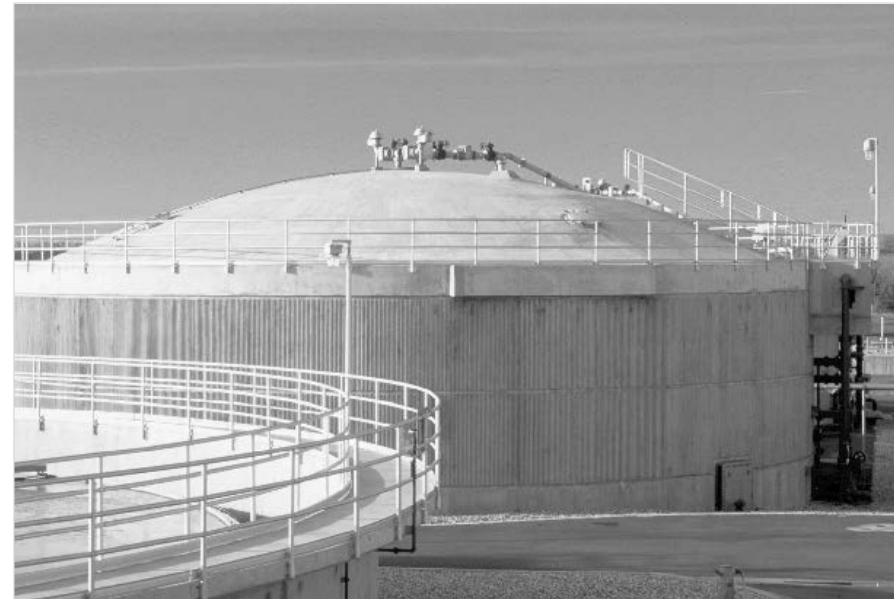
National Trends




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Water
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**Food Waste Co-Digestion at
Water Resource Recovery Facilities
Business Case Analysis**




 CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD

Co-Digestion Capacity Analysis
Prepared for the California State Water Resources
Control Board under Agreement #17-014-240

CO-DIGESTION CAPACITY IN
CALIFORNIA

FINAL | June 2019

 **carollo**

Side Stream Liquid Waste Management

- AD should be located at a WWTP in order to efficiently manage the liquid waste stream.
- Understanding of the WWTP operations with the additional waste load is required.
- WWTP effluent requirements will drive any side stream treatment requirements.

Feedstock Characteristics

- Characteristics drive gas production, handling, acceptance systems
- Solid vs. liquid feed
 - System complexity
 - Grinding/screening vs. screening



Photo Courtesy JWC

Get the Right Tools



Co-digestion Waste Storage and Feeding

- Proper system controls and understanding of the process are key, just like any other digester.
- Septage waste can be effectively managed with some of the same facilities, but not co-digested.



Environmental Benefits of Co-Digestion

- Increased recycling rates.
- Reduced surface water contamination from land application of un-stabilized wastes.
- Renewable energy (RNG) creation and use.
- Reduced net greenhouse gas emissions vs other options.

How do we get there?

Who is responsible?

- Wastewater Department
- Solid Waste Department
- City or County Manager
- Chairman of the Board
- Private Sector
- State Regulators
- Federal Mandates
- Must have a local Champion!



ESG Project: Beckley Sanitary Board, West Virginia

How do we get there?

Procurement Options

- Design Build/Progressive Design Build
- Guaranteed Energy, Water, Wastewater, Savings Performance Contract – Florida Statute 489.145
- Study-Design-Bid-Build



Thank You
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