Mixed Waste Organics Extraction and Integrated Organics Management

Los Angeles County
March 17, 2016
Anaergia’s Global Footprint

1,600 Projects, 380 MW, 12 Facilities, 29 Patents, 20 Years
AB 939 – California Leading the Way in Recycling

Recycling Rates Flat since 2008

AB 341 – 75% recycling goal and Mandatory Commercial Recycling
California Organics Regulations

*Everything is driven by Climate Change*

California Organics Regulations

**AB 1826**  
Commercial Organics

**SB 605**  
Short Lived Climate Pollutants  
{Eliminate Organics from Landfills by 2025}

**AB 1594**  
Green Waste ADC Diversion Credit Eliminated

**AB 876**  
Organics Infrastructure Plan

By 2019 – Organics Recycling will require a mixed waste processing solution. SSO becomes uneconomical.
Difficulties in Achieving High Organics Recycling Rates

“Communities Struggle to Enact Residential Food Waste Collection Programs”¹

- Low Participation & Capture Rates
- High Cost – compostable bags, collection
- High Contamination – up to 25%
- Difficult to implement in commercial and multifamily sector
SSO Programs Challenged to meet Climate Change Goals

- Alameda County has instituted residential food waste programs since 2008.
- Alarming dip in participation shows fatigue in participation.
- Regardless, still has a tremendous amount of food waste in disposal.
Integrated Organics Solutions

Organic Waste Processing

Digestion

Energy Recovery

Residual Recovery

Anaerobic Digestion

Biogas Treatment

Biogas

Renewable Gas

Vehicle Fuel

Electricity

Dewatering

Drying

Ammonia Stripping

Acid Scrubbing

Fertilizer

Material Recovery

Upgrade to Renewable Solid Fuel

Residual

Dry Fraction

Wet Fraction

OREX

Commercial Waste

Residential Waste

SSO
Organic Waste Processing (OREX)

**Generation 1**  
Kaiserslautern, Germany

**Generation 2**  
Ventspils, Latvia

**Generation 3**  
OREX 500 Gescher, Germany
OREX Operating Principal

Feed phase
Low pressure

Compression phase
High pressure 250 bar

Expulsion phase
Low pressure

- 18 to 22 second cycle time.
- Continuous operation.

90%+ putrescible organics recovery
## OREX Commercial Operating Units

<table>
<thead>
<tr>
<th>Description of experience/reference</th>
<th>Country</th>
<th>Capacity</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>Sorting and treatment of mixed MSW</td>
<td>Kaiserslautern (Germany)</td>
<td>50,000 t/a</td>
<td>2006</td>
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<tr>
<td>Sorting and treatment of mixed MSW</td>
<td>Alessandria (Italy)</td>
<td>100,000 t/a</td>
<td>2007</td>
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<tr>
<td>Treatment of separately collected bio-waste</td>
<td>Castelceriolo (Italy)</td>
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<tr>
<td>Treatment of separately collected bio-waste</td>
<td>Viareggio (Italy)</td>
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<td>2008</td>
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<tr>
<td>Sorting and treatment of mixed MSW / industrial waste</td>
<td>Premier Waste (UK)</td>
<td>100,000 t/a</td>
<td>2008</td>
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<tr>
<td>Treatment of mixed MSW, RDF production</td>
<td>VamWijster (Netherlands)</td>
<td>200,000 t/a</td>
<td>last changes 2009</td>
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<tr>
<td>Vagron (MBT) anaerobic digestion of organic fraction from MSW</td>
<td>Groningen (Netherlands)</td>
<td>100,000 t/a</td>
<td>last changes 2009</td>
</tr>
</tbody>
</table>

*1st OREX Line in North America installed in San Francisco*
OREX Processing Line

- Reduces Collection Cost vs SSO Collection w/Wet/Dry Routing
- Achieves Maximum Organics Recovery
- Complements Dry/MF Commercial Recycling Line
- Organics Polishing System cleans Wet Fraction, ensuring beneficial use of digestate (ensures full value of diversion by exceeding CA compost regulations).
Installation of First North America OREX
Clean Digestate is a Marketable Resource

Dirty digestate is waste regardless of nutrient value

Conventional organics separation processes do not meet CalRecycle standards for land application

Hammer Mill
(SSO Digestate Compost)

Trommel Screen
(MSW Digestate Compost)

ANAERGIA ORGANICS RECOVERY PRODUCES CLEAN DIGESTATE
OREX Flexible to Any Level of Contamination

Wet Fraction from MSW or WCW
30-35% TS
30 to 35% recovery from MSW
50 to 70% recovery from WCW (wet commercial waste)

Wet Fraction from SSO
20 – 25% TS
70 to 95% recovery from SSO
Organics Polishing System (OPS)
Two stage plastic film and grit removal system

Min. - 85% removal of plastic film and grit
Mini OREX Testing in North America

OREX Test Press – Test Scale

• Anaergia tested at eight sites in North America
• 5 in CA and now at LACSD
• Complements standard waste characterization

Waste to be Sampled
North America Testing Results

• New York City (*New Yorkers call it the “Garlic Press”*)
  • General results of the tests indicate that with material fed in the < 6 to 8” range:

  • Single Family Residential – 30 to 35% organics recovery
  • Multifamily Residential – 35 to 55% organics recovery
  • Wet Commercial Waste – 50 to 70% organics recovery
  • Source Separated Organics – 70 to 95% organics recovery

  • <2% physical contaminants > 2mm and low metals content
  • Highly digestable with VS/TS in the 85 to 92% range
Dedicated Digestion - London

- **Dagenham, UK (London)**
- **Substrate:** Municipal Source Separated Organic Waste
- **Capacity:** 30,000 TPY
- **Energy Output:** 1.4 MWe, 2.8 MW Total
High Solids Anaerobic Digestion is Capital Efficient
Omnivore™ Retrofit Creates Capacity

High solids retrofit:
1. High Solids Mixers
2. Recuperative- or Pre-thickening

- Increase capacity by 3x
  - HRT = 8-10 d
  - SRT = 24-30 d
- Low power
- Low polymer
- Customize capacity

- High torque, constant torque mixers
- Intermittent operation for less power

- Isolated service boxes for safe in-situ mixer adjustment
- Adjust position while operating
### Omnivore Concentrates Biomass

**Conventional Omnivore**
- **HRT** = **SRT** ~ 25 d
- **SRT** > **HRT**
- **SRT** = 25-30 days
- **HRT** = 8-10 days

**Omnivore**
- **OLR** 4.5 kg/m$^3$/d
- **OLR** 1.5 kg/m$^3$/d
- **TS** 6%
- **TS** 2%
- **Sludge/External Waste** 60/40
- **Sludge/External Waste** 90/10

**Notes:**
- **HRT** = Hydraulic Retention Time
- **SRT** = Solids Retention Time

**Diagram:**
- **BIOGAS**
- **EXTERNAL**
- **SLUDGE**
- **RECUPEATIVE THICKENER**
- **DIGESTATE**
- **FILTRATE**
Utilizing WWTP Infrastructure – Omnivore
3X Capacity Increase at VVWRA

Omnivore Site Overview

High Strength Waste Receiving Station

Recuperative Thickener SST 225
Anaheim Energy – 2017
(Republic Services)

- Phase I: 85,000 TPY wet fraction, Phase II: 170,000 TPY wet fraction
- 4 MW PPA with Anaheim Public Utilities
- Digester Site on < 2 acres
Rialto BioEnergy Facility
(Athens Services)

300 ton/day organics
Organic Fraction of Municipal Solid Waste → Hauling → Anaerobic Digestion → Biogas → Biogas Conversion → Electricity

300 ton/day biosolids
Wastewater Treatment → Biosolids → Hauling → Digestate → Digestate Processing → Urban Fertilizer

5 MWe export
- Electric Power
- Renewable Gas Injection
- Vehicle Fuel or Other Use

Energy Independent
Summary

- OREX Processing Lines offers a key technology for diverting organics from MSW – regardless of contamination. Maximum recovery/lowest collection cost.
- Preprocessing Organics is just one part of the puzzle of an **Integrated Organics Solution** – must consider digestion, and maximizing energy & residual recovery (contamination is biggest threat).
- Organic specific testing should be done to complement standard waste characterization.
- All technologies proposed are commercially proven at multiple facilities globally.
Questions