Digestate Composting, Nutrient Utilization and Wastewater Management

Clean World Partners Presentation

Thursday, May 31, 2012

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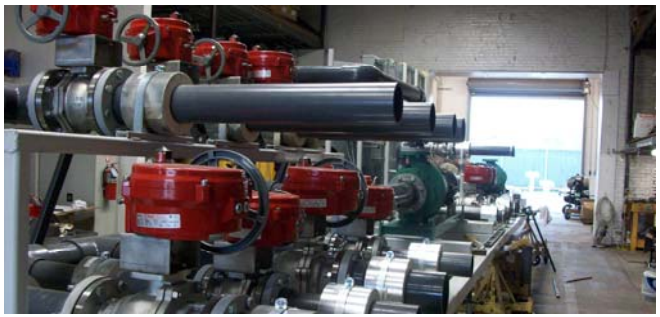
Overview

- Who are we?
- What are digester residuals?
- Liquid digester effluent management
  - Quality
  - Options
  - Technologies
- Solid residuals management
  - Quality
  - Options
  - Technologies
- Value adding and next gen products

Who is Clean World Partners?



- Manufacture and install high-solids anaerobic digesters
- Based on patented UC Davis technologies
- Founded in 2009
- Launched first commercial system on April 19, 2012

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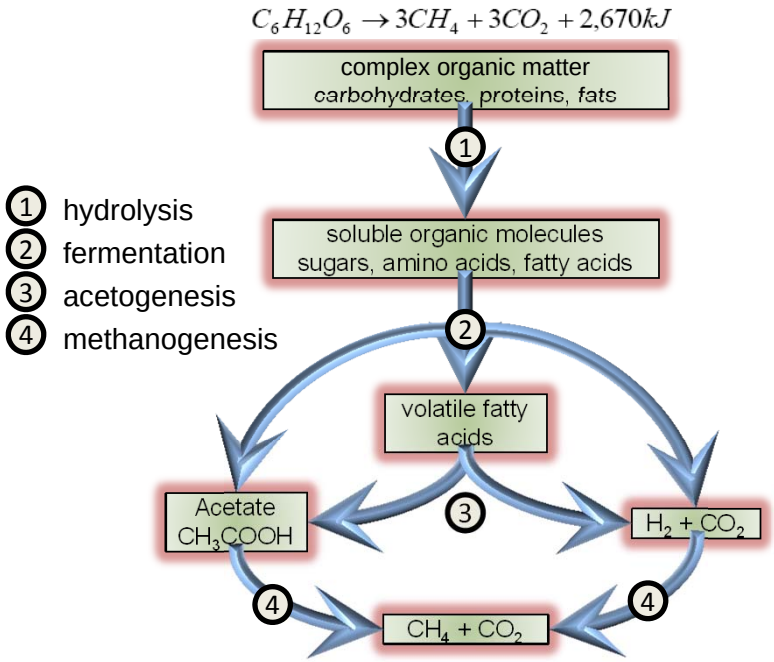
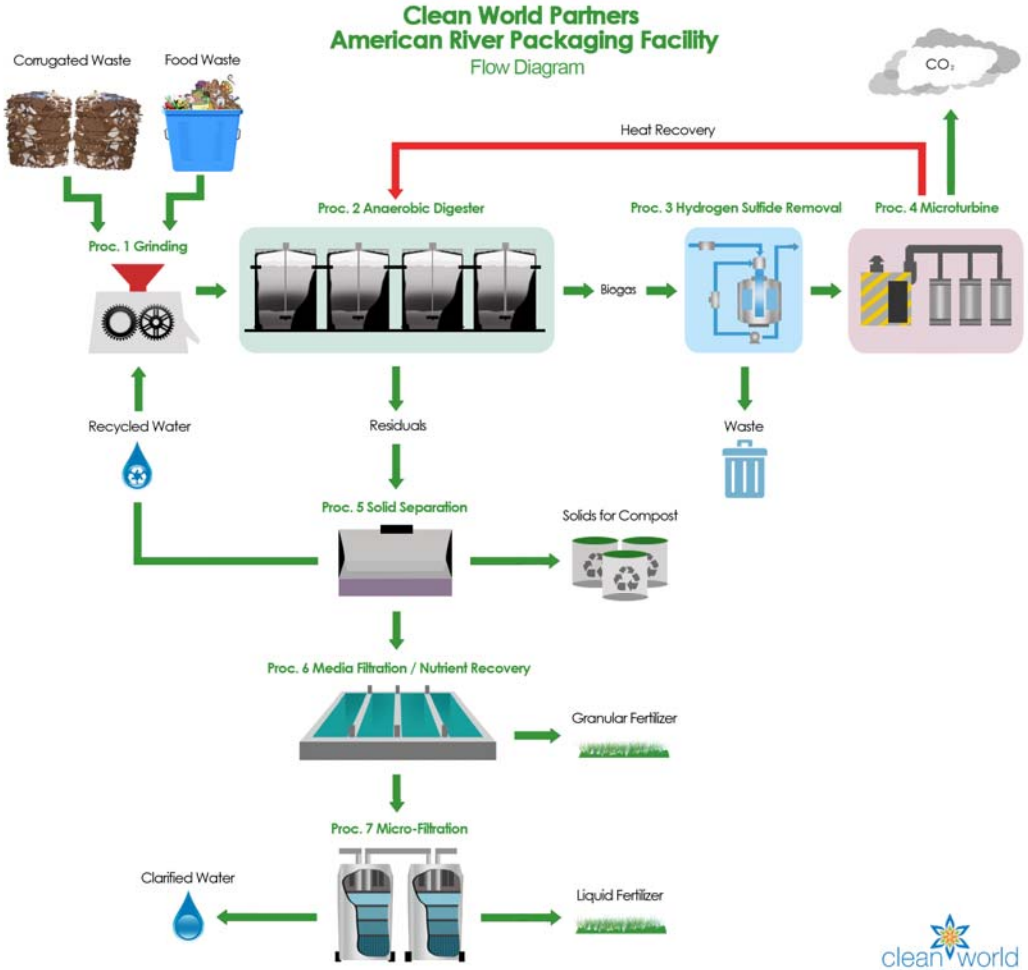
Anaerobic Digestion Process





Digestate and Effluent

- Composition
  - Residual fibers and large solid particulates
  - Cellular biomass (suspended solids)
  - Dissolved salts, nutrients, and minerals
  - Water
- Flows
  - 10 tons foodwaste input → 2,000 gallons digestate output (plus biogas)
    - 1,500 gallons water
    - 2 tons solids

Removing Solid Particulates From Raw Digestate

- Fibers and large non-biodegradable particles
  - >100 micron
- Suspended solids
  - 1-100 micron
- Technologies for separation
  - Screw press
  - Rotary filter press
  - Belt filter press

Composting the Solid Fraction of Digestate

- 1-5 weeks additional aeration needed for reduction of residual oxygen demand
- After composting
  - Nitrogen 1-3% (dry basis)
  - Phosphorus 0.2 – 0.5% (d.b.)
  - Potassium 0.2 – 0.5% (d.b.)




Removing Suspended Solids and BOD

- Coagulation/Aggregation
- Sedimentation and Clarification
- Membrane Filtration
- Dissolved Air Floatation

Typical Composition of Liquid and Solid Effluents

Liquid Byproduct

	Concentration (mg/L)
Total Solids	10,000 – 20,000
Suspended Solids	4,000 – 6,000
Dissolved Solids	6,000 – 14,000
BOD	5,000 – 15,000
Ammonia	1,000 – 3,000
Phosphorus	1,000 – 10,000
Potassium	5,000 – 15,000
Sodium	1,000 – 3,000

Solid Residuals (Press Cake)

	Composition (dry basis)
Moisture*	60 – 70%
Nitrogen	1 – 5%
Phosphorus	0.2 – 1%
Potassium	0.2 – 1%
Sulfur	0.1- 0.3%
Magnesium	0.1 – 0.2%
Calcium	0.5 – 1%
Sodium	0.2 – 0.8%
Copper	10 – 100 ppm
Iron	200 – 1,500 ppm
Manganese	30 – 1,000 ppm
Zinc	100 – 1,000 ppm

*Moisture content based on the wet mass.

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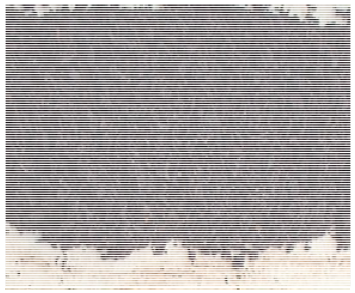
Creating Value Added Products

- From Dewatered Solids
  - Compost
  - Worm castings
  - Potting soils
- From liquid effluent
  - Concentrated liquid fertilizer
  - Water
- Next generation products
  - Microbial inoculants for bioremediation, deodorization, pest control, and plant growth stimulation
  - Particle board/press board
  - Seed pots
  - Bio-plastics



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Thank You

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