
YIELD

renewable energy producers

Recycling the Nutrients & Energy in Urban Organic Feedstocks

Urban Organic Feedstocks



¹ "Food Loss and the American Household" BioCycle Mar '06, Dr. Timothy Jones

² "Analyzing Retail Food Loss" BioCycle Dec '05, Dr. Timothy Jones

Residential Organic Feedstocks



Source Separated Residential Organics

- * Total Solids (TS): 35-42%
- * Contaminations up to 55% of TS
 - Plastic Bags
 - Bones, shells
 - Glass/Metal/Plastic Packaging
 - Diapers, Dog & Cat litter etc.

Grocery Store Feedstocks



Expired food (Pre-Consumer):

- * Total Solids (TS): 20-35%
- * Contaminations up to 35% of TS
 - Plastics (e.g. cellophane, containers)
 - Waxed cardboards
 - Eggshells, seashells, bones
 - Glass, Metal & Plastic Packaging

Restaurant Feedstocks



Food Feedstock (Post-Consumer):

- * Total Solids (TS): 20-30%
- * Contaminations up to 15% of TS
 - Plates, forks, knives etc.
 - Plastic bags
 - Eggshells, seashells, bones
 - Glass, Metal & Plastic Packaging

The Challenges

- ◆ Separating organics from the high levels of contaminants found in urban organic feedstock streams
- ◆ Maintaining a high quality (i.e. low contaminant) digestate/compost output -> **Nutrient Recycling**
- ◆ Maximizing the net energy output from the reclaimed organics -> **Maximize Energy Output**

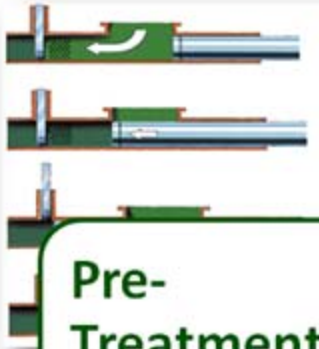
The Yield Solution

Yield Solution



Condition Feedstock

- Shred material to <1" pieces
- Dilute with recycled water to 25% total solids (TS)



Pre-Treatment

- Piston pump liquefies organics and forces them through a .5" filter
- Residuals are heated and re-pressed



Digester Cleaning

- Sand, egg shells, particles that passed the filter
- Floor scraper cleans bottom
- Skimmers collect floating particles

Our Competitive Advantages

Cost Effective Pre-Processing

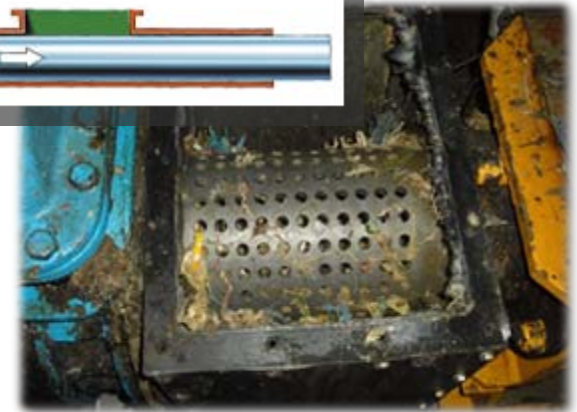
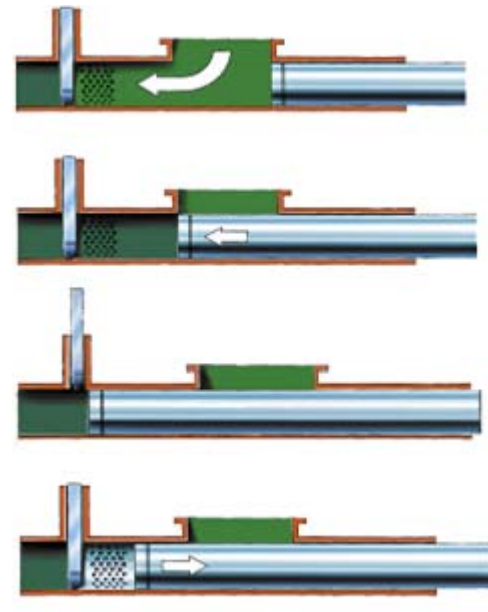
Key Differentiation:

1) Pre-Processing

- Chain Shredder & Piston Pump Separation, no hydro-pulper
- Elimination of >99% of contaminants before digester

Benefits:

- *Low parasitic energy load* → 10-15%
- Minimal fresh water used
- Smaller facility footprint



Yield's Pre-Processing System



Installation of the pre-treatment process at Bioenergie Schlitters, Austria

In-Tank Contaminant Removal

Key Differentiation:

- 2) Patented in tank scraper & skimmer system
 - Continuous cleaning

Benefits:

- *Reduced downtime*
- *>99% of contaminants removed from digestate*
- Prevent compacted sediment on bottom of digester
- Prevent crust of floating contaminants in digester
- Reduce maintenance costs



Yield's In-Tank Contaminant Removal System



Digester Tank:
Floor Scraper



Digester Tank:
Skimmer & Separator

Biochemical Stability & Biogas Optimization



Dr. Digester™

Key Differentiation:

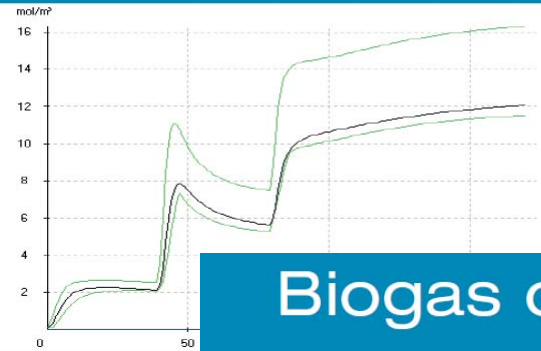
- 3) Proven Simulation Software &
- 4) Customized Supplements (Trace elements, micronutrients)

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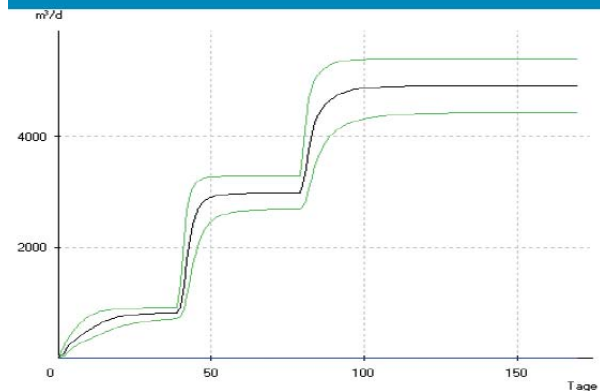
Benefits:

- *Greater uptime, more biogas*
- Biochemical stability modeled on specific input feedstock
- Continuous monitoring of digester health reduces risk of digester collapse

Organic acids



Biogas output



Competitive Matrix

| | Biogas Production Consistency | Net Water Output | Parasitic Energy Use | Capital Cost (L/M/H) | Feedstock Flexibility | Feedstock Amendment | Organic Decomposition |
|--------------------------|-------------------------------|------------------|----------------------|----------------------|-----------------------|---------------------|-----------------------|
| Yield Wet AD System | H | M | 10-15% | M | H | No | H |
| Very Wet AD Systems | M | H | 50-70% | H | H | No | M |
| Dry Fermentation Systems | L | L | 20-30% | L* | L | Yes-Carbon | M |

* Not Including compost facility

Yield Business Model

- Biogas Plant Developer
 - Design/Build/Own/Operate/Optimize!
- Key Equity/Operational Partnerships (3P & JV)
 - Municipalities
 - Major Organic Feedstock Collectors
 - Major Organic Feedstock Generators

Yield Energy Booth

- Case Studies
 - Urban Organics Biogas Plants
 - Biogas Optimization References
- Plant Videos
- Yield Pre-processing System Graphics

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Questions

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