



Empowering Organics
Bio Pacific Rim Summit on Industrial Biotechnology & Bioenergy
October 10-12, 2012

- Harvest Power background
- What is working today?
- What are the challenges?

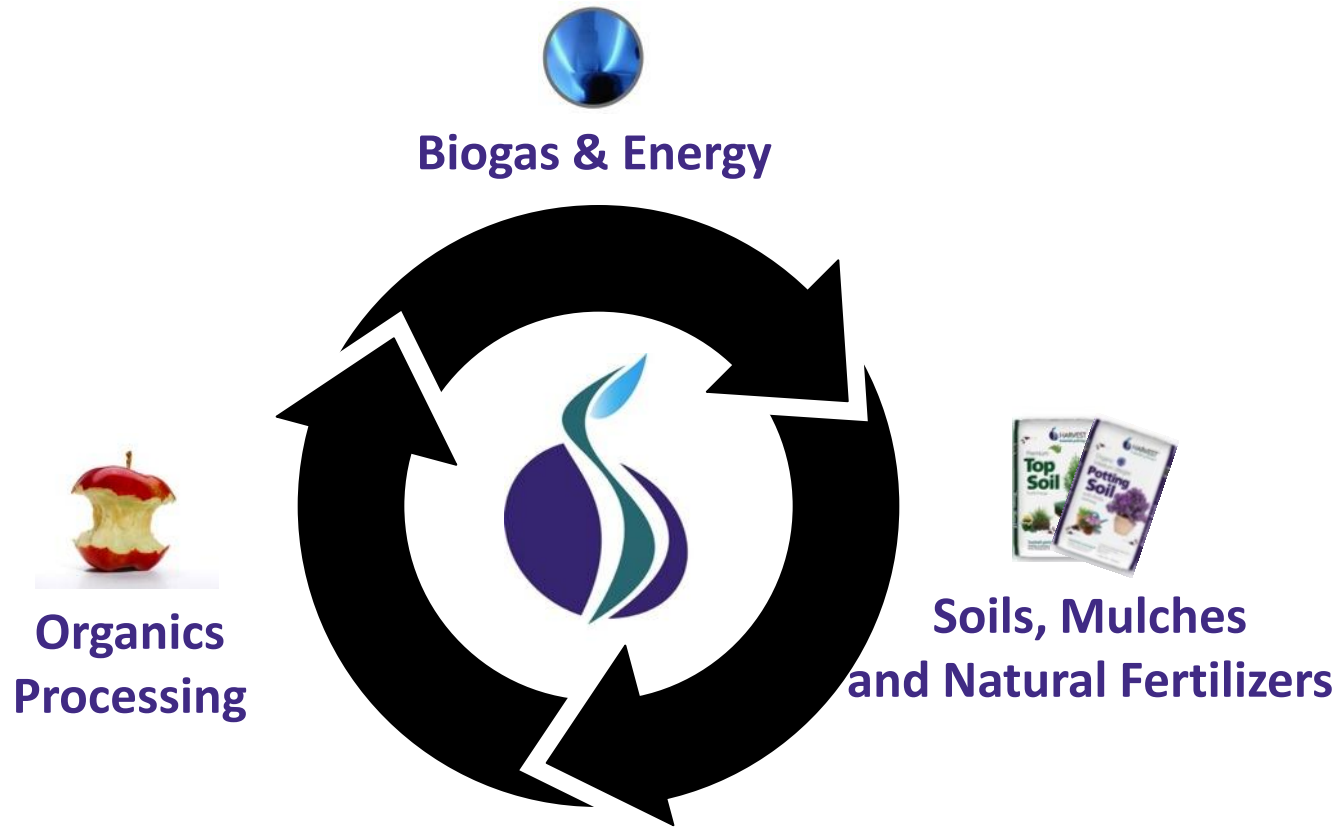
Harvest harnesses the maximum value from organic materials through the production of renewable energy and soils, mulches and natural fertilizers.

Corporate Profile

- Operates 28 processing facilities in North America with more than 430 employees
- Leads the industry managing more than 2 million tons of organic materials; largest composter of yard trimmings & food scraps in North America
- Commissioning North America's largest HSAD and LSAD this fall; third facility starting up in 2013



Adding Value At Every Turn



Harvest generates revenue from all three segments of its business, which simultaneously creates the lowest costs in all three markets.

Agenda

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- What are the challenges?

What is working? Summary

- **Foodwaste and SSO are taking hold** across North America
 - The Metro Vancouver region leads with Zero Waste Challenge targets
- **Economically viable solutions exist to convert these organics** into energy:
 - High and Low solids anaerobic digestion
 - Feedstock types drive technology selection
- **Incentives that support anaerobic digestion and bioenergy**
- Composting and energy production of these organics are **cheaper than landfilling**
- Attractive **high-value wholesale and retail markets exist** for finished compost and blends

Solutions: High and Low Solids AD

CORE ANAEROBIC DIGESTION OPTIONS

Characteristic	HSAD	LSAD
Solids Content	High solids (stack)	Low solids (pump)
Temperature	Mesophilic	1 st Phase Thermophilic Hydrolysis followed by 2 nd Phase Mesophilic AD
Process	Batch	Continuous
No. of Stages	Multi-stage	Multi-stage
Schematic		

Feedstock Drives Technology Selection

The locally-available feedstocks and their relative tip fees determine which AD technology will be operationally suitable and economically profitable.

Characteristic	High Solids AD	Low Solids AD
Ideal waste stream types	Solid food wastes (including SSO, commercial/industrial and some FOG) and yard/wood wastes	Dewatered residuals, food waste, manure, FOG, liquid organic wastes
Solids content of overall mix	25-50%	5-15% (any greater requires dilution)
Contamination levels	Can be higher due to fewer moving parts; contaminants are removed post-AD	Lower due to pumping of material; requires pre-processing of feedstock to remove contaminants

High Solids Case Study: Harvest Energy Garden – Richmond, BC

Key Statistics

Start-Up: Autumn 2012

Capacity: 40,000+ tons /yr.
organics (mixed food & yard
waste)

Energy Output: 2.2 MW
combined heat-and-power

Product Output: 21,000 MT
/yr. high quality compost

Public Outreach: Visitor
Center to host educational
tours and promote Zero
Waste



High Solids Case Study: Mobile Energy Harvester – Richmond, BC

Key Statistics

Start-Up: Spring 2012

Capacity: Scale model

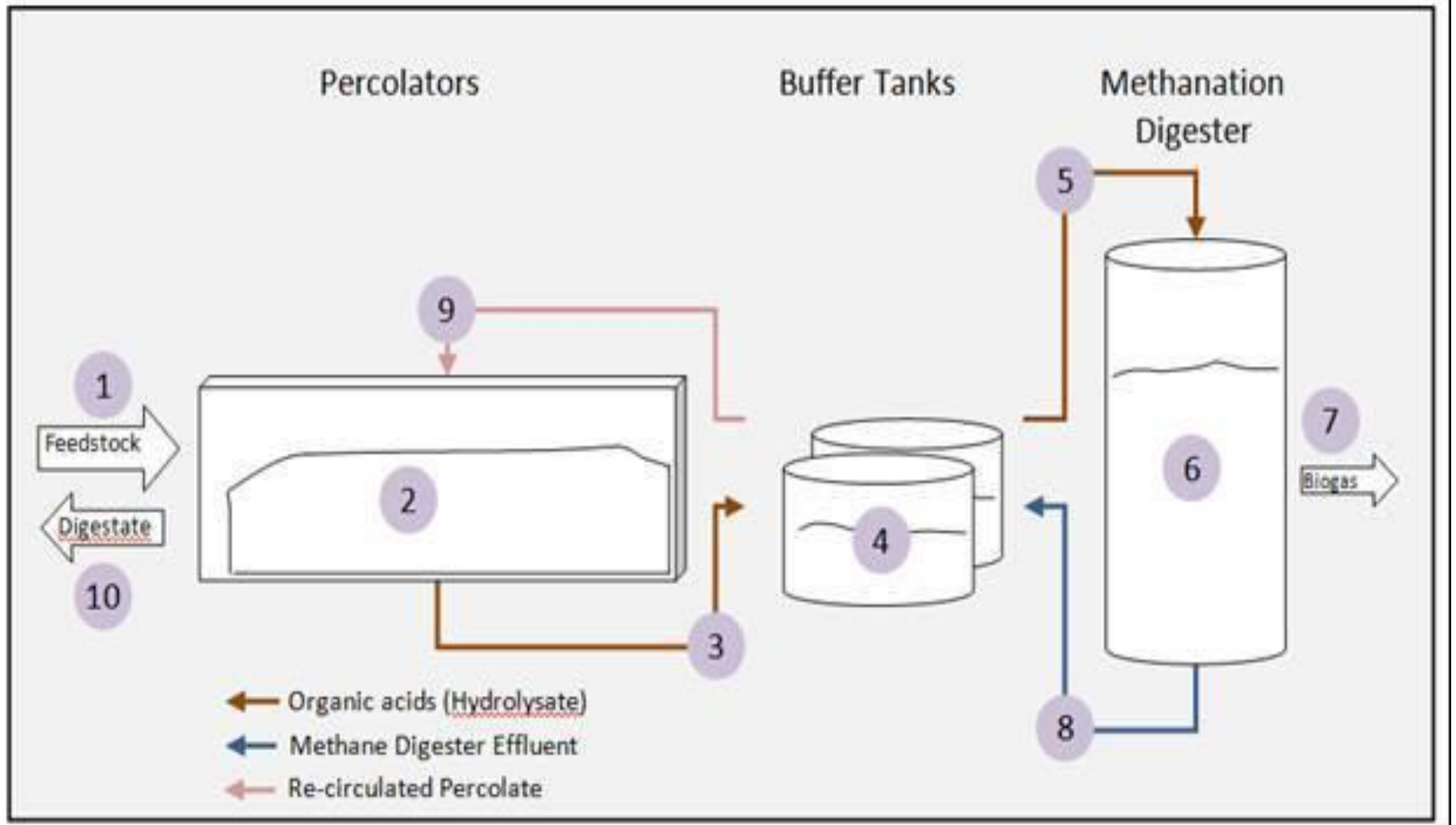
Energy Output: N/A (flared)

Product Output: N/A

Public Outreach: Designed to tour around North America and demonstrate anaerobic digestion technology



Process Diagram - HSAD



Key Statistics

Start-Up: Autumn 2012

Capacity: 70,000 tons /yr. ICI
(Institutional, Commercial,
Industrial) organics

Energy Output: 6 MW
combined heat-and-power

Product Output: 5,200 MT
/yr. granular fertilizer

Customers: Commercial food
processors, grocery stores,
restaurants, rendering plants.



Traditional solution: land application of all the digestate.

Alternative: Liquid-solid separation

1. **Liquid fraction:** Treated using a traditional Membrane Bioreactor aerobic treatment system prior to disposal into the municipal sewer
2. **Solid fraction:** Dried using the excess heat from the CHP units to create a low moisture high density quality solid product

High-quality organic fertilizer

- 60-85% organic content
- 3-4%-N, 3-4%-P and 0-1%-K
- Agriculture, horticulture, professional turf, and retail lawn and garden applications
- Safer alternative to synthetic fertilizers



Low Solids Case Study: Florida Energy Garden Overview

Harvest's Energy Garden will co-digest food wastes from local tourist and resort locations with thickened waste activated sludge from the adjacent, publicly-owned waste water treatment plant (WWTP) to produce baseload renewable energy, fertilizer and soil amendments.

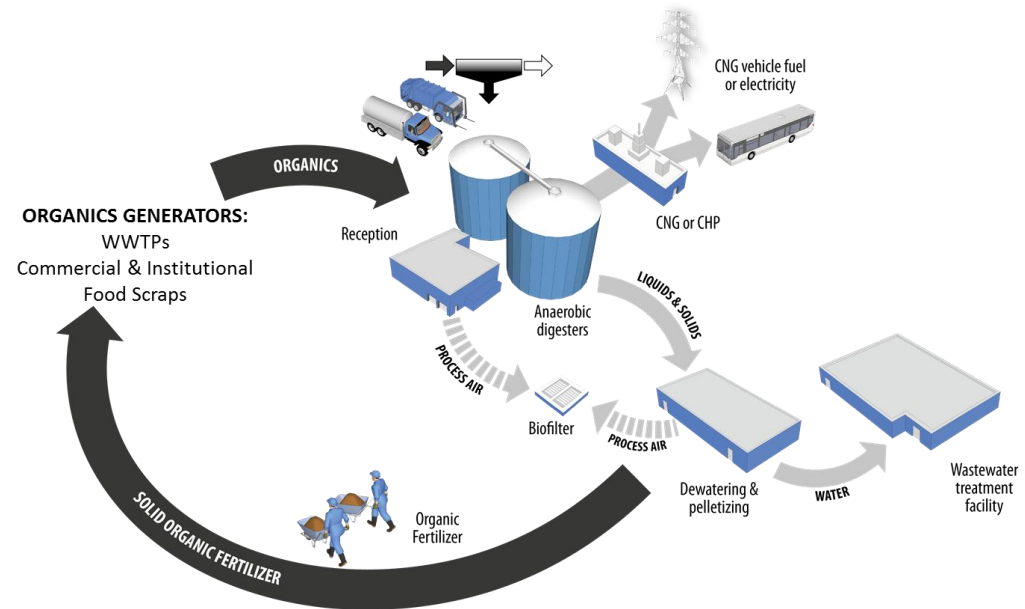
Start-Up: Autumn 2013

Capacity: 120,000 tons /yr. ICI (Institutional, Commercial, Industrial) and biosolids organics

Energy Output: 6 MW combined heat-and-power

Product Output: 3,200 MT /yr. granular fertilizer

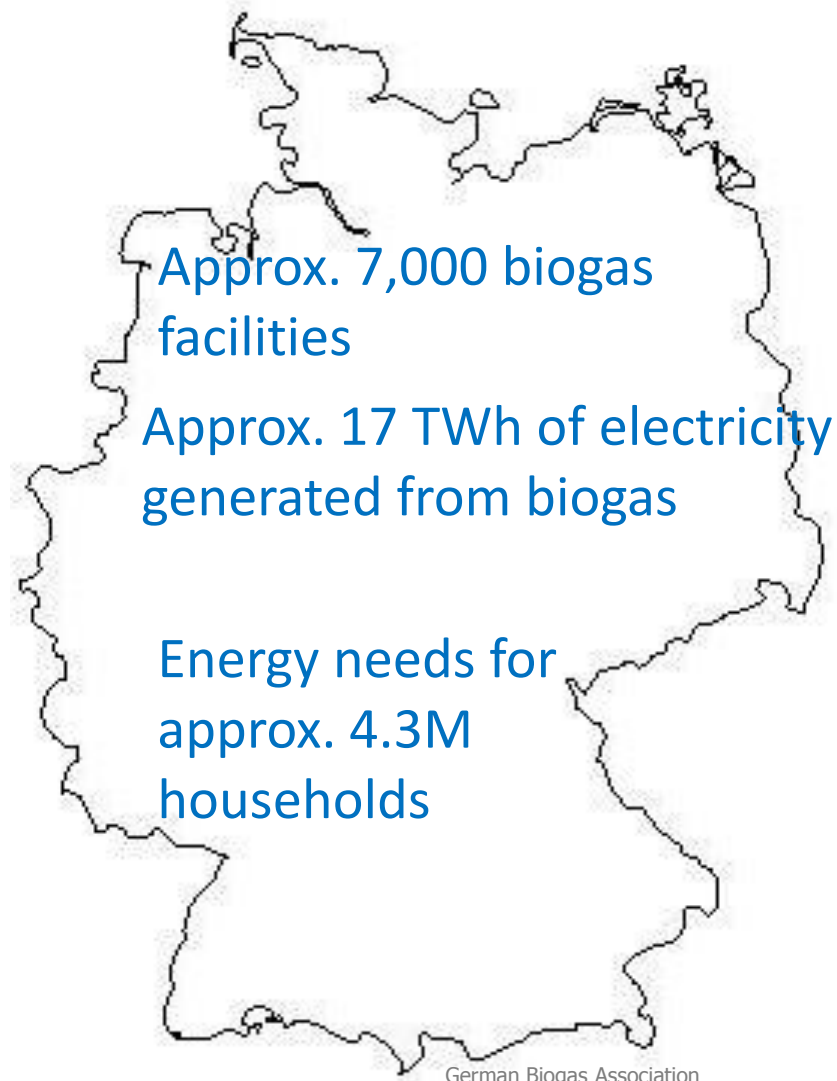
Customers: Located at WWTP and co-digesting biosolids with ICI food wastes



Case Study: Germany

Germany in 2011

- ✓ Total ban on all organic wastes in landfills
- ✓ Societal support of source separation programs



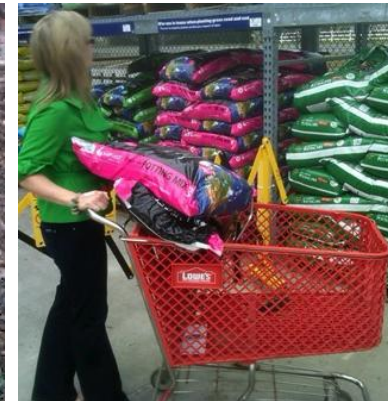
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- **Critical success factors** within state/local control:
 - ✓ Efficient permitting process
 - ✓ Community support
 - ✓ Long-term access to feedstocks
 - ✓ Long-term energy off-take agreements
- **Federal and Provincial incentives can help**, but difficult to count on
- **Source Separation of the Organics is Essential** to ensure long term success of any organics program.
- Composting and energy production of organics can be **cheaper than landfilling** and moves communities to greater sustainability

A strong, effective working relationship between local government, state regulators and the project developer/operator paves the way for success

- Significant tailwinds exist in Canada for a significant build-out of biogas: more positives than challenges.
- However, a unified industry focused on simplification of the process will allow for more rapid industry growth



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