

**Urban Renewable Biogas**  
**The Potential Win-Win-Win Solution**

Renewable Energy: Too Valuable to Waste  
June 16<sup>th</sup>, 2010  
Environmental and Energy Study Institute

Wayne Davis  
Vice President, Harvest Power



**Does This Make Sense?**

		
85% of our energy comes from sources that pollute	We send enough food, yard, and wood waste to landfills and incinerators to fill Giants Stadium more than 50 times	In 2008, the U.S. recycled only 2.5% of its MSW food waste

***It's enough to power 2.5 million homes with renewable energy from biogas!***

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 **HARVEST**

## Empowering Organics

Harvest's purpose is to help businesses, governments, and individuals meet zero waste and diversion goals and implement sustainable waste management practices. Using innovative technologies, we create a new path for organics that transforms wastes into valuable resources

**ORGANIC FEEDSTOCK**  
*(e.g. food scraps, yard trimmings,  
paper fibers and clean wood waste)*



**ENERGY**




**COMPOST & NUTRIENT-RICH  
SOIL PRODUCTS**



*Turning organic waste into valued resources* 



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 **HARVEST**

## Harvest's Unique Characteristics

- Organics recycling company building next-generation facilities that unlock and optimize the energy and compost value of organic waste streams
- Experienced management team with expertise in design, development, finance, construction, renewable energy, and compost marketing
- Financial resources devoted to investing in and acquiring high-value projects along with partners
- Commercialized best-of-breed technologies that extract energy value from organics
- Program development and support, community outreach and education for implementation of source separation programs

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### Our Mission

Promoting the advancement of anaerobic digestion technology in the US

**Biological Material**

- Manure
- Municipal Waste
- Industrial Waste
- Organic Residues


Anaerobic Digester

**Biogas**  
(40-80% Methane)







- ➔ Electricity Generation
- ➔ Gas Pipeline Injection
- ➔ CNG

[americanbiogascouncil.org](http://americanbiogascouncil.org)

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### Wet vs. High Solids Anaerobic Digestion

	<p><b>Wet</b></p> <p><b>Solids Content</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>2%</p>  </div> <div style="text-align: center;"> <p>10%</p>  </div> </div> <p>WWTP, manure</p>	<p><b>High Solids</b></p> <p><b>Solids Content</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>25%</p>  </div> <div style="text-align: center;"> <p>50%</p>  </div> </div> <p>Food, yard, wood waste</p>
<b>Feedstock</b>		

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## Different Configurations for Different Feedstocks



### Konstanz, Germany

Input material: fruits, fats, pomace and herbs  
 Capacity: 5,000 t/year  
 Installed electric power: 150 kW  
 Digestion volume: 1,000 m<sup>3</sup>



### Berlin Klein Eichholz, Germany

Input material: kitchen waste  
 Capacity: 35,000 t/year  
 Installed electric power: 1,350 kW  
 Digestion volume: 2 x 3,000 m<sup>3</sup> + 1 x 2,500m<sup>3</sup>



### Möhrle, Germany

Input material: pig manure and renewable crops  
 Capacity: 12,000 t/year  
 Installed electric power: 530 kW  
 Digestion volume: 2,500 m<sup>3</sup>



### Bois Joly, France

Input material: slaughterhouse residue, manure and sewage sludge  
 Capacity: 18,000 t/year  
 Installed electric power: 250 kW  
 Digestion volume: 1,800 m<sup>3</sup>

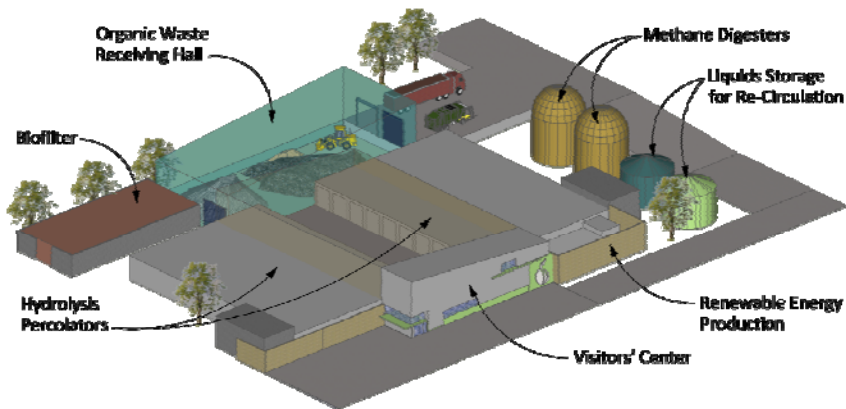
AD projects can be adapted both to urban environments where it's hard to site other energy projects and rural environments where provide a significant economic boost.

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## High Solids Anaerobic Digestion

*Each facility may be completely enclosed, making it suitable for urban and suburban locations*



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### Urban Production of Biogas



HSAD biogas can be sited in urban environments, unlike other renewable energy sources

- A city of only 140,000 people produces enough organic waste for a 30k ton/year facility producing 1MW of power



Biogas is a constant renewable energy source, unlike most other, intermittent sources

- Solar power needs almost twice the footprint to produce the same amount of electricity as an HSAD plant



Electricity production can be tailored to meet peak power demand

- A 30,000 ton facility can provide enough energy to power over 600 homes

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### Biogas Production and Composting Near Cities



- Harvest flagship facility near Vancouver
- 275,000 tons of organic waste/yr. → compost
- Will begin generating renewable biogas in 2011



Metro Vancouver is home to over 2 million people. For over 15 years, Fraser Richmond has operated successfully within 6 miles of 1 million of those residents.

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### European Experience

- Over 5000 operating AD facilities, most in Germany
- 500,000+ jobs
- Many in large towns and cities
- Multiple technology vendors

#### Critical Success Factors

- Landfill Directive 1999/31/EC mandates 35% reduction from 1995 levels of biodegradable waste by 2016
- Feed-in tariffs: 20+ countries

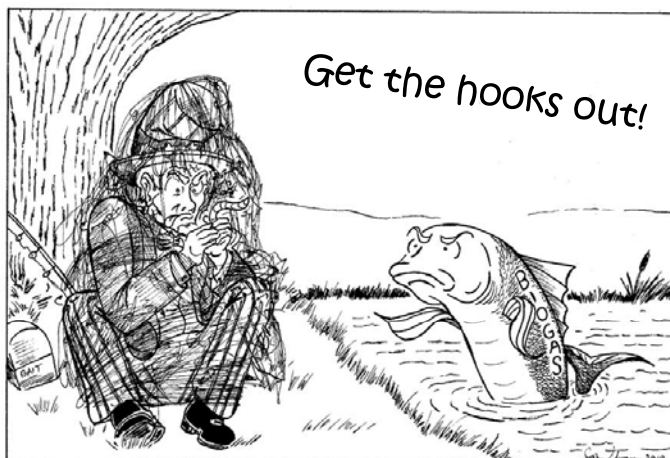


#### Munich HSAD facility

25,000 MT/yr capacity  
570 kW electric (est. 1600 homes)  
9,000 MT/yr compost



### Challenges to U.S. Adoption



Courtesy Jon Sloan



## Challenges to U.S. Adoption

### Market Challenges

- Lack of demonstration facilities
- Secure access to feedstock
- Pricing (in certain markets)

### Policy Challenges

- “Green gas” disadvantage compared to “green electricity”
- Unwillingness to internalize the externalities
  - Carbon emissions from fossil fuels
  - Methane emissions from landfills
  - Environmental impacts of fossil-fuel derived fertilizers
- Regulatory patchwork at all levels
  - 16 federal definitions of “biomass”
- Utility interconnect resistance



## Federal Policy Recommendations

Level the playing field  
for *renewable* biogas

- S 306, Biogas Production Incentive Act
- Add “biogas” or “biomethane” to ITC
- Put a price on carbon across *whole* economy

Long-Term Programs

- Create greater certainty & consistency
- Use graduated phase-outs instead of on/off switch
- RPS, Feed-in-tariffs, net metering

Promote Organics Waste  
Recycling through Best  
Use Determination

- Most efficient way to produce biogas AND compost from organic waste
- Divert **food** as well as yard waste from landfills
- Regulation of landfill methane emissions



## The Win-Win-Win Solution

### High solids anaerobic digestion

- ✓ Divert wastes from landfills, avoid methane emissions to atmosphere
- ✓ Produce a constant supply of renewable energy
- ✓ Create products to improve soil health

### An urban and rural solution

- ✓ Renewable energy produced near where consumed
- ✓ Population density improves economics
- ✓ Wet and mixed AD processes can utilize agricultural wastes

### An affordable solution

- ✓ Incentives will help speed adoption, but not a long-term necessity



## Contact

Wayne Davis  
VP, Incentives and Regulatory Affairs  
[wdavis@harvestpower.com](mailto:wdavis@harvestpower.com)  
781.314.9504 (office)  
978.505.2710 (cell)



[americanbiogascouncil.org](http://americanbiogascouncil.org)

Harvest Power, Inc.  
Waltham MA, Seattle WA, Richmond BC  
[info@harvestpower.com](mailto:info@harvestpower.com)  
781.314.9500  
[www.harvestpower.com](http://www.harvestpower.com)