



# Renewable Energy Education Field Days -- Anaerobic Digester Webinars Thermophilic Digestion



*Biogas: America's homegrown energy*



*Power from Poultry Litter*

*March 14, 2012*

# Technology - Types of Digesters

## I. Total Solid Ranges:

Covered Lagoon: 0.5 – 3% total solids

Complete Mix: 3 – 10% total solids

Plug Flow: 10 – 13% total solids

## II. Temperature Regimes:

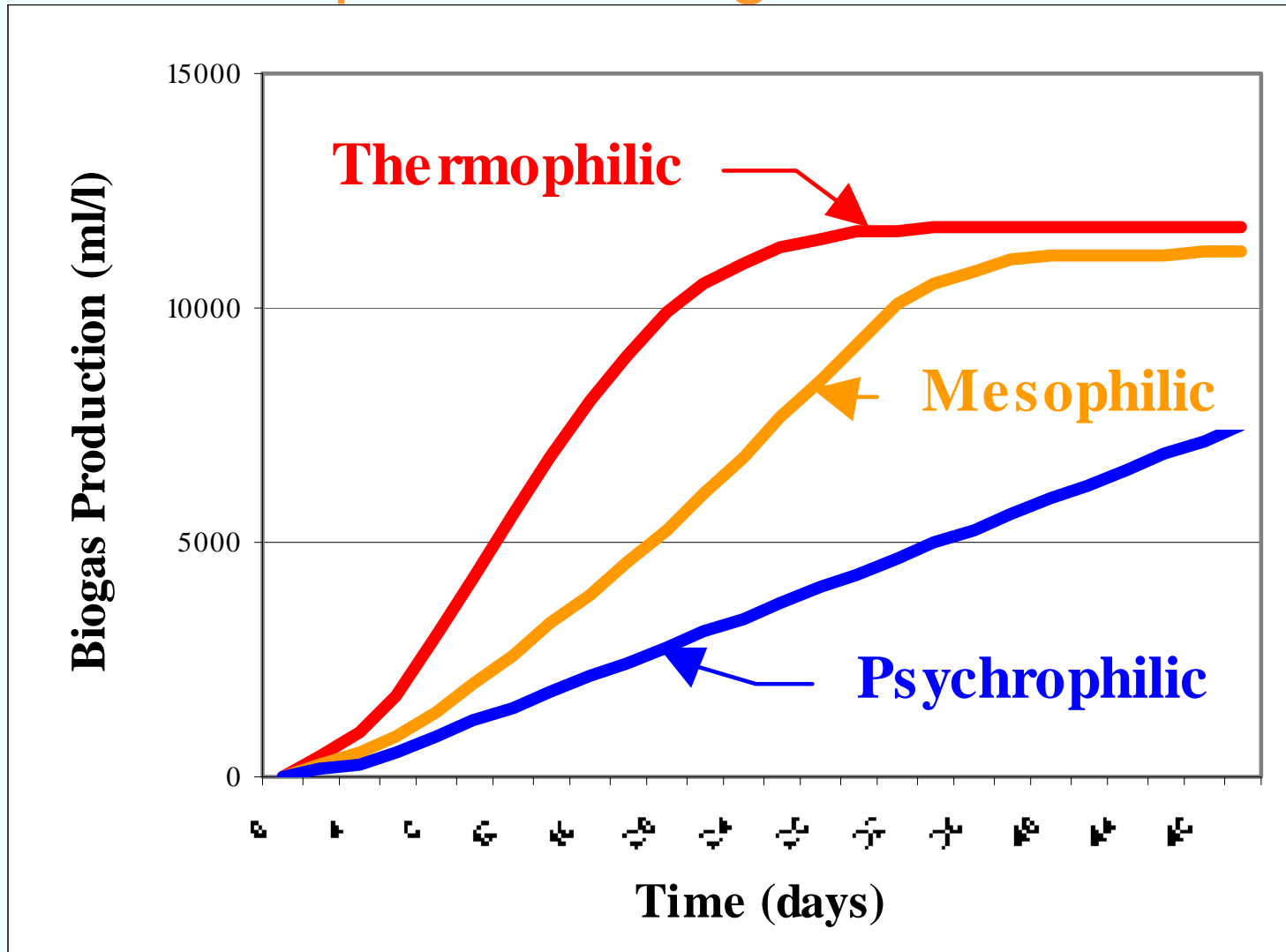
Psychrophilic: 50 – 77°F

Mesophilic: 77 – 104°F

Thermophilic: 120 – 140°F



# Different Temperature Regimes



# Existing Wisconsin Facilities

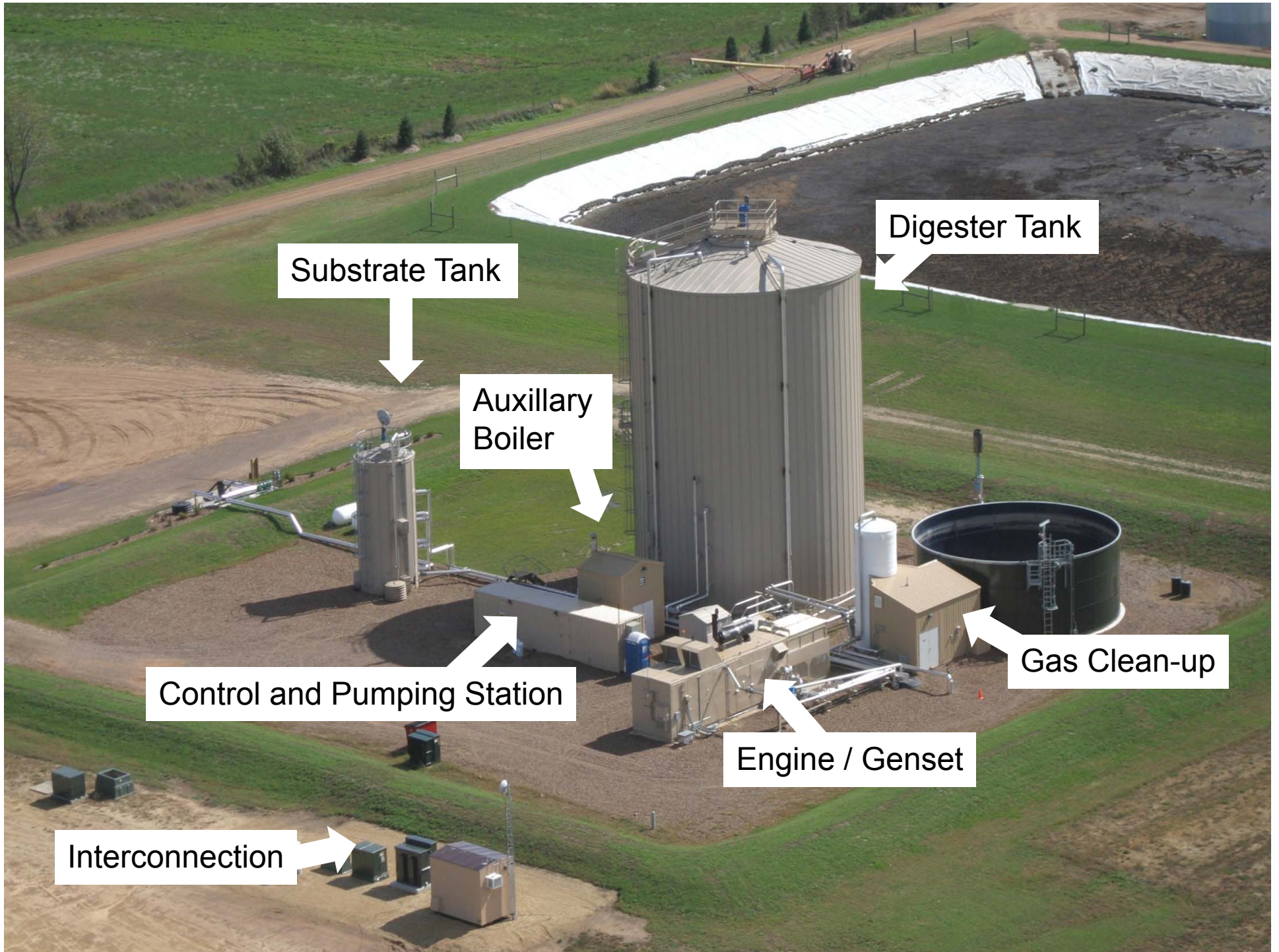


**Five Star Facility,**  
Elk Mound, WI  
Commissioned by HB Energy staff 2005. 69,000 MMBtu used to generate 775kW of electricity  
Farmer-owned; operated by HRE

**Norswiss Facility,**  
Rice Lake, WI  
Commissioned by HB Energy staff 2005. 68,000 MMBtu used to generate 848kW of electricity  
Farmer-owned; operated by HRE



**Wild Rose Facility,**  
La Farge, WI  
Commissioned by HB Energy staff 2005. 69,000 MMBtu used to generate 775kW of electricity  
Farmer-owned; operated by HRE



Substrate Tank

Digester Tank

Auxillary  
Boiler

Control and Pumping Station

Gas Clean-up

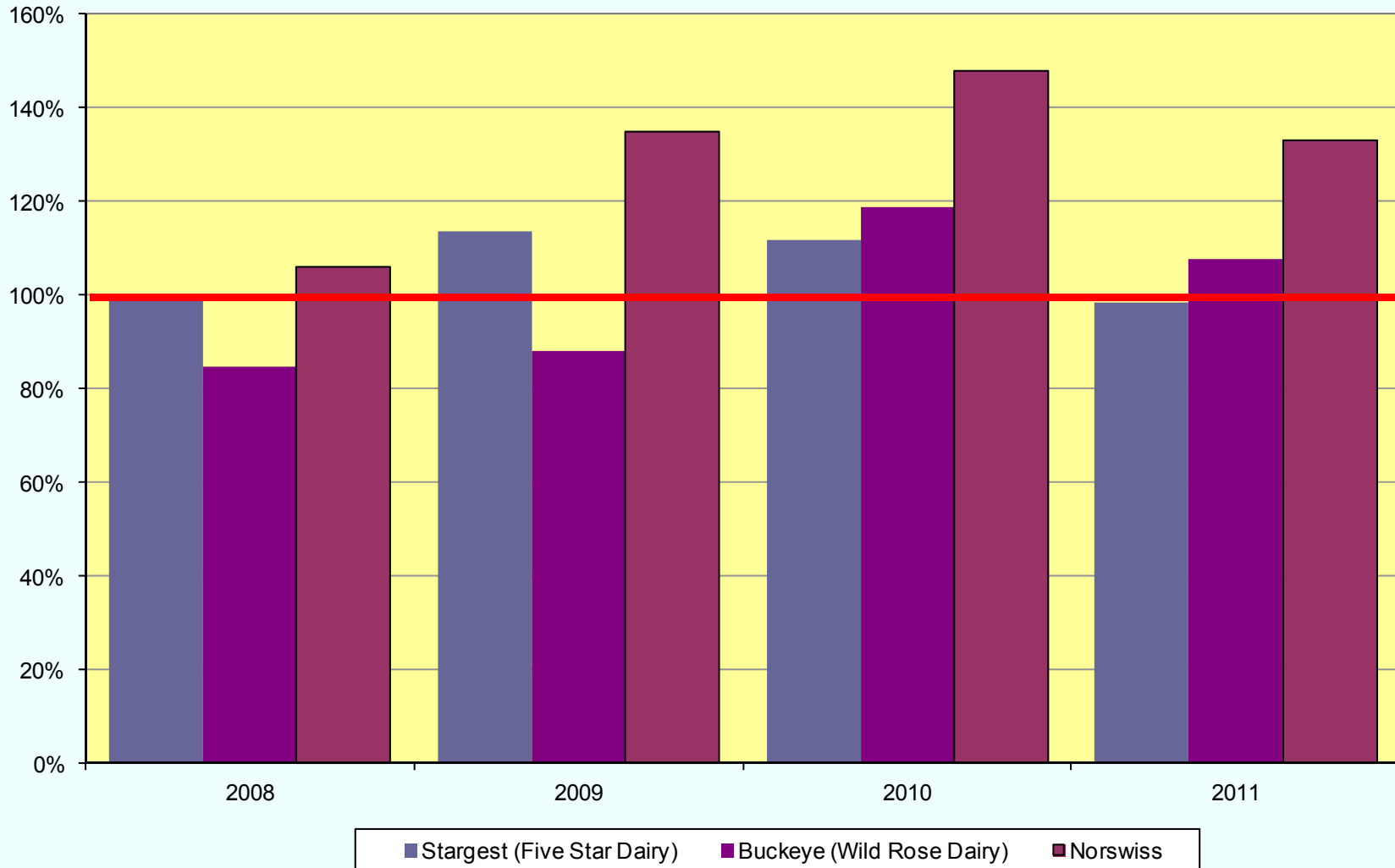
Engine / Genset

Interconnection

# Wisconsin Thermophilic Digesters

## HBE Wisconsin Digesters Annual Biogas Output

Capacity Factors: 2008 - 2011



# Biogas Output

<b>GAS OUTPUT - MODELED VERSUS ACTUAL</b>					
		Modeled	Actual 2009-10 (8 mth period)	Modeled	Expected & Tested (7 day period)
Target		100%	159%	100%	159%
Actual above Modeled		0%	59%	0%	59%
Manure Gal/day		46,968	46,968	36,000	36,000
Substrate Gal/day		6,770	6,770	12,000	12,000
Substrate %		13%	13%	25%	25%
<b>Raw Gas MMBtu/day</b>		<b>188</b>	<b>299</b>	<b>292</b>	<b>464</b>
<b>Raw Gas MMBtu/Year (90% CF)</b>		<b>61,758</b>	<b>98,222</b>	<b>95,768</b>	<b>152,473</b>

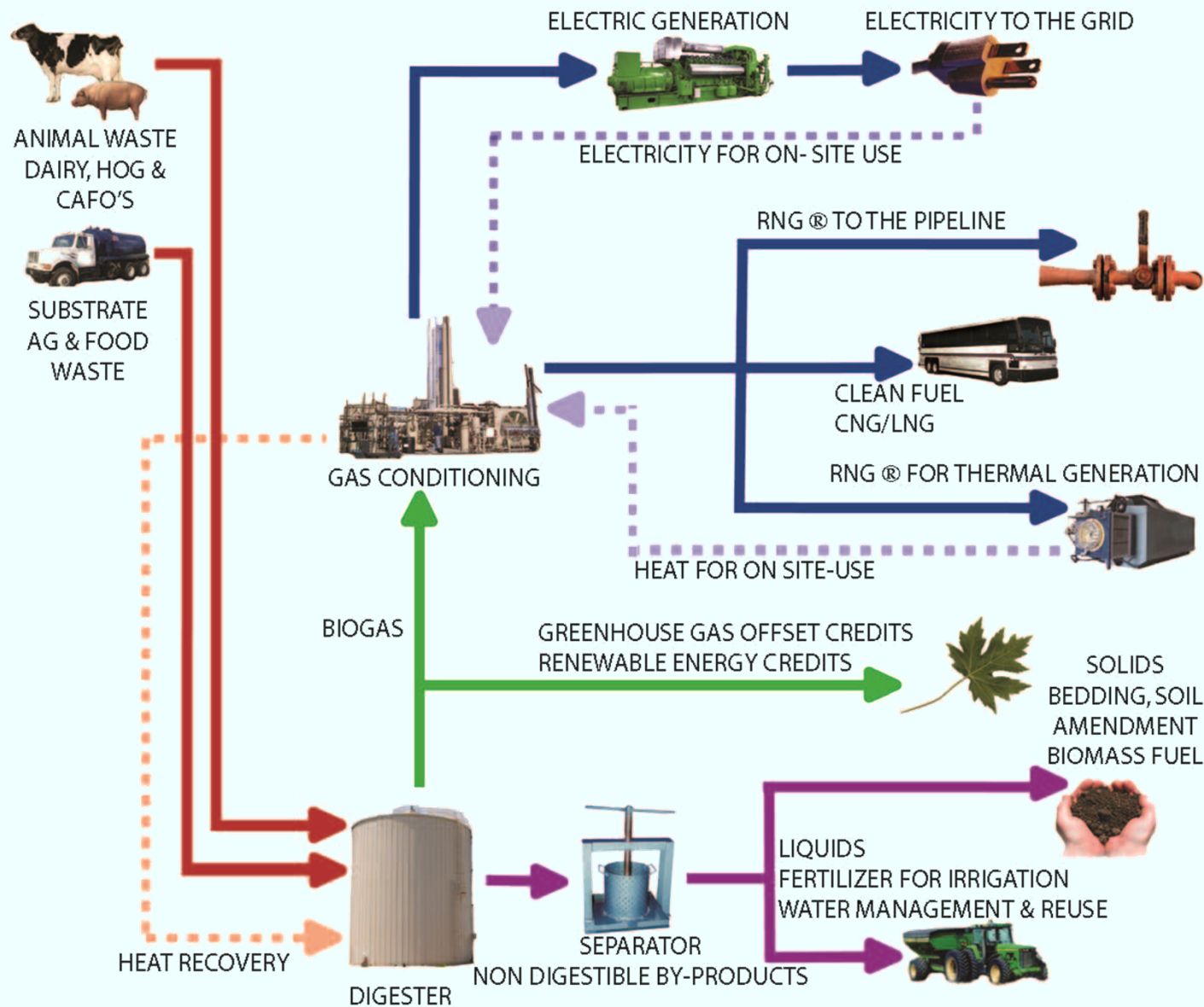
## Summary for Success

- Technology – Complete mix, more efficient and allows for a greater variety of feedstocks
- Temperature – Thermophilic, more efficient and lowers hydraulic retention time
- Digester Health – Monitor HRT, temperature, pH, volatile fatty acid count, organic loading, etc.
- Operation and Maintenance – Implement preventative maintenance program
- Feedstock Management – Quality assurance and supply management





# HBE Process Diagram



## Contact Information

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