
Benefits of Biogas Conditioning

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What is Biogas?

- Anaerobic decomposition of organic material
- Composition
 - CH₄ 40-70%
 - CO₂ 25-40%
 - N₂ <5%
 - O₂ < 2%
 - H₂S 100 – 5,000 ppm
 - Siloxanes & VOCs 0 – 150 ppm
 - H₂O Saturated, 100% RH

What can we do with it?

Flare

- Carbon Credit

Heat

- Low Net Value

Electricity

- Low Net Value

Combined Heat and Power

- Best Energy Value

Upgrade to Natural Gas Quality

- Higher Value

Why Remove H₂S?

Safety

- H₂S Toxicity

Protects Downstream Equipment

- Corrosion
- Acidification
- Deposit Formation
- Siloxane Removal Media

Environmental Considerations

- Reduces SO_x Emissions
- Odors

H₂S Removal Technologies

- Scavenger medias
 - Iron Sponge
 - SulfaTreat
- Water/Amine scrubbing
- Biological

Biological H₂S Removal



Emissions Control

Why Remove Moisture?

Corrosion Prevention

- Eliminates formation of acidic compounds such as sulfuric acid

Prevents condensation

Protects Downstream Equipment

- Siloxane removal medias

Moisture Removal Equipment

- Knockout
- Coalescing filter
- Desiccant dryer
- Refrigerated dryer/glycol chiller

Why Remove Siloxanes?

Silicon dioxide formation

- During combustion, SiO_2 is formed
- Reduce glass-like deposits

Protection of equipment

- Deposit formation
- Reduce spark plug replacement
- Fouling of combustion catalyst

Environmental Considerations

- CO and NOx emissions

Siloxane Removal Technologies

- Once through system
- Regenerable system
- All systems use: Adsorption media
 - Silica gels
 - Activated carbon
 - Polymorphous graphite

Siloxane Removal



Emissions Control

Case Study

- 250scfm of Biogas
 - 65% Methane
 - 1,000ppm H₂S, 100ppm Siloxanes
 - 1MW of Power
 - Revenue stream of ~\$0.7MM (@ \$0.08/kWh)
- Cost of Power Generation
 - \$1MM CHP Generator

Benefits of Biogas Conditioning

Capital Cost of Biogas Conditioning Equipment		
H ₂ S Removal		\$ 150,000
Siloxane Removal		\$ 350,000
Annual O&M	Cost	Savings
H ₂ S Removal (nutrients)	\$ 1,000	
Siloxane Removal (media)	\$ 2,500	
Oil Changes		\$18,000
Spark plug		\$ 5,000
Engine Maintenance		\$ 75,000
Electricity (85% availability)		\$ 105,000

Payback Period 2.5 years

Biogas Conditioning System



Emissions Control

Biogas Conditioning System



Emissions Control

Thank you!

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