BIOVIS P2500 2-Stage PSA Case Study

Dane County Landfill Madison, Wisconsin

The Dane County Landfill installed a BIOVIS 2-Stage Pressure Swing Adsorption (PSA) gas upgrading plant from BIOFerm Energy Systems to generate renewable natural gas (RNG) for clean transportation fuel. Previously, the Dane County Landfill generated electricity with the gas collected from the breakdown of garbage and organic waste. However, this facility enables the county to convert its landfill gas into vehicle fuel, thereby eliminating thousands of tons of carbon emissions.



Project Background

Customer: Dane County Landfill **Dane County Landfill:** Collects 220,000 tons waste/year

Gas Source: Landfill gas Location: Madison, Wisconsin Gas Upgrading Technology: 2-Stage PSA Operational: April 2019



Skid-Ready PSA Installation Includes:

- Fully integrated control system
- Landfill gas filtration
- Biological sulfur removal unit
- Landfill gas compressor
- VOC removal
- Thermal oxidizer
- Gas cooling
- Booster blower
- RNG compression

Project

Project Gas Upgrading Specifications

2-Stage BIOVIS: P2500 Plant Footprint: 24,000 ft² Gas Utilization: Pipeline injection Energy Content: >967 BTU/scf Pipeline Requirements: Exceeds ANR pipeline specs

Raw Gas Capacity: 2,500 scfm **Raw Gas**: 56% CH₄, 34% CO₂, 6.6% N₂, 0.3% O₂, >430 ppm H₂S

Product Gas Flow: 1,340 scfm



Fuel Output

RNG: ~680 million scf/year **Gas Gallon Equivalent:** 8.57 million (GGE)/year





BIOVIS 2-Stage PSA Technology

About BIOFerm Energy Systems

Based in Madison, Wisconsin, BIOFerm Energy Systems is an experienced provider of turnkey renewable energy systems, including anaerobic digestion, gas upgrading, and solar energy. From project conception to commissioning, optimization and training, BIOFerm handles every aspect of the entire process. Our range of biogas solutions allows for seamless integration into a variety of different operations, including landfills, municipalities, wastewater treatment plants, food processors, agricultural operations, and more. BIOFerm is committed to providing successful renewable energy projects to our clients and ensuring that our technologies will produce the results agreed upon by offering the industry's most thorough Performance Guarantee & Warranty.



System Applications

- Landfills
- Wastewater treatment plants
- Municipalities
- Agricultural operations
- Food processors
- Other producers of biogas



Key Features

- Typical CH₄ recovery > 92-96%
- High N₂ rejection
- Pre-manufactured/tested/assembled
- Skid-ready, reducing installation costs
- Capable of meeting stringent pipeline requirements
- In-house VOC removal technology
- No increased CH₄ losses over time
- Low operating costs
- Modular approach
- High processing efficiency





Gas Upgrading System Components

- Biological desulfurization
- Compression
- H₂O removal
- VOC and H₂S removal
- Pressure swing adsorption
- Thermal oxidation
- Fully integrated control system



2-Stage PSA Process Steps

- 1. Raw biogas is compressed
- 2. Cooling system removes condensed water vapor
- **3.** Activated carbon removes trace component such as H₂S, VOCs, and siloxanes
- **4.** Conditioned biogas is channeled through PSA adsorbers filled with carbon molecular sieves for adsorption
- 5. First stage of adsorption removes $CO_{2'}$ H₂O, NH_{3'}, and parts of O₂ and N₂
- **6.** Second stage removes remaining O₂ and N₂
- **7.** RNG is injected into the grid, or upgraded to CNG



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