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Clean Energy Solutions | Partnership | Success

BGXSOLUTIONS

METHANE UPGRADING - CLEAN, SIMPLE, PROVEN, RELIABLE

When upgrading biogas into an economical source of renewable energy, choose a compact XEBEC pressure swing adsorption (PSA) system featuring simple and reliable XEBEC rotary valves and rapid cycle PSA technology. XEBEC PSA systems are being used worldwide to effectively remove carbon dioxide (CO2) from landfill, digester or well gas streams to meet stringent quality specifications for pipeline natural gas and vehicle fuel.

XEBEC M-3100 processing landfill gas in Ohio for distribution to customers via Duke Energy natural gas pipelines.

XEBEC M-3200 processes dairy farm biogas for distribution to customers via Michigan Gas Utility natural gas pipelines.

XEBEC PSA ADVANTAGES:

- Compact and skid mounted
- Proven reliability and simple to maintain
- Minimal utilities and consumables required
- Automatic purity control
- Standard plant designs
- Configurable process design

XEBEC PSA BENEFITS:

- Simple and economical to integrate, install, or re-locate
- Maximize revenues
- Minimal operating costs
- Simple to operate and maintain product purity with changing feed conditions
- Minimized cost
- Optimized performance for specific projects including facilities with existing power or combined heat and power assets

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XEBEC ADSORPTION INC. | 730 Boul. Industriel, Blainville, Quebec, J7C 3V4 Canada
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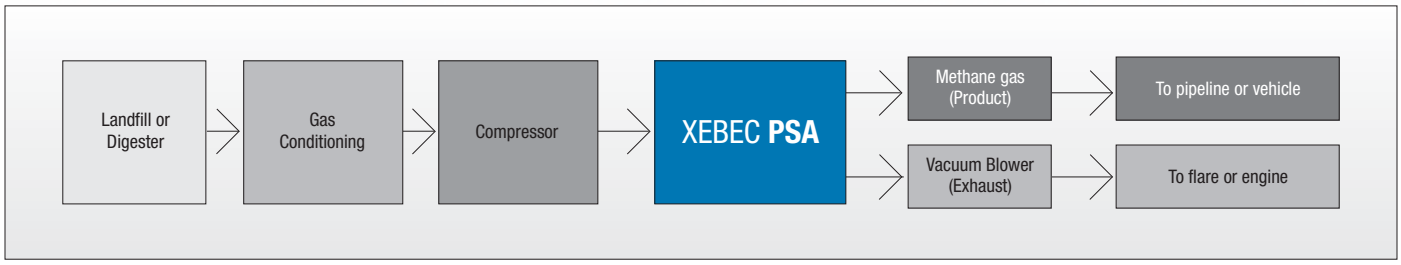
XEBEC METHANE UPGRADING PSA SYSTEMS

PROCESS DESCRIPTION

The XEBEC M-3200 and M-3100 PSA systems remove carbon dioxide (CO2), water vapor and most trace gases present in biogas streams to meet and exceed levels for natural gas pipelines or vehicle fuel requirements. In some applications pre-treatment is required to reduce contaminants such as non-methane organics (NMOC's) and hydrogen sulfide (H2S). The PSA process is based on physical adsorption of gas molecules on specially selected adsorbent materials. At operating pressure the adsorbents remove contaminants such as carbon dioxide and water vapor from the biogas stream and allow upgraded methane to pass through at near operating pressure. Typical pressure loss of the bio-methane product is less than 1 bar or 15 psi. The off-gas or exhaust stream removes the contaminants as part of the continuous PSA cycle by allowing the adsorbents to regenerate under vacuum pressure (typically 0.5 bar or 7.4 psia). The process repeats continuously to provide constant production of high-quality methane gas unlike other upgrading processes which require re-compression of the product bio-methane.

SIMPLIFIED BIOGAS UPGRADING SYSTEM



XEBEC PSA FOR METHANE PURIFICATION PRODUCT RANGE AND SPECIFICATION

Feed Pressure vs. Biogas Feed Flowrate (higher operating pressures are possible)

** Process and PSA cycle are common for the M-3200, but two equipment sizes are available.*

XEBEC PROVIDES

> International engineering and design experience for project specific requirements and codes
> System feasibility and optimization studies
> PSA only or full gas treatment engineering and procurement solutions
> Short delivery times to meet tight project schedules
> Technical training programs for integrators and operators
> Product and engineering support through-out the life of the plant

ABOUT XEBEC ADSORPTION INC.

XEBEC ADSORPTION INC. is a developer and supplier of proprietary and conventional gas purification systems for several large international markets, including biogas production, natural gas processing, natural gas for NGV's, oil refining and compressed air. XEBEC is based in Blainville, Quebec.

NOTE TO READER: At the time this document went to print, Xebec Adsorption Inc. and QuestAir Technologies Inc. were in the process of a merger transaction. All Questair IP will become the property of the combined company under Xebec Adsorption Inc.

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