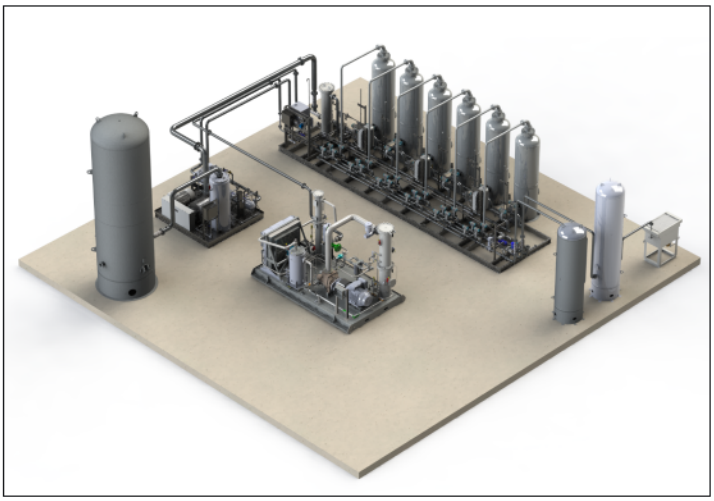
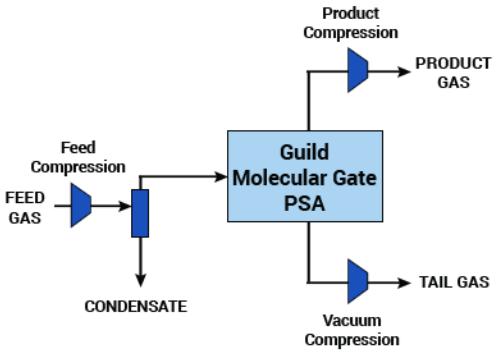
Guild Associates, Inc.

Molecular Gate™ Pressure Swing Adsorption is RNG Made Easy!

No replaceable media + simple operation + high methane recovery = less headaches and higher revenue



Guild Associates' Molecular Gate CO_2 Pressure Swing Adsorption system offers high methane capture efficiency and low operational costs. Standard features include:



Single-Pass Contaminant Removal without Upstream Equipment Including:

- Siloxane removal
- Moisture removal
- Hydrogen Sulfide (H_2S) removal (> 10,000 PPM)
- Volatile Organic Compounds (VOCs) removal
- Field-proven removal of all chemicals identified by California Rule 21 / 30

High Reliability and Durability

- Molecular Gate media will last for entire equipment lifetime
- Annual Maintenance downtime less than 48 hours typical
- Equipment availability typically > 98% with preventative maintenance
- No operational downtime caused by upstream removal equipment

Simple Operation

- Autonomous Software requires little operator interface
- System automatically adjusts to changes in feed gas quantity and quality
- CO_2 product gas level is operator-specified
- Capable of producing LNG-quality gas (< 50 ppm CO_2)
- Operator primarily responsible for periodic leak and oil checks

The Molecular Gate CO_2 Removal PSA system is RNG Made Easy! Contact Guild Associates for a review of your specific application.

About Guild Associates

Guild Associates designs and manufactures PSA systems for CO_2 and N_2 removal, and also manufactures BSR-050, the highest capacity hydrogen sulfide removal media on the market. Guild is the sole licensee of BASF's Molecular Gate™ Adsorbent, which was was first commercialized in PSAs in 2004.

Contact us for more information:
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NanoGate and MicroGate PSA Systems For Small Digesters

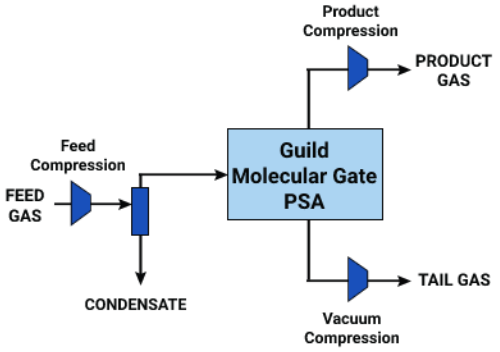
Single-Skid Solution is a game-changer to enable small digesters to enter the RNG market

Small digesters at last now have a viable and cost effective option for upgrading biogas to Renewable Natural Gas (RNG) to participate in the lucrative markets for federal Renewable Fuel Standard (RFS) Renewable Identification Number (RIN) and state-based Low Carbon Fuel Standard credits. Guild Associates has packaged the industry-leading Molecular Gate Pressure Swing Adsorption (PSA) system into a single-skid solution that requires minimal site preparation and just a few days for equipment commissioning. Within a few days of delivery, the system can be fully operational and producing RNG.

Two sizes are available, NanoGate™ (50 SCFM) and MicroGate™ (100 SCFM). These PSAs have the same Molecular Gate™ technology, including autonomous operation, high menthane efficiency, and no pretreatment systems nor replaceable media. Systems are supplied fully complete with motor starters, instrument air compressors, and control system.

Site preparation can be as simple as a gravel surface to place the skid. Field piping and wiring are minimized, as only the feed gas line, product gas line and waste stream require field pipe connections. Systems are fully rated for outdoor service and do not require an enclosure. These plants are self-adjusting to feed gas quantity and quality, requiring minimal operator interaction. Maintenance is largely a yearly event to service the compressors, consisting of oil and oil filter changes, gas filter changes, fan belt service and bearing lubrication. Maintenance can typically be accomplished on one calendar day.

The process diagram is shown to the right. The feed gas is compressed and cooled using passive cooling to remove the bulk of water as condensate. This low-moisture gas is re-heated with waste heat from the compressor to 150°F and fed into the PSA, where carbon dioxide, water, hydrogen sulfide (H_2S), VOCs, siloxanes and other trace impurities are removed. The resulting RNG is compressed for injection into the pipeline system, or compressed for CNG.



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RNG is a New Income Stream for Hog Farmers

Tap into a new revenue stream by selling Renewable Natural Gas (RNG)

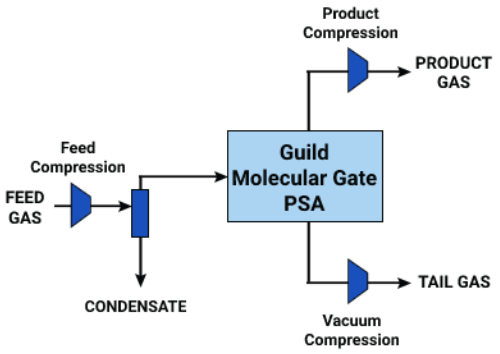
Manure management has become a regulatory and liability issue for Hog Farmers. Odor lawsuits, environmental regulations, and communitiy activisim are all on the increase, demanding changes in hog manure management. Recent state initiatives by North Carolina are being examined by other states, and may well be widely adopted. Consider turning this compulsory activity to a new revenue stream by collecting the manure into digesters to produce biogas. If this biogas is captured and upgraded to Renewable Natural Gas (RNG), it can produce a significant new revenue stream for swine farms.

A common rule of thumb is that a yearly dekatherm (1,000,000 BTUs) of biogas can be budgeted for each finishing pig space if the manure is collected and anaerobically digested. Therefore a 15,000 hog finishing facility will produce about the full capacity of a Guild Associates NanoGate™ PSA system. When this amount of biogas is upgraded to RNG and injected into the pipeline, it can have a provide a significant revenue stream as a D3 RIN per the Renewable Fuels Standard, with opportunities for additional revenue through state initiatives such as the California or Oregon Low Carbon Fuel Standard.

Guild Associates has Molecular Gate™ Pressure Swing Adsorption (PSA) systems at digesters across the USA, allowing these facilities to take advantage of this new income stream. The systems are complete equipment solutions, have excellent uptime (>98%), and require little maintenance and operator interface.

The process diagram is shown to the right. The feed gas is compressed and cooled using passive cooling to remove the bulk of water as condensate. This low-moisture gas is re-heated with waste heat from the compressor and fed into the PSA, where carbon dioxide, water, hydrogen sulfide (H_2S), VOCs, siloxanes and other trace impurities are removed. The resulting RNG can be compressed for injection into the pipeline system or alternatively compressed into CNG for sale to market.

Guild Associates can assist hog farmers through the whole process of system design, equipment selection, and installation. Guild Associates also has partners to assist with financing, financial risk management, and maximizing the monetization of the RNG.



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Guild Associates, Inc.

Guild Associates BioGas Processing Plant Locations Throughout North America

Guild Associates, Inc. has biogas plants in operation at landfills, waste water treatment plants, lagoon digesters, and other facilities where the biogas is purified to either pipeline or LNG specifications. Our portfolio of equipment includes: feed compression, Pressure Swing Adsorption (PSA), Temperature Swing Adsorption (TSA), membrane separation, vacuum compression, and product compression. We have standard system offerings or can custom build a package to meet individual customer needs. Guild's Molecular Gate™ PSA systems use only regenerable media with our longest running plant in operation since 2004. Tours of operating commercial units in similar scale and application can be arranged upon request.

Biogas plant locations:

- USA
- Canada
- UK
- Brazil
- Philippines

Feed Flows:

- 50 to 8,000 SCFM

Product Compression:

- Pressure up to 1,400 PSIG for high pressure interstate pipeline
- CNG up to 4,500 PSIG with both slow fill and direct fill

Applications:

- RNG Pipeline Injection
- CNG for Vehicle Fuel
- LNG for Vehicle Fuel

Contaminants removed:

Bulk rejection of:

- Carbon Dioxide (CO_2)
- Nitrogen (N_2)

Rejection of common components:

- Hydrogen Sulfide (H_2S)
- Oxygen (O_2)
- Volatile Organics (VOCs)
- Moisture (H_2O)
- Heavy Hydrocarbons (C_6+)
- Ammonia (NH_3)
- Siloxanes
- California Rule 21 and Rule 30 compliance.

Phone: 614-798-8215

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