

Expertise and integrated solution support
for your decarbonization goals



Renewable Natural Gas Solutions

Proven expertise in engineered, integrated and fabricated solutions to help you overcome your toughest challenges





How do you ensure safe and consistent production, minimize project complexity and lower lifecycle costs?

Sustainability and **Decarbonization** have become an integral part of discussions around energy security and securing economic growth. With the aim of net zero emissions by 2050, many countries have introduced legislation and subsidies, along with public and private investment to encourage the use of renewable energy in place of traditional fossil fuels. For natural gas utilities, the injection of **Renewable Natural Gas (Biomethane)** and **Hydrogen** in their distribution network is accelerating the transition to a carbon neutral energy supply.

Utilities and developers face the challenge of bringing new biomethane projects into their distribution systems, on time and within budget. Gas must then be delivered safely and to the required specifications for pipeline quality gas. Dealing with multiple suppliers, complex contracts and new systems while complying with regulations can be challenging. In addition, there is an urgent need to maintain supply and minimize downtime to obtain a greater return on investment.

Innovative technologies, proven expertise and integrated solutions can give you unprecedented flexibility in attaining your renewable energy goals.

“RNG could reduce emissions from natural gas 95% in the residential sector”
- American Gas Foundation study, December 2019



“Full utilization of the sustainable biogas and biomethane production could cover 20% of today’s worldwide gas demand”
- The Outlook for Biogas and Biomethane, IEA, March 2020



“157 Operational / Online facilities, 76 Under Construction, 79 Planned”
- RNG production facilities in North America, March 2021, The Coalition for Renewable Natural Gas



Emerson – Your safety and reliability partner

Renewable Natural Gas (RNG) or Biomethane is an alternative to natural gas. It can be used in multiple applications (heat, power generation, industrial feedstock, transportation fuel) and is an effective way to reduce total emissions across the whole value chain. Biomethane is produced by upgrading biogas captured from sources such as anaerobic digesters, wastewater treatment facilities and landfill sites. From the upstream upgrading processes to remove moisture, H₂S and other inerts and other impurities to the downstream injection of biomethane into the natural gas grid, Emerson’s expertise can help ensure **safe and reliable operation, lower lifecycle costs and reduce project complexity.**

Your Challenges



- Multiple suppliers
- Complex contracts
- Inefficiencies between different supplier products



- On time delivery and within budget
- Compliant with regulations and challenging legislation
- Design expertise



- Need to maintain equipment availability
- Avoid unscheduled downtime
- Quicker return on investment



- Manual management of parameters (pressures, flow rates, odorization etc.) is error prone
- Integration of biomethane injection with existing SCADA network
- Additional resources to perform monitoring at injection point

Our Solutions

- Extensive product portfolio to suit your project’s requirements
- Modular and customizable options to meet project requirements
- Eliminate supplier inefficiencies by partnering with a global leader that provides the complete solution in one stop shopping

- Dedicated project resources
- Design to local and global standards
- Globally recognized R&D facilities, testing centers and manufacturing facilities that design and deliver exceptional integrated solutions

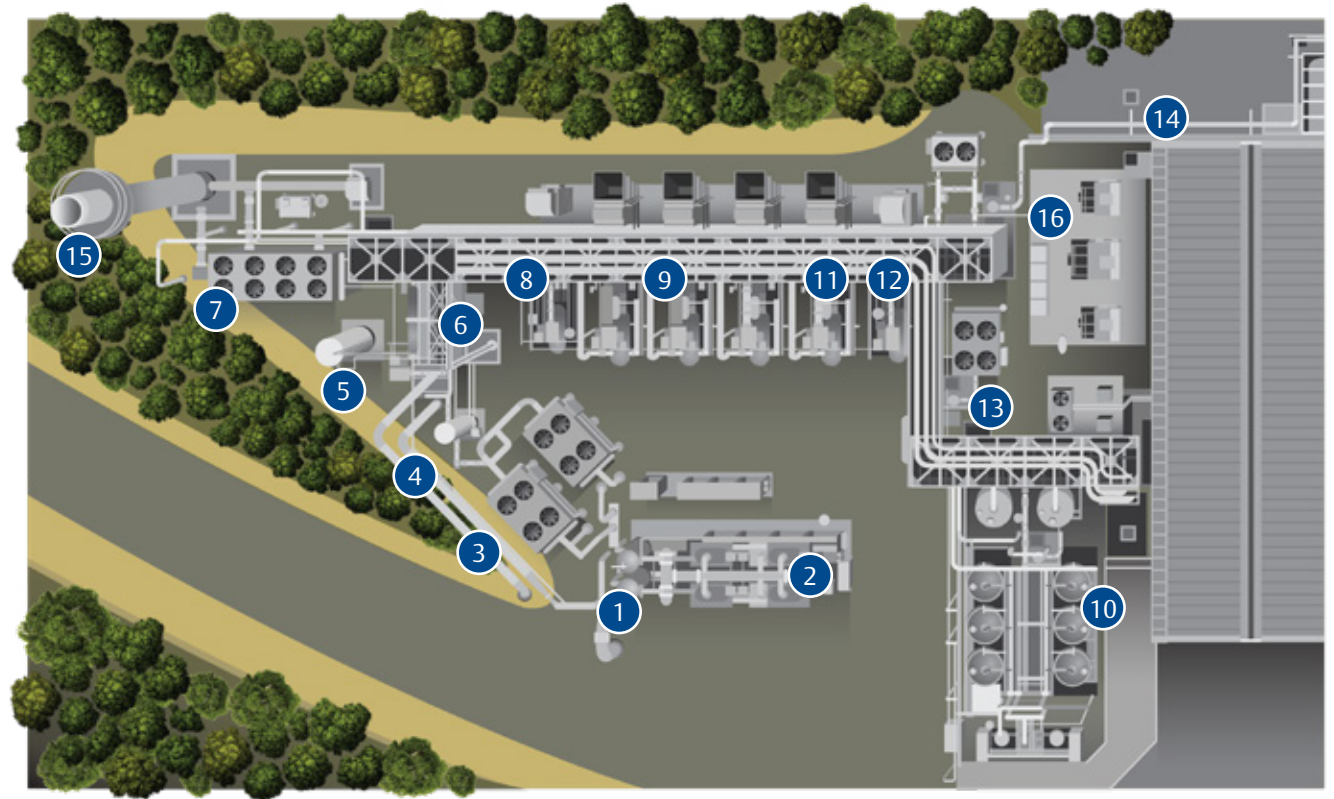
- Network of support specialists available for product lifecycle management
- A well-connected partner network providing global as well as localized expertise

- Integrated Emerson automation and control systems (flow computers, RTUs, SCADA, odorization)
- Seamless integration with centralized/ existing control / IT networks
- Embedded algorithms to perform analytics and remote monitoring

A complete portfolio of biomethane production and injection solutions

Process Steps:

- 1 Landfill or Digester Inlet
- 2 Blower skid
- 3 Blower after-cooler
- 4 Blower discharge scrubber
- 5 H₂S Removal
- 6 Flooded chiller for dehydration
- 7 Refrigeration condenser
- 8 Refrigeration compressor
- 9 Renewable gas feed compressor
- 10 CO₂ or siloxane removal skid
- 11 Swing compressor
- 12 Sales pipeline compressor
- 13 After-coolers and scrubbers for feed and sales gas
- 14 Biomethane injection skid
- 15 Flare
- 16 MCC starter equipment



Compression Technologies

Common biogas applications present a diverse and demanding environment for equipment. Single-screw compressors include the mechanical attributes that make them ideal for biogas applications. Emerson builds the reliable single-screw compressor around a precision main screw drive and two gate rotors; a unique configuration for a rotary, positive displacement compressor required to perform in these harsh conditions. Plus, unique access points make it easier to maintain.

Before you select your compression technology, make sure you can answer these questions:

- What is the total cost of ownership for a quality compressor?
- Are there accessible service ports to make ongoing upkeep hassle free?
- Will my compressor design provide versatility to fulfill demands in applications across the enterprise?

Gas Analysis

In order for biomethane to be injected into the gas grid, it must be compatible with the properties of natural gas. Hence before injection, the gas quality and energy quantity must be determined, and the accuracy of these values must be verified. There is a need for a robust analyzer capable of measuring sulfur compounds as well as heating value / BTU content in one single analyzer solution. Emerson's technology ensures safe gas production to desired quality standards.

- Fully compliant gas quality measurements
- High-quality, heavy-duty Exd design built to last and perform with minimal cost of implementation and maintenance
- Metrology approved gas chromatographs
- Proven sample conditioning system

Pressure Control

Pressure regulating devices (regulators, pressure relief valves, control valves, slamshuts) are required throughout the upgrading process to ensure gas quality and interchangeability are met. Emerson provides support for uninterrupted injection with products designed with accuracy, repeatability and easy maintenance in mind.

- Pressure control solutions maintain safe injection pressure
- Environmentally friendly with no leaking or venting to atmosphere
- Easy in-line maintenance
- Trip mechanisms designed with accuracy and vibration resistance to avoid unintentional trips on slamshuts
- Wide portfolio offers solutions for variety of pressure control configurations

Custody Transfer

Custody transfer measurements are reliable and easy when using state-of-the-art Coriolis and ultrasonic flow metering technology that can fit any application at any stage in the value chain:

Coriolis meters benefits:

- Capable of measuring flow in mass and volume units simultaneously for maximum flexibility in custody transfer, RIN tracking and leak detection all with a single meter
- Leading solution for CNG/LNG/RNG vehicle fuel dispensers
- Immune to damage from water and particulates eliminating the risk of downtime in upstream applications

Ultrasonic meters benefits:

- Provide superior accuracy for larger pipeline sizes without the need for flow conditioners
- Do not restrict pipeline flow or add any pressure drop

Control Systems

Automation and controls in an RNG facility can be distributed with multi-vendor packages or can be centralized with a common platform. The primary concern is to provide a simple to use next gen technology for measurement, control and communication which is future ready for IIOT and digital transformation. Emerson's new FB Series RTU and flow computer platform provides simple to use configurable tools and a full IEC61131 programming suite for any complex application requirement.

Key factors to consider:

- Do you need a separate device for automation and custody transfer, or do you prefer a common platform which can provide both custody transfer flow calculations and controls together?
- How will the different vendor packages interact with the automation and custody transfer system?

Odorization

Since natural gas and biomethane are odorless by nature, it is a considerable safety risk if leakage occurs. Adding odorant into the biomethane being injected ensure compliance with current odorization standards.

Federal code 49 CFR 192.625 and CSA Z662 requires that all gas that is transported through specified populated areas be odorized as a warning agent.

- Emerson odorization equipment is designed and maintained to ensure the required odorant concentration in the gas under varying flow conditions
- Verification of odorant concentration to mitigate risk of non-compliance, or customer complaints about odor due to overodorization
- SCADA access, reduced maintenance (compared to traditional pump systems) and configurable alarms provide maximum information on the health of the odorization system

Vilter™ Gas Compression Solutions: Unprecedented efficiency, productivity and reliability

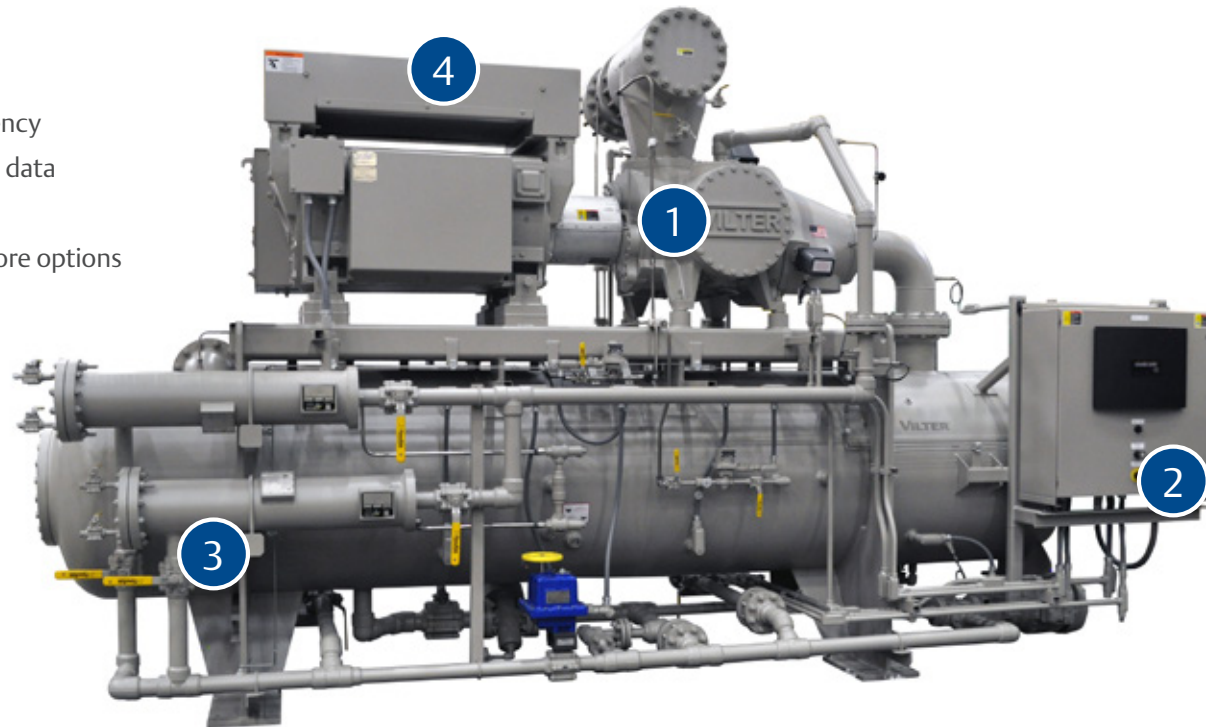
With fewer moving parts, the single-screw compressor meets productivity demands and delivers the lowest total cost of ownership of compressors rated for high discharge pressures, flow rates and horsepower.

Emerson's single-screw compressor delivers the operational benefits you need. A unique parallax slide system allows the single-screw compressor to run at optimum efficiency through a full range of capacity and is especially proven in high pressure operations. Since no variable frequency drive is required, you can save an additional 5 percent in potential energy losses through this simplified system. The performance forces within a single-screw compressor result in minimal forces on bearings and lower loads on shaft seals.

Regardless of operation size and output, scalable compressor options create the versatility to achieve production goals. From specialty scroll to high-pressure/low discharge, Emerson offers a range of trusted options.

COMPRESSOR PARTS

- 1 A durable compressor ensures reliable consistency
- 2 Controls give operators real-time performance data
- 3 Easily serviceable oil filters contribute uptime
- 4 Versatility of single-screw compressor gives more options for motors and drives



	Discharge Pressure	SCFM Flow Rate (each)	Horsepower
Blower Package	<25 PSI	45,000	800
Feed Compression	Vac to 300 PSI	3500	25 to 2000
Sales Compression	Vac to 1500 PSI	Up to 12,000	100 to 2000

Biomethane Injection – A Unique Plug and Play Integrated Solution

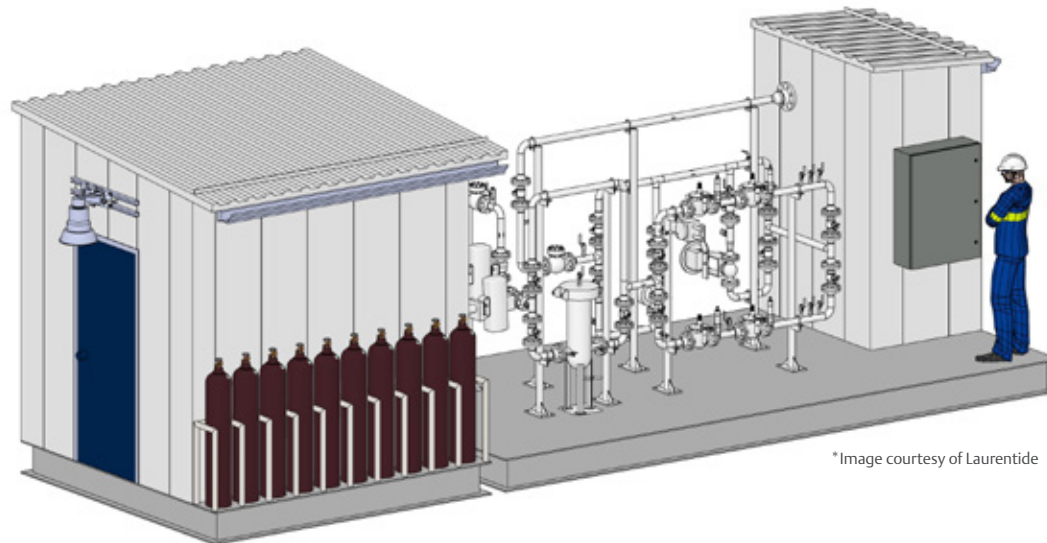
Emerson offers a complete portfolio of solutions that address all your injection skid requirements. Through an extensive Emerson Sales Partner network network and in-house design and fabrication facilities, we can support you from the concept design phase through the lifetime of the asset.

- Fully engineered to federal / local codes as a plug and play solution
- PE stamped engineers designing systems to meet ASME, ANSI and CSA standards
- Complete traceability and documentation package
- Start up services and long- term support strategy

Automation & Custody Transfer System



- Single platform for measurement and control
- Easy-to-use configuration tools
- Fully programable IEC 61131 suite
- Multiple communication options
- Configurable I/O



* Image courtesy of Laurentide

Odorant Injection



- New technologies ensure ease of use, reduced maintenance and remote access / control
- Higher accuracy, almost infinite turn-down
- Automatic calibration
- Configurable alarms
- Direct or SCADA access

Pressure Control



- Portfolio with both “Axial Flow” and “Top Entry” technology
- Whisper Trim™ technology for noise reduction
- Innovative no-bleed technology to eliminate gas emissions
- Overpressure protection methods: monitors, relief valves, slamshuts

Gas Chromatograph



700XA Gas Chromatograph

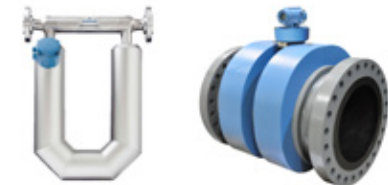
- Unique capability of measuring both BTU and sulfur content in one single analyzer
- Ideal for trace contaminant monitoring



370XA Gas Chromatograph

- Economical, compact, easy to use
- Can be paired with a H₂S analyzer
- Field mountable and offers low installation and operational costs

Flow Meters



- Superior accuracy over wider range of conditions
- Most reliable technology available
- Little or no maintenance required
- Advanced meter diagnostics; measurement confidence in the meter and diagnostics for your process with Smart Meter Verification on Coriolis
- Able to handle gas with residual water and particulate contaminants

Solving RNG industry challenges with proven results and differentiated solutions



Emerson delivers time-tested and innovative solutions for biogas to biomethane processing and downstream applications. Contact us now for world-class technologies and services that can help you meet renewable energy targets, while reducing project complexity, ensuring safe and consistent production and optimizing lifecycle costs.

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