



BROCHURE | BIOGAS SOLUTION OVERVIEW

Driving Innovation,
Efficiency,
and
Sustainability
in the Biogas Industry





Biogas Industry Trends and Sustainability Outlook

The global biogas industry is experiencing strong growth as governments, utilities, and industrial operators accelerate efforts to meet net-zero and decarbonization targets. One of the most significant trends is the shift from traditional biogas-to-electricity projects toward the **production of biomethane, also known as Renewable Natural Gas (RNG)**, which can be injected into existing gas grids and used as a low-carbon substitute for fossil natural gas.

Globally, increasing investments in waste-to-energy infrastructure, agricultural waste valorization, and circular economy initiatives are **creating new opportunities for biogas deployment**, while policy frameworks and biomethane trading mechanisms are emerging to **support regional decarbonization objectives**. Internal market assessments also highlight growing interest in upgrading technologies, gas compression systems, and resource recovery solutions as project developers seek higher-value applications beyond power generation.

As industries face increasing pressure to reduce greenhouse gas emissions, biogas is becoming a strategic component of the energy transition by converting organic waste streams into renewable energy, reducing methane emissions, improving energy security, and supporting long-term sustainability and ESG goals.

The market is expected to continue expanding through 2030, driven by stronger climate policies, energy security concerns, and increasing demand for low-carbon fuels in transportation, utilities, and hard-to-abate industrial sectors.

How does Biogas fit into the Decarbonization mix?

Biogas plays a critical role in the decarbonization journey by transforming organic waste from agriculture, wastewater treatment, food processing, and municipalities into renewable energy while simultaneously reducing methane emissions that would otherwise be released into the atmosphere.

As the industry evolves, increasing emphasis is being placed on upgrading biogas into Biomethane or Renewable Natural Gas (RNG), allowing low-carbon fuel to be transported through existing gas infrastructure and used across power generation, transportation, and hard-to-abate industrial sectors. This dual benefit of waste reduction and fossil fuel displacement positions biogas as a key enabler of the circular economy, energy security, and net-zero strategies. Supported by growing policy incentives, renewable gas frameworks, and investments in waste-to-energy projects, biogas is becoming an increasingly important component of global sustainability and decarbonization efforts.



• Enhancing Biogas Production

In the pursuit of sustainable energy solutions, biogas production stands out as an environmentally friendly and cost-effective method of generating energy from organic waste. Ingersoll Rand has a comprehensive range of vacuum pumps, blowers and compressors, which play a pivotal role in optimizing the biogas production and upgrading process.



• Biogas clean-up and compression

Methods have been established to capture biogas at its source, enhance its energy content, and transport it to areas of need. Typically, this involves purifying the biogas by extracting water vapor and impurities, followed by removing CO₂ to yield nearly pure, high-grade methane suitable for pipeline distribution.



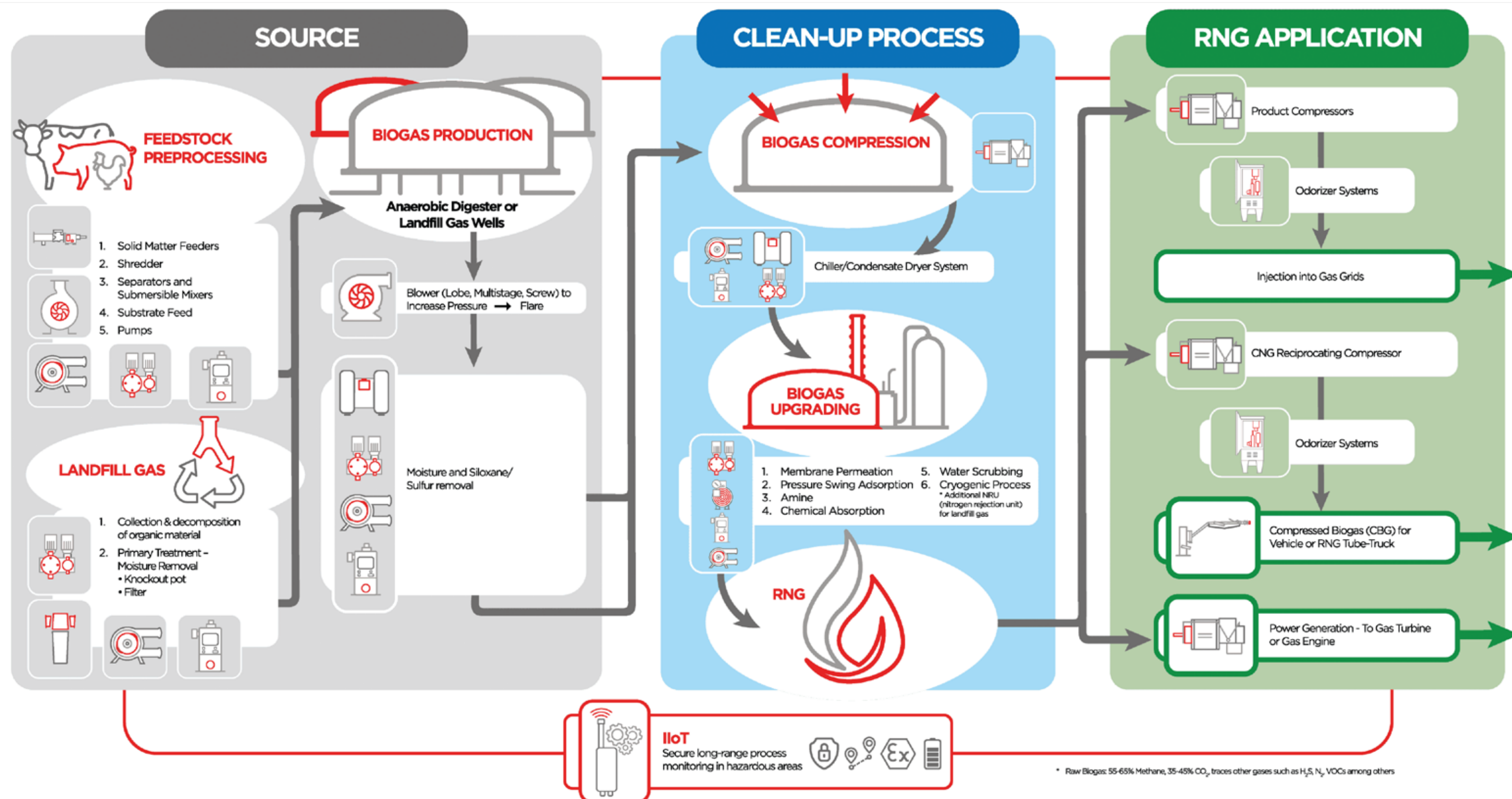
• Biogas upgrading to Biomethane (RNG)

The upgraded biogas reaches near-natural gas purity as Biomethane, allowing it to enter the grid or be converted to CNG (Compressed Natural Gas) for fuel. Additionally, it can be transformed into liquid fuels like methanol or DME (Dimethyl Ether), a clean-burning alternative suitable for power, transport, and domestic use, with minimal CO₂ and no particulates.



Anaerobic Digestion and Landfill Gas to RNG/Biomethane

Ingersoll Rand can serve customers through all the steps of the Biogas value chain.



Step-by-Step Guide to Generating High Quality RNG

Ingersoll Rand's range of vacuum pumps, blowers, compressors and loading arms are carefully designed to serve the multifaceted needs of biogas production and upgrading, ensuring optimal performance, durability, and adaptability.



Biogas Collection

Biogas collection begins with capturing gas generated from organic waste through storage tanks, pipelines, and collection wells. Since raw biogas contains contaminants such as water vapor, hydrogen sulfide (H₂S), and siloxanes, effective gas treatment is essential.

Ingersoll Rand supports this process with:

- Integrated vacuum systems
- Blower solutions
- Industrial pumps
- Advanced filtration technologies that help remove impurities and prepare biogas for downstream processing and utilization.

Primary Treatment

Primary treatment is a critical stage in biogas processing, where impurities such as water vapor, hydrogen sulfide (H₂S), and siloxanes are removed to protect equipment and improve gas quality.

Ingersoll Rand supports operators achieve efficient contaminant removal, enhance system reliability, and optimize downstream biogas upgrading and utilization in this process with an integrated portfolio of:

- Centrifugal and Positive Displacement Blowers
- Vacuum solutions
- Chemical Injection and Process Flow Pumps
- Air Dryers

Compression

Biogas compression is a critical step following purification, where methane-rich gas is compressed to high pressures for storage, transportation, or further use.

Ingersoll Rand's specialized natural gas compression solutions are engineered to handle the demanding conditions of biogas and biomethane applications, delivering safe, reliable, and efficient performance while supporting downstream processing and distribution.



Cooling and Drying

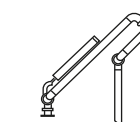
Gas cooling and drying are essential steps in biogas processing, reducing gas temperature to condense and remove residual moisture.

Ingersoll Rand's Air Compressor Dryers helps prevent corrosion, protects downstream equipment, and ensures reliable, efficient performance throughout the biogas system.



Biogas Upgrading

Biogas upgrading is a critical purification process that transforms raw biogas into high-quality renewable natural gas (RNG) by removing carbon dioxide, moisture, oxygen, nitrogen, hydrogen sulfide, siloxanes, and other contaminants. This process enhances methane concentration to meet pipeline injection and vehicle fuel standards, enabling safe, reliable, and efficient use of biomethane in energy and transportation applications.



Storage and Distribution

The compressed and dried biogas is stored in high-pressure tanks or transported through pipelines or loading arms for various uses. Our loading and unloading arms are used for the distribution and transport of pressurized or liquified biogas, and used when biogas must be transported via truck, railcar or vessel.

The product of the upgrading process is a high-quality RNG that is virtually indistinguishable from fossil natural gas. The gas must be easily detectable to ensure safe gas consumption. For this reason, RNG is odorized with a special blend of tetrahydrothiophene (THT) or mercaptan variations (such as TBM, DMS, or other types of odorants). Ingersoll Rand's specialized odorizers for these applications help you meet regulatory requirements.

Remote Process Monitoring

Remote monitoring plays a vital role in ensuring safe, reliable, and efficient biogas and RNG operations.

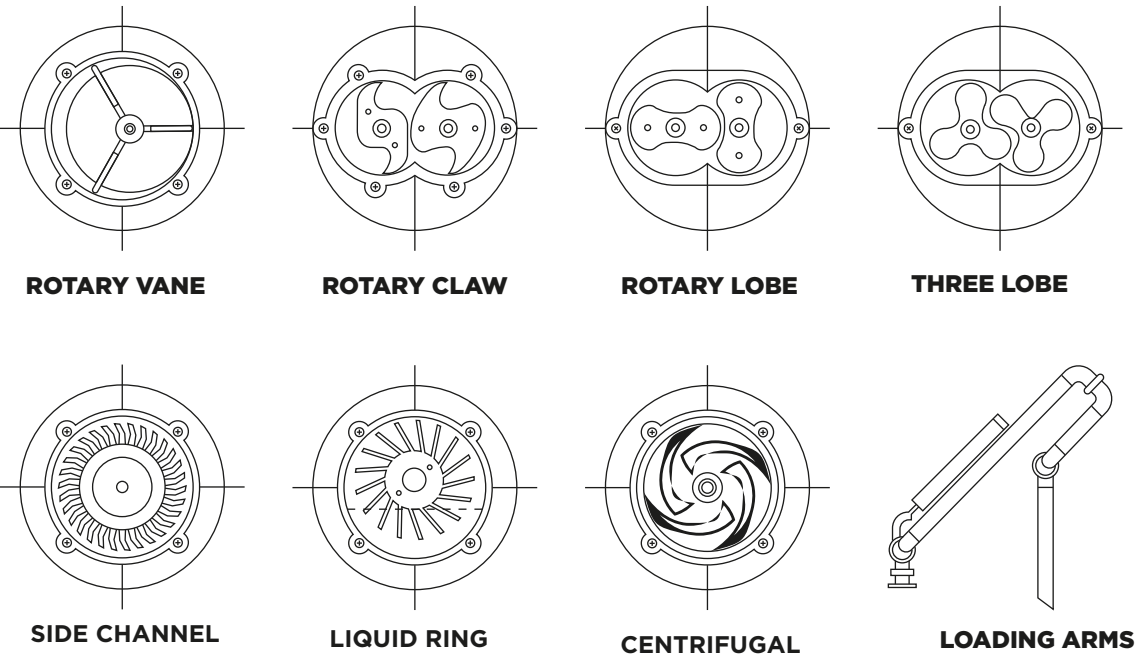
Ingersoll Rand's specialized IIoT solutions enable continuous monitoring of critical parameters such as pressure, temperature, and gas quality, even in hazardous and potentially explosive environments. Designed for demanding applications, these technologies provide real-time visibility, enhance operational safety, support proactive maintenance, and help maximize system uptime and performance.



Application Area Snapshot

PRODUCT CATEGORY	BLOWERS	VACUUM	MIXERS	GAS COMPRESSORS	INDUSTRIAL DRYERS	PUMPS	ODORIZER SYSTEMS	LOADING ARMS
BRAND(S)	• GARNER DENVER • ROBUSCHI • HIBON • ROOTS • ELMO RITSCHLE	• ELMO RIETSCHLE • HIBON • ROOTS • NASH	• MILTON ROY	• NASH • GARO • WITTIG • ADICOMP • LEROI	• INGERSOLL RAND	• SEEPEX • MILTON ROY • ALBIN PUMP	• YZ SYSTEMS	• EMCO WHEATON
BIOGAS PRODUCTION								
Feedstock Preprocessing	•		•			•		
Digester Gas Mixing	•							
Storage of Digester Gas	•							
Pressure Booster to Pre-treatment	•							
Landfill Gas	•	•		•		•		
Anaerobic Digester or Landfill Gas Wells	•	•						
Sewage Gas	•	•						
BIOGAS UPGRADING								
Booster to elevate pressure upstream main compressor	•			•	•	•		
Membrane Upgrading Technology		•		•		•		
Pressure Swing Adsorption	•	•		•				
Water or Chemical Scrubbing	•	•		•				
CO ₂ Extraction		•						
CO ₂ Compression for Liquifaction or Grid Injection				•				
BIOMETHANE USAGE								
Biomethane Compression	•			•				
Grid Injection				•			•	
Loading/unloading process for road/rail/sea transport								•
Remote Control and Monitoring in Hazardous areas	•	•	•	•	•	•	•	•

Our Technologies



Compliance with Industry Certifications and Standards

Regulatory compliance is at the core of Ingersoll Rand's approach to the biogas industry. With solutions designed to align with globally recognized standards such as ATEX, API, and other industry certifications, we help customers operate with the highest levels of safety, reliability, and environmental responsibility.

Our engineering expertise, certified technologies, and lifecycle support provide confidence that critical systems meet regulatory requirements while maximizing uptime, protecting personnel, reducing operational risk, and ensuring long-term asset integrity in demanding biogas applications.

- + ATEX
- + American Petroleum Institute (API)
- + IEC/IECEx

Partner with Ingersoll Rand for Customized Engineered-to-Order Solutions

At Ingersoll Rand Engineered Solutions, we deliver the most reliable Engineered-to-Order (ETO) solutions by prioritizing your specific needs at every step:



UNIQUE REQUIREMENTS

We take the time to fully understand your application through comprehensive research, ensuring the best-fit solution for your project.



MULTI-BRAND EXPERTISE

Our portfolio of brands enables us to confidently manage even the most complex projects, providing a broad range of innovative solutions tailored to your needs.



UNMATCHED EXPERTISE

With over 300 years of combined experience, we ensure reliable, repeatable quality on every project.



TECHNOLOGY FOR YOU

We select the most suitable and advanced technologies, customized to meet your precise specifications.



END-TO-END SUPPORT

From concept to installation, we offer innovative, safe, and meticulously engineered solutions, partners throughout the entire project lifecycle.



GLOBAL REACH

No matter where your project is, we deliver engineered systems to any corner of the world, backed by a commitment to excellence.



GUARANTEED PERFORMANCE

Our in-house testing facilities ensures each design solution meets your highest standards for performance and quality.

Professional Services

Backed by professionally trained Service Engineers, Ingersoll Rand delivers end-to-end turnkey solutions for the biogas industry, providing expert support throughout the entire asset lifecycle. From installation and commissioning to preventive maintenance, remote monitoring, troubleshooting, and optimization, Ingersoll Rand helps biogas operators reduce downtime, enhance operational performance, and achieve sustainable, cost-effective operations.

+ Installation

+ Equipment Audits

+ Troubleshooting and Problem Solving

+ Preventive Maintenance

+ Testing and Commissioning

+ Genuine Spare Parts

+ Remanufacturing and Overhaul

+ CARE Maintenance Plans

+ Rentals



Delve Deeper into our Brands



Air Compressor Dryers helps prevent corrosion, protects downstream equipment, and ensures reliable, efficient performance throughout the biogas system.



Rotary lobe blowers, screw compressors, vacuum and centrifugal pumps that work across biogas production, biogas recovery, slurry drying process, landfill gas recovery, soil gas extraction, and suction vehicles.



Plug & play screw compressor packages engineered to deliver biogas with the characteristics required by modern upgrading facilities.



Fluid handling technologies with Metering, Mixing, and Odorization Solutions for Renewable Energy, creating new dosing, mixing, and process control challenges that demand industrial-grade precision.



Precision Vacuum Solutions for Biogas production providing Efficient mixing and compression to maximize gas yield.



Gas Compressors for Renewable Natural Gas processes, from Biogas collection, Primary Treatment, Compression, Cooling and Drying, and Storage and Distribution.



Blower, Vacuum and Compressed Air applications for the biogas industry.



Process Vacuum Systems and Packaged Solutions for Biogas projects. Optimal, durable and time-tested choice for Liquid Ring Vacuum Pumps and Compressors.



Rotary Vane Compressors designed for the Biogas Market. Compact, durable with minimal maintenance gas compressors are the ideal choice for Bio, Landfill and Sewage gases.



RNG Compressors and Boosters engineered for maximum simplicity, flexibility, and maintainability.



Positive Displacement (PD) and Rotary Lobe Blowers with ATEX certification designed to brave the harshest conditions, facilitating the safe and efficient transfer of harmful gas mixtures.



Garo provides **liquid ring compression solutions** for a broad range of applications in the Oil & Gas, Chemical and Petrochemical industries.



Biogas Loading Arms specialized gear designed to ensure safe and effective loading and unloading of the biogas end product that has been processed to purity standards or biomethane.



Pumps in Biogas Fermentation and Biomass Slurry Handling



Specialized **odorization** and IIoT remote monitoring for every stage of the renewable natural gas process — from biogas collection to pipeline injection.



Delivering Reliable Biogas Compression Solutions for Renewable Energy Generation in Thailand

A greenfield biogas project in Thailand selected Robuschi's proven biogas blower technology to support the efficient delivery of biogas to gas engines for renewable power generation. The project required a reliable and energy-efficient solution capable of handling demanding operating conditions while ensuring long-term performance and operational reliability.

Solutions proposed by Robuschi:

- Supplied three units of CR 65 Bio rotary lobe blower packages, each operating at a duty point of 1,000 m³/hr at 350 mbar(g).
- The blower packages were designed specifically for biogas applications and equipped with 18.5 kW motors, while requiring only 15.7 kW absorbed power during operation, providing a robust margin for reliable performance.
- The selected CRBIO range is specifically engineered for biogas handling, offering gas-tight construction, ATEX-compliant design options, and dependable operation in challenging environments.

Our Winning Formula:

- Leveraging decades of engineering expertise, the team worked closely with the EPC to understand the project's technical challenges and operational objectives.
- Robuschi demonstrated its ability to deliver a complete and dependable packaged solution by listening to customer pain points, proposing practical solutions, and providing comprehensive technical support throughout the project development cycle.
- The team's end-to-end project management approach, combined with proactive communication and follow-up support, gave the EPC confidence that the solution would meet both immediate project requirements and long-term operational expectations.

Outcome:

By combining proven biogas technology with customer-focused engineering support, Robuschi Thailand successfully secured the project and delivered a solution that helps generate clean electricity, supports sustainability targets, and contributes to a cleaner environment for local communities.



Your Partner in Biogas Excellence



Ingersoll Rand has been a trusted single-source turnkey solutions partner with leading EPCCs and Biogas Developers in the biogas industry.

Our Subject Matter Expert in this industry is focused on understanding the industry's demands and challenges, delivering integrated technologies and engineering expertise that improves efficiency, safety, speed, operational agility and support long-term sustainability goals across the entire production process.

From biogas generation and upgrading to compression, transfer, and utilization, Ingersoll Rand empowers producers to accelerate their journey toward cleaner and net-zero carbon energy production with confidence and reliability.





About Ingersoll Rand Inc.

Ingersoll Rand Inc. (NYSE:IR), driven by an entrepreneurial spirit and ownership mindset, is dedicated to helping make life better for our employees, customers and communities. Customers lean on us for our technology-driven excellence in mission-critical flow creation and industrial solutions across 40+ respected brands where our products and services excel in the most complex and harsh conditions. Our employees develop customers for life through their daily commitment to expertise, productivity and efficiency. For more information, visit irco.com



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