

Compression technology for the Biogas market

Advanced solutions supporting
a sustainable energy future



Pioneering the Future: Howden Screw Compressors in the Evolving Biogas Market

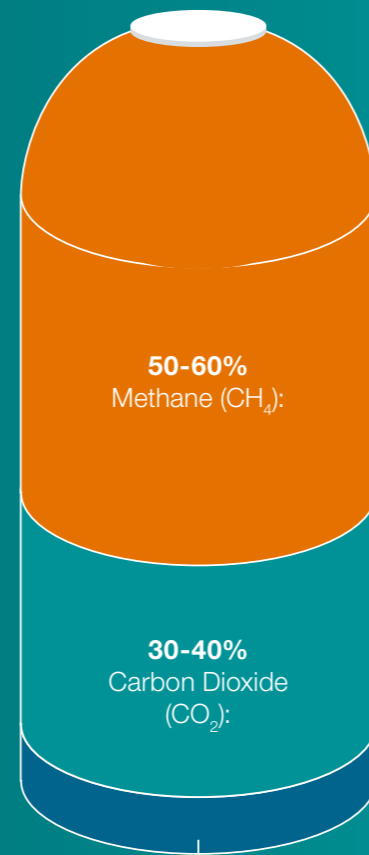
As the biogas industry continues to advance towards a more sustainable and energy efficient future, Howden Screw Compressors stand at the forefront of innovation, poised to revolutionise the way biogas is processed, upgraded and distributed.

With a legacy of excellence and a commitment to pushing the boundaries of technology, Howden is set to shape the future of the biogas market. In this era of renewable energy transformation, our state-of-the-art screw compressor solutions are paving the way for unparalleled efficiency, reliability and environmental stewardship in every facet of biogas utilisation. Explore the exciting journey ahead as we embark on a path to redefine what's possible in the dynamic landscape of biogas applications.

What is biogas?

In a world that is increasingly focused on sustainable solutions, biogas emerges as a remarkable contender in the realm of renewable energy. Biogas is a versatile and eco-friendly energy source generated through the breakdown of organic materials in the absence of oxygen. This natural process, known as anaerobic digestion, transforms agricultural residues, food waste, sewage sludge and various organic by-products into a potent blend of methane and carbon dioxide gases. The result? A renewable source of energy that can drive economic growth. Not only does it curtail greenhouse gas emissions, it also provides a viable pathway to energy independence and environmental stewardship.

What does it consist of?



Traces of nitrogen (N_2), oxygen (O_2), water vapour (H_2O) and other volatile organic compounds (VOCs) & hydrogen sulfide (H_2S)

What is it used for?

Biogas finds its purpose in a variety of applications that extend far beyond traditional energy production. The unique properties of biogas, primarily composed of methane and carbon dioxide, make it an invaluable resource with the potential to reshape industries, reduce environmental impact and foster sustainable development. From powering homes and industries to mitigating waste and bolstering agricultural practices, the applications of biogas are as diverse as they are impactful.

- Feeding the biogas to a CHP unit for heat and power generation
- Renewable natural gas (biomethane) produced via upgrading techniques
- Upgrading processes also present the opportunity for CO_2 recovery

Renewable natural gas (RNG) is interchangeable with the natural gas produced today via fossil fuels, supporting ESG goals worldwide to reduce our carbon footprint.

Fuelling the Future

Howden manufactures highly engineered compressors, fans, heat exchangers, steam turbines and other air and gas handling equipment. We provide service and support to our customers around the world in highly diversified end-markets and geographies. Our reputation as a trusted expert is demonstrated by our application

expertise, portfolio of renowned product brands and extensive installed base of reliable technologies. The combination of our international expertise and on the ground operations enables us to support our customers' energy transition throughout. We bring an approach driven by service and value.

Proven Solutions

We are proud to support numerous world-leading projects that are currently driving forward the energy transition. The Howden reputation for high quality, integrity and absolute dependability is crucial in supporting this vital work. This reputation stems from engineering excellence, understanding our customers' operational objectives and our commitment to addressing

the most complex challenges. Howden exclusively supplies bareshaft screw compressors through our global network of nominated compressor packaging customers and distributors. Our packagers are experienced in packaging the Howden's screw compressor products within the biogas market.



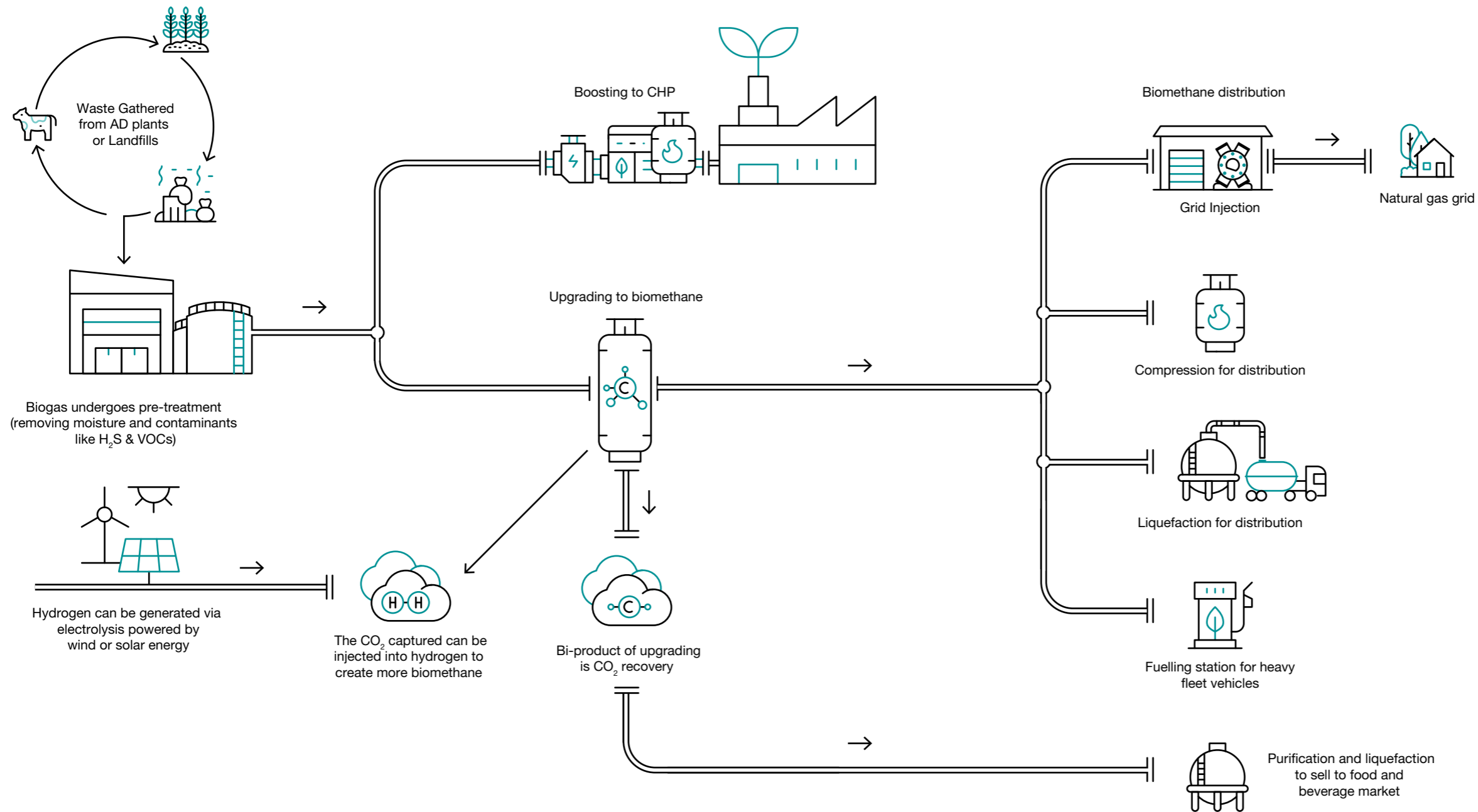
Howden - at the heart of your operations

Our compressor team, backed by over 160 years of application knowledge and experience, guarantees that equipment meets safety requirements, customer specifications, application requirements and international codes. Our technology contributes to reducing carbon emissions, supporting customers' sustainability goals and increasing energy performance. Howden provides safe and reliable solutions to the biogas market.

Proficient and efficient biogas compression solutions across the biogas value chain



We bring over a century of application knowledge, reliable solutions and partner with our customers across the biogas value chain



Maximise efficiency and reliability with Howden screw compressors for the biogas market

Our cutting-edge compressor solutions are designed to meet the unique demands of the biogas sector, delivering superior performance, efficiency, and reliability for a variety of key applications. With years of experience and a commitment to innovation, Howden is the top choice for businesses seeking to optimise their biogas operations. We offer a multitude of different products across the biogas process.

Two market leading upgrading techniques where a Howden oil-lubricated screw compressor is used are Pressure Swing Adsorption (PSA) and Membrane Separation.

Versatile applications of Howden screw compressors in the biogas market

When it comes to screw compressors in the biogas market, Howden is the go-to choice for businesses seeking cutting-edge technology, superior performance, and unmatched reliability.

Whether its boosting for CHP, upgrading to Biomethane or other processes as this market continues to evolve to support energy transitions, our screw compressors deliver outstanding results that drive your biogas plant operations to new heights.

Embrace the power of Howden Screw Compressors and unlock the full potential of your biogas ventures today.

The Howden screw compressor range



CHP Units:

One of the first business ventures from biogas plants was the emergence of cogeneration units. Otherwise known as combined heat and power (CHP) units for the production of both electricity and heat simultaneously.

Powered by traditional fossil fuels, CHP systems have been in existence for over 100 years.

The introduction of renewables such as biogas, syngas or hydrogen enables more sustainable sources of energy and reduces greenhouse gas emissions.

Once the biogas has been treated to remove any moisture and volatile organic compounds (VOCs), a compressor can be used to boost the biogas (a methane and carbon dioxide gas mix) to the CHP unit.

Benefits:

- This energy source produced can be utilised on site or distributed onto the national grid

Upgrading via Pressure Swing Adsorption (PSA):

With market progression in recent years, the upgrading of biogas to produce biomethane has been the main desirable output, along with power generation via CHP units.

Pressure Swing Adsorption (PSA) is an example of upgrading technology which is well suited to biogas generated via landfill sites.

The reason for this is the gas mix contains some traces of nitrogen and oxygen.

Adsorbent media within each of the PSA columns helps to trap nitrogen, oxygen and carbon dioxide, leaving the methane (biomethane) to flow through.

Howden screw compressors have been delivering on these applications with operating pressures up to approx. 13bar.

Benefits:

- An upgrading technique that benefits the handling of more complex gas mixtures containing nitrogen as an example, which is more common from landfill sites

Upgrading via Membrane Separation

Membrane separation is an alternative upgrading technology that has been prominent from Anaerobic Digestion Plants with agricultural feedstocks.

The moisture and VOCs from the biogas are firstly removed via primary treatment stages. A screw compressor then boosts the biogas mix (CH₄ and CO₂) to up to 18bar through a three stage membrane system to separate the methane and carbon dioxide.

Benefits:

- An environmentally friendly upgrading process that doesn't require the use of chemicals. A simple process design with the ease of scaling up with modular constructions.

Other Outputs:

As the biogas market evolves, other plant outputs are being explored.

A bi-product from the upgrading process is the capturing of carbon dioxide.

Treating the CO₂ to a 99.9% purity before liquefaction to aid distribution to the food and beverage industry.

Plant outputs can be subject to buyers.

If there's no demand for CO₂, hydrogen can be produced via electrolysis, injecting the H₂ & CO₂ to create more biomethane (CH₄).

In many cases, biomethane is a main driver for injection into grid.

Where applicable, some plants are generating hydrogen via steam methane reforming, cold methane pyrolysis or even thermal plasma electrolysis on biomethane to produce hydrogen.

Benefits:

- CO₂ recovery to reduce greenhouse gas emissions
- Opportunity for localised H₂ production via renewable energy reducing dependence on Grey Hydrogen sources

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