ON-SITE GAS TECHNOLOGY

FOR THE FLAT GLASS INDUSTRY

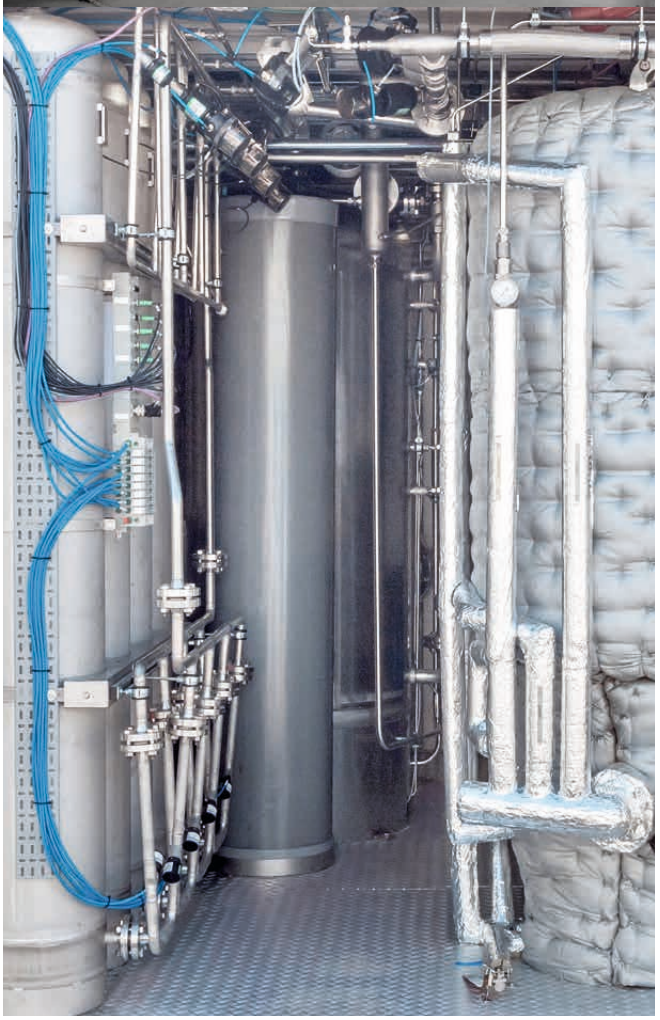
HYGEAR

ON-SITE GAS TECHNOLOGY

A reliable supply of industrial gases plays a vital role in producing high quality flat glass. The most common are hydrogen and nitrogen for the tin bath and oxygen in case of oxy-fired furnaces.

Currently, these gases are mainly supplied by electrolysis or road transportation of compressed or liquefied gas. Decentralised gas production by HyGear offers a safer, more reliable and cost attractive alternative to conventional hydrogen supply.

HyGear offers a package of on-site gas production technologies that make transportation of hydrogen, nitrogen and oxygen obsolete. We offer these technologies as packaged systems or turn-key as part of an integrated gas system for the entire float line.

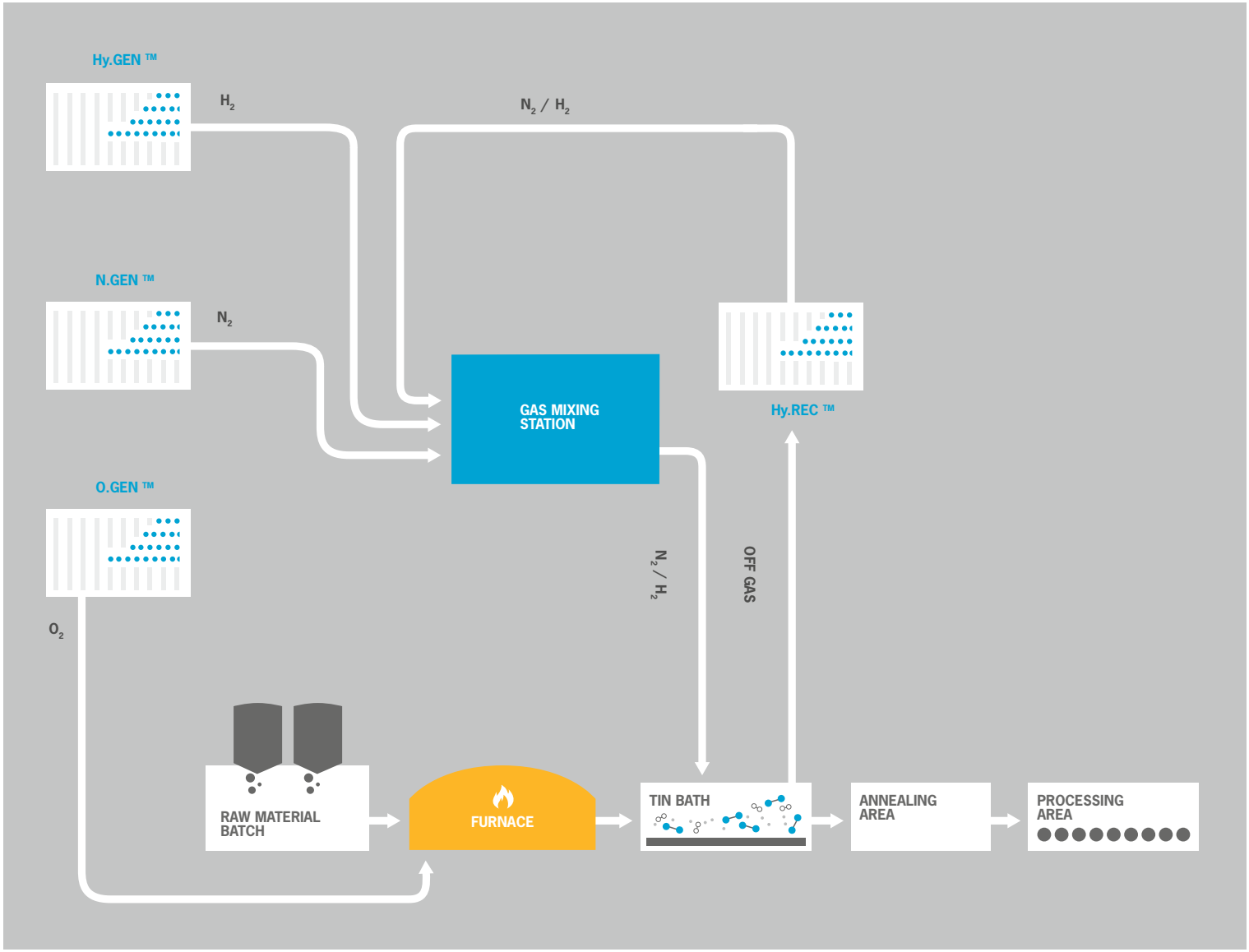


100% RELIABILITY OF SUPPLY

HyGear guarantees the continuous supply of industrial gases by combining advanced on-site technologies with traditional supply options from our own facilities and local partners worldwide.

FOR THE FLAT GLASS INDUSTRY

HyGear offers groundbreaking technologies for on-site gas generation and recovery of hydrogen, nitrogen and oxygen for the flat glass industry.



Hy.GEN™ Hydrogen Generation by steam reforming of natural gas

HyGear offers on-site hydrogen generation systems based on highly efficient Steam Methane Reforming of natural gas. The gas is produced and mixed with nitrogen to create a suitable reductive atmosphere over the tin bath.

A variety of sizes is available for the flat glass industry. The most commonly used systems generate either 50 or 100 Nm^3/h of high purity hydrogen. These products can be cascaded to fit the hydrogen demand of every float glass line worldwide.

N.GEN™ Nitrogen Generation by PSA

Nitrogen can be generated on-site with HyGear's Pressure Swing Adsorption System. The highly efficient on-site nitrogen generator is based on HyGear's extensive experience in PSA gas separation technology and gas processing systems. The generated nitrogen can be mixed with hydrogen to form the reductive atmosphere over the tin bath.

The systems are flexible in capacity and supplied as an integrated skid including purification, compression and a PSA for air separation.

O.GEN™ Oxygen Generation by VPSA

HyGear supplies very efficient Vacuum PSA systems to enrich the oxygen content of the combustion air.

This oxygen is used in oxy-fuel furnaces to reduce both overall energy consumption and emission of harmful species.

The O.GEN is flexible in capacity as well as product purity. This allows HyGear to design the gas system for the optimal overall plant efficiency.

Hy.REC™ Inert Gas Recycling from the tin bath

In flat glass production, the spent inert gas mixture is usually vented from the process. However, this waste stream has a significant value because of the relatively high hydrogen and nitrogen content.

HyGear supplies an integrated skid that recovers the vented gas from the upstream side of the tin bath. The system removes particles and purifies the mixture into high quality hydrogen and nitrogen that can be blended back into the gas system.

The Hy.REC system is tailored for float glass lines of 600 tonnes/day and can be cascaded to supply larger capacity plants.

KEY BENEFITS

- Significant cost reduction
- Independent of third party supply
- Reduction of harmful emissions
- Increased reliability of supply
- Compact and Modular systems
- Customer specific design

ABOUT HYGEAR

HYGEAR ENGINEERING FOR SUSTAINABLE GROWTH

HyGear is a clean tech company with expertise in gas processing and industrial gas system design. The main offices and manufacturing facilities are located in The Netherlands and technical support is guaranteed by many local partnerships worldwide.

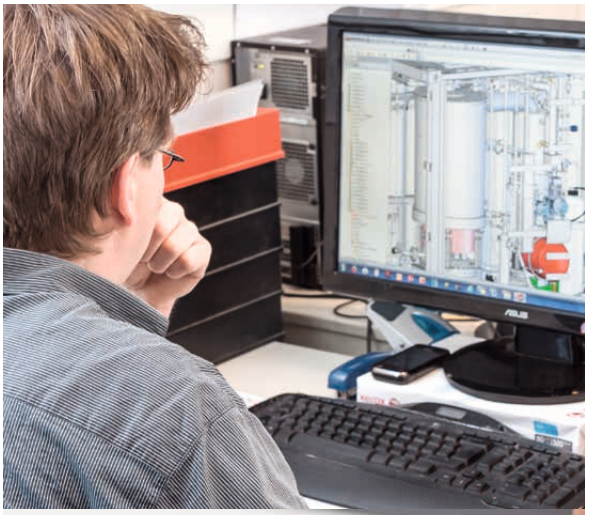
Besides standardised products for on-site generation of hydrogen, nitrogen and oxygen, we offer tailored systems for the recycling of industrial gases. Our products reduce both costs and the environmental impact of industrial gas delivery for our global customers.

We offer our products as stand-alone systems or as part of an integrated package of solutions, including the entire gas mixing and delivery system, tailored to the customers' needs.

Major shareholders are Spanish multinational engineering company Abengoa S.A. (www.abengoa.es) and PPM Oost NV, a Dutch financial investment company (www.ppmoost.nl).

FINANCIAL SERVICES

HyGear, together with its international finance partners, offers various financing options to realise ambitious projects at our customers.



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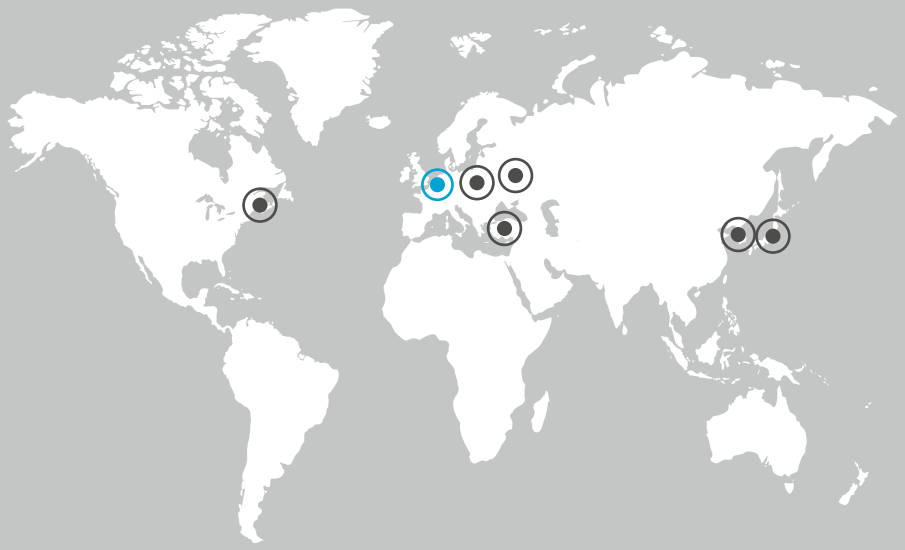

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