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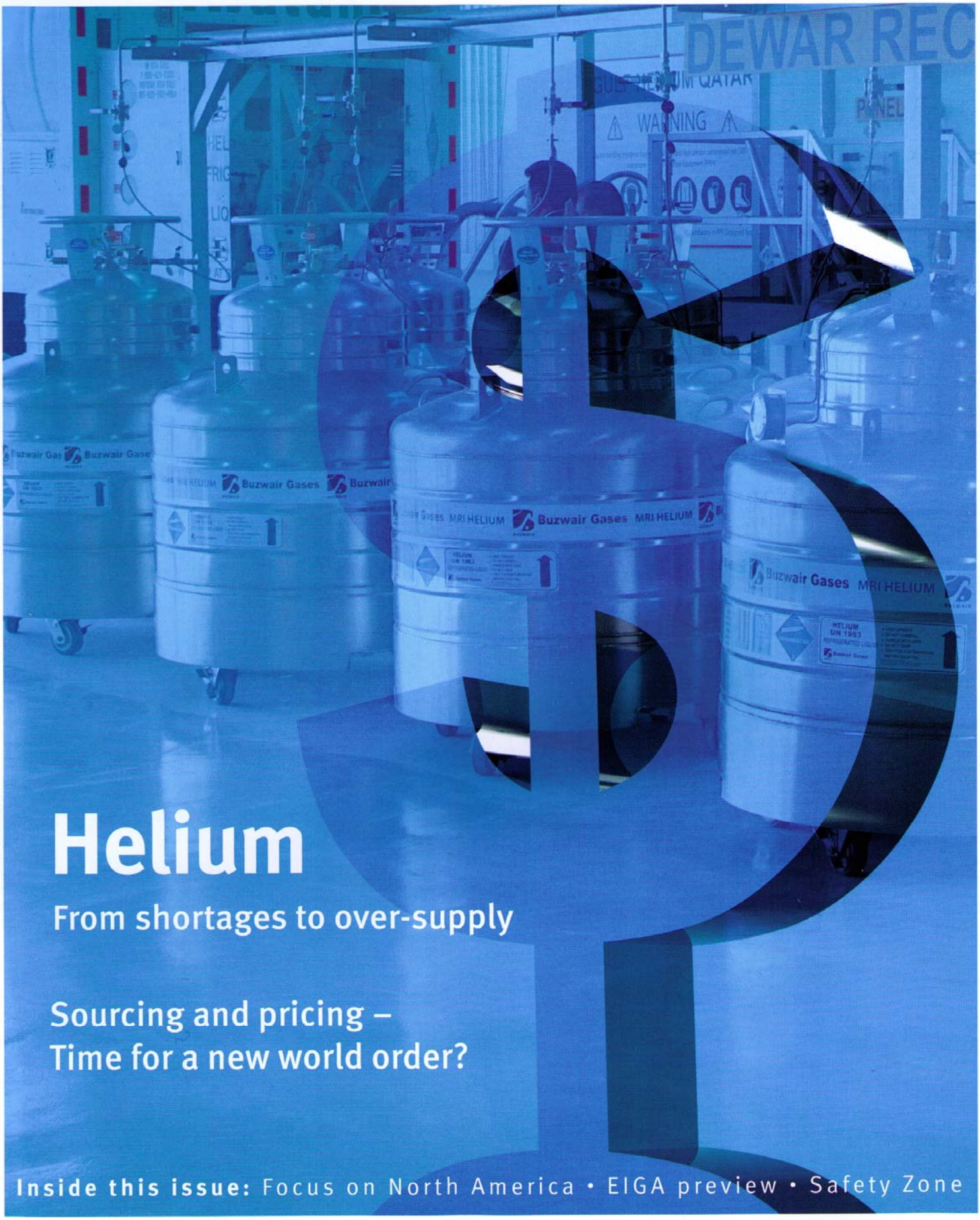

Helium

From shortages to over-supply

Sourcing and pricing – Time for a new world order?

Inside this issue: Focus on North America • EIGA preview • Safety Zone

© Buzwair Gases

In focus...

Helium equipment

For the last three years helium, or rather the lack of it, has dominated the headlines. With concern at this predicament and the adverse impact it would have on the world, it was difficult to see if there was any light at the end of the proverbial tunnel.

But, fresh into the dawn of a New Year, 2015 brings with it news of a market shift from shortages to over-supply.

Helium supply

Gulf Helium Services, a joint venture between Buzwair gases, Iwatani Corporation and LNG Japan Corporation, operates a helium transfill station at the Qatar II helium plant that was so instrumental in bringing new capacity to the market in 2014.

As majority stakeholder in the venture, Buzwair agrees that over-supply is currently experienced in the market and has seen it prudent to create an additional division of the company to generate new business and revenue streams from the helium sector.

Mike Bee, General Manager of Regional Business Development, told gasworld, "With Gulf Helium Services (GHS) fully operational, Buzwair Industrial Gases has created a new division, Buzwair Helium, to market helium and associated services throughout MENA and North Africa. In a relatively short space of time we have been encouraged by the response we are getting from potential customers. Whilst most of these are relatively low to medium volume accounts, they nonetheless suffer when there are shortages or dramatic price fluctuations in the market. What Buzwair is offering is consistency of availability and supply due to its partnership with Iwatani of Japan and access to the helium volumes coming out of the RasGas Qatar II plant. The proximity of our helium handling facility to the source lowers handling costs and shortens response times."

"In the current scenario of over-supply, customers can be more selective in choosing their supplier. Despite this, or because of this, Buzwair has enjoyed rapid growth ahead of expectations and is receiving enquiries from outside of the region. We have had to accelerate our planned build-up of capital assets to accommodate this ramp up in interest and demand."

This is an interesting view as, due to over-supply, those seeking product have a favourable market to operate in and will seek out the securing of contracts with a company that offers reliable supply. At the time of the 'Helium Cliff', this was not possible as prices were escalated and limited – something we discuss later.

Storage and transportation

One would assume with a slowdown in supply, storage and transportation would also be adversely affected? Chart's Chris Schmoeckel explained, "Even with the helium market being tight in recent years we have seen the demand for liquid helium diminish over time. Reliquefaction techniques have improved and large users, such as MRI equipment, have found ways to reduce their consumption. As a result, many of the larger helium suppliers have been more of an excess inventory position in terms of the dewars themselves."

"In terms of what our customers have been saying, some of the bigger concerns from a supply viewpoint are transporting product from overseas. Historically, the supply has been domestic but with import supply becoming a bigger piece of the overall picture, transportation to the US, in the form of dewars or ISO containers, is a concern."

Germany-based Cryotherm GmbH, manufacturer of helium containers and transfer lines among other cryogenic equipment, shared the view of the emergence of a globalised market. Wolfgang Flohr, who heads up the company's Product Development, stated, "Since 2014 we are noticing an increased number of enquiries and orders from customers all over the world from the gas industry and research centres; especially for our highly efficient LHe transport containers, the STRATOS 100SL, 250SL and 380SL, which are characterised by compact dimensions (capable of passing through doors), high safety standard, lightweight [design] and low maintenance. In addition, the demand for storage tanks from 1,000 litres to 10,000 litres is increasing."

"Due the improved helium supply situation in 2014 the gas industry and research centres are looking for additional helium vessels and helium storage capacities – and additionally

looking for helium recovery and liquefier solutions. Due to the planned large scientific accelerator projects, we are confident that the LHe market will also grow in the coming years."

Recycling, recovery and reliquefaction

With the shared view of market over-supply, does the trend for recovery and recycling continue? During market shortages of 2011-2013, helium recovery and recycling technologies proliferated – and were almost a necessity for some applications. But is this still the case?

Ute Probst, from Linde Kryotechnik's Marketing and Sales department, said, "The global helium shortage has compelled heavy helium users to consider recovery and liquefaction technologies. The driving forces behind this trend were both the significant increases in helium prices, and the product scarcity. In many industry sectors where helium is an indispensable element (MRI, NMR, particle research,) and where helium substitution is not an option, the only viable alternative was to reduce user dependency on fresh helium and promote recovery and re-liquefaction."

"Although the market has recovered from the supply point of view, the helium prices have remained high and are likely to continue their upwards trend in the foreseeable future. Periods of helium abundance have always been followed by scarcity, so we believe that industry will continue to seek ways to reduce its dependency on this scarce element."

This note of caution was echoed by Charles Monroe, of UK-based Monroe Brothers. The company deals in the business of helium recovery and Monroe had a similar message of warning for gasworld readers, "The shortage in helium two years ago was a wake-up call when the suppliers put their customers 'on allocation' – a euphemism for rationing. Some customers could make efficiency improvements to reduce their helium usage but for others, 'allocation' was a blunt instrument to control demand. It fell hardest on the small user taking a regular delivery to keep a system cold, for example a superconducting magnet. Such a user had no options to reduce the helium consumption and they had little negotiating power."

"Faced with an 'allocation of 80%', in other words a reduction of 20%, they would have to shut the system down for a period of time and let it warm. However, they would experience a downtime which could be up to 50% of the year once they had taken into account the additional liquid helium to re-cool the system and the lengthy process to reconfigure the system following the cool-down."

"Monroe Brothers Ltd has designed helium gas recovery systems for small users consuming 100 liquid litres per week of helium on a single system and large research facilities using up to 8,000 liquid litres per week on multiple experimental stations. The main components of the recovery system are a pipe network to all the experimental stations, helium gas bags, helium compressors, high pressure storage and monitoring for purity and quantity."

"...we believe that industry will continue to seek ways to reduce its dependency on this scarce element"

"The helium gas is recovered at ambient temperature and collected into the gas bags. The compressors have sufficient capacity to meet the time averaged flow rate of helium gas after the gas bags have smoothed out the peaks. The gas is compressed to a high pressure, for example 200 bar G, and stored in high-pressure cylinders. It is transported by road (or pipe if the distances are short) to a helium refrigerator to be re-liquefied."

"After liquefaction, the saving on the raw material cost can generate a typical payback of two years. It has surprised customers that a project which was started to safeguard helium supply can also result in significant cost savings."

End use

Party balloons aside, MRI (magnetic resonance imaging) is the most renowned application of liquid helium. An interesting development in the MRI market could be the rise of an integrated whole-body molecular system that combines an MR scanner with a PET (Positron Emission Tomography) detection system.

On 19th November 2010 Siemens Healthcare unveiled its Biograph mMR system, the world's first integrated whole-body molecular MR with simultaneous data acquisition technology. The new 3-tesla hybrid system saw Siemens' developers succeed for the first time in simultaneously capturing MR and PET data within a whole-body unit. Designed to provide new opportunities for diagnostic imaging, the combination of MR and PET in one device allows doctors - for the first time - to simultaneously see the position of internal organs, how they are working and their metabolism, all in one image. While the MR provides exquisite morphological and functional details in human tissue, PET examines this on a cellular level and the combination of these in one procedure has the potential to be a valuable tool for identifying neurological, oncological and cardiac diseases.

Described as a 'new dimension' in diagnostic imaging today, the combination of these two technologies in one system could also significantly cut the time needed for an examination, by up to 50% compared to two separate procedures. And, subsequently, this would reduce the liquid helium used by these vital medical machines.

In conclusion of all the responses provided, the three following statements are true summaries of the current market. There is growth, there is over supply, but caution should be exercised. For if there is another Helium Cliff pending in the future, it would be prudent to restructure reliance on product and benefit from the cost savings associated with installing recycling or reliquefaction capabilities – benefitting both a company's bottom line and the balance of global helium supply.

Cryotherm

Expertise in liquid helium handling

Cryotherm GmbH & Co. KG, based in Kirchen, Germany, specialises in the manufacture of vacuum super-insulated storage and transport vessels, as well as pipelines for cryogenic liquefied gases such as nitrogen, oxygen, argon, hydrogen and helium. These gases are used in industry – for instance in the chemistry, biotechnology, foodstuffs, aeronautics and aerospace industries – as well as in medicine and research.

Cryotherm has been in business for almost 50 years, in various different guises. In 2012, the company manufactured and supplied its 60,000th vessel, a HELIOS® 2000, a 2000 litre liquid helium (LHe) vessel to be used in a helium liquefier.

Cryotherm has received certification as a manufacturer of pressure vessels and medical devices according to the European guidelines PED, TPED and MDD. Cryotherm is also certified according ISO 9001.

Helium applications and solutions

Super light and ready for easy use, the STRATOS® SL series is a range of vacuum super-insulated transport and supply containers for stationary and mobile use.

Made from aluminium, the containers boast many advantages for applications with deeply cold, liquid helium, including easy handling, high efficiency and high safety standards as hallmarks.

The STRATOS® SL series can also be used for the execution of cryogenic experiments, and serves to supply liquid helium (250–1000 litre capacity) to magnetic resonance imaging (MRI) tomographs and large cryostats in research centres, hospitals and the gases industry. Advantages include:

- Easy and safe: no need to install a siphon, so no problem in lower rooms
- Integrated, patented LHe decanting siphon with Anti-Oscillation Facility
- Economical and also space saving solution in an already integrated heating system. It enables a regulated pressure build-up for easy extraction
- Easy to set-up pressure regulator
- Robust transport frame

Storage of LHe with HELIOS® – Large helium storage capacities and additional scope for helium recovery and liquefier solutions with stationary storage tanks, the Helios® 1,000 – 10,000 litre tanks.

Transfer lines for LHe – Customised siphons for LHe transfer and filling-stations, in either rigid or flexible design, and multi-channel transfer lines for LHe supply of large experiments or accelerators, including valve-boxes.

Cryostats, cryo test-modules and valve-boxes – Customised cryostats, LHe distribution systems, valve-boxes together with transfer lines, and cryo test-boxes for testing cryo-modules.

To ensure that refrigeration is maintained for a long time, Cryotherm's containers and transfer piping systems have a special sophisticated insulating technology developed by its own researchers; a high quality multi-layer vacuum super insulation between internal and external containers, with highly active adsorbents and a computer-aided thermal design, reduces heat ingress and minimises boil-off.

GET IN TOUCH

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1960

1964 Container manufacturing begins, Siegtal Trade Union

1979 Foundation of Siegtal Cryotherm GmbH

1980

1980 Takeover by Messer Griesheim GmbH

2000

2000 Independent subsidiary of Messer Griesheim GmbH, Messer Cryotherm GmbH & Co. KG

2014 Management Buy Out, Cryotherm GmbH & Co. KG