

Great expectations in specialty gases

Legislation, market consolidation and high customer expectations remain key drivers in the dynamic specialty gases market, **Helen Carmichael** reports.

MIDDLE EAST – A MARKET OPPORTUNITY

With its availability of raw materials and strong hydrocarbon base, the Middle East could emerge as not just a major market for industrial gases – but a hub for specialty gases too.

That's the view of Gulf Cryo CEO Naji Skaf. Speaking back in December 2011 as part of an executive panel session of CEOs and managing directors at the **gasworld** Middle East Industrial Gases Conference 2011, Skaf was keen to express his enthusiasm for the specialty gases industry in the region.

He explained, "Specialty gases are a big market here in the Middle East,

due to the hydrocarbon base and a number of other factors. I think this is an area that will continue to grow too. The availability of raw material means that it will definitely continue to grow."

"There is still a lot of product that gets imported and a lot of it is brand driven. There is still a lot of reluctance to switch to local suppliers than international suppliers, and I think this will continue to transition as the local companies get better at producing specialty gases."

Chris Street, Managing Director of Scientific and Technical Gases (StG), echoed the earlier sentiments

of Skaf. He told **gasworld** magazine through an interview this month, "StG recognises the importance of having a presence in the region and to establish a manufacturing operation locally. At present there is a combination of large tier one companies and local manufacturers based here."

"However, the market is very niche and so there are a lot of opportunities for specialist companies such as StG to establish a presence based on manufacturing excellence, high quality products and excellent customer service," he added.

mixtures and improved blending tolerances for instrumentation gas mixtures," Harrison notes.

Feeling the pressure

One specialty gas market that has gleaned considerable attention is electronics, but 2013 has proved a challenging year for electronics specialty gases (ESGs), due to overcapacity in solar and LED markets.

Supply infrastructure for gases used in these segments (for example silane, nitrogen trifluoride and ammonia) has been built in line with aggressive customer plans. "However, the end market is not growing as fast as predicted, most solar and LED manufacturers are not able to fully load their fabs," according to Linde. "There is high pressure on pricing across the value chain – including ESG's."

However, the semiconductor area is developing well, driven by the growth of smartphones and tablets. "Leading IC [integrated circuit] makers continue to shrink their technology nodes to 20nm and below, to make the chips faster and to reduce power consumption," says Harrison. "These leading edge technologies offer three opportunities and challenges to ESG suppliers. First there is a wave of new materials that are deposited in chemical vapour deposition (CVD) and atomic layer deposition (ALD) processes on the chips. Second,

"These leading edge technologies offer three opportunities and challenges to ESG suppliers..."

there are multiple patterning processes needed to build nano structures on the device. This is increasing the demand for deposition and etching gases. Thirdly, this need for multiple patterning increases the investment for semiconductor manufacturers – a new fab costs up to \$5bn."

With the costs of low yields increasing, focus on material quality intensifies, including ESG's. "Quality control requirements are becoming much more stringent, with a focus in on advanced metrology, tighter controls limits, and higher purities of the materials," Harrison concludes.

Looking forward

Whilst the electronics sector has its challenges, the automotive manufacturing sector is poised for growth, partly due to emissions legislation changes, like Euro VI, driving increased demand for specialty gases products into 2014. Similar changes in marine emissions legislation in busy Northern European and Eastern US sea

Very high-purity products, specialty gases may consist of a single gas, or a mixture of fifty or more individual components. Identifiable by its price tag, a specialty gas is tested for purity after the cylinder is filled – customers are paying for guarantees of both the purity and the tolerance of the product.

Recent research from Cleveland, Ohio-based investment bank League Park into the \$63bn global market for industrial and specialty gases pegs the US gas market at around \$16bn, of which a quarter consists of specialty gases sales. The breakdown indicates a diverse market with a plethora of products, driven by increasingly specific and complex end-user demands.

Stephen Harrison, Global Head of Specialty Gases & Specialty Equipment at Linde AG, says that internationally the specialty gases market is buoyant and growing – especially in the energy, automotive and environmental sectors. "Clearly there are geographic regions which are growing faster than others, but overall the current state and near term outlook is positive. The industrial gases sector generally continues to consolidate to unlock technology transfer and productivity synergies for customers."

Specialty gases find a wide range of applications – but a common factor is quality, by which customers mean a combination of the ideal purity and mixture accuracy for their purpose. Users reporting to regulatory authorities

– for example in pharmaceutical or environmental markets – demand accuracy and traceability. End-user applications drive the analytical equipment and support gases market.

"In the laboratory, the internal trends are for high productivity, greater accuracy, better repeatability, convenience and safety for operators, more efficient use of space and better capital utilisation of the instrumentation assets," says Harrison.

Standards are rising. For instance, in ambient environmental monitoring, Harrison says that in many parts of the world, we are measuring ever-cleaner air. "This is great news for the people who breathe this air, but brings technological challenges. One hurdle that

► lanes will also build an increased demand for premium specialty gases products in the next few years.

Meanwhile, specialty gas manufacturers will continue to hone their technical expertise to stay abreast of the latest opportunities in customer markets, buying capacity and reach, through the acquisition of smaller specialists where they can.

“The US market remains ripe for consolidation, as independents still control up to half of the market”

Ongoing merger and acquisition (M&A) activity in the gases sector has continued through 2013, and specialty gases operations are no exception.

October saw Airgas, Inc. take over the Encompass Gas Group, taking in 11 locations across the US Midwest. “The Encompass Gas Group is among the most respected companies in the US packaged gas industry, and we are very excited for their associates and customers to join the Airgas family,” said Airgas Executive Chairman Peter McCausland of the acquired company, one of the largest privately-owned suppliers of industrial, medical, and specialty gases and related hardgoods in the US, generating approximately \$55m in annual sales in 2012.

Another important deal was finalised at the end of September, which saw Air Liquide complete its takeover of electronics materials company Voltaix. The acquisition, which in particular complements Air Liquide’s ALOHA™ product line of advanced precursors, will create synergies in molecule discovery and scale-up. Semiconductor manufacturers stand to benefit from a broader portfolio of new, high-tech materials introduced sooner as a result of the deal, according to Air Liquide.

Voltaix brings expertise and global capabilities in silicon, germanium, and boron chemistries to the Air Liquide stable, along with both US and South Korean manufacturing sites.

SPECIALTY GASES IN SOUTH EAST ASIA – A PERSPECTIVE

As the leading gases company in South & East Asia, The Linde Group is a major supplier of next generation high purity specialty gases and complex mixtures for a diverse range of industrial needs.

Although the rate of growth in demand for such products has dipped in line with the recent slowdown in manufacturing, the overall demand for specialty gases in the region has continued to show a moderate uptrend, supported by the growing number of industrial uses. In particular, rising environmental standards have driven up the demand for specialty gases products used in environmental monitoring and controls, as governments across the region implement stricter legislation on climate protection and enforce emissions limits.

Further, the Act on the registration and evaluation of chemicals, known as Korea REACH, passed the plenary session of National Assembly in South Korea on 30th April 2013 and will come into force on 1st January 2015.

Managing Director of Linde Korea, Rob Hughes said, “In recent years the South Korean government has taken strong steps to upgrade public health and environmental standards, for

Meanwhile, October also saw Electronic Fluorocarbons LLC add to its electronic specialty gases portfolio through a major deal with technology company 3M. The company has secured a global exclusive supply agreement with 3M for the supply of octafluoropropane (C₃F₈ - also known as 3M PFG-3218), a gas with applications in the electronics, semiconductor and refrigerant industries.

The US market in particular remains ripe for further consolidation, as independents still control up to half of the cylinder and packaged gas market. Industry commentators suggest that this fragmentation is an opportunity for gas companies on the acquisition path

example, imposing new regulatory controls for the registration of chemical products and encouraging ozone depleting products to be phased out.”

“We are also seeing growing interest in specialty gases for the electronics and lighting industries, bulk and fine chemicals for use in the pharmaceutical industry, and also rare gases and niche products for scientific research in universities and laboratories in Korea.”

In Thailand, the ASEAN’s top automotive production hub, major car assemblers are seeking to further expand their production capacities and have established various R&D, emissions analysis, and testing facilities which require large volumes of specialty gases and related equipment as the industry moves towards meeting the Euro 6 emissions standards. Safety is also a key concern in the region, Linde explained.

to position themselves for long-term growth, by adding capacity in response to shifting end market dynamics to stay ahead of competitors.

Consolidators can expand their product offering, increase geographic coverage, enhance their supply chain, capture share in the high margin cylinder and packaged gas market, and drive both sales and cost synergies, analysts at League Park suggest. 

ABOUT THE AUTHOR

Helen Carmichael is a freelance science writer, based in Dorset, UK.