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The Little Red Dot Shines Brightly

This research has been conducted by Irina Negoita and Neha Ghanshmdas of Global Business Reports. For more information, contact info@gbreports.com. Cover photos courtesy of ExxonMobil, Pacific Light and Singapore Economic Development Board.

INTRODUCTION

Singapore Remains a Global Pillar

Comfortably situated on Jurong Island, Singapore's chemical sector serves as a pillar of the global chemical industry. In 2015, grossing over \$80 billion and employing more than 25,000 people, the sector accounted for 28.6% of Singapore's total manufacturing output, according to the Ministry of Trade and Industry. The city-state continues to perpetuate its "home for business" motto, impressing the world with its top-class facilities, regulatory transparency, and innovative policies. Positioned among high growth markets such as Indonesia, Malaysia and India, Singapore is well aware that it must reinvent itself to stay afloat and, more importantly, ahead. This will be especially important in the midst of a current global economic downturn that has muted demand and slowed the advent of new projects. Today, a new set of dynamics is at play, keeping Singapore and its chemical industry on their toes.

The first factor on everyone's mind is oil. The disconcertingly low price of crude is weighing on many players and fostering a muted outlook across jurisdictions and industries. Singapore is no exception to this trend, as its total merchandise trade dipped 9.5% to \$884.1 billion in 2015, largely due to the contraction of oil trade by 36%. A broader economic malaise is beginning to set in, as new plant projects have been put on hold, majors such as Teijin Limited have left the island altogether, and others like Jurong Aromatics Corp. have yet to start up again. Other challenges such as rising business costs and difficulties associated with labor continue to pose as obstacles for multinational corporations (MNCs) and small and medium sized enterprises (SMEs) alike. "Rising costs of labor and land, coupled with a shrinking manufacturing base, are pushing Singapore's SMEs through the cracks," said managing director of Unilite Chemicals, Nicholas Lim. The year 2016 will call for caution and good business acumen across all segments of the chemical industry. "Attracting and retain-

ing talent is a lingering concern in Singapore's oil and gas and petrochemical sectors. This, coupled with an expected 20% to 30% decrease in demand from 2015, means that our company needs to bring a very competitive, value-added proposition to our clients in all our services so that we can navigate the current turbulent waters safely until the business cycle improves," said general manager of local maintenance company Ad-Meth Mech-Field, Shaun Pang.

Well aware of current hurdles, Singapore's stakeholders are taking active measures to galvanize the industry. Most notably, as part of the Jurong Island Version 2.0 (JIV2.0) initiative, policymakers have put a series of infrastructure developments in place to strengthen the country's chemical ecosystem. The program kicked off in 2010, addressing the following areas: energy, feedstock optionality, logistics and infrastructure, productivity and data analytics. With regards to a shortage of labor for instance, industry wide initiatives have been put in place to increase productivity among existing workers. As

THE ENERGY & CHEMICALS SECTOR AT A GLANCE

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>100 

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(2015)

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Interview with Damian Chan, Executive Director and Cindy Koh, Director, Energy & Chemicals, Singapore Economic Development Board (EDB)

Notwithstanding today's uncertain economic climate, a number of players in Singapore are riding on the back of increased margins due to lower feedstock prices. In fact, many investments have been made on the island over the past three years. What continues to incentivize multinationals to come to Singapore and set up their operations here?

DC: Firstly, Singapore's infrastructure capabilities have been critical for continuing to attract new companies to our frontiers. Over the past 20 years Jurong Island has come to serve as a centerpiece for all energy, petrochemical, and specialty chemicals activities. Jurong Island's key value proposition is integration, from the perspective of being connected to both customer and supplier, often literally over the fence through pipes. This significantly reduces time to customers, lowering logistics and transportation costs. Another contributing factor to Jurong Island's plug and play infrastructure is the presence of service providers such as third party logistics providers (3PLs) and utilities players.

Secondly, Singapore's business environment plays an important part in the city-state's competitiveness equation. Chemicals is a capital intensive, and in many cases technology intensive, industry. Hence, predictability with regards to government policies, rule of law and Intellectual Property (IP) protection, make Singapore a trusted and secure environment for sensitive and large investments. Especially in the energy and chemicals space where companies tend to take a long-term view, predictability and stability are critical, aligning well with Singapore's attributes. However we cannot simply rest on our laurels and rely on such attributes or value propositions to attract investments. We need to continue to improve ourselves to make sure that we remain competitive and sustainable. In today's environment—whether in the context of commodity markets, business growth, or political developments around the world—there is a great deal of uncertainty. Consequently, being able to provide some degree of resilience, or flexibility to respond to changes, becomes increasingly important. Accordingly, we have been working to improve Singapore's energy and chemical companies' resilience. The Jurong Island v2.0 initiative will be of paramount importance to this, and we are beginning to see the fruits of this labor.

In 2014 specialty chemicals comprised 9.7% of Singapore's chemical cluster's total output. How is the EDB working to promote specialty chemical research and production in Singapore? How are initiatives such as the joint industry sectorial planning (JISP) for specialty chemicals affecting the growth of this market segment?

CK: Innovation is key for companies to formulate the right products, and deliver customized solutions to Asian consumers, whose needs could be quite unique. JISP is a joint initiative between EDB and the Agency for Science, Technology and Research (A*STAR) that spans across multiple research institutes including the Institute of Chemical Engineering Sciences (ICES), the Institute of Materials Research and Engineering (IMRE) as well as the Institute of High Performance Computing (IHPC). We realize that there is increased pressure to improve R&D yield for specialty chemical companies, and hence a need to keep costs down. This is where IHPC comes in with modeling and simulation, for example. JISP is a deliberate effort on the part of EDB



and A*STAR to try and identify scientific and technology areas in which companies have capability gaps, and where A*STAR and EDB could invest public funds to develop these capabilities within our research institutes.

How is Singapore working to promote the production of specialty chemicals? What will prompt more companies to come and conduct innovation here?

CK: The global specialty chemicals market will grow at a compound annual growth rate (CAGR) of about 5.4% from 2015 to 2025, with Asia Pacific growing at a CAGR of 6.35% and contributing 45% of the global

market share. This presents numerous opportunities for specialty chemical companies, who have to maintain a strategic presence in Asia to capture these growth opportunities. While Singapore is a small market, the country has a dense ecosystem of specialty chemical companies' customers. And what is important to note is that these customers are looking beyond Singapore and innovating for the Asia Pacific market. The challenge for specialty chemical companies is getting the right solutions out to the market at the right time, making the ability to respond quickly crucial. Over the last five years, we have seen specialty chemical companies leverage Singapore's strengths, such as our strong research capabilities and IP protection, access to regional problem statements from their regional customers in Singapore and availability of manufacturing infrastructure, to set up their strategic hubs here. These strategic hubs include commercial, innovation and manufacturing functions. The co-location of commercial, innovation and manufacturing activities in Singapore has a strong reinforcing effect and make these companies more nimble in meeting customers' needs.

Have you identified any more opportunities or gaps in the Asian chemical supply chain that Singaporean manufacturers could potentially fill?

DC: We are actively working on developing the higher olefins chains, such as C5s. While typically one cracker does not produce enough C5s to result in a world scale C5 complex, the island has the benefit of having four crackers. Hence we could aggregate C5s that come out of the crackers to produce a world-scale C5 complex, which is something that we are keen to develop.

While Singapore does continue to boast a host of structural advantages, challenges such as space certainly remain. JTC and other players have stepped up with innovations such as the Jurong Rock Caverns. How are these being utilized and what other innovations are in the pipeline in the context of space optimization?

DC: The construction of the first phase of the Jurong Rock Caverns has been completed.

This underground storage facility was conceived for the purpose of storing crude and condensates, and has stocked condensates for one of the aromatic complexes on Jurong Island. The next stage is to see how we can use the caverns for crude storage, which would add another degree of resilience to our refineries.

Further to this, we are constantly looking at other ways to optimize space. When it comes to chemical plants, because of safety, there is some limit to the extent they can optimize space. On Jurong Island however, there are logistics facilities and warehouses that are exploring ways to better utilize automation technologies such as robotics to help with space

conservation. The EDB is also working to be more judicious with projects, and taking care to ensure a high level of land productivity.

CK: JTC is developing a new chemicals hub, which is the first of its kind in Singapore, in Tuas. The facility is catered towards specialties and small footprint type plants, serving as a multi-story facility for chemical companies to set up some of their blending and packaging activities. It is unique in that it includes shared facilities and services, which helps companies save on up-front capital requirement, operating costs and improve process efficiencies.



Labor has been a hot topic among all industrial stakeholders. While the issue is policy-driven, what are some initiatives being headed to combat labor related challenges? How successful have these and additional mechanization efforts been in combatting the shortage of workers?

DC: Initiatives such as the Process Construction and Maintenance Management Committee (PCMMC) are progressing well. We launched PCMMC two or three years ago to bring together plant owners and contractors represented by the Association of Process Industry (ASPRI) and identify ways to improve productivity and save on labor, especially reliance on foreign labor. This would also reduce maintenance and construction costs. There were some low hanging fruit we have identified and worked on, such as worker housing, which should ideally be proximate to Jurong Island. The EDB has worked with ASPRI on this front, which is currently constructing a new foreign worker dormitory close to Jurong Island, in tandem with an in-house training facility.

We have also set up a turnaround scheduling system to smooth out peaks and troughs in demand. Often times there are increased costs for maintenance or construction due to the sheer number of jobs. Other initiatives such as mechanization will take longer to implement. A productivity council has been formed as a result of PCMMC, whose members are exploring mechanization and identifying parts of the maintenance or construction process that can be better mechanized. Additionally, we are making efforts in the field of worker certification. Lastly, an important component moving forward is benchmarking. We are currently working with the Construction Industry Institute (CII) at the University of Texas Austin on benchmarking of projects. PCMMC has a three-year agreement with CII to help with benchmarking projects, which will in turn support efforts in the fields of mechanization and certification.

Data analytics is expected to play an important role moving forward in increasing the competitiveness of the petrochemical sector. Can you speak more broadly about this?

DC: Data analytics will play a role in enhancing competitiveness as well as health and safety. The Industrial Internet of Things (IIoT) is potentially transformative for many industries. Even for a sector that is rightfully conservative—due to the importance of health and safety—there are many opportunities for new technologies to help boost competitiveness and sustainability. For example, we can use data analytics to improve energy efficiency within our chemical plants. Technology company Emerson for instance, has set up a pervasive sensing center of excellence in Singapore. They have been working with chemical players on Jurong Island such as Denka to apply sensing technology and bring about cost sav-

ings as well as enhance health and safety. The other major controls and automations company Yokogawa has also just set up a co-innovation center with the aim of working with companies in the chemicals industry to deploy IoT technologies. However, it is important to note that we need to continue to improve awareness surrounding new technologies. IoT is still relatively new and given the nature of the industry, education efforts have to be made to help companies better crystalize the benefits of adoption.

What will continue to set Singapore apart in the international chemical industry for the long term?

DC: We have to go beyond the hygiene factor, and no matter how commodity prices shift, work to ensure that Singapore remains competitive. Eventually oil prices will increase again, and we have to shield ourselves against volatility. Developments such as the LNG terminal, increasing the number of LNG aggregators for greater energy security and competitiveness, along with efforts put towards feed-stock diversification such as Vopak's new LPG terminal on Jurong Island, all contribute to this goal.

But aside from looking at resilience from a cost perspective, market connectivity should be taken into account. We believe that Asia will continue to be the world's long-term growth story. Consequently Singapore's status as a hub due to its location in the heart of Southeast Asia will continue to hold us in good stead. Furthermore, we will leverage key attributes that we have built over the years, such as strong financial institutions and logistics networks to complement our manufacturing capabilities. For example, Singapore is home to many customers of the specialty chemicals companies that are not just conducting sales and marketing, but engaged in manufacturing and R&D (such as P&G, a major customer to consumer chemicals companies). Having a critical mass of companies from different business areas that drive demand from an innovation perspective is key, and many of these firms have established their hubs in Singapore. By bringing their manufacturing and R&D here, companies will be very well connected to their customers, and improve their market resilience.

What is your outlook and vision for Singapore's chemicals sector over the course of the next three to five years?

DC: We hope to continue to be vibrant from a growth perspective. We observe a great deal of growth stemming from specialty chemicals, including the types of jobs the segment creates. With more technologies emerging, the nature of jobs will also evolve, and there will be a demand for more IT savvy talent, as well as analytics-trained capital. Technology enablement of the sector is a critical part of how we see it transforming. Another key part of Singapore's vision is for the energy and chemicals sector to grow in a sustainable way.

Do you have a final message about Singapore and its resilient industry?

DC: Singapore remains committed to the development and growth of its energy and chemicals sector. We are dedicated to ensuring that the country remains a long-term competitive location for energy and chemicals companies. The EDB specifically is here to serve as a long-term partner to these companies, and ensure that they are successful in Asia at least partly because of Singapore.



Jurong Island. Photo courtesy of Singapore Economic Development Board.

an example, the Association of Process Industry (ASPRI) is collaborating with Centurion Corporation to set up the island nation's first integrated development, comprising both a workers accommodation and training center to cater to the needs of workers from the process, construction and maintenance industry. "Labor management is an issue on everyone's minds. Our new workers accommodation is a 12-minute express lane bus ride to the Jurong Island Checkpoint, and designed to enhance the wellbeing and productivity of foreign workers. Together with ASPRI, the facility will make a palpable difference in helping to alleviate some of the chemical industry's labor challenges," said group chief executive officer at Centurion, Kong Chee Min.

On a wider scale, the industry is working towards the production of high value-added derivatives in order to ensure the long-term competitiveness of the nation's chemical cluster. Characterized by wider margins and increasing demand, the specialty chemicals market is at the top of everyone's agenda. Japanese chemical heavyweight Mitsui Chemicals Asia Pacific (MCAP), for example, is turning towards healthcare and packaging. "Diversification is key for Mitsui Chemicals Group and placing Singapore at the forefront as one of the regional headquarters, MCAP integrates various regional strategies to meet market needs. With shifting market conditions, MCAP is diversifying its products from base petrochemicals to specialty chemicals areas, as the increasingly so-

phisticated consumer base is linchpin to our business. We are also collaborating with institutions such as A*STAR and its institutes to develop new technologies for innovation," said managing director and CEO, Shigeharu Matsuzaka.

Policymakers are also actively promoting research and development (R&D) in Singapore in order to draw more companies to the island's shores. Earlier this year, the government announced a Research Innovation Enterprise 2020 Plan (RIE2020) through which \$19 billion will support R&D efforts over the course of the next five years. This is the city-state's largest R&D budget to date, and is an 18% increase from RIE2015's \$16.1 billion commitment. R&D will enhance the city-state's role not only as a manufacturing hub but as a center for innovation and technology. Thus far, Mitsui Chemicals, Syngenta, BASF and many more chemical players have all set up research facilities in Singapore. Additionally, a number of strategic initiatives have been implemented to optimize Singapore's chemical infrastructure. In September of 2014, Prime Minister Lee Hsien Loong officially opened phase one of Southeast Asia's first underground oil storage facility, Jurong Rock Caverns. Located beneath Jurong Island, the caverns provide additional capacity for the storage of crude oil, condensate, naphtha, and gas oil. Given the island's limited land space, Jurong Rock Caverns support petrochemical giants' operations by providing them with 60 hectares of additional space.



Tan Soo Koong, Managing Director, Vopak Terminals Singapore

Speaking of space, Singapore's most advanced Pasir Panjang Terminal is undergoing a \$3.5 billion expansion that is slated for completion by 2017. The development known as Phase 3 and 4 will increase container-handling capacity by upwards of 40%. On the other side of the island, officials are cooking up plans for a new terminal in Tuas with the hopes of consolidating PSA's entire portfolio by the year 2040. Such investments demonstrate the government's commitment to Singapore's industry, and will ensure the local chemical sector's competitive advantage for the long term.

To further boost capacity on land, European tank storage firm Vopak Terminals Singapore recently unveiled Southeast Asia's first liquefied petroleum gas (LPG) facility on Jurong Island. The new import and storage terminal will help the industry diversify its feedstock and increase competitiveness. Depressed feedstock prices are already bolstering global petrochemical manufacturers' margins, and Vopak's investment will hopefully serve as an additional boost.

While hesitations over depressed fuel prices and China's slowing growth abound, Singapore's key players are confident in the underlying mega trends that will drive the industry forward long into the future. Southeast Asia remains an attractive growth market, given its rising middle class and consequently increasing purchasing power. But more importantly, Singapore's innovative policymakers are always one step ahead, working to ensure the future prosperity of their small but mighty island. For these reasons and more,

multinationals will continue to see reason to set up shop in the city-state. “Singaporeans do not rest on their achievements and are constantly looking ahead. The country’s astounding development over the last fifty years has proven that its policy-makers had indeed crafted a good master plan. The Economic Development Board (EDB) is attentive towards the industries and companies coming to Singapore that can contribute to the further development of the country’s industry and possibly other industries, which is a unique and effective strategy,” said managing director of Helm Asia, Andreas Woschek.

Here we find ourselves in an ever-evolving landscape, engaged in thought-provoking conversations with some of the country’s leading business minds. While Singapore’s poet Edwin Thumboo once called Singapore a “quiet island with a name,” beneath the calm and order of a well-running society, the industry’s cogs and wheels are perpetually in motion. 2016 may bring economic uncertainty, but Singapore is rising to the challenge.

REGULATIONS

Adoption of a New Safety Case Regime to Strengthen Singapore’s Chemical Ecosystem

Singapore has maintained its stature as one of the most sophisticated hubs in the world for petroleum refining and chemical manufacturing for decades, but as a number of global incidents have illustrated, the chemical trade remains an inherently risky business. Inspired by an impetus to continually evolve, Singapore’s industry stakeholders are taking concerted actions to ensure the longevity of its precious industry. In a population-dense city-state, this calls for staunch attention to workplace safety and health in order to protect the industry, its surrounding communities and the environment as well as to ensure its competitiveness.

Thus far, Singapore’s chemical industry is fortunate to boast a stellar safety record and serves as the country’s leading

industry in terms of the health and safety of its workers and has avoided any accidents such as have tarnished the image of industry elsewhere. However, while Singapore’s current workplace safety and health management system is stringent, its regulators are working to introduce a new framework to even better manage risk, prevent major accidents and limit their potentially grave consequences.

Accordingly, in March 2014, the Ministry of Manpower (MOM) set up an inter-agency taskforce to review and enhance Singapore’s existing regulatory framework for major hazard installations (MHIs) with the goal of being in line with international best practices. MHIs include petroleum refining and manufacturing facilities, chemical facilities, chemical processing plants and facilities where large quantities of toxic and flammable substances are stored or used—accounting for thousands of companies across the oil and gas, chemicals and process sectors. MOM, along with the Ministry of the Environment and



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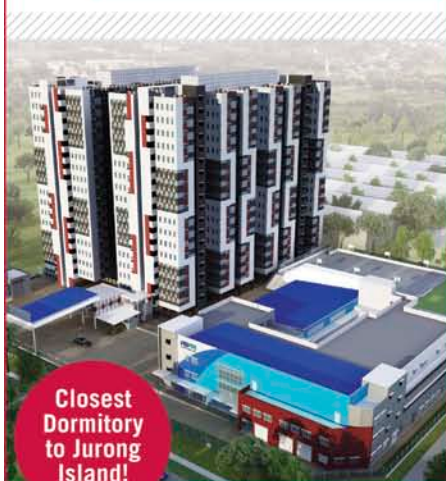
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Water Resources (MEWR), the Ministry of Home Affairs (MHA), the Ministry of Trade and Industry (MTI), Singapore Civil Defense Force (SCDF) National Environment Agency (NEA), the Economic Development Board (EDB), JTC Corporation (JTC) have been working alongside the industry to implement Safety Case regime.

THE HEART OF THE MATTER

Safety Case regime is not new to the chemical industry, but has only recently made its way into the local regulatory framework. Singapore's avid regulators have travelled across Europe to study the ways in which other jurisdictions, such as the United Kingdom, Germany and the Netherlands, manage their MHIs, returning to the homeland inspired by a more flexible and comprehensive approach to safety.

A Safety Case regime will allow MHIs greater flexibility to tailor risk mitigating measures to best suit their own needs, moving away from a prescriptive one-size-fits-all regulatory approach. This means that MHIs will assume greater responsibilities to identify and manage safety, health and environment (SHE) risks, and demonstrate that they are safe. Essentially, Safety Case will call for the integration of all SHE protocols onsite as well as a formal demonstration to regulators that all MHI risks have been reduced to as low as reasonably practicable. MHIs will have to make a case to convince regulators that their unique strategy for managing safety is satisfactory. Adoption of a Safety Case regime will lead to the improved understanding of hazards and risks, an enhanced knowledge of technical and managerial controls, and better oversight in general.

RING UP THE CURTAIN

Along with an introduction of Safety Case regime, the inter-agency taskforce also recommended to establish the Major Hazards Department (MHD), to serve as the single and easily accessible regulatory body overseeing the new safety protocol. The MHD will be responsible for Safety Case assessments, inspections

and investigations. The department will be led by MOM, and comprise officers from SCDF and NEA.

New MHI regulations will be introduced under the Workplace Safety and Health Act to put the Safety Case regime into effect. A law will be enacted to require safety case submissions by MHIs in the first half of 2016, followed by the release of a technical guidance document to instruct the industry on how to best prepare for new regulations. To ease the industry into adoption, there will be a grace period until mid-2017, when the Safety Case regime for MHIs will formally take effect.

WORKING HAND IN GLOVE

The implementation of new MHI regulations is a result of close cooperation between a number of aforementioned government agencies and the industry in order to tailor the framework to a Singaporean context. In addition to various industry consultations and capability building initiatives led by regulators, Singapore Chemical Industry Council (SCIC) has established an MHI committee for the sole purpose of supporting the enhancement of the new framework. The entire regulatory process is a testament to Singapore's transparent and consultative way of doing business and the widespread belief that collaboration leads to better outcomes. "We work together for the betterment of Singapore, that is why our economy can grow," said executive director of SCIC, Terence Koh.

In fact, agencies are continuing to work closely alongside the industry to co-develop specific guidelines, including technical guidance for the Safety Case regime. Additionally, with the introduction of Safety Case regime, regulators are prepared to further streamline existing SHE regulatory requirements. In sum, all of Singapore's stakeholders—from multinationals to local producers and regulators—are investing time and resources into preserving the city-state's competitiveness. Together they are doing what Singapore does best: taking a long-term view, and working tirelessly for the betterment of their chemical industry.

MANUFACTURING

Jurong's Heavyweights Continue Lifting

Singaporeans and foreigners alike are attune to the Lion City's high cost of living and doing business. While the country's delicious hawker fare might cost a hungry tourist just a few dollars, setting up shop here begs a much larger investment. Today, increasingly high costs of doing business on the island are taking center stage, especially in the midst of an economic downturn (see Figure 1). In fact, according to the Economic Development Board (EDB), Singapore's manufacturing output contracted by 5.2% in 2015, the first annual decline since 2009. It is no surprise that the world economy has heavily impacted the local chemical landscape. Today, Singapore's producers are vulnerable to China's slowing demand and oversupply. Low oil and energy prices have not stimulated demand for petrochemicals in Asia to a great extent, and a weaker Singapore Dollar is unlikely to boost exports in the face of poor external demand and a weaker Yuan. Consequently, the first three quarters of 2015 saw a 0.2% y-o-y average increase in the local petrochemical index, down from 13.3% in 2014. More broadly, these blows are exacerbating what is already a shrinking manufacturing base. The share of manufacturing as a percentage of Singapore's GDP has been declining consistently over the past ten years, from a high of 27.8% in 2005, to 19.8% in 2015. (see Figure 2) Hence, the key question today is, what actions are being taken to counter this contraction and boost homegrown production, and will they succeed?

While the signs pointing south abound, we have discovered a sense of resilience among some of Singapore's chemical players that hopefully will keep the island's industry afloat. Brave investors remain confident in the city-state and continue to pour capital into the local chemical cluster, one of Singapore's three sectors that attracted the highest fixed asset investment commitments in 2015. "Investments made in the last two years were not made with a short-term view, but rather with a 20 to 30 year timeline

Interview with Dr. Tay Kin Bee, Chairman, Singapore Chemical Industry Council (SCIC)

In 2013, SCIC's key industry initiatives and roles included the Global Harmonized System (GHS), the Responsible Care Program and its Regulatory Affairs Committee. What is the status of the GHS and Responsible Care program today and what additional initiatives, if any, is SCIC currently spearheading?

The Responsible Care program continues to be the flagship program for the chemical industry. This voluntary program helps drive continuous improvements in the areas of Health, Safety & Environmental (HSE) performance of the industry. It is well recognized and supported by local government agencies, and officers from the Ministry of Manpower (MOM), National Environment Agency (NEA) and Singapore Civil Defense Force (SCDF) participate in the review of the annual Responsible Care submissions of companies. In recent years, SCIC has also launched two collaboration schemes with the aforementioned agencies to recognize companies that have achieved good implementation performance. 2015 was a significant milestone as we celebrated 25 years of Responsible Care in Singapore.

The GHS implementation for manufacturers and suppliers took effect on the 1st of July 2015. As for users of chemicals, the timeline will be 1st of July 2016. Now that the legislation and standards to comply with GHS have been put in place, the focus moving forward has shifted to promotion, engagement and capability building for all industries affected by this new regulation. As the appointed training organizer by the National GHS Taskforce to build cross-industry capability for GHS implementation, SCIC has trained more than 5,000 personnel since 2006, including regulatory officers. This capacity building effort is ongoing in order to update the industry on the latest GHS requirements for Singapore.

Some additional initiatives we are spearheading include productivity improvement, the ASEAN regulatory cooperation project, and the development of a process safety regulatory framework. SCIC began working on improving productivity in the process, construction and



maintenance (PCM) industries in early 2013, and in mid-2015, gained momentum with the formation of the PCMMC (Process, Construction and Maintenance Management Committee)'s Productivity Council, involving key companies in the industry. Funded by the Singapore Economic Development

Board (EDB), SCIC and the Association of Process Industry (ASPRI), SCIC has been tasked to lead the facilitation and support of this national productivity program. This important three-year national implementation project is expected to help the process industry improve productivity through the introduction of best practices, mechanization and a benchmarking study.

Some economic challenges facing local chemical companies include the high cost of energy and tightening labor market. What is your take on these trials? How is the evolving labor market composition affecting Singapore's local chemical companies and MNCs?

The tightening of the labor market is an impetus for our strong focus on productivity improvements for maintenance and construction activities as well as our efforts to raise the profile and attractiveness of career opportunities within the chemical industry.

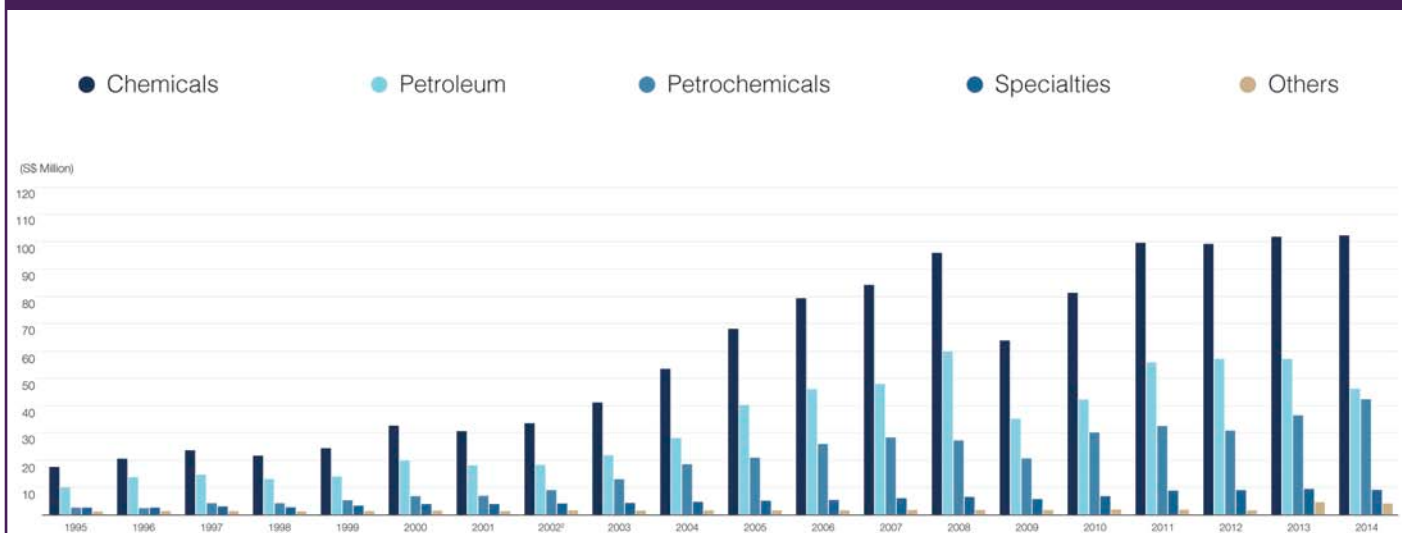
SCIC is managing the PCMMC's Productivity Council, which was formed in mid-2015. The timeline for the national implementation project is from 2015 to 2018. Upon completion, the project expected to introduce best practices, metrics and benchmarking for the PCM industry.

Many industry initiatives have been undertaken by SCIC as part of our ongoing involvement with student outreach programs to raise awareness about careers in the energy and chemical industry.

As a representative of Singapore's chemical and petrochemical industries, what is your medium term outlook for the sector?

We are optimistic about the medium to long-term outlook for the sector, based on the expected increase in demand for petrochemical products from a growing middle class in the Asia Pacific region.

TOTAL OUTPUT* BY MFG CLUSTERS, 1995 - 2014



*Total output refers to total value of goods and services derived from a production process and ancillary activities such as management or marketing. As such, it includes manufacturing output and other operating income. Source: Singapore Economic Development Board

in mind. It is very clear that Singapore does not offer the lowest costs in terms of manufacturing but boasts advantages in other areas. Hence, Singapore needs to continue to work towards differentiation, which will help companies like Dow remain competitive,” said country manager at Dow Chemical Pacific (Singapore), Suniati Basirun.

Differentiation is the name of the game today, especially in an environment where increasing supply of basic petrochemicals from lower cost production centers are weighing heavily on margins. China’s move to self-sufficiency has created supply gluts in the marketplace, as the coun-

try is transitioning quickly from a net importer to a net exporter of many petroleum products and chemicals for the first time. According to ICIS, China’s capacity as a percentage of consumption of PTA, for example, has risen from 72% in 2010, to 164% in 2016. Staggering Chinese capacity increases are compelling Singaporean producers to alter their strategies entirely.

“Today in Southeast Asia, 70% of MCI’s businesses depend on basic petrochemicals such as phenol, BPA or PTA, which are suffering from severe global competition in the region due to the growing supply from China. As a result we are turning to more specialty areas such as

specialty polymers and healthcare materials,” said managing director & CEO of Mitsui Chemicals Asia Pacific, Shigeharu Matsuzaka.

Mitsui is ramping up production of specialty elastomers and polyethylene, with the hopes of catering to Asia’s growing demand for more specialized applications in the automotive and food and packaging areas. Celanese too is bolstering its presence in Singapore with a new vinyl acetate ethylene (VAE) production facility. “We are proud to be the first chemical company to build a VAE emulsions plant in Singapore. The new plant is integrated with our upstream infrastructure, which

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helped foster quick completion,” explained commercial director of Celanese’s acetyl chain business, Anna An.

Singapore is not giving in to competition easily. Policymakers and industrialists are taking actions to preserve the island’s competitiveness by promoting stability and predictability in a world economy that is laden with uncertainty. On the energy front, for example, while Singapore’s costs have historically been among the highest in the region, they have come off by 50% since 2013. This is due to the fall in the price of oil, increased supply of almost 3,000MW of capacity in the market, and liquefied natural gas (LNG) diversification efforts. The addition of a new LNG terminal by Singapore LNG Corporation in 2014 enables aggregators to import the fuel from all over the world, leading to heightened security and competitiveness of supply.

Such initiatives have bolstered the city-state’s attractiveness as a manufacturing base. According to the Ministry of Trade and Industry, the local chemi-

cal industry produced \$81 billion worth of output in 2015, accounting for 28.6% of the city-state’s total manufacturing output that year. That year, all clusters except for the chemicals cluster, recorded a decline in output. And the mighty Island is not due to float away any time soon. Large multinationals that have called Jurong Island home for decades are strengthening their commitment to the region with increased investments in production capacity expansions and new plants.

But what keeps them all coming back for more, during a period of high market volatility and overall uncertainty? Multinationals undoubtedly remain convinced by Singapore’s attractive offering as a chemical manufacturing hub. Instead of moving operations to lower-cost locales such as Malaysia or Thailand, the world’s chemical giants continue to be wooed by the city-state’s attractive tax schemes, top-notch infrastructure and interconnectivity, pro-business government, legal transparency, highly skilled

human capital and academic resources. These factors are especially relevant as more and more firms look to streamline their operations and focus on their core businesses: production and R&D.

While Singapore’s chemical industry continues to evolve, petrochemicals still account for the bulk of the island’s production, representing 40.2% of total output. Increased competition and lower prices of basic petrochemicals internationally have prompted all stakeholders to recognize the need to continually add value and differentiate their offering. Given the island’s sophisticated infrastructure and interconnectedness, there is little debottlenecking to be done. Instead, what manufacturers will have to focus on moving forward is feedstock security, plant and equipment reliability, and overall flexibility and safety. Ensuring all these factors will help keep Singaporean manufacturers afloat during difficult times. As new investments indicate, no one is giving up on Singapore’s Jurong Island as a chemicals hub just yet.



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SPECIALTIES

Asia Sets a New Benchmark for Innovation

It is no secret that specialty chemicals are the way forward for Singapore's chemicals manufacturing cluster. In fact, boosting specialty chemical production has been at the top of the country's forward-looking policymakers' agenda for years. This is because according to the Singapore Economic Development Board (EDB), Asia's fast growing middle class population will account for 40% of global middle-class consumption by 2030, pushing demand for specialty chemicals up. To satisfy this growing demand, according to the EDB, Singapore's specialty chemical manufacturing output has increased by 77% from 2005 to 2014 at a compounded annual growth rate (CAGR) of 5.89%. In 2014, the sector accounted for 9.7% of the chemical cluster's total output, grossing S\$ 9.2 billion.

"With regards to globalization, the rapid growth in Asia's emerging markets is offering people access to improved living standards which propels demand for high-quality products in the region. This is where we can best meet our customers' demand for easy access to proven solutions and best-in-class technology at competitive conditions, by placing our assets close to where they need them," said



Peter Meinshausen, President of Southeast Asia, Australia and New Zealand Region, Evonik (SEA)

President of South East Asia, Australia & New Zealand Region, at Evonik (SEA), Peter Meinshausen.

Furthermore, Singapore's high cost of production and increasing petrochemical competition from powerhouses such as India and China, have compelled its Jurong Island residents to pursue higher value-added manufacturing. But what exactly can the small island nation offer to the world's specialty chemical giants? Through targeted investments, Singapore's government has successfully developed an ecosystem that continues to compel global chemical companies to bring their manufacturing, R&D and business functions to the city-state. In addition to its premier manufacturing and logistics facilities, Singapore has built an innovation infrastructure comprised of top-notch facilities, institutes, and



Pieter Nuboe, Vice President for Human Nutrition and Health, DSM Asia Pacific

research programs that enable open innovation, collaborative research and product development. Firms like DSM for example are "leveraging Singapore's many research institutions and multicultural environment to conceptualize and co-create within the fields of life sciences and material sciences," explained vice president for human nutrition and health Asia Pacific at DSM, Pieter Nuboe.

Facilities such as JTC Corp's 200 hectare One-North development, an R&D hub and icon of Singapore's knowledge economy, stands as a symbol of the country's commitment to innovation. Located in the heart of the mainland, the complex is home to four of the Agency for Science, Technology and Research (A*STAR)'s institutes, as well as a host of companies and their global research centers. "We dis-

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covered that global innovation conducted here in the consumer industry, including products developed for home and personal care segments, have many commonalities that customers seek throughout the world. Solvay pioneered research in the home care segment, and made discoveries that could be applicable to other industry markets. Often, we think of research and innovation as being done in Europe or the US, but I believe Singapore is on par with other laboratories in the world,” said vice president and general manager of Solvay Specialty Chemicals Asia Pacific, Valdirene Licht. Solvay opened its new Innovation Center within One-North in February of 2014, and is already in the process of patenting four new technologies for global home and personal care, oil and gas and agrochemical segments. Other chemical companies such as DuPont have plans to set up similar research facilities in the city-state.

Singapore has further strengthened its scientific capabilities through public sector research organization A*STAR, and

its Institute of Chemical and Engineering Sciences (ICES). ICES provides highly trained R&D manpower and necessary infrastructure to carry out research in the chemical field. Within ICES, a specialty chemicals program has been founded to focus on developing new formulations, encapsulation and delivery technologies for various end markets. The EDB is also playing an active role and working closely with A*STAR through a joint industry sectorial planning (JISP) initiative to identify capability gaps in scientific and technology areas that can be filled through investment. Most recently, the state’s commitment to R&D was formalized through the sixth science and technology plan—the RIE2020 Plan—that pledged S\$ 19 billion over the course of the next four years towards research, innovation and enterprise, bumping total R&D investment close to 1% of GDP.

If innovation resources are not enough, specialty chemical companies are likely to be convinced by the presence of key customers, including prominent fast mov-

ing consumer goods companies, to set up shop in Singapore. “While Singapore is a small market, the country has a dense ecosystem of specialty chemical companies’ customers. And what is important to note is that these customers are looking beyond Singapore and innovating for the Asia Pacific market,” said director of energy and chemicals at the EDB, Cindy Koh.

Wooed by the presence of customers, a pool of highly qualified human resources, favorable IP protection laws, proximity to high growth markets and a robust innovation ecosystem, or all of the above, specialty chemical companies are finding it hard to resist Singapore’s flavorful offering.

Huntsman, Evonik (SEA), Lanxess and ExxonMobil Asia Pacific are among the majors that have made significant investments in Singapore’s specialty chemical market of late. “Prior to commencement of production, amines were imported from the United States or Europe, which took about 120 days. Today when we ship product from Singapore to other parts of

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Gan Seow Kee, Chairman and Managing Director, ExxonMobil Singapore

Asia, lead times are reduced to approximately 30 days, improving supply and inventory management,” said president of Huntsman Textile Effects, Paul Hulme. Huntsman’s performance products plant on Jurong Island is currently undergoing an expansion that will double the facility’s capacity by mid-2016. Capitalizing on the growing global market for feed additives and amino acids—a large portion of which is stemming from Asian markets—Evonik invested in 150,000 tons of DL methionine production capacity in 2014. Less than one year later in May of 2015, the firm unveiled its expanded oil additives plant, nearly doubling capacity and producing 40% of Evonik’s global product portfolio. The chemical company also announced plans to double capacity of its new methionine plant by 2019.

Another German chemical manufacturer, Lanxess, made one of its largest investments worldwide in Singapore earlier last year. The firm opened its second plant in Singapore in August 2015, a \$318 million neodymium butadiene rubber plant with an annual production capacity of 140,000 metric tons. Lanxess’ new production facility strengthens Singapore’s growing position as a hub for synthetic rubber production in the region. Other chemical heavyweights such as Sumitomo Chemical and Asahi Kasei have also put dollars towards synthetic rubber production in Singapore, further complementing the city-state’s position as the world’s largest rubber trading hub.

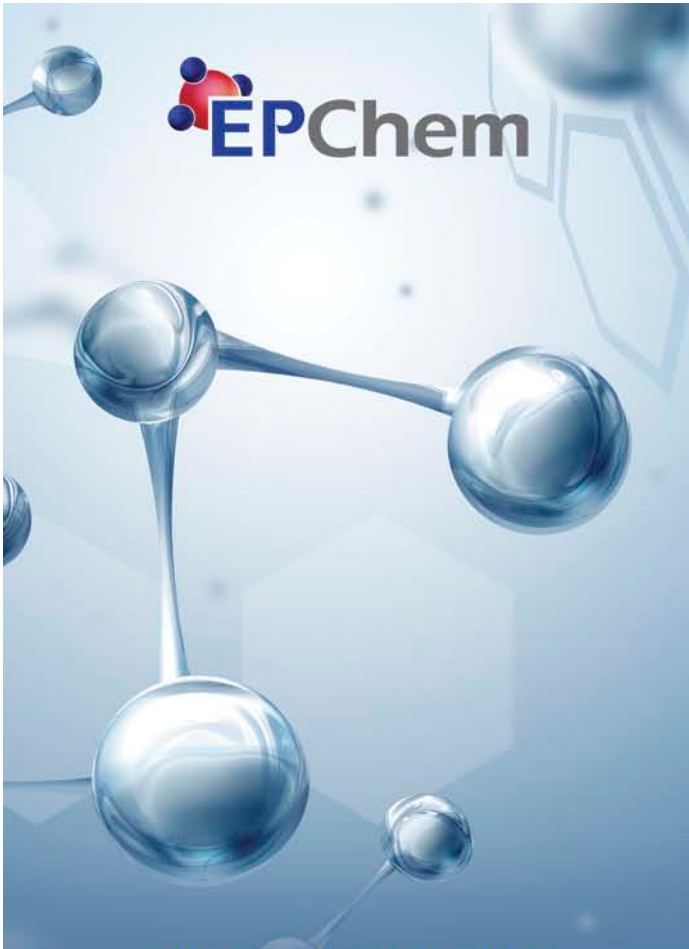
ExxonMobil, a pillar of Singapore’s growth as a nation and member of the club for over 120 years, also continues to make

large investments in the country. The integrated giant is currently in the process of adding increased specialty production to its complex, including hydrocarbon resins and halo-butyl rubber plants that are scheduled to go on line next year. Of these facilities, ExxonMobil's new halobutyl rubber plant will be the largest of its kind in the world. "Demand for commodity products is growing at a slower rate than GDP growth, while growth in demand for select specialty chemical and lubricant products is occurring at a faster rate than GDP growth. Hence, over time we want to upgrade our molecules and add capacity to be able to convert commodity fuels into products such as lubricants, chemicals and specialty chemicals," explained ExxonMobil Singapore's chairman and managing director, Gan Seow Kee.

Firms such as DSM and Croda Singapore are also heading portions of their Asia Pacific operations from Singapore, keen to capitalize on the country's attractive innovation resources. They are working to be as close to their customers as possible in order to better cater to the evolving Asian consumer. As the fastest growing region in the world, new demands are stemming from the region, calling for the creation of differentiated products and tailored applications. According to the EDB, growth of Asian economies has resulted in an increased market demand for energy, refined products, chemicals and consumer goods. This exponential growth is driving trends in the personal care, packaging, automotive and infrastructure sub market segments.

"The market is evolving and whilst historically most businesses have approached Asia by deploying developed western technologies, it is becoming increasingly apparent that innovation cannot be parachuted into the region and be expected to be effectively utilized and integrated into new technological solutions. Innovation in Asia has to be driven for Asia, and as the fastest growing market in the world, deserves its own attention," emphasized Croda's President of Asia Pacific, Dr. Nick Chaloner. Croda recently opened its expanded alkoxylation facility in December of 2015 on Jurong Island, more than doubling the firm's capacity from 12,000 tons to 30,000 tons and marking the beginning of a series of investments the company has planned for Singapore.

Asia's growing significance as a dynamic and differentiated market implies that Singapore will not only continue to serve as a regional hub for manufacturing, but increasingly as a global center for R&D and innovation. Today all eyes are on Asia and the evolving Asian consumer, particularly as the rest of the world economy experiences sluggish growth. In the context of the day, Singaporeans are working tirelessly to leverage their unique offering in the region and seize such opportunities in the specialty chemical space. And as the nation's petrochemical competitive advantage erodes in the face of increasing capacities in lower cost production centers such as China, the Middle East and the United States, Singapore must push this agenda forward to prevent its manufacturing base from shrinking any further. The little red dot will have to continue to increase its R&D spending, provide attractive financial incentives and enhance its top-notch infrastructure to increase its specialty chemical manufacturing output, and hopefully keep shining brightly.



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LOGISTICS

Movers and Shakers: Singapore's Logistics Firms Gear Up for Expansion

Looking down from the 57th floor of Singapore's famous Marina Bay Sands Hotel, the island's dark waters are speckled with the glimmering lights of hundreds of ships. According to the Maritime and Port Authority of Singapore (MPA), at any given point there are about 1,000 vessels floating in Singapore's port. Approximately 30 million containers and 500 million tons of cargo are handled every year by Singapore's terminals. The city-state has long been known for its strategic positioning in the middle of the Malacca Straits, connecting Asia with the West and hence it is only natural that Singapore has become known as a global logistics hub. "Singapore is well positioned as a key logistics hub, and will play a seminal role in moving material across Asia Pacific," said country manager at Dow Chemical Pacific (Singapore), Suiniaty Basirun.

Logistics and infrastructure are key functions when it comes to the chemical industry, and hence represent a critical component of Singapore's Jurong Island Version 2.0 (JIV2.0) initiative. As raw materials and finished products are shuffled across the world through complex supply chains, these shipments often

contain hazardous goods, begging compliance to strict regulations. Chemical logistics is not for the faint hearted, especially in today's volatile market. Faced by economic pressures, manufacturers and chemical heavyweights are streamlining operations, cutting costs and placing greater emphasis on diversification and R&D to remain competitive. More and more producers are choosing to focus on their core capabilities and leave the rest to the experts. "Chemical companies' core knowledge is production, marketing and R&D. Logistics is not part of this core and hence there are a great deal of inefficiencies in the way logistics is done in Asia. Our customers are becoming aware of that fact," said managing director of Bertschi Singapore, Lieven Vander Elstraeten.

While chemical logistics have long been outsourced in Europe and the United States due to discrepancies in costs, this has not been the case in Asia where salaries are largely consistent across the two industries. Nevertheless, Asian firms have started to follow suit, especially in Singapore where manpower is scarce. Facing a number of recruitment difficulties due to a labor shortage, producers are eager to outsource labor-intensive functions, such as logistics. This trend has opened a fresh gap for logistics firms to fill. In response to a burgeoning demand for chemical logistics services, international and local third-party logistics providers (3PLs) alike are stepping



Suiniaty Basirun, Country Manager, Dow Chemical Pacific (Singapore)

up. Singaporean firm Yang Kee Logistics, for example, has recently embarked on an expansion of its chemical logistics capabilities. "We have been offering transportation services to our customers on Jurong Island for over a decade. Along the course of the company's evolution, we gauged a demand for more value added services. This prompted us to expand our offering to include warehousing, freight management and project logistics, which subsequently led to the development of our chemical warehouse in 2014 that today stands as a chemical logistics hub," said chief executive officer of Yang Kee Logistics, Jos Raaymakers.

Other logistics firms that have also been in the space for decades are beefing up their suite of technology offerings to stay ahead. Family owned BDP Interna-

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tional, celebrating its 50th anniversary later this year, attributes success to its high technology offering. “Our flagship BDP Smart is a highly configurable strategic tool that allows shippers to visualize their logistics process and provides performance measurement reports according to users’ requirements via a single-source web portal. Furthermore, customers in the Chemical and Life Sciences verticals enjoy fields that are unique to the industry. The BDP Smart Chemical dashboard is tailored specifically to the practices of the international chemical industry, with extra focus on sensitive shipments of hazardous cargo for instant visibility. Interactive maps provide users with a global view of the top 10 trade lanes along with any alerts that may require immediate attention,” said BDP International’s South Asia managing director Richard Strollo.

In a technology-driven arena, it will be crucial for logistics companies to continue innovating in order to differentiate themselves and garner trust within the industry. Trust is especially important in the chemicals space and requires time, experience and expertise to build. Leading international intermodal chemical transporter Bertschi has managed to do this over the course of the last 60 years in Europe. Recently however, Bertschi decided to bring its Swiss swagger to Singapore, investing \$45 million in the new Bertschi Jurong Island Chemical Cluster (JICC), a state-of-the-art chemical logistics service hub. The family-owned European company quickly wooed Singaporean clients with its new terminal, achieving astounding commercial success within just five months of operation. Bertschi offers its customers a one-stop lean supply chain solution, providing storage for dangerous goods, ISOtanks, a semi-automated warehouse and sizeable drumming and ISOtank heating capacities.

Another European player, Vopak, unveiled the region’s first independent LPG import and storage facility on Jurong Island in early 2016. Further strengthening the island’s logistical offering, the new facility grants the island’s crackers greater flexibility to use LPG instead of solely naphtha. The 400 year-old logistics firm



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has constructed a complete infrastructure to optimize supply. “Vopak also utilizes a pipeline system, through which an LPG pipeline grid connects to the crackers on Jurong Island. While ship or tank trucks can transport gas, pipeline transportation is the safest and most cost efficient way of transporting gas, helping customers optimize their supply chains. Future capacity increases were incorporated in the initial design of the facility in preparation for expansions,” explained managing director of Vopak Terminals Singapore, Tan Soo Koong.

Alongside its private enterprises, Singapore has gotten its logistical juices flowing with its new JTC Chemicals Hub at Tuas South, and Jurong Rock Caverns underground storage facility. Off of Jurong Island, the former is the country’s first multi-tenanted and high-rise specialized development designed for chemical companies. The construction is a plug-and-play facility geared towards companies that conduct small batch manufacturing, blending and distribution

activities, including chemicals classified as Dangerous Goods (DG). The facility’s value proposition is that it helps companies save on capital and operating costs. International ECPM contractor AECOM is currently in the process of fitting out potential investors’ facilities within the hub. The latter, Jurong Rock Caverns, is Asia’s first commercial underground storage facility for crude and condensates. The first phase of the caverns has been completed, with the hopes of saving space above ground for higher value-added activities.

Together, Singapore and its logistics companies are working to optimize chemical manufacturers’ operations and bring about cost savings, with the goal to build leaner supply chains. All ears are perked for evolving customer demands: “The logistics world continues to evolve with increasingly globalized chemical flows. Most customers perceive the summation of their various plants as one production unit, and feed the market from different plants. There is an added com-

plexity in the entire supply chain, which creates more opportunities . . . to add value to logistics solutions,” said CEO of Katoen Natie, Koen Cardon.

Companies are just beginning to scratch the surface in Singapore, excited by the prospect of Jurong’s heavyweights outsourcing a greater portion of their businesses. While logistics players’ critical function is at times overlooked, these movers and shakers form the backbone of all chemical operations. And as Singapore continues to search for new ways to remain competitive, optimizing supply chains will further enhance the country’s industrial landscape, making it attractive to all stakeholders. “An efficient and well-managed logistics setup is key to ensuring the safe and smooth movement of goods and services across the industry and to our customers. For us, the success of Singapore and Jurong Island is not just in its strategic positioning but also in its accessibility and connectivity,” said chairman & managing director of Exxon-Mobil Asia Pacific, Gan Seow Kee.





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SPECIAL FEATURE: AN INDUSTRIAL INTERNET OF THINGS

Digitizing the Chemical Ecosystem

SMART SINGAPORE

Singapore's commitment to increasing productivity through innovation and mechanization has propelled the city-state forward on an Internet of Things (IoT) crusade. Through targeted investments in various technology centers of excellence, the local government is helping drive industrial innovation forward. But industrial application of IoT scratches only the surface of the state's total technology agenda. The resource-scarce nation is seeking to leverage its formative strength, talent, to transform itself and add value to the global marketplace by building the world's first Smart Nation. Smart Nation aims to lever-

age IoT technology to improve the quality of life of its citizens, infrastructure and industrial sector, in a bid for Singapore to remain one of the most economically competitive and livable cities in the world.

The industrial sector factors heavily into Singapore's Smart Nation equation, with the manufacturing sector representing close to 20 per cent of the country's GDP. When applied in an industrial context, IoT has the potential to increase productivity, safety and competitiveness of both the enterprise and the economy. By helping solution providers overcome the most difficult "first-adopter" stage for new IIoT technologies, Singapore's economy stands to gain a first-mover advantage and establish itself as the IIoT technology and business hub of Asia.

INTERNET OF THINGS (IoT) EXPLAINED

This latest technology buzz phrase is taking not just Singapore, but the world, by storm. But what exactly does IoT mean,

and how pertinent is the concept to the world of chemicals? For starters, IoT can be loosely defined as a network of physical objects that are linked to one another through the Internet. More concretely, it refers to physical objects, equipment or machinery that are fitted with various types of data collecting sensors.

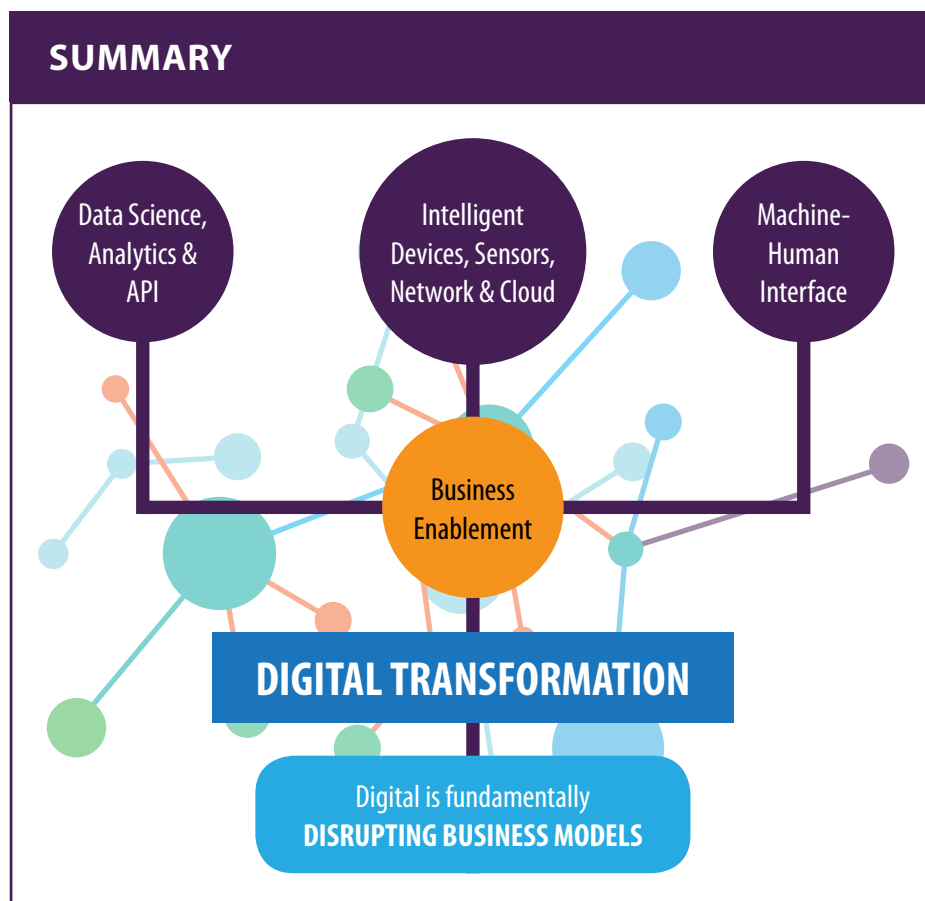
To complete the IoT puzzle, cloud-based applications analyze the data that is collected by sensors, eventually enabling machines to communicate with other machines, applications or users. The application of IoT is not limited to any particular industry, device or user, but rather can be employed in virtually every sphere of life.

As an example, new smart metering systems in homes digitally provide energy suppliers and end users with consumption data. Smart meters automatically send meter readings to suppliers, and show users how much energy they are consuming in near real time. Provision of this data results in more accurate energy bills, and increased energy awareness among consumers, ultimately leading to cost savings and more sustainable living practices. Now just begin to imagine what IoT can achieve at scale, and within a large chemical facility.

TURNAROUND YOUR PLANT AND BALANCE SHEET

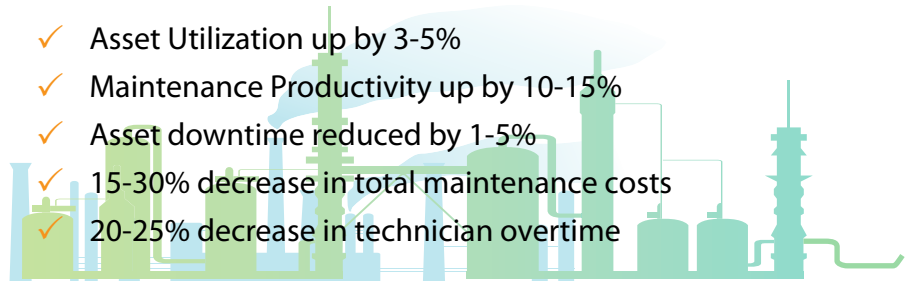
While IoT debuted decades ago, the concept has begun making strides in the industrial space only recently. You might ask, why is this the case? The answer is simple—data. The amount of data generated within a process plant or mine site has been discovered to be astounding. According to Accenture, 144 terabytes of data are generated in a mine site in the span of just one hour, which up until recently, was not being leveraged. To make music out of the copious amounts of data, Emerson for example, helps "industrial plants gain huge benefits from data analytics, by integrating and analyzing large amount of data using smart field devices on plant equipment, to improve reliability and energy efficiency for the plants," explained vice president of solutions and lifecycle services, Vidya Ramnath.

SUMMARY



*Source: Accenture

BENEFITS OF ADOPTING IIoT

- ✓ Asset Utilization up by 3-5%
 - ✓ Maintenance Productivity up by 10-15%
 - ✓ Asset downtime reduced by 1-5%
 - ✓ 15-30% decrease in total maintenance costs
 - ✓ 20-25% decrease in technician overtime
- 

*Source: Accenture

These benefits trickle down to the bottom line. A company with EBITDA of \$2 billion for example, can save \$100 million by implementing digital plant initiatives. By going digital, end users are quickly discovering that industrial IIoT (IIoT), or IoT applied within the context of industry, boosts operations on two fundamental fronts: reliability and energy efficiency. And in today's marketplace, increasing and ensuring both factors are imperative for any firm to remain competitive. By engaging IIoT and installing sensors on 148 of chemical manufacturer Denka's steam traps for example, the firm was able to save 7% on the cost of steam. The steam traps were remotely monitored and analyzed by Emerson to detect and stop energy losses in real time (Figure 2). "In a highly complex and volatile business environment, companies are finding ways to perform, optimize processes and operate more efficiently to sustain growth," said head of Yokogawa's new co-innovation center and general manager of the firm's Singapore Development Center, Joseph Lee Ching Hua.

Another large chemical manufacturer Afton recently unveiled a new plant on Jurong Island that stands as a testament to the benefits of digitization. "Afton's plant on Jurong Island is a state of the art chemical additive manufacturing facility. The plant has a very high level of automation and utilizes advanced distributed control systems to manage plant process and utilities systems, ensuring ongoing safety, productivity and sustainability. Notably, it is our first facility in the world to have an installed remote machine-human interface, which reduc-

es manual communication and human error, thereby improving productivity," said vice president and managing director of Afton Asia Pacific, Sean Spencer.

So how exactly can a chemical plant leverage IIoT to achieve these savings? According to Accenture, four fundamental pieces of the IIoT puzzle need to fit together in order to effect change: sensors, data science, a human-machine interface and action. Traditionally, a contractor comes on site to inspect the health of plant equipment, including the likes of pumps, heat exchangers, blowers, cooling tower cells and non-process compressors. Manual inspection and data collection is typically conducted a few times over the course of the year to ensure smooth plant operation. However, there are a number of caveats associated with this conventional process. The first is related to labor, as large teams are deployed to perform inspections, collect data and identify necessary improvements. Contractors often have to measure the health of dangerous equipment, adding a layer of risk to an already costly and time-intensive process. Further to this, many issues are often not detected on time or at all, leading to damage that interrupts plant operation and production, and loss of capital.

The first and key ingredient in the IIoT recipe, a sensor, automates measurements and performs them much more frequently. Affixed to assets, sensors can measure variables such as pressure, temperature, corrosion and humidity, and transmit relevant data over a secure network to analytics software. This is where the second ingredient, data science, comes in to play, generating reports that reveal the condi-

tion of a given asset. Thirdly, an interface between machine and human provides the operator with the information needed to act, and make an informed, cost saving decision. Analytics can often specify the amount of financial loss associated with the deteriorated state of an asset, yielding a clear impetus for the fourth ingredient to kick in: action. Hence, leveraging IIoT can result in less time spent on collecting data manually, and more time acting on results, leading to improved productivity, increased efficiency and cost savings.

RENT, LEASE, OR BUY?

Reading this you might quickly be wooed by the wonders of IIoT. But how can such technology be implemented in a facility without overhauling the entire plant? Do the purported savings justify the cost? There are various approaches to plant modernization and the realization of a total digital ecosystem in which sensors, networking and software fit together. In fact, an IIoT infrastructure can be installed and parceled within a plant in virtually countless number of ways. Traditionally, plant owners have invested in purchasing sensors, networks and software, and conducting reporting autonomously. However, IIoT allows for remote monitoring, and new business models that encourage greater partnership and enable less capital-intensive commitments. For example, digital automation provider Emerson installs sensors, networks and software in exchange for zero upfront investment. Instead, the firm offers what can be described as an IIoT subscription, charging a monthly fee for resulting data analytics.

"Pumps, steam traps, and other equipment monitored on-premise, centrally from corporate engineering center, and remotely from Emerson's center of excellence have enabled our customers to yield huge benefits at the operational level. These real-world implementations are helping industrial facilities to frame their priorities for IIoT investments," said Ramnath.

With capex considerations also in mind, systems integrator Accenture is offering clients the opportunity to rent or lease equipment, and begin pilots to test the waters before considering build-



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ing an entire network. “There is also a trend towards permanently leasing and renting, and adopting the use of shared services,” said managing director, digital business lead and director of Accenture’s IoT Center of Excellence, Senthil Ramani. The technology giant is committed to building “custom IoT journeys” for their industrial clients in the region through their newly established IoT Center of Excellence in Singapore.

Electrical engineering and software firm Yokogawa is working alongside its customers in its new Co-Innovation Center, to ensure efficient utilization of data and diagnostics generated by their smart sensors. But regardless of the chosen provider, by leveraging data science, digital transformation has the potential to maximize utilization of existing assets, often with little to no capital expenditure.

EMPLOYING A NEW GENERATION

IIoT is inextricably tied to the workforce of the future. By 2025, millennials, or digital natives, will comprise 75% of the global workforce. This implies that in order to attract and retain talent to traditional manufacturing industries such as chemicals or mining, business models will have to evolve and incorporate new technologies. Incoming workers are quick learners and gear towards efficiency, and are not inclined to read hundreds of pages of instruction manuals to assimilate operational knowledge. “Wisdom needs to be digitized, without which smartness cannot meet wisdom, and younger operators run the risk of working in a plant without sufficient knowledge. Going digital can help solve this issue and accelerate the pace of adoption for the incoming generation,” said Accenture’s Ramani. As more and more wisdom is digitized, the results are multifold. Fewer workers are needed inside a plant, which increases productivity as well as enhances safety. As more processes are progressively automated, workers can engage in higher value added tasks that are both more technical and safe.

LEADING THE DIGITAL REVOLUTION

Singapore is evolving into an IIoT global center of excellence, with technology players such as Emerson, Accenture and Yokogawa pioneering new developments in the sector. With the support of Singapore’s government, these players have established a Pervasive Sensing Center of Excellence, An IoT Center of Excellence and Co-Innovation Center, respectively. Government agencies are also incentivizing the uptake of plant modernization, digitization, and automation, and supporting the development of an innovative industrial ecosystem. These policies are not only in line with goals to improve productivity, but factor in to a greater vision of total transformation.

“Singapore was, and continues to be, a net exporter of chemicals. But more importantly, I believe the city-state is on its way to transforming itself and becoming a net exporter of innovation in the chemical industry, with IIoT leading the agenda,” said Ramani.

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A GLASS HALF FULL

Singapore Pioneers Water and Environment Solutions

In January 2015, the World Economic Forum announced the water crisis as the #1 global risk based on impact to society. The rapid disappearance of our world's essential non-renewable resource is compelling leaders, policymakers, innovators and industrialists to find ways to reduce, reuse and recycle water. Among them, Singapore has taken it upon itself to become a global leader in the field of water technology, recognized as a "Global Hydrohub," and home to approximately 180 water companies and 26 private research centers. Endowed with few natural resources, the city-state uses four major sources of water, known as the National Taps. One of these is imported water from Malaysia, based on an agreement that will last through 2061. Singapore is planning ahead for water security, not only to meet the anticipated increase in demand with growth, but also towards drought resilience from climate change and other challenges. These challenges, like others facing the island, have inspired Singaporeans to develop new technologies to bring about water security and efficiency, at both the municipal and industrial levels, and eventually achieve water self-sufficiency.

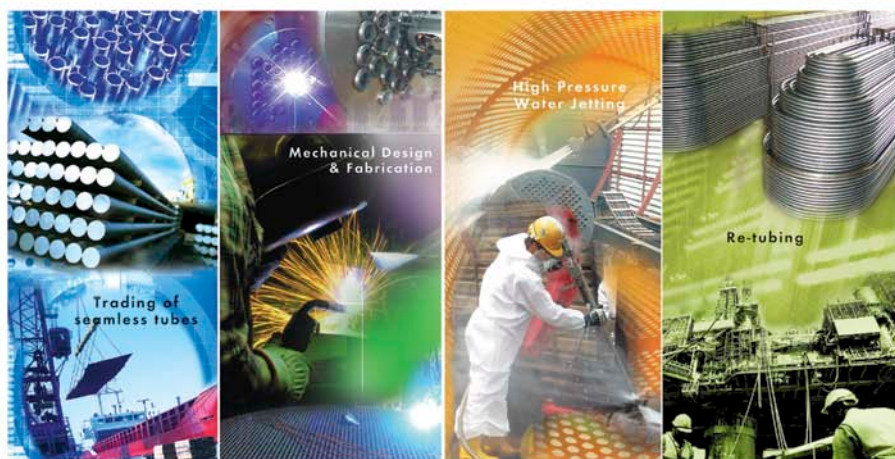
"Maximizing use of water is especially important today as availability and qual-

ity of water are limiting factors for industrial and community growth. Hence, there is a demand for technological innovation to transform the way we treat, distribute and reuse water. This is especially key in Singapore, where there is limited water availability and high dependence on other countries such as Malaysia for supply," explained general manager of GE Power & Water, Daniel Lim.

In addition to tackling the water variable in the sustainability equation, Singapore is also supporting the development of its broader environmental industry, comprising environmental consultancy, waste management and pollution control. Homegrown NSL OilChem for example, has grown to become one of Singapore's largest environmental services groups, and is quickly expanding its presence in the region. "We are the only company in Singapore that has a waterfront facility for the purpose of receiving waste. This facility is unique in that it is able to maximize efficiency and cost effectiveness by receiving and treating waste at the same site. NSL OilChem also operates an incineration facility that can process up to 20 tons of hazardous waste per day. Utilizing a green process, the heat from waste is captured and converted into steam, which is in turn used within the plant to process additional waste," said chief executive officer of NSL OilChem Waste Management, Jeffrey Fung. In light of tightening regulations, the likes of DHI Water & Environment and NSL Oilchem are providing much needed

services to Singapore's water and energy intensive chemical industry.

Singapore is continually reinforcing its position at the helm of the global water and environment sectors, exporting technologies that equip both municipalities and industries with the tools needed to combat water scarcity and be more sustainable. But what precludes companies and plant operators from rushing to conduct audits and implement sustainable water management practices? "Despite numerous incentives for sustainable wastewater treatment, companies are wary of hindering production," explained head of innovation for marine infrastructure and energy at DHI Water & Environment Singapore, Dr Jacob Tornfeldt Sorensen. Much like the IIoT story, "conservatism and operational processes in the chemical industry make new idea implementation a challenge," confirmed Tornfeldt. Other hindrances include manpower shortage and space constraints, both of which limit companies' abilities to implement solutions on their premises. While sustainability is a key theme today across industries, a further mindset shift needs to occur in order to spur widespread change and adoption. With Singapore's non-domestic sector accounting for about 55% of water demand, industrialists share great responsibility in helping Singapore achieve water self-sufficiency. Not only do water and waste efficiency result in cost savings, but form part of a greater effort to sustain our society as we know it today.



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BUILDERS AND MOVERS DIVERSIFY TO CONQUER

Engineering, Procurement and Construction Companies Adapt

China's 6.7% growth rate is hardly a new topic of conversation, some refer to this as the superpower's "new normal". What is often referred to as China's chill, or the giant's slower growth, has spurred a ripple effect across the region and the world. The state's industrial overcapacity, coupled with lower demand, has stalled many players' success, including those serving the chemical and petrochemical industries. Falling external demand has resulted in fewer green field projects in Singapore and beyond, pushing more players across the world in new directions. According to the Ministry of Trade's (MTI) Economic Survey of Singapore 2015, external demand grew at a slower rate of 2.5%, compared to 4.3% in 2014. As an air of global economic uncertainty continued to weigh on investor confidence, total private gross fixed capital formation in the country also declined by 2.2% in 2015, extending the 5.2% contraction in 2014.

In an era characterized by falling demand, fewer new builds, increasing investment costs and heightened competition, chemical majors are curbing capital expenditure and focusing on operational excellence. New economics have profoundly impacted members of Singapore's engineering, procurement, construction, management (EPCM) and services ecosystem who are diversifying their offerings to remain competitive, and fighting hard to improve productivity and stay in the game.

"It is true that some Association of Process Industry (ASPRI) members might have experienced a decline in their business as a result of the current economic situation. As oil prices are lower, a large number of plants have put their projects on hold and work volumes have declined significantly, resulting in a very competitive market," said general manager of ASPRI, Chantal Quek.



Chantal Quek, General Manager,
Association of Process Industry (ASPRI)

To combat these external challenges, industrialists are looking outside the scope of their traditional business models and pursuing opportunities in other geographies. Global EPCM firms such as WorleyParsons, for example, are catering to new demands by being nimble and adding services to their existing suite. In July of 2015, the Australian engineering firm launched its Advisian business line in Singapore, which targets asset intensive businesses operating within the hydrocarbons, minerals and metals, chemicals, power and infrastructure sectors with niche technical and management consulting services. Advisian enables WorleyParsons to guide its customers through their entire project life cycles, by addressing their permitting, quantitative risk assessment (QRA) and environmental risk assessment needs, and helping them maximize

production, reduce operating costs and generate maximum profit.

Providing an enhanced integrated offering is popular, as players seek to fill gaps and reduce risk for their customers. In June of 2016, another global player AECOM brought its famed construction services line to Southeast Asia to offer customers a complete service and a different delivery model. The construction services line enhances AECOM's existing environmental and design offering, and allows the firm to provide their customers with a fully integrated delivery. Instead of engaging multiple players, clients in Southeast Asia can now turn to a single entity, resulting in less risk and cost savings.

"More clients are requesting a one-stop solution provider, as they do not want just one piece of advice, and instead prefer an integrated service offering instead. Our thinking behind piecing everything together is that traditionally there have been many cracks between contracts, for example between design and build, whereas in an integrated offering, there is nowhere to hide," explained senior vice president and managing director of AECOM's Asia Pacific Environment business line, Bengt von Schwerin.

A single delivery model allows companies to generate savings internally as project managers can administer fewer developments. It also allows clients the flexibility to remove layers of overheads within the supply chain and manage risk more actively.

Today, newer ways of packaging are not limited to services, but also extend to the physical parceling parts of the plant. Firms such as McConnell Dowell are utilizing smart construction techniques to reduce costs for clients and boost productivity, a key focus area for the local government. As an example, modularization allows companies to leverage lower cost centers by building parcels in other countries, to reduce costs and circumvent manpower shortages in the city-state. "As part of the engineering solutions we offer to our clients, McConnell Dowell also utilizes modularization as frequently as possible. Modularization takes place off-site or in fabrication facilities outside of Singapore, reducing man-hours in Singapore and improving both productivity and efficiency. For example, we have recently shipped large modules to Australia from one of our facilities in Batam," said managing director at McConnell Dowell, Murray Dundas.

But with only two major projects in progress on Jurong Island at present, other firms are turning their attention towards maintenance provision. Dutch heavy lifting company Mammoet is now offering its maintenance expertise to the chemical industry in Southeast Asia, as the firm increases assistance with plant shutdowns and turnarounds. Mammoet is investing in smaller cranes to serve a more diverse selection of clients. "There is currently a need to refocus our business and diversify away from oil and gas

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and expand upon our competitive advantage. We have diversified our crane range for instance, to address evolving customer demands,” said managing director of Mammoet Asia Pacific, Robin Koenis.

However, as companies look to delay maintenance projects and shut down cycles, demand for maintenance services has also contracted by roughly 30% since 2015, putting downward pressure on service rates. Competition is fierce and the lack of work volume is compounded by Singapore’s tight labor market. Firm efforts on the part of the government to reduce Singapore’s dependency on foreign workers have left many contractors without a sufficient workforce. “With limited capabilities, resources, land and manpower, smaller firms find it difficult to increase facility utilization and service efficiency,” said CEO of Huatong Holdings, Jimmy Chua.

Instead of permitting companies to rely on cheap labor, policymakers have put forth incentives to encourage innovation and productivity. Notwith-

standing a strong drive from the top to increase productivity growth—which until last year has been flat or negative—companies across the process, construction and management sector continue to struggle without sufficient human resources. Heightened competition for work packages, coupled with a lack of manpower are forcing companies to think differently.

Fortunately, the resilient city-state and its stakeholders are taking steps to ride out the economic downturn. Firstly, with regards to labor, specialized foreign worker accommodation facilities are being built proximate to Jurong Island, specifically for the struggling process industry. “ASPRI-Westlite Papan stems from the Association of Process Industry (ASPRI)’s vision and initiative to build Singapore’s first dedicated workers accommodation with an integrated training center to contribute to the sustainable growth and productivity of the Process, Construction and Maintenance (PCM) industry,” explained group chief execu-

tive officer of accommodation provider Centurion, Kong Chee Min.

Workers housed within ASPRI-Westlite Papan will receive 48 hours of heavily subsidized training each year, as well as functional and specialized on-site training, incur reduced travel time to work on the Island, and potentially clear security within the dormitory itself. This initiative, combined with those spearheaded by the Process, Construction and Maintenance Management Committee’s (PCMMC) Productivity Council, have been fired up to improve the process industry’s productivity through the introduction of best practices, mechanization and benchmarking.

“Mun Siong Engineering is involved in the ASPRI-Westlite Papan project as well as the Process, Construction and Maintenance Management Committee (PCMMC) initiatives, which successfully address labor issues in Singapore. As a testament, our workers are among the first batch to move into the dormitory upon its opening in June,” said execu-

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tive director of Mun Siong Engineering, Quek Kian Hui.

The state is also working to mediate adverse effects of the economic slump. Cognizant of the challenges associated with a tight labor market, in the 2016 budget the government granted a reprieve from foreign worker levy hikes to the struggling process sector. The budget also addressed the need for Singapore's small and medium sized enterprises (SMEs) to scale up, and consequently included schemes to promote automation and internationalization. Notwithstanding policymakers and associations' valiant efforts to spur recovery, the reality is that until external demand picks up and rebalances supply, competition will remain squeezed. "As Southeast Asian neighbors present investors with lower cost alternatives, Singapore needs to innovate and enhance cost competitiveness with its high quality and efficiency-driven service offering," emphasized Quek.

And Singapore is doing just that. By tirelessly leveraging and enhancing its

strengths, the island nation has continued to attract fixed asset investment (FAI) to its shores. According to the MTI's Economic Survey of Singapore 2015, manufacturing garnered the most FAI commitments relative to other sectors despite the challenging external environment. Within the sector, the chemicals cluster attracted the largest amount of investment—\$3.6 billion, or 32% of total FAI.

"We are still seeing investment in areas where customers are able to leverage existing assets into producing differentiated products, or where customers are looking for security of intellectual property. Customers are looking to build on existing investments as opposed to building new greenfield projects," said director of hydrocarbons and chemicals Southeast Asia at WorleyParsons, Matthew Spalding.

As Singapore continues along its higher value added production journey and weathers the economic storm, EPCM contractors and service providers will have to continue to adapt, innovate, and vie for a smaller piece of the pie.

INDUSTRIAL GASES

Giants Rise to the Challenge

Industrial gas products are referred to as 'the oxygen of the chemicals industry. From the food we eat to the electronics we use and the pharmaceuticals we prescribe, the daily applications of industrial gas products are numerous and have been improving living standards for decades. It follows, then, that there is no better home for the leading industrial and specialty gas players than Singapore, a citadel of high standards. The success of Jurong Island engendered the development of a highly competitive and reliable pipeline network for industrial gas providers, and is home to industry heavyweights such as The Linde Group, Air Products and Air Liquide Singapore. President of industrial gases Southeast Asia at Air Products, Alex Tan, surveys the market and noted: "There are two broad categories of industrial gas players in the market: tier one global ma-



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jors which represent almost 90% - 95% of the market share, and tier two local trans-fill companies. Currently, there is also a growing number of Chinese companies entering markets outside of China and competing for market share.”

But despite Singapore’s strong capacity expansion in the energy and chemicals space in recent years, the global commodity downturn is demanding transformation in the industrial gas sector. All of the key

players echo concern over their customers’ cost constraints and are rising to meet the challenge with internal improvements, technological innovation and infrastructure expansion.

The Linde Group, which operates a high performance air separation unit (ASU) and one of the largest gasification plants in the Asia Pacific region producing gaseous hydrogen and carbon monoxide, is addressing the changing landscape

with a new organizational outlook. “The industrial gases industry here and globally has weathered significant economic challenges, which include an oversupply in the steel industry and slump in oil prices. Some of our customers have similarly been impacted by the economic headwinds. We have identified a major opportunity which is to build even closer partnerships with our customers to deepen our understanding of their businesses. This enables us to help them identify the right gas solutions to help them reduce costs, optimise process efficiency and enhance productivity,” explained the group’s regional managing director for South Asia and ASEAN, Rob Hughes.

The Linde Group’s recent renewal of their longstanding relationship with chemical manufacturer Celanese to supply carbon monoxide to their operations on Jurong Island for the production of acetic acid speaks to the continuing industry standard of enduring partnerships. With regards to large onsite plants, long-term contracts with minimum volume requirements are contributing to a stable environment despite the global downturn.

The sensitivity to customer cost constraints is most evident in the unwavering adoption of new technologies. Tan highlights the possibilities of productivity improvement and cost reduction through innovation: “Customers always require safety and reliability from their suppliers, but the main differentiator in the market is innovation. By introducing more oxygen to the steel production process, for example, iron ore is burned more effectively. Higher oxygen levels allow for



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Alex Tan, President of Industrial Gases Southeast Asia, Air Products

faster heating and faster burning, and subsequently significant costs can be saved on coke and higher productivity can be achieved. Oxygen is cheaper than the raw materials and the end product is cheaper high quality steel.”

In addition to technology, logistics are being incorporated across the value chain for increasingly comprehensive, cost-effective solutions. “By utilizing a vaporizer inside a truck, we are able to transform liquid into gas at high pressures quickly. With the use of our mobile trucks, Air Products is able to perform rapid cool-down and heating of reactors, which shortens the entire turnaround schedule for refineries. Oil majors, for instance, are attracted to quick turnarounds and have expressed interest in our unique APEX Nitrogen Pumper Service. We expect a growing demand for this service as customers are able to achieve significant cost reduction and improvement in efficiency,” said Tan.

Air Liquide Singapore, the largest gas provider in the region, currently owns and operates the largest network in Singapore with six separation plants, interconnected by a common pipeline. By coordinating shutdowns with customers, and offering expansive backup storage facilities, Air Liquide Singapore endeavors to limit downtime significantly for customers and ensure a constant supply of industrial gases. David Leblanc, managing director of Singapore, Malaysia, Riau Island (SMR), for Air Liquide Singapore, remarked: “The advantage of being part of a pipeline network is that we have a number of plants that allow us a very high level of reliability. If there is an interruption to a plant, we can directly divert supply from another plant to the same customer.”

What once were gas providers 25 years ago are now full-fledged technology stalwarts and solution providers. The acute attention to customer needs industry-wide has transformed the industrial gas sector in Singapore, which promises to evolve on both organizational and technological fronts. Although the region will not experience growth equal to that of the past decade, existing expertise will continue to enhance the client experience from the ground up, and expand beyond the chemical and petrochemical industry to buoy new sectors and geographies.

TRICKS OF THE TRADE

Riding the Intraregional Wave

Singapore’s unrivalled infrastructure in the region has propelled the island nation’s chemical trading activities to new heights. According to the local government agency responsible for bolstering the country’s international trade, International Enterprise (IE) Singapore, there are over 400 companies trading petroleum and petroleum products operating out of the country today. A mixture of sophisticated local financing, storage facilities and excellent shipping infrastructure has tempted many traders to set up shop here and distribute petrochemicals to their customers across the globe. Even during a time of high market volatility and economic uncertainty, local buyers and sellers are continuing to reap rewards amidst new trade winds. Growing regional supply bases in China and India are prompting a rise in intraregional trade, and challenging Singapore’s players to time their moves well.

The global commodity downturn, driven primarily by a slump in Chinese demand, has served as a major headwind for the industry. Slower consumption and investment in China have translated into sluggish demand for petrochemicals, which serve as inputs for an array of industries. This, coupled with China’s own increased petrochemical production, has squeezed margins and flooded the market with supply. The Asian superpower’s post financial crisis stimulus

led to staggering capacity increases that are pushing the country past self-sufficiency. “The biggest trend affecting our business over the last two years has been China’s evolution from buyer to supplier. While China has always served as the world’s factory for consumer goods, the superpower has always been exclusively a buyer of commodities. Today however, tables have turned and products we never imagined China would supply are being exported, leading to an increasing number of small parcel shipments and logistical advantages. China is playing a different game that is affecting many manufacturers in Southeast Asia that depend on the powerhouse as a market,” said director at Kempar Energy, Nikunj Parekh.

Thus, margins have been squeezed, and cheaper inputs have not offset the effects of increased supply of, and a slump in demand for, finished products. In this environment, slowing investment into industrial capacity in Singapore has been exacerbated by the fact that the island does not offer the same opportunities for scale and vertical integration as do larger markets such as China or India.

“The challenge facing Singapore’s chemical industry is that new developments cannot be built on a scale compared to in China, India and America. The government is keen to continue trading commodities on Singapore’s exchange, and wants companies to manage inventories locally. However companies will have to work in accordance with demand and investment”, said managing director of Interchem, Gary C.Y. Yeap.



Photo courtesy of Bertschi Singapore.



Gary C. Yeap, Managing Director, Interchem



Henri Nejade, President and CEO, Brenntag Asia Pacific



Seah Cheong Leong, CEO, EPChem

Industry sentiment, however, is far from pessimistic. While leaders acknowledge the importance of China as an industrial powerhouse in the region, there are signs that the industry is adapting rather quickly to a new phase in the business cycle characterized by more moderate levels of growth. “With regards to China I believe we are going to see a new normal. I do not expect to return to double-digit growth rates but there to be more moderate growth rates in the area of five to seven percent”, explained managing director of Helm Asia, Andreas Woscheck.

Major players in the space are reacting to an increasingly competitive landscape by leveraging their strengths to distinguish themselves from the pack. Trader Integra, for example, has gone above and beyond the company’s role as a trader by adding logistics to their service offering. Executive director Gina Fyffe said: “Integra has always been attentive to our customers, for example, by increasing the size of our fleet of ships and staffing to provide us with more flexibility to serve our customers in the region. Integra has integrated logistics into our service offering to consolidate a complex supply chain and reduce risk for our customers.”

Other companies are strengthening their foothold in more nascent markets to access higher rates of growth. Leading global distributor for Shell MDS, EPChem International, is keen on geographical diversification. “China and Indonesia have been our traditional markets and we are looking to expand in Vietnam and Myanmar. Although these markets are not as big, they have the potential to become important in the chemical market,” said the firm’s chief executive officer, Seah Cheong Leng.

In the face of competition companies are looking to identify niche markets for themselves, but moving forward, some degree of consolidation is inevitable. Global distributor, Brenntag, recently finalized their acquisition of ExxonMobil’s largest distributor TAT Petroleum, and remains confident in pursuing more acquisitions to drive growth. “There is a demand for good distributors to serve customers and suppliers, lending huge opportunity. Furthermore, we believe that consolidation will continue in the distribution space, and Brenntag will acquire more companies in the region to support our growth strategy”, said president and chief executive officer Asia Pacific at Brenntag, Henri Nejade.

While multinational corporations (MNCs) are equipped with capital and scale to expand, diversify and acquire, SMEs remain highly dependent on what is now a shrinking manufacturing base in Singapore. They are also more adversely affected by fluctuations in commodity prices and volatile currency movements due to the cost and complexity involved in hedging and managing these risks.

“MNCs producing on Jurong Island are perhaps continuing to export to the Asian market, but local SMEs are current-

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ly not seeing much growth in these markets”, says Nicholas Lim, managing director of Unilite Chemicals. Lim believes it is imperative for the government to take decisive action to strengthen local manufacturing. He claimed: “The existence of smaller manufacturers (about \$100 million in annual turnover) in Singapore can help promote a more balanced ecosystem that supports local SMEs. The manufacturing base in Singapore has shrunk to almost one fifth of the country’s GDP. The decline of a country’s manufacturing base can eventually lead to complete erosion of such activities, and in the case of Singapore, potential reversion to solely a trade hub.”

While there are indisputable challenges facing today’s petrochemical and chemical industries, despite structural headwinds, businesses appear to remain confident in Singapore’s establishment to tackle them head on. Organizations such as SPRING Singapore, an agency under the Ministry of Trade and Industry responsible for helping Singaporean enterprises grow, have helped SMEs build credibility with entrepreneurs and business leaders. Its most recent budget provided for higher income tax rebates and increased loan assistance for struggling sectors, a move that was welcomed by the oil and petrochemicals sectors. And support for SMEs ventures beyond pure monetary incentives into the domain of increasing productivity. EPChem International, for example, has been a beneficiary of SPRING Singapore’s efforts to invest in automation systems. Seah Cheong Leong, CEO of EPChem, re-affirms the same: “SPRING Singapore has built a

platform for us to develop various products and, in recent years, supported the automation of EPChem entirely. Their support has propelled EPChem International to become one of the few fully automated companies in Singapore.”

Moreover, Singapore’s value proposition as a trading hub remains intact given its high trade finance liquidity, dominance as a foreign exchange hub in Asia, stable regulatory and legal framework, and highly skilled workforce. In cognizance of a more challenging labor market, IE Singapore has placed emphasis on promoting and developing local talent, and launched an International Trading Program (ITP) in collaboration with Nanyang Technological University (NTU) to better prepare graduates for jobs in trading. The program is expected to go a long way in alleviating one of the industry’s longstanding issues - reliance on higher cost foreign labor.

Global macroeconomic forces will undoubtedly continue to dictate margins and profitability in the sector, but despite short-term headwinds, Singapore is poised to continue attracting capital and investment, albeit at a slower pace. Its ability to sustain its dominance as a regional trading hub will be largely contingent upon the development of Jurong Island, the country’s financial and trading infrastructure, storage and logistics facilities. According to IE Singapore, Asia is expected to account for approximately 60% of the average annual growth in global trade until the year 2020, and there is no better location than Singapore from which to capture this growth.

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