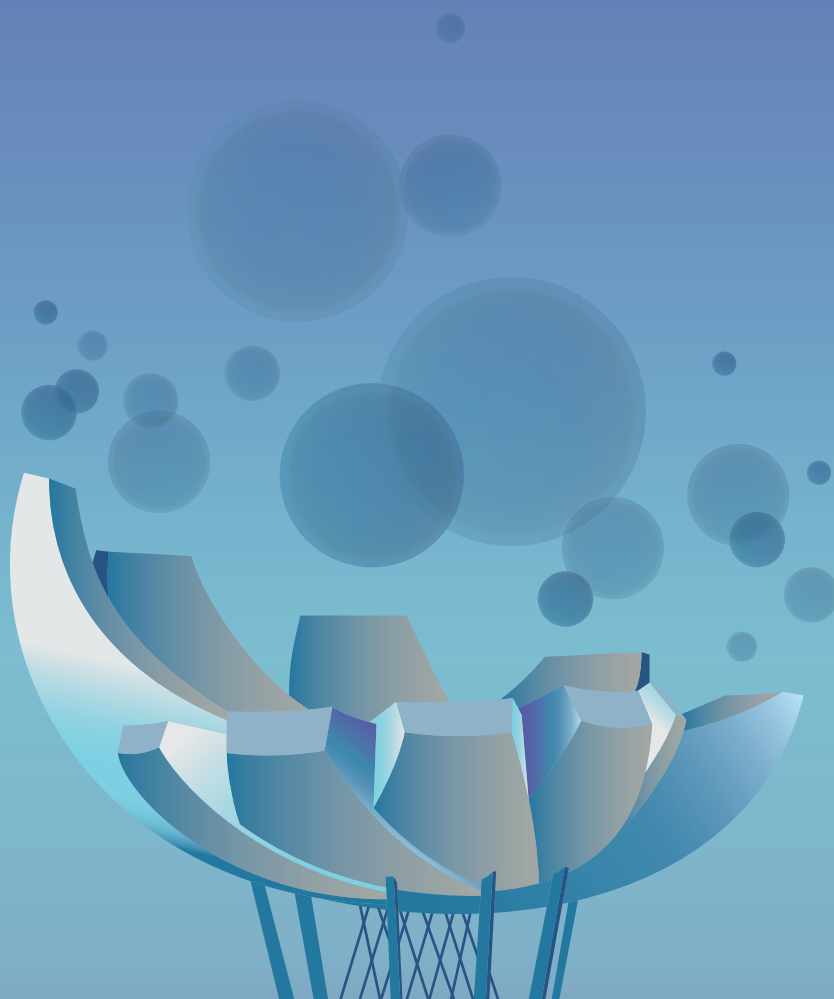


GLOBAL BUSINESS REPORTS

INDUSTRY EXPLORATIONS



SINGAPORE CHEMICALS 2018



*Chemicals - Sustainability
Production - Logistics - Distribution - Technology*

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Dear Reader,

We are delighted to be partnering Global Business Reports once again for an in-depth feature of the energy and chemicals industry in Singapore.

Since our last collaboration in 2016, we are operating in a different environment. The Fourth Industrial Revolution is seeing innovation and breakthroughs taking place at unprecedented speeds, with the convergence of physical and digital worlds across industrial sectors disrupting many traditional ways of doing business.

This new global wave of industrialization presents Singapore with a unique opportunity to build upon its strengths in technology and innovation and cement its role in global manufacturing supply chains.

For the energy and chemicals industry, it is important that we develop innovative solutions to enhance our competitiveness, especially in the areas of resource efficiency and productivity. We have started seeing new applications of technology on Jurong Island, from the use of driverless trucks to transport goods, underwater drones for inspecting tanks, to RFID and wireless terminals for access control in facilities. The proliferation of sensors has also provided businesses with more data, enabling them to further optimize their manufacturing processes.

While we have made a good start, we need to ensure we continue building on this good foundation. The launch of the Energy & Chemicals Industry Transformation Map (ITM) in 2017 sig-

nals Singapore's long-term commitment to grow the industry in a competitive and sustainable manner. The ITM outlines a two pronged approach focused on innovation to ensure the long-term competitiveness and sustainable growth of the energy and chemicals industry – firstly, to transform our existing base of chemicals manufacturing through the adoption of innovative technologies and secondly, to diversify into new growth markets and build innovation capabilities in applied research or novel platform strategies. To aid our transformation efforts, we launched the Singapore Smart Industry Readiness Index to help companies evaluate their readiness for Industry 4.0 transformation. We have also anchored the Asia Pacific chapter of Hannover Messe in Singapore, which will take place this year from 16 to 18 October. By building a world-class advanced manufacturing ecosystem, we hope Singapore can help catalyze industrial transformation and enable companies to forge new partnerships and find new ways to grow their business.

Having contributed S\$82.8b to Singapore's total manufacturing output in 2017¹, a 20 percent year-on-year increase, and accounting for 28,000 workers, the energy and chemicals sector remains a mainstay of Singapore's economy. We hope that the report will provide you with a better understanding of the sector, and how Singapore can play an integral role in helping your business succeed in Asia.

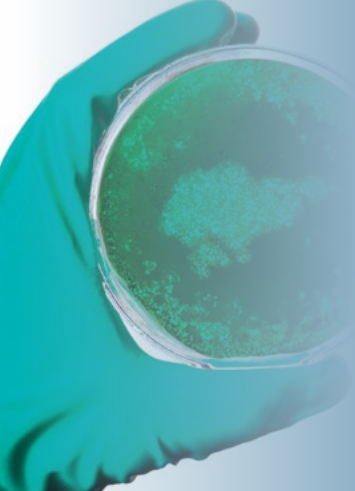


Damian Chan,
Executive Director, Energy & Chemicals,
**Singapore Economic
Development Board (EDB)**



Cindy Koh,
Director, Energy & Chemicals,
**Singapore Economic
Development Board (EDB)**

¹2017 preliminary estimates, Economic Survey of Singapore, Ministry of Trade & Industry.



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Singapore Year of Climate Action and Water Security

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SINGAPORE CHEMICALS 2018
Industry Explorations
Global Business Reports

This research has been conducted by
Irina Negoita, Julian Issa,
Sarah Crompton-Donnelly and
Emma Johannes
Edited by John Bowlus
Graphic design by Gonzalo Da Cunha







Introducing Singapore's Chemicals Industry

"We now have over 100 Energy and Chemicals companies on Jurong Island. That in itself provides Singapore with competitive advantage over other chemical hubs in the region, which are generally dominated by individual companies. For businesses looking to operate in Singapore, the opportunity to source for feedstock and then sell their products, over the fence, is immense."

- Damian Chan,
Executive Director,
EDB



Singapore's Chemicals Sector Once Again Redefining Itself

8

Singapore continues to redefine itself 53 years on since independence. From the city-state's humble beginnings, it emerged as one of the four Asian tigers before consolidating its position as a global logistics and business hub. With an area spanning only 721.5km², less than half the size of London, and with no natural resources of its own, Singapore's rise was no easy feat. In fact, the country's founding father Lee Kuan Yew believed, in 1965, that a merger with Malaysia was essential to its survival. "Every time we look back on this moment when we signed this agreement which severed Singapore from Malaysia, it will be a moment of anguish," Lee uttered the day before the Malaysian parliament passed the resolution to sever ties with Singapore. Few would have disagreed with Lee's assessment then, but even fewer would have predicted Singapore's success over the next half-century.

Lee argued that an independent Singapore was a "political, economic and geographical absurdity," yet it has been these three variables that have been the bedrock of this success. Lee faced his share of political opponents, who criticized his policies, but he vanquished them by minimizing

corruption and crime and allowing communities to thrive harmoniously. Adopting a free trade policy in the 1960s where few others in the region did, he set the tone for large multinational corporations (MNCs) to come. Singapore's strategic location at the southern tip of the Malay Peninsula, well positioned to take advantage of markets in the Indian and Pacific Oceans, and its natural deep-water ports made it an ideal global trading and shipping hub. By the end of 2017, there were 37,400 international companies headquartered in Singapore, including 7,000 MNCs (EDB).

Now, Singapore is leveraging dynamic trends in economic growth and shifts in geopolitical power in the Asia-Pacific (APAC) region. Exponential population growth has caused consumption in China, India and the Association of Southeast Asian Nations (ASEAN) to surge, propelling increased demand for a range of chemicals. Singapore's strategic location, well-defined regulatory landscape, and advantageous business conditions make it perfectly situated to capitalize on regional growth. Its manufacturing sector has seen demand rise most noticeably for high value-added derivatives including lubricants,

"

Singapore's Smart Nation initiative sets the right framework for the early adoption of innovative technologies. We always position ourselves in regions where these new technologies are deployed to develop our services as close to partners and customers as possible. Our decision has been vindicated over the last three years. Additionally, the liberal labor laws in Singapore fasten the hiring process.

- Andreas Hauser,
Director Digital Service,
TÜV SÜD Asia Pacific



"



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INDUSTRY AT A GLANCE



manufacturing
sector 2017



chemicals manufacturing
sector 2017

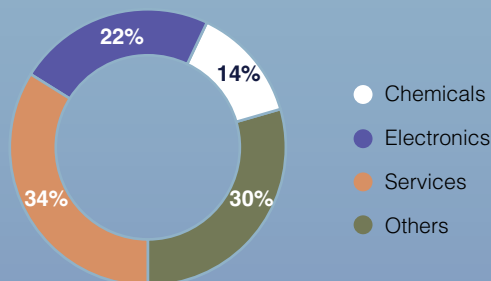


annual increase
2017



chemicals share of overall
manufacturing 2017

FIXED ASSET INVESTMENTS BY INDUSTRY CLUSTER



\$S\$19 BILLION IN R&D

from 2016 to 2020 through the Research, Innovation
and Enterprise (RIE) plan

\$S\$1.3 BILLION

OF FIXED ASSET INVESTMENTS
in Singapore's Chemicals Industry in 2017

Source: Ministry of Trade and Industry (MTI)

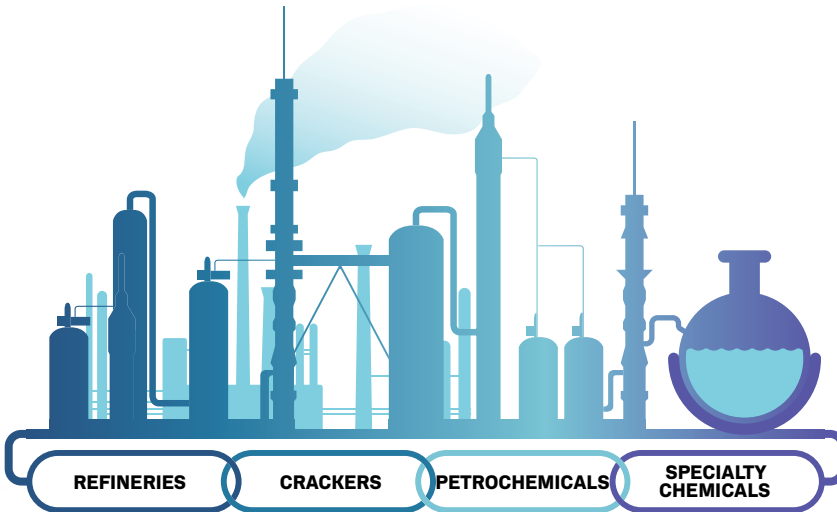
ENERGY & CHEMICALS INDUSTRY TRANSFORMATION MAP

Source: Singapore Economic Development Board

Building a Globally Competitive
Energy & Chemicals Hub

BY 2025


\$S\$12.7
billion in value added

1,400
new good jobs


TRANSFORM

*Transform existing base through
the adoption of innovative technologies*

 Boost productivity, rejuvenate
assets and optimize resources
through the adoption of
automation and digital
technologies

 Anchor high value-added
Advanced Manufacturing
activities

 Target at least plants, including
all refineries and crackers to
adopt Advanced Manufacturing
technologies by 2020

DIVERSIFY & GROW

*Diversify into new growth markets and
develop innovation capabilities to
capture growth*

 Diversify and upgrade product
slate towards high value-added
petrochemicals and specialty
chemicals

 Grow and develop innovation
capabilities to help companies
accelerate and shorten innovation
cycles

 Target at least 20 new or
expanded application
development centres by 2025 with
an increase of \$S\$55 million in
business expenditure on R&D
ENSURING GOOD JOBS
FOR SINGAPOREANS
 Deliver government programmes
and initiatives to help
Singaporeans over the course of
their career, such as Skills
Framework, Earn & Learn and
Professional Conversion
Programmes
TRADE ASSOCIATIONS &
CHAMBERS AS KEY PARTNERS
 Foster closer collaborations with
trade associations and chambers
such as Singapore Chemical
Industry Council (SCIC) and
Association of Process Industry
[ASPRI] to further develop the
industry

dyes, synthetic rubbers and coatings in recent years. It is increasingly being seen as the ideal regional headquarters for MNCs, a global destination for research and development (R&D), and the Asia-Pacific's logistics and manufacturing hub. "Although Singapore is a small market in terms of chemicals consumption, it is a good regional hub where we can easily serve the surrounding countries," said Henri Nejade, president and CEO Asia, Brenntag.

Jurong Island lies at the center of Singapore's refining, petrochemical, and specialty chemicals activity. Its integrated design and robust logistical capabilities have made it home to most of the major chemicals manufacturers. The chemicals sector has seen sustained, year-on-year growth of 10%, as of May 2018, nearly mirroring the 9.8% growth in the manufacturing sector. The industry has not been without its share of challenges, however: "the evolving regulatory landscape, organizational restructuring to a leaner workforce and demands for higher productivity are still prevailing challenges faced by the industry," said Terence Koh, executive director of the Singapore Chemical Industry Council (SCIC).

Recently ranked second as a driver of production in the World Economic Forum's 2018 Readiness for the Future of Production Report, Singapore's government has underlined productivity as one of its priorities. Central to this mission, the Singapore Economic Development Board (EDB) is implementing Industry 4.0 technologies. Driven by the Energy and Chemicals Industry Transformation Map (ITM), the initiative aims for a manufacturing value added (MVA) of \$S\$12.7 billion and 1,400 new jobs by 2025. The ITM's two-pronged

Innovation that meets economic and environmental sustainability

strategy focuses on transforming Singapore's existing base of chemicals manufacturing through the adoption of innovative solutions and, in doing so, expanding into new markets.

Success in technological advancement and digitalization will be underpinned by the industry's readiness to adopt dramatic changes, given its conservative nature with certain manufacturers who have yet to embrace Industry 3.0-level technology. As Industry 4.0 gathers momentum, companies are grappling with trying to understand its concepts and the value it could bring. Consequently, the EDB has partnered with TÜV SÜD Asia Pacific to develop the Singapore Smart Industry Readiness Index, which serves as a diagnostic tool that companies across all industries and sizes can use to better understand Industry 4.0 concepts, evaluate the state of their facilities, and build a transformation roadmap.

Sustainability is another priority for the government, with 2018 being named as Singapore's Year of Climate Action. The government is seeking to raise the level of national consciousness about climate change and encourage efforts towards ensuring a more sustainable Singapore. This has been coordinated with the passing of legislation on a carbon tax, which will come into effect in 2019, and will be initially set at S\$5/t of CO₂.

Singapore has shown its ability in the past to adapt to market volatility by creating optionality and optimization. Moving forward, digitalization and technological advancement will be the pivots on which it seeks to transform itself into a more sustainable and ultimately more productive market. ■



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AVITERA® SE

Damian Chan & Cindy Koh

DC: Executive Director,
Energy & Chemicals

CK: Director, Energy & Chemicals

**SINGAPORE ECONOMIC
DEVELOPMENT BOARD (EDB)**

12



DC



CK

Singapore was recently ranked 2nd as a driver of production in the World Economic Forum's 2018 Readiness for the Future of Production Report. What sets Singapore apart as the preferred destination for the chemicals value chain?

DC: Singapore has a very well established foundation for its energy and chemicals industry. The industry was built on its refineries, and during the 1980s, we integrated downstream into petrochemicals. The opening of Jurong Island in 2000 put Singapore on the path towards building a highly integrated energy and chemicals complex, providing the city-state with a significant head start in the region in terms of developing a competitive and integrated chemicals ecosystem. As a result, we now have over 100 energy and chemicals companies on Jurong Island. That in itself provides Singapore with a competitive advantage over other chemical hubs in the region, which are generally dominated by individual companies. For businesses looking to operate in Singapore, the opportunity to source for feedstock and then sell their products, over the fence, is immense. Moreover, our industry is export-oriented and driven by global demand and business cycles. As such, Singapore is highly reliant on global trade. Companies in Singapore will be able to tap into our extremely wide network of free-trade agreements representing 60% of global GDP, which includes ASEAN, China, India and the United States. We are also in the process of ratifying the Singapore-EU trade agreement. Finally, given that investments in the industry are capital-intensive, predictability, in terms of politics and government policy, is essential and something we are able to provide.

CK: In addition, as Singapore moves towards higher value-added derivatives, intellectual property (IP) protection with respect to innovation and manufacturing processes will be very important. For many companies, formulation and process

technologies are trade secrets, so they appreciate Singapore's respect for IP protection.

The carbon tax has been a major topic amongst Singapore's manufacturers. What do you hope the 2019 carbon tax will achieve?

DC: Under the Paris Agreement, our commitment is to reduce emission intensity by 36% from 2005 levels and to stabilize its emissions with the aim of peaking around 2030. In developing this commitment, we have factored in the continued growth of emissions-intensive industries, like energy and chemicals, so that the industry has a continued growth runway in Singapore.

The carbon tax will be levied on large emitters who emit 25,000 tons and above of greenhouse gas annually. It will be priced at a flat rate of S\$5 per ton for a transition period of five years from 2019 to 2023. The first payment will be made in 2020, based on emissions in 2019. While the current longer-term intent is to raise the carbon tax to S\$10 to S\$15 per ton of emission by 2030 after the initial five years, changes to the carbon tax will be taken into account international climate change developments, progress of Singapore's emissions mitigation efforts, and economic competitiveness. The government has factored competitiveness concerns, and that is why the starting rate is relatively low and is fixed for the first five years. In addition, the revenues collected will be used to support companies' energy efficiency and carbon reduction projects.

The Singapore Government estimates that about S\$1 billion will be collected from the carbon tax over the initial five years. However, the carbon tax is not a revenue generating exercise. The Singapore Government is prepared to make available more than what is collected to support worthwhile energy efficiency and carbon emissions reduction projects in the industry. Many of the oil majors have announced their

commitment to sustainability and we look forward to stronger collaboration so as to increase energy and emissions efficiency for the long term. We do foresee that carbon pricing will become more pervasive moving forward and our early efforts will position Singapore well for the future, especially when carbon capture or sequestration technologies becomes more widely available.

Industry 4.0 technologies have become a key focus for Jurong Island with automated systems, driverless trucks, and big data a few of the new technologies being implemented. How important will it be for the industry to embrace these technologies and how will they stand to benefit?

DC: We are heartened by the early adoption of these technologies by manufacturers. Additionally, there are a number of solutions providers who are opening digitalization hubs and centers of excellence in Singapore, including Accenture, Emerson, Yokogawa, Siemens and GE. Digital transformation ranks highly on the Singapore Government agenda because such technologies have a wide range of application. For instance, besides investing in cogeneration plants, digitalization could be a low-hanging fruit for companies wanting to improve energy management to reduce carbon emissions. Digitalization could also improve competitiveness by enhancing productivity in the areas of inspection and maintenance. We are seeing companies adopting drones and robots for tank inspection and cleaning. There are also applications in logistics, including driverless trucks, and in safety, such as worker access.

In addition, the Singapore Government, alongside TÜV SÜD, launched the Singapore Smart Industry Readiness Index ('Index') - a diagnostic tool that companies can use to evaluate their Industry 4.0 readiness and develop a transformation roadmap.

The Energy and Chemicals Transformation Map (ITM) is aiming for a manufacturing value added (MVA) of S\$12.7 billion as well as 1,400 new jobs by 2025. Can you introduce our readers to the ITM and tell us what it sets out to achieve?

DC: The initiative to develop roadmaps for 23 sectors originated from a recommendation by Singapore's Committee on the Future Economy. Each ITM sets out a holistic roadmap for each industry across four main pillars of focus: productivity, innovation, skills and jobs, and trade and internationalization.

The ITM leverages Singapore's tripartite approach - government, unions and industries - to work together on the future competitiveness and sustainability of those respective sectors.

The productivity segment outlines the priorities with respect to improving and upgrading the existing plants in Singapore, both in terms of digitalization and product upgrading. We have to recognize that this is a mature industry and the government stands fully prepared to work on its restructuring and upgrading. Key to this is the diversification from commoditized to higher value added and specialty-grade products.

The other part includes system-level solutions to help improve competitiveness. This involves providing increased opportunities for companies to carry out feedstock diversification, as well as investing in logistics. For example, Petrochemical Corporation of Singapore's new naphtha storage tanks have enabled them to respond quicker to the changing needs of the market as they have flexibility to blend different grades of naphtha. Vopak's new LPG terminal also provides crackers with an alternative feedstock beyond naphtha.

The jobs and skills segment is mainly tied to Singapore's SkillsFuture initiative, which is a national movement that promotes lifelong learning and skills mas-

tery. Alongside the ITM, we launched the SkillsFramework for Energy & Chemicals. It maps out, and makes available to the public, information related to career paths in the industry and the skillset required for each path. Subsequently the government will ensure that there are relevant courses available for individuals that want to upgrade themselves.

A*STAR is trying to increase collaboration between research institutions and the industry. How important are Singapore's research institutions in attracting new industry investment?

CK: Our work in this area is closely tied to the innovation pillar of the ITM. Specialty chemicals is the growth engine of Singapore's energy and chemicals industry. For these companies, the ability to formulate the right products and deliver customized solutions is a key differentiating value proposition.

In this regard, we have shortlisted five initial focus areas that have demonstrated strong growth potential in Asia: consumer chemicals, oilfield water chemicals, lubricant additives, animal health nutrition and agrochemicals.

We have also conducted a joint-road mapping exercise with A*STAR, where we identified four to six technology platforms and capabilities to invest in.

What will be the major milestones for the chemicals sector moving forward?

DC: We expect to see a healthy amount of investment moving forward. Important milestones in 2019 will include the implementation of the carbon tax as we start supporting companies more aggressively in terms of energy efficiency. Moreover, we anticipate continued upgrading investments from the refineries and crackers. There is also potential for an additional cracker and downstream petrochemicals clusters on Jurong Island. ■



Satvinder Singh

Assistant Chief Executive Officer
ENTERPRISE SINGAPORE

With International Enterprise (IE) merging with the Standards, Productivity and Innovation Board (SPRING) in April to form Enterprise Singapore, can you share with us what is new and different under Enterprise Singapore?

IE Singapore was the trade promotion agency responsible for spearheading the overseas growth of Singapore companies as well as promoting international trading and the development of Singapore's trading ecosystem, while SPRING Singapore was the agency responsible for driving the enterprise growth of small and medium enterprises in Singapore. It was also Singapore's national standards and accreditation body.

With the formation of Enterprise Singapore, our role is to grow stronger Singapore enterprises. Building on the foundation of the two previous organizations, we now have increased and improved resources to be more effective on both the domestic and international fronts. We hope to drive more collaboration opportunities with overseas companies and partners.

Enterprise Singapore is responsible for growing the wholesale trade sector of Singapore. What is your assessment of the current trading environment?

Last year, the Singapore economy grew by 3.5% and trade has also grown effectively. The biggest driving force is regional growth from the major economies that sit within the Asian time zone. When looking at projected growth for 2030, trends suggest that the top economies in the world will be China, the United States, India, Japan and Indonesia. Singapore sits in the middle of four out of five of these economies, providing us a unique ability to be a critical part of their trade flows with one another and the rest of the world. We are the biggest trading hub in Asia, but we have the potential to become one of the biggest trading hubs in the world. Our pro-business environment encourages innovation for trade, and we have the right infrastructure to support this, be it through our R&D centers or talent pool. Singapore has become a magnet for solution providers who are producing new digital-trade services in areas including reducing frictional costs in trade transactions and enhancing decision making through data analytics.

What is Singapore's key strategy to developing itself as the leading petrochemicals hub in the world?

The strategy includes large investments in infrastructure that we have already embarked on in the past two to three decades. We can see the fruits of those investments through the full implementation of an integrated petrochemical infrastructure on Jurong Island. Major petrochemical players are attracted here by both the marketplace, the availability of international talent, and the effective pro-business policies. People trust the system of jurisdiction very deeply. We are a neutral marketplace where rule of law works, where contracts can be drawn up quickly, and mediation and arbitration are deemed to be efficient and fair.

Can you tell us about Singapore's growing capabilities as an LNG trading hub?

Enterprise Singapore has been actively building the LNG trading community and there has been a significant increase in the number of players in the LNG trading cluster in Singapore. The LNG cluster in Singapore was nascent a decade ago, but there are now more than 45 companies with LNG trading or business development presence. With SLNG's fourth storage tank due to be completed by the first half of 2018, we are looking forward to the additional storage capacity which will not only cater to our domestic needs but also increase the scope for more LNG physical trading activities.

How much further can the city-state realistically grow, considering its limitations with respect to land and population?

Production requires physical space, which is a limitation. But looking beyond this, physical constraints are not preventing Singapore from becoming a petrochemical, marketing and trading hub. From that perspective, our hinterland is what is around us, and any activity - in Philippines, Thailand, or elsewhere - will come from physical investments in the region. Companies that manage these flows will be attracted to this marketplace, supported by global banks. Global market players are using our rules of engagement to contract, arbitrate and mediate. Regional development and production triggered by increased consumption is not constrained by Singapore's geographical location. It is more important that we have the correct environment, with a market and financial sector, a good rule of law and a pool of global talent. Most of the ASEAN economies are committed to a world with open markets, providing good services, which will propel our region faster, and keep us steering on the growth trajectory of recent years. ■



Doan Nguyen Hansen

Partner

MCKINSEY & COMPANY

Head

MCKINSEY'S CHEMICALS & AGRICULTURE PRACTICE IN SOUTH EAST ASIA

How have you seen the ASEAN's chemicals landscape evolve over the past 10 years?

The change in the region has not been overly dramatic. There is still a shortage of multiple products; for example, Indonesia will be short of supply in the long term. Although Vietnam and Myanmar are increasing their manufacturing capabilities, it will take a long time before they can compete in basic petrochemicals. Singapore remains an exporter and producer that serves other markets in the region.

How is Singapore differentiating itself in a market that is becoming ever more competitive?

Many companies now see ASEAN as a growth market, and they are primarily putting their more complex product, higher-end investments into Singapore. When companies carry out a total cost-equation assessment, Singapore is still highly attractive. They are willing to balance higher operating costs and rigorous environmental standards against a more highly skilled talent pool and the ease of doing business. Over the past five to ten years, several MNCs located their Asian HQs in Shanghai, but others are also moving them to Singapore due to the ability to recruit global talent, the high quality of life, and easy business environment.

What are your thoughts on the increased M&A activity happening in the chemicals industry?

Companies are increasingly looking at cost optimization to remain competitive but history has proven that mergers do not often return value. An interesting concept is what DowDupont are trying to do by merging, capturing cost synergies and splitting into three companies. However, the rigorous focus on improving the performance of the underlying businesses to extract the value and synergies that formed the basis for the merger is where most companies fail. Furthermore, M&A activity can sometimes lead to a "lemming effect." When large mergers happen, it can put pressure on other companies to follow suit and try to increase scale to compete.

How is digitization affecting the industry here and across the ASEAN region?

There is significant awareness about Industry 4.0 technologies, and some applications are gaining widescale traction. However, it is still very early for a wholesale company digitization in the chemicals industry. In a recent McKinsey global survey, 50% of CEOs

said they did not see a positive return on their company's digital investment. To support digitization, one needs a flexible IT architecture in the middleware. It can be a major investment that can be worth it if there is still a good business case given the company's IT infrastructure requirements.

McKinsey has created the Digital Capability Centre (DCC) in Singapore, an Industry 4.0-focused model factory to drive digital transformation of companies in Southeast Asia. The facility was founded in partnership with the Advanced Remanufacturing and Technology Center (ARTC), a public-private collaboration between the Agency for Science, Technology, and Research (A*STAR), the Nanyang Technological University (NTU) and industry partners to develop digital manufacturing and industrial design expertise for Asia.

At the DCC, we encourage companies to look at their business case and analyze the benefits of going digital. What we see in the chemicals space broadly, for example, is a positive business case for advanced analytics-based yield optimization and predictive maintenance, or where digital technologies can lead to significant labor efficiencies.

Will the imminent carbon-tax laws deter potential investors from Singapore?

The vast majority of companies in Singapore know that sustainability is a real priority. In our modern age, even developing countries are starting to think along these lines very early on. In terms of being a deterrent, Singapore offsets cost burdens through other means. If the government wants to tax carbon emissions and usage, it can alleviate these burdens in other ways, for example by offering incentives for surpassing targets.

How do you foresee the chemicals landscape changing in the years to come?

Singapore is moving away from refining and commodity petrochemicals towards specialty chemicals and advanced technologies. For Singapore, the government needs to help incentivize companies to be more cutting edge: helping them to invest in automation, encouraging higher industrial productivity to ensure competitiveness, promoting specialization in high value products or technologies, and endorsing innovative partnerships. My outlook for Singapore is hugely positive. It will remain the leader in technological advancement and fostering growth in broader Asia regions. ■



Terence Koh

Executive Director

**SINGAPORE CHEMICAL
INDUSTRY COUNCIL (SCIC)**

16

The Singapore Chemical Industry Council (SCIC) discusses its objectives for the year.

The new carbon tax will come into effect in 2019. How do you think it will affect the industry?

The implementation of the carbon-pricing regime is one way of encouraging the industry to achieve its sustainability goals under the Paris Agreement. The government announced in the recent Budget 2018 that a flat carbon-tax rate of S\$5/tCO₂e will be implemented. This fee has been reduced from S\$10-20/tCO₂e, as announced in Budget 2017. However, the industry has always advocated for the carbon-tax regime to be based on benchmarking as compared to a flat-tax rate. In the long term, benchmarking systems will motivate companies towards lowering carbon emissions while ensuring the competitiveness of their business operations in Singapore.

What initiatives are the SCIC currently working on?

Industry productivity and sustainability continue to be key focus areas. SCIC is exploring ways to help industry address and support industry sustainability needs in areas of energy efficiency, conservation of water resources, waste management and the reduction of environmental emissions. For example, we are working closely with the UK Energy Institute on industry capability-building efforts to upgrade companies' knowledge on energy efficiency and lower carbon emissions. This is in parallel to the implementation of the carbon policy. The Productivity Council comprises the

Singapore Economic Development Board (EDB), Association of Process Industry (ASPRI) and SCIC, and has recently embarked on the trial certification process, aiming to improve the productivity levels of the process industry.

Singapore launched the Energy & Chemicals Industry Transformation Map (E&C ITM) in October 2017, focusing on innovations through Industry 4.0. There has been ongoing collaboration with the EDB on enhancing greater awareness amongst industry players including the small and medium enterprises (SMEs) to leverage on innovation and ensure that the industry is ready for the Industry 4.0 evolution.

Can you tell us more about Singapore's first national standard for liquefied natural gas (LNG) bunkering that was launched by the SDO@SCIC together with MPA and SRPING Singapore?

To maintain Singapore's position as a premier bunkering hub, it is important to remain competitive and to keep abreast of new growth and developments regionally and internationally. To achieve this, the shipping industry is constantly looking at solutions to meet more stringent regulatory requirements. Singapore has also taken measures to provide cleaner and alternative sources of fuel such as LNG. In April 2017, the SDO@SCIC together with MPA and SPRING Singapore jointly launched the first Singapore Technical Reference (TR) 56 for LNG Bunkering. The Techni-

cal Reference (TR) 56 for LNG Bunkering was developed to help the maritime industry in Singapore pave the way towards a low-sulfur requirement in bunker fuel following the announcement by the International Maritime Organization (IMO) to cap the sulfur content of marine fuel at 0.5% from 2020. The TR 56 provides a safe, efficient, sustainable and transparent technical framework for conducting LNG-bunkering operations in Singapore, thereby offering greater assurance to local and international LNG-bunker buyers and suppliers.

What regulatory changes have been implemented to address safety in the industry?

Health, safety, environment and security performance remains a key priority of the chemical industry. With the enactment of the workplace safety and health (major hazard installations) regulations in September 2016, SCIC has been building capacity and safety case knowledge to prepare companies to implement safety case regime regulation. To date, more than 300 practitioners from 70 companies have been trained. We have also launched the safety case e-forum that allows the major hazard installations community to exchange information.

Moving forward, as we continue to instill a safe work environment, SCIC has been working closely with the Ministry of Manpower and Workplace Safety & Health Council to reinforce the “Vision Zero”

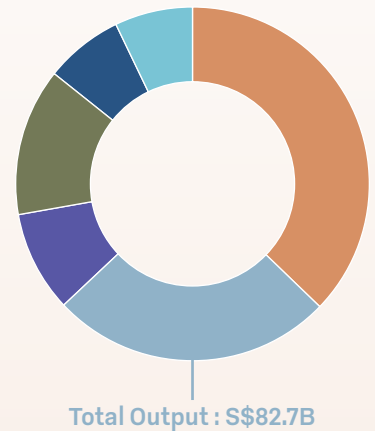
movement, starting with Jurong Island. Since the incorporation of the seventh code on security into Singapore’s Responsible Care program last year, a set of self-evaluation guidelines on security practices has been developed. These fit-for-purpose guidelines aim to encourage companies to achieve continuous improvements in security performances through a risk-based approach.

What are the main challenges facing the chemicals industry in Singapore?

Evolving regulatory landscape, organizational restructuring to leaner workforce and demands for higher productivity are still the prevailing challenges faced by the industry. As we gear up for Industry 4.0 in process, technology and organization, industry players will need to relook how they can align their business operations with cyber platforms via vertical integration. Apart from that, integration horizontally across the entire value chain is equally important.

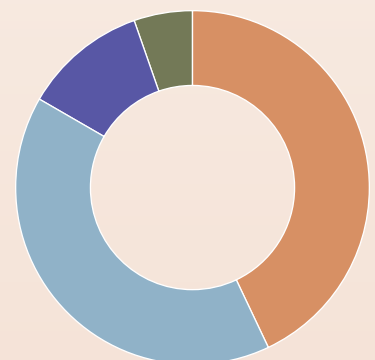
Chemistry is essential in our daily lives. The chemical industry has a key role in addressing and providing solutions to environmental, human health, workplace safety and climate change issues. We are also the enabler to technologies and innovation advancements. The continued breakthrough in innovation by the chemical companies will be able to support the projected population growth of close to 10 billion people by 2050. ■

Manufacturing Output (2017)

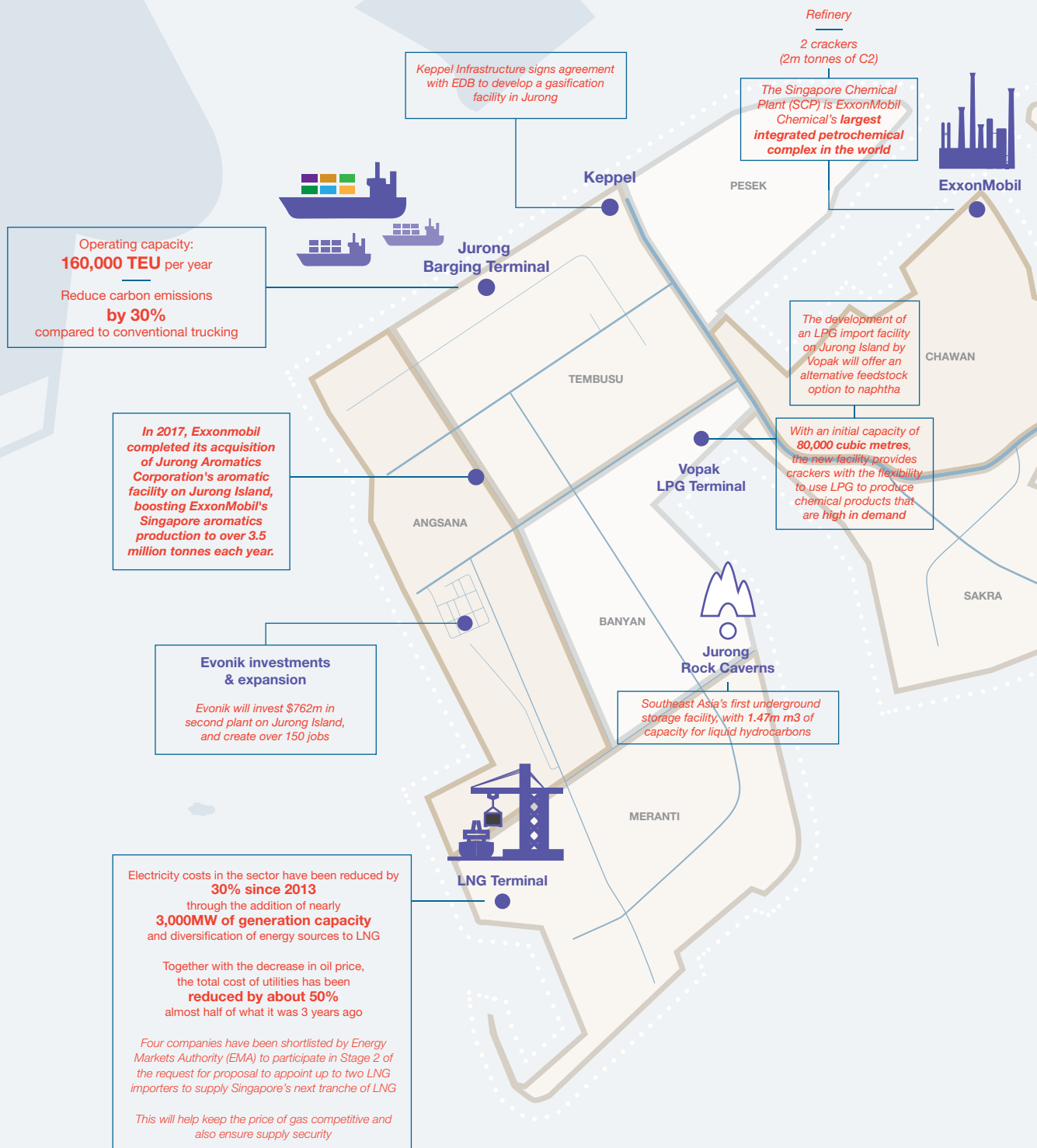


● Electronics	37.1%
● Chemicals	25.8%
● Biomedical Manufacturing	9.2%
● Precision Engineering	13.7%
● Transport Engineering	7%
● General Manufacturing Industry	7.2%

The Singapore Chemical Cluster is made up of the following segments

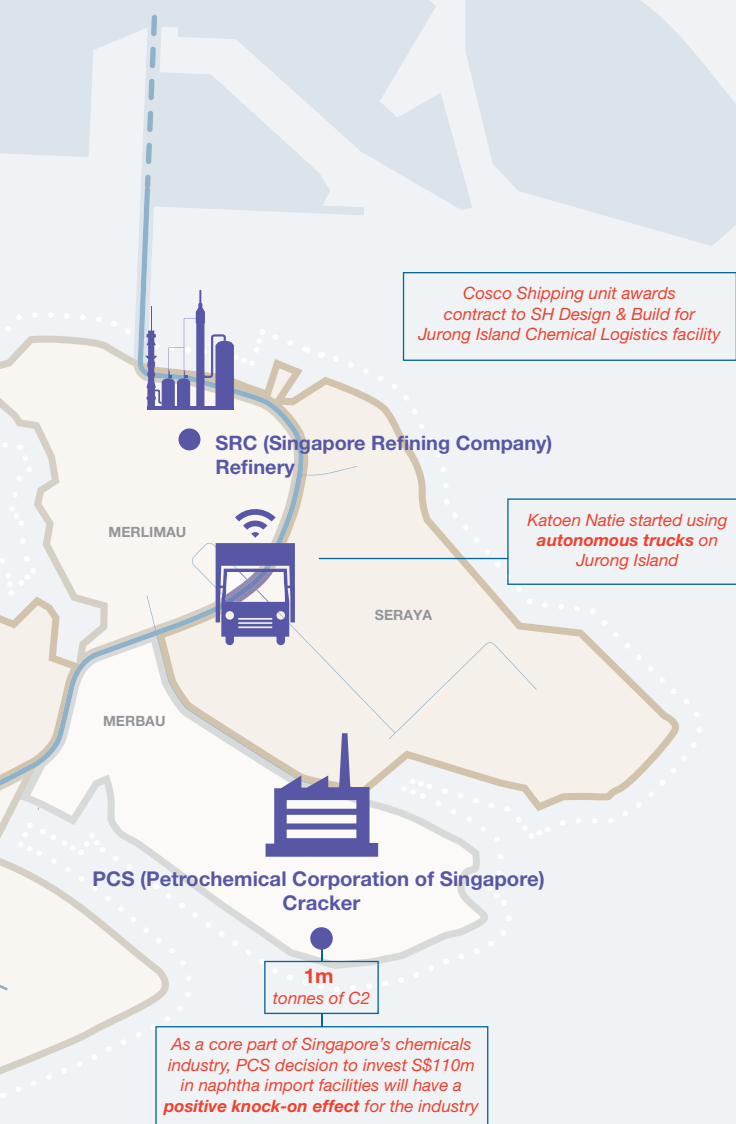


● Petroleum	43%
● Petrochemicals	40%
● Specialty Chemicals	11%
● Others	6%



Jurong Island

Recent Developments



Process Construction Maintenance

PCM Management Committee formed in 2013 to raise productivity in the sector

Productivity Council formed in 2015, 3-year partnership with **Construction Industry Institute (CII) Texas**

Process Construction Maintenance

Implemented turnaround scheduling – smoothen manpower demand and reduce peak-induced costs

Dormitory – centralised dormitory for workers on Jurong Island helps reduce travel time & fatigue, which improves worker productivity on-site

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**Shell Refinery
Shell Cracker**

**1m
tonnes of C2**

Singapore is Shell's largest petrochemical production and export centre in the Asia Pacific region





Year of Climate Action

"Climate change poses an existential challenge for Singapore. We must take action now, for the sake of our future generations. Although Singapore contributes only a small amount (0.11%) of carbon emissions worldwide, we will do our part as a responsible global citizen to fight climate change."

- Masagos Zulkifli,
Minister for the Environment and Water Resources,
Government of Singapore



Sustainability Brings a New Lens to Industry

On December 12th 2015, 175 nations adopted the Paris Climate Agreement, pledging to reduce carbon emissions through switching to cleaner fuels and financing more sustainable energy solutions. With a predicted temperature increase of between 1.7° C to 4.4° C (A1B Scenario, SE Asia) and an expected sea-level rise of one meter by 2100, Singapore will be severely affected by the effects of global warming if action is not taken. Aware of these implications, the city-state is meeting the problem head-on. Even though it ranked the eighth most sustainable city in the world in 2017 (Arcadis Sustainable Cities Index), the government knows it can do better.

Singapore therefore declared 2018 the city-state's Year of Climate Action with the intention of reaffirming its commitment to meeting its Paris targets and consolidating policy changes announced in 2017. Singapore's leadership on this issue matters even more in 2018, since it has assumed the chairmanship for ASEAN, in which capacity it is already leading discussions on climate action. "Climate change poses an existential challenge for Singapore. We must take action now, for the sake of our future generations. Although Singapore contributes only a small amount (0.11%) of carbon emissions worldwide, we will do our part as a responsible global citizen to fight climate change," said Masagos Zulkifli, Minister for the Environment and Water Resources.

Sustainability, it must be noted, was only on the periphery of the industry's conscience before Paris. As much as Singapore wants to meet its international obligations, market forces are also at play. Changing consumer perceptions, new regulations, and a sprinkle of morality are additional factors propelling the quest for sustainability. This combination of factors is pushing industry and govern-

ment to collaborate in specific ways at both the local and global levels.

Together for Sustainability (TfS) was founded for this purpose: to create dialogue on tangible sustainability improvements between both suppliers and their customers. Started by six major multinational chemical companies with significant operations in Singapore – BASF, Bayer, Evonik, Henkel, LANXESS and Solvay – TfS shares the results of sustainability assessments and audits with all its members and has a vision to improve sustainability practices across the industry's supply chains. "TfS members have been working jointly on assessing and auditing suppliers in order to create transparency and push for improvements [...] we notice that sustainability is becoming more and more important: with the United Nations Sustainable Development Goals we have seen for

the first time a globally accepted framework aiming at sustainability," said Dr. Gabriele Unger, General Manager at TfS.

As manufacturers look for ways to be more sustainable, the concept of a circular economy that can increase energy efficiency and reduce carbon emissions is gaining currency. The chemicals industry has already seen a number of co-generation (the simultaneous production of electricity with the recovery and utilization of heat) and tri-generation (the process in which some of the heat produced in a co-generation plant is used to generate chilled water) facilities open. ExxonMobil, for instance, opened a new cogeneration plant in Singapore, while producers Chang Chun Group and Novabay have been actively decarbonizing their production processes in symbiotic fashion: Chang Chun provides high-purity carbon 'waste' to Novabay, which uses it to produce high-quality sodium bicarbonate.

Neste, who begun commercial production at its refinery in Singapore, has been carving ahead with its drive towards sustainability. The company sources 100% of its feedstock from wastes and residue oil and fats and through its NEXTBTL technology produces renewable diesel. "Neste wants to be a valued partner in the global fight against climate change, and is committed to develop solutions to help decarbonize society for the present and future generations. This is the purpose that drives us on a daily basis," said Kenneth Lim, site director at Neste. ■



The industry has realized that there is much that can be done operationally to improve longer-term sustainability and efficiency. For example, emissions from oil and gas-producing fields have to a large extent been terminated, and companies are now considering ways to best utilize waste heat and other forms of energy in their production processes. This is also starting to happen in the petrochemicals industry, largely driven by an increased regulatory effort towards decarbonization. Ultimately, a value on waste energy must be set, whether via a tax or price. So, regulators and the industry will in the future be working towards creating value out of decarbonization.



- Peter Godfrey FEI,
Managing Director – Asia Pacific,
The Energy Institute and Member,
BritCham Energy & Utilities Group



A Search for Regulatory Cohesiveness

In Singapore as well as China, a strong and cohesive regulatory framework complements the growth in demand for sustainable products. It is what Rohit Aggarwal, president of global textile effects at Huntsman, calls a “perfect storm: where the consumer is becoming more aware of environmental sustainability and governments are prioritizing legislation. This represents an exciting time for the industry as focus shifts from pure cost to sustainability and creating value,” said Aggarwal.

Despite this, other countries in the ASEAN and APAC more broadly, including Indonesia, Malaysia, and India, have been slower to adopt new regulations on sustainability. These markets are also some of Singapore’s top export destinations. Unlike in the EU, the ASEAN does not have a regulatory

setup that creates uniformity across the region. This is problematic for Singapore’s chemicals producers, as they are likely to face competition from local producers who may be using cheaper, less environmentally friendly products. “What is happening in China and Singapore is very different from both Southeast Asia and India. In those regions, the change to volatile organic compounds (VOCs) and low odor is not driven by regulation or the government but by marketing forces,” said Belur Krishnamurthy Sethuram, managing director, India, Japan and SEA-ANZ, Celanese.

Singapore has been a force of change in the past and is taking the lead in specific areas. Singapore’s green building strategy, for instance, aims at making sure that 80% of all buildings meet green credentials by

In the ASEAN region, some countries have no clear regulation or guideline on separating the usage of pesticidal chemistries and formulations for non-agricultural uses. It conflicts with global regulations, thereby potentially affecting the development of robust scientific sustainable solutions in specific areas in industry.

- Vinod Agnihotri,
Managing Director,
ASEAN and Head of Material
Production Products (MPP)
-Asia Pacific,
LANXESS



The countries that adopt a more cohesive regulatory framework earlier than others will be the countries that gain a competitive advantage through increased 'ease of operation'. Once this competitive positioning is recognized through increased industrial investment and growth, it creates momentum, and others countries will have to follow or risk falling further behind, because it will become increasingly difficult to move raw materials and products to and from the countries with incompatible regulations, or – worse – to find customers.

- Thomas Kustus,
APAC Chemical Industry
Sector Lead,
Environmental Resources Management



2030. Jeremy Rowe, managing director of decorative paints, Southeast and South Asia and Middle East, AkzoNobel, highlighted that this initiative is a great example of how Singapore is able to instigate a regional shift. “Singapore is a leader in the region when it comes to developing regulations through its system of governance, measurement and incentives. This is why Singapore sets ambitious targets on green buildings, for example. What is positive is that many countries in the region use Singapore as a reference point for building regulations, which increases regional standards,” said Rowe.

Singapore, alongside China, is setting an example for the region. India and Vietnam are already showing further commitment to strengthening their regulatory framework and, with Singapore holding the ASEAN chairmanship this year, there is an increased possibility that the association aligns further on sustainability. ■

Carbon Tax Set for 2019



**S\$5
PER TONNE**

Intended tax rate for CO₂ emissions from 2019-2023 [Budget 2018]



S\$1 BILLION

Expected tax revenue that will be channelled towards industry's energy efficiency projects



1 METER

Mean sea levels potential rise by 2100 in Singapore



**+1.7°C to 4.4°C
CHANGE**

IPCC AR4 Projections 2100 [A1B Scenario, SE Asia]



A CLOSER LOOK AT THE CARBON TAX



In March 2018, the Singaporean government passed the Carbon Pricing Act, which sets out the tax **to be implemented in 2019**.

Initially, the proposed carbon tax in Budget 2017 was set at **S\$10/t to S\$20/t of CO₂** but after reconsideration, it was **reduced** in Budget 2018 to **S\$5/t of CO₂**.

Budget 2018, delivered by Finance Minister Heng Swee Keat, highlighted that the carbon tax will affect all facilities producing **25,000 tonnes or more** of greenhouse gas (GHG) emissions per year.

The recent budget also proposes to reinvest all of the tax revenue – expected to be **nearly S\$1 billion in first five years** – plus an additional amount into worthwhile projects which deliver the necessary abatement in emissions.



The introduction of a carbon tax as part of a wider suite of mitigation measures is necessary to facilitate Singapore's transition to a low-carbon economy and achieve our nation's goals under the Paris Agreement. It will provide a uniform and economy-wide signal to incentivise emissions reductions and energy efficiency improvements and encourage investments in clean technology. Countries and investors around the world are moving forward on climate-smart investments. To maintain our competitive edge in the global economy, I encourage all businesses to embrace opportunities in low-carbon growth



**- Masagos Zulkifli,
Minister for the Environment and
Water Resources,
Government of Singapore**



The impending carbon tax has been on the mind of most manufacturers as well as companies that will be directly or indirectly affected by it. Some of Jurong Island's producers have already made efforts to reduce their carbon footprint. ExxonMobil's cogeneration plant in Singapore, which opened in 2017, will have a 4% to 5% improvement in energy output, reducing carbon emissions by 265,000 tonnes per year. However, in an industry that is becoming ever more competitive, every cent counts. Industry leaders are concerned that even at the improved rate of S\$5/t of CO₂, the carbon tax may deter potential manufacturers from investing on Jurong Island. Terence Koh, executive director at the Singapore Chemical Industry Council (SCIC), has encouraged the carbon tax regime to be based on benchmarking, rather than a flat-tax rate. "In the long term, benchmarking systems will motivate companies towards lowering carbon emissions while ensuring the competitiveness of their business operations in Singapore," said Koh.

Industry Perspectives On The Impending Carbon Tax



"There will be financial impacts due to the carbon tax, but the government's most recent plan is much more reasonable than its first. Sustainability and future carbon taxes are going to impact every single jurisdiction as countries start to combat environmental concerns."

**-Joosang Kim,
Managing Director and Regional Head of APAC,
ARLANXEO**



"We are well-positioned as we have a strong manufacturing program around waste and energy efficiency. With regards to sustainability, we prioritize recycling and the efficiency in which we produce products, which will help us manage the carbon tax. The carbon footprint of vinyl acetate-ethylene (VAE) emulsions is favorable to us."

**-Belur Krishnamurthy Sethuram,
Managing Director, India, Japan and SEA-ANZ,
Celanese**



"Having spent a few years measuring our own carbon emissions, we are ready for the carbon tax. Reducing carbon emissions is an outcome that all industries will face and we have set ourselves a task of reducing our 2010 baseline measurements by 30% by 2025 and be carbon neutral by 2050. It is good to see a government putting forward legislation on this matter to help everyone move in the right direction."

**-Jeremy Rowe,
Managing Director of Decorative Paints, South East and South Asia and Middle East,
AkzoNobel Paints**



"The carbon tax makes renewable energy more attractive, and DSM is convinced this change is inevitable. My perspective is that the government is trying to balance short-term competitiveness with a long-term objective."

**-Pieter Nuboer,
Vice President, Animal Nutrition and Health, and President, Nutritional Products,
DSM Nutritional Products, Asia Pacific**



"The government is moving in the right direction by committing to the Paris Climate Change agreement. One of the challenges that the industry faces is that many companies are already using the best available technologies, so benchmarking could perhaps be more effective to incentivize companies to reduce carbon emissions and be competitive at the same time."

**-Kenneth Lim,
Site Director,
Neste Singapore**



Kenneth Lim

Site Director
NESTE SINGAPORE

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Neste celebrates its 70th anniversary this year. Can you tell us about the history of the company?

Neste started as an oil refinery in 1948 mainly to secure Finland's oil reserves. The idea of producing renewable fuels began in 1993 and, in 2007, Neste built its first renewable-diesel plant in Porvoo, Finland based on the NEXTBTL technology. This was soon followed by the construction of two world-scale renewable-diesel refineries in Singapore and Rotterdam, in 2010 and 2011, respectively. Together with the Porvoo renewable plants, the combined nameplate capacity of our renewable diesel refineries was 2 million tons/year. Over the years, we have successfully de-bottlenecked our refineries and, by 2020, our combined capacity will be 3 million tons/year.

Can you tell us about the decision to base one of your renewable-diesel refineries in Singapore?

The investment decision to move to Singapore was made in 2007. Plant construction started in 2008 and commercial production began in November 2010. Singapore's excellent logistics infrastructure, close proximity to feedstock and strong support from both the Singapore government agencies and strategic partners were key reasons for basing our refinery here. All our refineries are currently running at full capacity, driven by the European Renewable Energy Directive (RED) which calls for 10% share of renewables in road transport energy use by 2020, and the Renewable Fuel Regulations in North America.

Neste uses a wide range of waste products for its renewable diesel including tallow. Can you tell us more about the feedstock being used?

We source our feedstock globally and our NEXTBTL technology enables us to use 100% of the feedstock from wastes and residue oils and fats. About 20% of Neste's feedstock currently comes from crude palm oil, which is sustainably produced and fully traceable to the palm oil plantations. All our palm oil suppliers are members of the RSPO (Roundtable of Sustainable Palm Oil) and have committed themselves to 'No-Deforestation' guidelines in their third-party sourcing. But having said that, Neste's focus is still on expanding the use of wastes and residues further from the current 80%.

Are you seeing a growing demand for renewable diesels in the ASEAN region?

We do not sense a push towards renewable diesels from this part of the world. Right now, 4% of total global transport fuel is bio-fuel. We see that doubling by 2030, driven by regulatory mandates and progressive companies and cities in Europe and North America.

Neste intends to bring more renewable aviation fuel to the market in the near future and we trust that the aviation sector in Asia will pick this up as a sustainable solution to decarbonization in time.

What are your views on the implementation of the 2019 carbon tax?

The government is moving in the right direction by committing to the Paris Climate Change agreement. One of the challenges that the industry faces is that many companies are already using the best-available technologies, so benchmarking could perhaps be more effective to incentivize companies to reduce carbon emissions and be competitive at the same time.

What are your expectations for renewable diesels moving forward?

There is much speculation about falling diesel demand following commitments by countries to ban the use of diesel passenger cars in the near future. But the fact is that about 70% of fossil diesel demand is from heavy-duty road and sea transportation for which there is currently no cheaper or more efficient alternative. By 2040, we will see a significant increase in demand for diesel, driven by economic growth and increased trade activity. Currently, there is insufficient renewable diesel to meet the regulatory requirements in Europe and North America. Globally, we expect the demand for sustainable diesel to grow substantially.

Could you please share with our readers your vision for the upcoming years?

Neste wants to be a valued partner in the global fight against climate change, and is committed to develop solutions to help decarbonize society. This is the purpose that drives us on a daily basis. Last year, Neste placed second in the Global 100 list of most sustainable companies. My wish is to see Neste taking the top position in the coming years, and remaining in that position for many years to come. ■



"When looking at Singapore's industry, the greatest potential to increase water efficiency is through plant design, which can significantly reduce the water requirement and improve the re-use of water. Even the heavily polluted part of the effluent can be treated and potentially re-used."

- Steve Clark,
CEO,
SUEZ Asia



"The major observation I have seen is an increased demand for vegetable-based products. The demand in APAC is due to increased consciousness on sustainability as well as the demand for halal products. Moreover, the production of sustainable palm oil has become essential from some of our clients, particularly in food and personal care."

- Roberto Fabbri,
Faci



Ultimately, we need to look at alternative fuels and energy sources and how we can reduce our impact upon the environment as a whole. However, the carbon tax should not be a 'stick'. It needs to be carefully considered in the context of Singapore's economic development and growth vision and balance impacts and innovation, with a focus on continual improvement.

- Bengt von Schwerin,
Business Unit Managing Partner Southeast Asia,
Environmental Resources Management

Gabriele Unger

General Manager

TOGETHER FOR SUSTAINABILITY (TFS)



Can you give us a brief introduction to Together for Sustainability (TFS) and how the initiative has evolved?

TfS Initiative aims to develop and implement a global program to assess and improve sustainability practices within the supply chains of the chemicals industry. The initiative was founded by six multinational chemical companies: BASF, Bayer, Evonik, Henkel, Lanxess and Solvay. To date, AkzoNobel, Arkema, Borealis, Brenntag, Clariant, Covestro, DSM, DuPont, Eastman, IFF, Merck, SANOFI, Syngenta and Wacker have joined the initiative.

The TfS approach consists of two core elements: TfS Assessments conducted by EcoVadis and TfS Audits conducted by independent audit companies approved by TfS. The TfS approach creates a path of continuous improvement for both suppliers and their customers by initiating a dialogue on tangible sustainability improvements. It is based on principles of the United Nations Global Compact and the Responsible Care initiative of the International Council of Chemical Associations (ICCA). Each TfS member applies either one or both of these

tools to evaluate suppliers' sustainability progress, based on the member's own analyses and supplier selection criteria. The suppliers' sustainability performance is verified against pre-defined criteria tailored to the chemicals industry. Audits and assessments are categorized in five areas: management, environment, health and safety, labor and human Rights, and governance.

One of the fundamental aspects of TfS is sharing the results of sustainability assessments and audits across all members. This reduces customer requests to suppliers, lessening the bureaucratic burden and allowing a more efficient allocation of resources, with more time left to focus on actual improvements. This benefits members, who can obtain more information regarding their suppliers' progress, and suppliers, who only have to be assessed and/or audited once for multiple customers simultaneously.

With almost 10,000 evaluation results, TfS is now actively working with business partners to implement continuous improvements. TfS members will also further engage with suppliers to enable improvements, including developing trainings for them. ■

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Ashok Ramamurthy

Managing Director

BUCKMAN ASIA PACIFIC



With a history dating back to 1945, can you introduce our readers to Buckman and your operations in Singapore?

The company started as a biocide application company founded by Dr. Stanley Buckman, a microbiologist and biochemist. Bob Buckman, the second generation of the family, revolutionized the organization, creating an environment in which knowledge sharing was the differentiator, which remains at the core of the company today.

Buckman was founded on product excellence, specifically creativity, innovation and end products, and we remained this way for nearly 35 years supplying 45 industries. When the global market started consolidating, we moved away from a product-oriented company serving many industries to a company serving the whole product line for a few industries including pulp and paper, water treatment, and leather.

Under the leadership of our new CEO, Junai Maharaj, we are entering a third fundamental shift through the adoption of Industry 4.0 technologies, where the extremely dynamic environment requires faster evolution than ever before

Could you tell us more about the enzymatic technologies that Buckman has developed and the company's goals for total water discharge?

Enzyme technology is a big focus for Buckman having won two Presidential Green Chemistry Challenge Awards from the U.S. Environment Protection Agency (EPA) for our Optimize® and Maximize® enzymes. The Maximize® technology consists of new enzymes and combinations of enzymes that allow for more sustainable production of paper and paperboard with improved strength and quality. These enzymes are derived from renewable resources and produced by fermentations, rather than typical chemical-reaction methods.

Buckman set a goal to reduce Total Water Discharge by 10% by 2020, which was surpassed in 2016. We also have the Oxamine® water treatment program for microbiological activity, which includes proprietary feed equipment with industry-leading safety features. Since the program was initiated, we've seen dramatic improvements in microbiological control as well as the reduction of potential human-to-chemical contact and equipment and maintenance costs. ■

Hannah Hamling

President Asia Pacific
GOLDER



Can you introduce our readers to Golder's operations in Singapore and the region?

Golder is a global employee-owned company providing consulting, design and construction services in engineering and environmental management. Our footprint in the Asia Pacific region includes Singapore, China (Hong Kong, Beijing, Shanghai), Indonesia, India, Kazakhstan, and Mongolia. Golder provides a diverse range of services to meet our clients' varying needs including: environmental management, contaminated-land investigations and remediation, risk assessment, pollution-control studies, industrial hygiene, waste and water management, as well as specialized geotechnical-engineering services.

We have a significant presence in Singapore, working with a number of Jurong Island's chemical manufacturers providing industrial hygiene services and health and safety assessments to members of the Singapore chemical industry, meeting their high standards for employee health and safety and helping them to develop world-class industrial hygiene practices. In providing services to this industry, Golder develops holistic programs and undertakes risk assessments, working to optimize management systems. Golder also leverages our regional and global expertise to carry out contaminated land site investigations and remediation programs, as well as mobilizing our strong local geotechnical engineering resources for major transport infrastructure projects.

When compared to the other APAC jurisdictions, how would you compare Singapore's approach towards sustainability?

One would expect Singapore to have difficulty in sustainability due to shortage of water resources and a relatively small, limited land mass. However, the people and government of Singapore have been innovative in their approach to developing a sustainable city and educating its people on their carbon footprint. It's moving away from its reliance on hydrocarbon fuels to more renewable energy. Much of this success can be attributed to a drive in Singapore to create an awareness, and an ownership, within its citizenry. Compared to other countries I have visited in Asia Pacific, Singapore is advanced in its public sustainability education—it's impressive and a role model for other countries in the region and around the world.

The investment in public transport will also play a significant role in lowering Singapore's carbon footprint. Golder is working with clients in ASEAN to bring increased clarity and to account for carbon in construction of, infrastructure and buildings developments as it relates to geotechnical engineering projects. Our main role is

to work with Singapore-based clients to innovate on design and provide alternative lower carbon solutions in infrastructure builds.

What is your vision for Golder in Singapore for the coming two to three years?

It is an exciting time for Singapore as it further embraces Industry 4.0 Technologies, especially automation. There is a desire from the EDB to bring more industry into Singapore, and its aim to upskill workers through the SkillsFuture Framework will be integral to this. Golder is committed to the Singapore market. We will continue to diversify by leveraging our great pool of talent, continuing to develop these resources, and grow our business in Singapore and the other ASEAN countries. ■



Business is transforming.

Technology is radically advancing.

Markets are disrupted.

We see it all through the lens of our clients.

**We thrive
on challenges**

golder.com



Raymond Sinnah

Novabay President and VP
NOVACAP GROUP
 (MINERAL SPECIALTIES DIVISION)



Novacap Group was created in 2003 with Bain Capital as its majority shareholder. How has the company evolved since then?

Novacap has grown from just three sites in 2003 to 27 production sites and more than 3,000 employees, globally. The Group has evolved through a number of leveraging buy-outs (LBO), initially by Bain Capital, then Ardian in 2011, and finally by EURAZEO in 2016. Group growth has been driven by equal acquisition and organic growth and we have come to differentiate ourselves from our competitors through our entrepreneurial mind-set.

The Group itself, with revenues of 1 billion euros, is divided into three divisions – pharmaceuticals and cosmetics with large and small-scale APIs or bio-based ingredients; performance chemicals, including phenol and solvents; and minerals which includes sodium carbonate and sodium bicarbonate. The minerals division's first venture into APAC was through our Novabay sodium bicarbonate plant on Jurong Island.

What is the key focus for Novacap's Mineral Specialties Division?

The division is a European-leading producer of soda ash and sodium bicarbonate and through Novacab, with 160 years of experience specializing in two key areas – silicates for green tires and sodium bicarbonates. For the latter, specialized technology produce high-quality sodium bicarbonates was developed in France and is now being utilized at Jurong Island. The key difference in Singapore is that we are capturing our CO₂ feedstock from a neighboring company. Our second feedstock – soda ash – is sourced from our operations in Europe.

The state-of-the-art facility on Jurong Island offers a strong alternative supply solution to serve fast-growing demand in Asia. It can produce one of the world's highest quality sodium bicarbonate grades, and is able to guarantee a consistent and continuous quality. It can immediately bring 70,000 metric tons to the market, and we will be able to rapidly expand production capacity to 120,000 metric tons. ■

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The company started off as a blender of lubricants - we conceptualized the idea of collecting lubricant waste to be recycled and re-blended into products such as oils and hydraulic oils. We created a system to distill the waste from the lubricant, which is how we entered into the waste-collection business. During the collection, we noticed there was a lot of waste solvent coming together with waste oil. Due to this, we decided to enter into the waste solvent collection business in addition to recycling.

- Tristant Lam,
 General Manager,
 Greenchem Technology



Across our plants, we have adopted the best available control technology (BACT) to implement a design that best reduces the consumption of resources. More importantly, we have been doing our part for the circular economy by supplying high purity CO₂ to a customer to produce high-quality sodium bicarbonate. Not only are we reducing our CO₂ emissions but we are also helping to produce high value-added products.

- Fu-Chu Huang,
 CEO Singapore,
 Chang Chun Group

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Rohit Aggarwal

President of Textile Effects Division
HUNTSMAN



How has the landscape for textiles evolved over the past 15-20 years?

Over the last two decades, the industry has gone through two transformations. Firstly, a wave of low-cost manufacturing moved to China, India and the ASEAN; and environmental sustainability driven by younger consumers asking how and where their products are produced, forcing the entire value chain to become more sustainable. We have been gearing up for the next transformation in the industry, and we are at the forefront, having investing in R&D and innovation over the years, introducing new award winning technologies.

How is Huntsman prioritizing productivity and sustainability?

Our innovative pipeline of products has focused on two angles - saving water and energy to be more environmentally sustainable, and helping drive up productivity for our customers. For example, we introduced award winning proprietary dyes called AVITERA that cut water and energy usage by 50% and 30% respectively, the benchmark in the industry today.

In light of the government driving industry 4.0, Can you tell us about some technologies that Huntsman is thinking about utilizing?

Big data and analytics are significant areas that Huntsman will explore. Blockchain is eventually going to help the marketplace evolve but it is not clear today how it will be applicable to our specific supply chain. From a marketing perspective, digital platforms are becoming more relevant.

What shifts are we going to see in Asia's textile industry over the next few years?

Sustainability is the number one issue across the industry. Brands are focusing on speed, agility and inventory management. Cost and shorter lead times will drive the supply chain in the next few years.

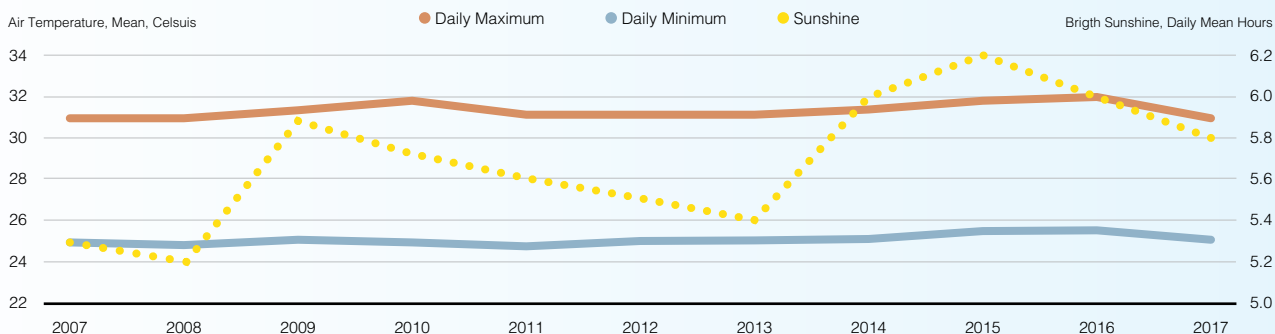
Can you give our readers a final message on both Singapore and the ASEAN region?

Singapore is a perfect ecosystem to operate, providing not only the right regulatory environment but also a business-friendly atmosphere. ■

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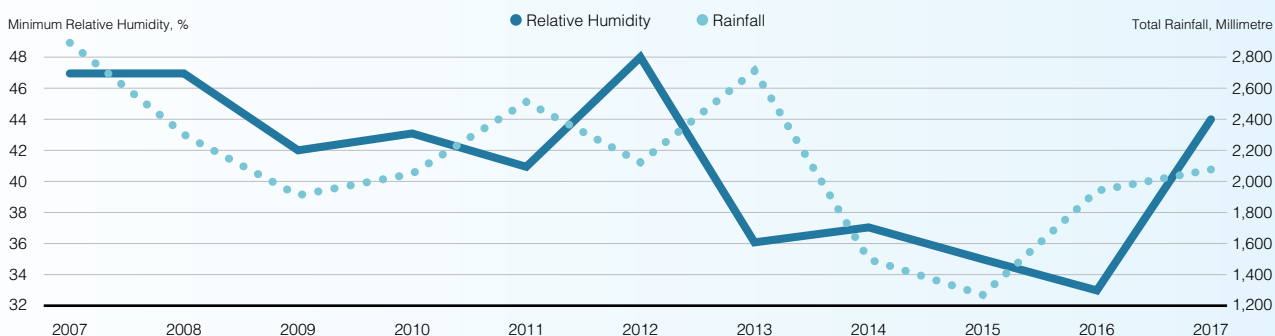
SINGAPORE AIR TEMPERATURE AND SUNSHINE

Source: National Environment Agency, available through Department of Statistics Singapore



SINGAPORE RELATIVE HUMIDITY AND RAINFALL

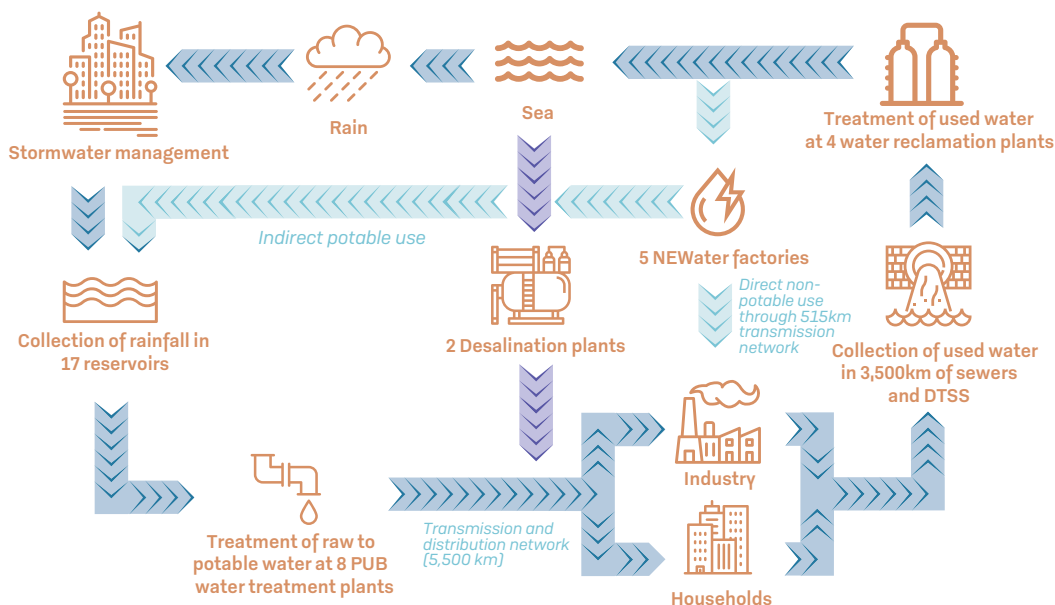
Source: National Environment Agency, available through Department of Statistics Singapore



For a Rainy Day: Targeting Water Self-Sufficiency

SINGAPORE WATER CYCLE

Source: Public Utilities Singapore (PUB)



The late Lee Kuan Yew made water his top priority, with a vision to capture every drop of rain that fell on the island. “Every other policy has to bend at the knees for our water survival,” said Singapore’s founding father. Water demand in Singapore currently stands at 430 million gallons a day, with non-domestic consumption accounting for 55% of total demand (PUB). By 2060, Singapore’s total water demand could almost double. In 2015, the Water Resources Institute (WRI) ranked Singapore as one of the most water-stressed countries in the world. Moreover, the WRI argued that Singapore is set to become one of eight countries globally that will be most vulnerable to disruptions in water supply. Singapore is therefore seeking self-sufficiency in water through a multi-pronged strategy. One of the key steps has been the construction of the NEWater plants, which recycle used water into ultra-clean, high-grade reclaimed water. Singapore currently has five NEWater plants providing 40% of the island nation’s needs. It is also harnessing reverse-

osmosis technology to produce desalinated water from seawater. A third desalination plant was recently completed in Tuas and construction on a fourth plant in Marina East began in earnest last year. The fourth plant is set to produce 30 million gallons of fresh drinking water per day with completion scheduled for early 2020. By 2060, the NEWater and desalination plants are forecast to meet 85% of Singapore’s water demand. Hannah Hamling, president for APAC at Golder, underlined the importance of Singapore’s talented ecosystem for its success in sustainability. “One would expect Singapore to have difficulty in sustainability due to a shortage of water resources and a relatively limited land mass. The people and government of Singapore, however, have been innovative in their approach to developing a sustainable city and educating its people on their carbon footprint. Much of this success can be attributed to a drive in Singapore to create an awareness, and an ownership, within its citizenry,” said Hamling.

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Singapore is one of the leading countries in water technology globally and also has positive intentions to promote the water industry. As a small, water-scarce nation that currently imports over half of its water from a neighboring country, Singapore is strongly motivated to move its water industry forward.



- Jerry Liu,
Chief Technology
Officer,
CITIC Envirotech

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Singapore has been extremely successful in its research and development efforts in the fields of water and environmental technology, with a robust ecosystem involving strong support from government agencies, world-class research at our universities, and a vibrant industrial ecosystem. With RIE2020, we have an increased national focus on translating some of our academic inventions to products and processes.



- Adil Dhalla,
Managing Director,
START Centre,
Nanyang Technological University,
NTUitive and COO, NEWRI

With non-domestic water consumption set to account for 70% of overall intake by 2060, manufacturers are looking at ways to improve water-usage efficiency through their operations. Huntsman, which operates in an industry that heavily relies on water consumption, has been prioritizing water savings in its innovation pipeline. Its award-winning proprietary dye, AVITERA, will cut water usage by 50%. LANXESS' LewaPlus software suite is also directly improving water purification. These solutions are increasing recovery rates in the reverse-osmosis process of water purification to 98%, considerably higher than the traditional 75% to 85%.

In light of Industry 4.0, water and waste resource-management companies are also expanding their product offerings to streamline and optimize their customers' processes. Veolia Water Technologies, who have a wide footprint in APAC, have offered a digital platform, AQUAVISTA™, to provide plant personnel with a monitoring tool to efficiently control connected plants and water-treatment equipment. "The AQUAVISTA™ portal provides real-time remote monitoring

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Singapore International Water Week (SIWW) 2018

Held 8-12 July 2018

24,000 participants from **110** countries and regions

S\$23 billion in total value for the announcements on projects awarded, tenders, investments and MOUs.

Over **1,100 companies** and innovative start-ups to showcase cutting-edge solutions for urban development, water, and waste management

The **Water Leaders Summit** played host to some **500** water leaders from governments, utilities, international organizations, academia and private companies, including, ministers, utility leaders and CEOs of the world's biggest water companies

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"SIWW 2018 marks 10 years since the first event in 2008, and this year's edition is the culmination of the last decade's efforts in driving industry growth, and helping to shape a much more sophisticated and forward-looking water industry."

- Bernard Tan,
Managing Director,
SIWW



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- Supplied **100** million people with drinking water and **63** million people with wastewater service
- Global network and local expertise
- Over **350** proprietary technologies



WATER TECHNOLOGIES

A complete range of services required to **design, build, maintain and upgrade water and wastewater treatment facilities and systems** for industrial clients and public authorities.

Discover our range
www.veoliawatertech.com/asia

Resourcing the world



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The development of new regulations or new technological advances in industrial plant processes often results in additional wastewater streams being created after the wastewater treatment equipment was built, which places additional stress on the equipment itself and potentially leads to it being unable to cope with the volume or the chemistry of the wastewater streams being created. We work to understand the issues and get the plants up and running with maximum operational efficiency and assure compliance.

- Massimo Endrizzi,
 Head of Industrial Water Solutions,
 Arcadis



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of equipment data, dynamic alarm management, and information for operators, leading to real improvements in efficiency and productivity. Moreover, the AQUAVISTA™ provides benchmarking and suggestions for process optimization,” said Frédéric Théry, CEO Asia Pacific, Veolia Water Technologies.

Singapore has come a long way since the polluted waterways of the 1970s. The city-state’s lack of clean water would for many countries have been a crippling disadvantage. Yet Singapore turned that weakness into a strength. Now a global hydrohub, it is leveraging its capabilities, from its leading research institutions to its multiple industrial sectors, to develop innovative, sustainable solutions to optimize water use and secure the city-state’s water future. ■

Frédéric Théry & Tony Ong

FT: CEO Asia Pacific

TO: Managing Director Singapore

VEOLIA WATER TECHNOLOGIES



FT



TO

Can you introduce our readers to Veolia's operations in Singapore and the APAC region?

FT: Veolia group is the global leader in optimized resource management. With nearly 169,000 employees worldwide, the Group designs and provides water, waste and energy management solutions that contribute to the sustainable development of communities and industries. Through its three complementary business activities, Veolia helps to develop access to resources, to preserve available resources, and to replenish them.

Currently, Veolia Water Technologies provides the complete range of services required to design, build, maintain and upgrade water and wastewater-treatment facilities and systems for industrial clients and public authorities.

Having recently been awarded 'water company of the year' at the Global Water Awards, what innovative technology has Veolia recently introduced into the market?

FT: Following the success of the AnoxKaldnes™ MBBR, Veolia continued to pour its resources into innovating and developing a new generation of biofilm carriers for MBBR, the AnoxKaldnes Z-MBBR™. In contrast to conventional MBBR carriers, the AnoxKaldnes Z-MBBR™ has a unique three-dimensional contoured structure that allows the creation of a self-controlled, pre-determined biofilm thickness on the carrier, providing a regulated redox gradient and maximizing mass transfer. The new Z-carriers are especially useful in applications where the biofilm tends to grow thicker (e.g. nitrification at higher organic loads), as process limitations related to uncontrolled growth of biofilm and clogging of carriers are effectively eliminated. Moreover, Veolia's Z carriers can also be customized with different biofilm thicknesses for fully aerobic processes or for processes requiring aerobic, anoxic, and anaerobic conditions on the same carrier.

Can you provide us with a case study example of Veolia's work in the region?

TO: Petron Corp. is the largest oil refining company in the Philippines. Their Bataan Refinery needed to introduce a reliable water treatment system for chemical oxygen demand (COD) removal. Utilizing the AnoxKaldnes BAS™ — which is a well-proven technology for treating highly concentrated waste streams while providing an effluent with good separation properties — we installed two biological

BAS™ trains after a preliminary de-oiling treatment. Despite large load variations, the system now allows Petron Corp to successfully treat the mix of streams, and also achieve advanced biological phenol removal.

Water scarcity is set to be one of the mega trends of the 21st century. Despite this, is new sustainable regulation still the key motivating factor for the industry with respect to water treatment?

FT: There is a clear correlation between the two, and we have seen both Singapore and China take the lead in the region through their regulatory framework on sustainability. Regulation clearly drives change, and although Veolia has been carrying out municipal work in China for the past 30 years, recent developments in environmental legislation have definitely been a catalyst for greater prioritization of water sustainability in the industrial sector.

In light of Industry 4.0, how is Veolia leveraging digitalization?

FT: AQUAVISTA™ is a digital offering that provides personnel with a monitoring tool to efficiently control connected plants and water treatment equipment. The data received from is then aggregated and secured on a cloud. The AQUAVISTA™ portal provides real-time remote monitoring of equipment data, dynamic-alarm management, and information for operators, leading to drastic improvements in efficiency and productivity. Moreover, the AQUAVISTA™ provides benchmarking and suggestions for process optimization.

For a company that leverages its expertise and its innovative technology, how important is Singapore for Veolia as a 'center of excellence'?

FT: Singapore is a key global hub for research and development. Singapore enables both research and technology most notably because of its intellectual property (IP) protection. As we are a company that is predominantly focused on technological advancement, the city-state's IP protection and rule of law are essential factors for continued investment here.

TO: Although Singapore has cemented itself as a center of knowledge, from an engineering standpoint, it still has some way to go. Singaporeans have long been taught to 'follow the rules' or 'toe the line', which has led to an extremely efficient nation, but not a creative one. Singapore should prioritize nurturing a creative environment especially when it comes to the application of technology. ■





Manufacturing

"Chemistry is essential in our daily lives. The chemical industry has a key role in addressing and providing solutions to environmental, human health, workplace safety and climate change issues. We are also the enabler of technologies and innovation advancements. The continued breakthrough in innovation by chemical companies will be able to support the projected population growth of close to 10 billion people by 2050."

- Terence Koh,
Executive Director,
Singapore Chemical Industry Council (SCIC)



Singapore's Chemical Producers:

Feeding Asia's Appetite

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One would be forgiven for missing the little red dot on a world map, but Singapore has proven over recent decades that size does not matter. Its position as a top 10 exporter of chemicals, according to the World Trade Statistical Review 2017, is alone testament to this truth. This feat is even more impressive when considering India, which exported US\$36 billion of chemicals in 2016 - US\$9 billion less than Singapore – is 4,716 times the size of Singapore.

The 32 square-km Jurong Island, an amalgamation of seven offshore isles, has been at the heart of Singapore's emergence as a chemicals powerhouse. With the global chemicals market expecting a compounded annual growth rate (CAGR) of 3.9% from 2015 to 2030 according to Ernst and Young, the island's role is set to grow even more powerful.

In fact, Singapore's manufacturing sector has experienced a resurgence in 2017, with the sector expanding by 10.1%. This measured against 3.7% growth in 2016, according to Singapore's Ministry of Trade and Industry. Although chemicals output is expected to increase by 5% in Q1 2018 compared to Q4 2017, the general business outlook for the first half of 2018 is less auspicious: growth is expected to decline by 9% compared to the second half of 2017, as noted by the Singapore Economic Development Board (EDB). This decline, however, is driven largely by a reduction in petrochemicals production due to scheduled plant maintenance, suggesting it will only be a temporary downturn. Further downstream, specialty chemicals manufacturers anticipate greater output in the near term due to increased export orders from the region, as ASEAN economies are expected to perform strongly in 2018 thanks to growth in domestic demand. ■

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Globally, we are seeing different trends in upstream and downstream operations. On the refining side, we have observed significant capacity expansion along with Euro 5/Euro 6 compliance projects in the Asia-Pacific region. Another growth area involves the large integrations of upstream and downstream operations throughout the region, including Indonesia, Thailand, China, India, and Malaysia (e.g., RAPID).

- Rolando Gachter,
Regional Director APAC,
Independent Project Analysis



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Specialty Chemicals

Singapore's forward-oriented leadership knows all too well that the city-state will not be able to compete with its neighbors as a low-cost destination for manufacturers. To enhance the island's competitiveness, it must nurture a business environment that is especially conducive to the production and export of specialty chemicals. Asia Pacific's (APAC) specialty chemical market is set to continue growing in the coming years, from US\$259.6 billion in 2017 to US\$361 billion in 2023, representing a CAGR of 5.7% according to P&S Market Research. With this increase in demand from a number of end-user markets in APAC, most notably in agrochemicals, lubricants and oilfield chemicals, water-treatment chemicals, and specialty coatings, companies can leverage the opportunities for research excellence and technological advancements that make Singapore so enticing to multinationals (MNCs). "As Singapore moves towards higher value-added derivatives, intellectual property (IP) protection with respect to innovation and manufacturing processes will be very important. For many companies, formulation and process technologies are trade secrets, so they appreciate Singapore's respect for IP protection," argued Cindy Koh, Director of Energy & Chemicals at EDB.

With this outlook in mind, Singapore is cementing its status as a global hub for R&D with its highly skilled talent pool and top research institutions. Through its Research, Innovation and Enterprise (RIE) 2020 plan, it is pumping S\$19 billion alone into R&D that can drive economic growth through creating value, adopting technology, and translating research into concrete business solutions. Moreover, the Energy and Chemicals industry transformation map (ITM) is targeting the construction and/or expansion of 20 new application-development centers by 2025, with US\$55 million added in business expenditure on R&D (Ministry of Trade and Industry).

In the past year, a number of Jurong Island's manufacturers have invested in research facilities and partnerships. Mitsui Chemicals, for instance, has been working closely with

the Agency of Science, Technology and Research (A*STAR) to develop advanced materials as well as chemical and biotechnological processes that enhance sustainability and productivity. Linde Gas has also recently launched an S\$30-million initiative to develop an Asia Pacific Digitalization Hub – the first such center outside of Germany. Another one is Evonik, who recently opened its Asia Research Hub, a rare feat for a company that traditionally concentrated its R&D in Germany. "Now, for the first time, we have a major concerted initiative to bring significant R&D capability to Asia, complementing our R&D in Germany. We have decided to do this in Singapore because it has over the years managed to establish a very interesting, highly developed, state-of-the-art ecosystem for R&D. We see an interesting overlap in the areas that we are working in: additive manufacturing, functional surfaces and tissue engineering," said Peter Meinshausen, president for APAC South at Evonik.

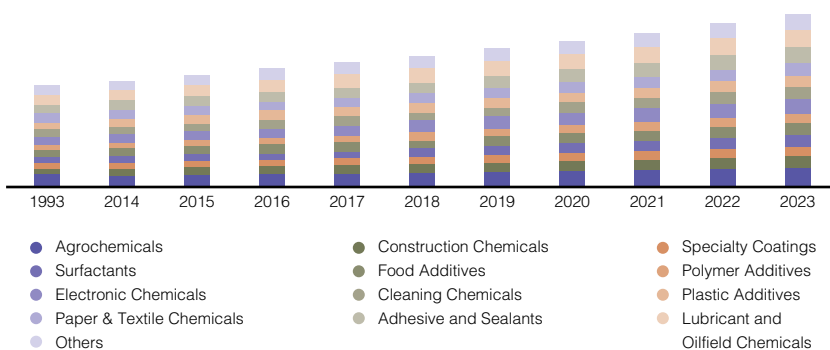
Despite Singapore's clear advantages in terms of academic and research excellence, some companies are deciding to split the baby: basing their production facilities elsewhere in the Association of Southeast Asian Nations (ASEAN), while only retaining their research and innovation facilities in Singapore. For example, Corbion's APAC headquarters (HQs) is in Singapore, where they also have an application and innovation center, but its regional production facility is in

Thailand. In another case, AkzoNobel conducts its R&D in Singapore and retains some manufacturing capabilities here, but most of its production facilities are positioned elsewhere in the region, including across the Strait in Johor.

Nonetheless, Singapore's motivated ecosystem, which is now embracing biotechnology, digitalization, and analytics, continues to attract specialty chemical producers to not only set up their regional HQs and innovation hubs alongside their manufacturing facilities. Driven by the aforementioned incentives and all-important political predictability – something that Malaysia has reminded is never a given in any jurisdiction, as will be discussed below – Singapore remains the top destination for MNCs aiming to meet APAC's increasing demands for chemicals. Doan Nguyen Hansen, head of McKinsey's chemicals and agriculture practice, highlighted that when companies carry out a total cost equation assessment, Singapore is still highly attractive. "They are willing to balance higher operating costs and rigorous environmental standards against a more highly skilled talent pool as well as the ease of doing business. Over the past five to 10 years, several MNCs located their Asian HQs in Shanghai. However, some companies are also now moving their Asian HQs to Singapore due to the ability to recruit global talent, the high quality of life, and the easy business environment," said Hansen. ■

APAC SPECIALTY CHEMICALS MARKET, BY TYPE (2013-2023)

Source: P&S Market Research



The Brave New World of Chemicals



By **Peter Nagler**,
Executive Director,
Institute of Chemical and
Engineering Sciences (ICES),
Agency for Science,
Technology and Research

In an increasingly “digital world” with rapidly changing technologies, one might assume that the 150-year-old chemicals industry must be outdated and in decline. Yet studies¹ project that it will outpace global GDP growth till 2030 – with Asia accounting for about two-thirds.

Chemistry forms the basis of our everyday lives, from our food, medicine, fuel and cosmetics to the furniture we are currently sitting on. The broad gamut of the chemicals industry’s applications thus allows it to profit from a wide range of global trends.

Megatrends like growing and ageing populations drive an increased demand for solutions for food, healthcare and urbanization. In addition, the use of chemicals across industries is increasing (e.g. composites in the automotive industry); all will fuel the industry’s growth, predominantly taking place in Asia, Latin America, and Africa in the longer term. The chemicals sector accounted for more than 25 percent of Singapore’s manufacturing output in 2017², which itself represented about 20 percent of the country’s GDP.

That said, the landscape of the industry is expected to change dramatically for a variety of reasons. For example, new production capacities will emerge in growth regions or in proximity to raw material sources, with an increased focus on specialty chemicals, or performance chemicals, potentially affecting established producers in Europe and the US. But there are other major trends. First, the continued will to increase sustainability and resource efficiency – a paradigm shift in consumer demands. Second, the notion of a “circular economy” is gaining attrac-

tion. And third, industries are digitalizing. Together, these form the ingredients of a revolution of the chemicals industry. This transformation has already begun. Welcome to “Chemistry 4.0”³.

Going Green

Let’s consider the aspect of sustainability. In 2016, the United Nations recognized sustainable chemistry as an important approach to “the sound management of chemicals” and member states were encouraged to put it into action. Chemists will immediately think of the “Twelve Principles of Green Chemistry”⁴. But sustainability is about much more; it is a journey that requires all stakeholders, enterprises, users of chemical products, end consumers, the authorities as well as society to come together for a successful implementation.

To play a key role, the industry will need to reconsider its approach. This is reflected in the concept of a circular economy, which is more than just recycling. In a nutshell, a circular economy manages to continuously keep materials and products in use and plans for this through the inception of new molecules or applications.

It will require a shift to renewable resources and increasing the efficiency of usage as well as closing loops throughout the life cycle. Some examples might be the increasing use of bio renewables or waste to produce chemicals or even CO₂ as a raw material. Digitalization will help in providing data about use structure, material information, logistics and product design.

Going Digital

Let’s take a look at digitalization. Certainly, chemical producers were among the first to use technologies like digital-plant controllers and data analytics to improve the efficiency of their operations, or computer-aided systems for plant design. In the meantime, other sectors like banking and retail have demonstrated innovative ways to use digital technology to evolve their businesses by improving the efficiencies of their operations and engaging end-consumers to generate greater value. As the process of data generation, collection, and storage gets easier while computational capabilities increase steadily at low costs, data curation and exploitation will have a significant impact on many areas of the chemicals industry. It will redefine value chains, increase productivity, drive innovation and create new channels to markets.

For example, advanced-data analytical tools can drive efficiencies through predictive maintenance or supply chain optimization. Life Cycle Asset Management technologies are also increasingly optimizing assets

REFERENCES

1. VCI: “Chemie 2030”; Roland Berger: “Chemicals 2035”
2. Economic Survey of Singapore 2017, Ministry of Trade and Industry
3. After coal based Chemistry 1.0, petrochemicals based Chemistry 2.0, and the recent globalisation and specialisation with increasing use of biorenewables being Chemistry 3.0.
4. P.T. Anastas, J.C. Warner, Green Chemistry, Theory and Practice, Oxford University Press, New York, 1998

from conceptual design to potential decommissioning. These include “digital twins” (a digital copy of a plant), integrated platforms for data and document management, as well as integrated computer-aided engineering landscapes that allow smooth interactions between departments. This holistic approach will enable more efficient planning, keep plant data updated, reduce maintenance costs, help ensure compliance with legal requirements, and prepare the ground for future, more sophisticated applications like Augmented and Virtual Reality.

Research and development in the chemicals industry will also profit from applying advanced digital tools. These include high-throughput optimization, advanced analytics and machine learning to simulate experiments, optimize formulations, or simply access past data to avoid duplication and learn from experiments. For example, A*STAR’s Institute of High Performance Computing (IHPC) and Institute of Chemical and Engineering Sciences (ICES) combine simulation and classical process development methodologies to advance the design of new catalysts for industrial processes.

The digital transformation will force the chemicals industry to rethink established business models as well as familiar supply and value chains given that multiple customer industries are being disrupted by digital technologies. New channels to market need to be created, like complementing traditional sales interactions with a digital channel. Often, digital business models might need a specific network, a prominent example being precision agriculture: chemical and agricultural machinery companies use geological and meteorological data as well as in situ analyses to optimize seed, fertilizer, and crop-protection deployment. Additive manufacturing may be another example where material suppliers join forces with hardware and software companies to develop tailored solutions for their customers.

Mass Customization

Another development is the increasing customization of applications, especially in fine and specialty chemicals. This may lead to

more specific and “individualized” solutions (e.g. personalized medicine), or the development of actives for pharmaceutical or agrochemical applications with higher potency. The implications are reduced quantities; hence production capacities need to be adjusted. Life cycle and development times for these products will be under pressure as well. One logical consequence is that in future, production plants will have to be much more adaptable to changing requirements. A solution could be highly automated and modular plant concepts that can flexibly adapt to different processes and allow faster investments (from years to months) through shortened planning times, reduced engineering as well as the reuse of equipment, all coming along with significantly reduced capital expenditure.

The overarching goal is to realize a shorter time-to-market while fulfilling smaller batch productions. While these concepts are being worked on widely in the industry, the standardization of equipment as well as the development of adequate process control and automation concepts are still major hurdles.

Innovating for Success

Besides an enterprise culture of agility, creativity lateral thinking and openness to unusual ideas, another main factor for successful innovation is the establishment of an efficient and effective innovation ecosystem, which should span far across chemical and pharmaceutical industry boundaries. Singapore provides a fertile ground for open innovation as leading universities, the Agency for Science, Technology and Research (A*STAR) and multiple industrial sectors are in close proximity, and aim to work closely together.

And because companies embarking on the digital journey might become overwhelmed by the vast array of opportunities and need support to take the right steps, A*STAR initiated a Future of Manufacturing (FoM) Initiative in 2015. Working closely with the Economic Development Board and Enterprise Singapore, A*STAR aims to sustain Singapore’s competitiveness in manufacturing and technology innovation so that it is a

location of choice for developing, test-bedding and deploying advanced cutting-edge technologies in the manufacturing sector.

The three key thrusts of A*STAR’s FoM Initiative are the complementary public-private partnership platforms of Tech Access, Tech Depot and A*STAR’s Model Factory Initiative, which aim to drive technology co-innovation, knowledge transfer and technology adoption by enterprises. A*STAR’s Model Factory Initiative bridges technological gaps in the private sector to help businesses across industries and across the value chain to reinvent themselves through technology adoption. The Model Factory is located at A*STAR’s Singapore Institute of Manufacturing Technology (SIMTech) and Advanced Remanufacturing and Technology Centre (ARTC). The Model Factory at SIMTech features a pilot-scale production line that enables companies to experience advanced manufacturing technologies first-hand in a learning environment and collaborate with stakeholders to test-bed and jointly develop innovative solutions. The Model Factory at ARTC will be launched in August 2018.

Consortia or public-private-partnerships that tackle fundamental and potentially game changing issues can be formed rather easily. For instance, in 2017, A*STAR launched the Pharma Innovation Programme Singapore (PIPS) in partnership with the National University of Singapore, with three pharmaceutical giants joining in the program as pioneer members. Based on the problem statements of these pharma companies, PIPS aims to revolutionize the manufacturing of small molecules through developing digitized plants and advanced-process analytical tools, moving from batch to more continuous operations and increasingly applying biocatalysis for efficient syntheses of complex structures.

Conclusion

The challenges outlined in this article will certainly change the picture of the chemical industry both in Singapore and globally, but at the same time they offer tremendous new opportunities for another successful 150 years. ■

Peter Meinshausen

President APAC South
EVONIK



Can you update us on Evonik's developments in Singapore including at its methionine plant?

Evonik is on track with its activities in Singapore as a regional HQ and business and manufacturing hub for Asia Pacific South. Our business is developing well across all of our business lines, our assets are performing excellently, the new 150-kt methionine project on Jurong Island is on track as planned and will come on stream in 2019, and the newly established R&D hub that is earmarked for research in the space of additive manufacturing, functional surfaces and tissue engineering was inaugurated in April and has started to operate.

Can you tell us more about the newly opened Asia Research Hub in Singapore as well as your partnership with Nanyang Technological University (NTU)?

The vast majority of Evonik's R&D has traditionally been done in Germany. Now, for the first time, we have a major initiative to bring significant R&D capability

to Asia. We see an interesting overlap in the areas that we are working in: additive manufacturing, functional surfaces and tissue engineering.

NTU has a large additive-manufacturing center with all of the relevant technologies, including 3D printing, to tap into. Evonik's interest focuses on the materials side of additive manufacturing. We have been active with Polyamide 12 for 3D printing for several years, but see interesting developments in other materials as well in this area. There are two other areas where Singapore is an interesting location for research: functional surfaces and regenerative medical applications. For functional surface research, we are already cooperating with Singapore's A*Star Institute on a variety of topics. Rounding the scope of activities of CREAVIS, the strategic innovation unit of Evonik, is setting up a project house on tissue engineering in the newly opened research hub as part of its global activities in this field of research. ■

Motoyuki Sakai

President
SUMITOMO CHEMICAL ASIA



Can you please introduce us to Sumitomo and your operations in Singapore?

We, Sumitomo Chemical Asia, are based here in Singapore, and running wide variety of businesses.

One main part is distribution of petrochemical products manufactured in Petro Rabigh, Sumitomo's joint venture in Saudi Arabia, with production capacity of 1,600KTA of ethylene and 1,100KTA of propylene, including its phase-2 expansions.

SCA is also running manufacturing operations of MMA, PMMA, and S-SBR in Jurong Island, whose products are supplied globally, mainly to Asian market. As we have expanded production capacity in several phases, and current capacity is 220KTA of MMA and 150KTA of PMMA. S-SBR plant's capacity is 40KTA. Our business scope also covers distribution of other various chemical products including those relating to automotive, IT, agriculture, and stockbreeding mainly produced in Sumitomo Chemical Japan.

Another important role we play is regional headquarters of Sumitomo Chemical in Asia Pacific, effectively supporting business operations in group companies in the region.

How is your portfolio, through products like the MMA monomer and SUMIPEX PMMA, evolving to meet increasing regional demand?

In recent years, there has been limited chance for volume expansion to meet increasing regional demand considering our surrounding situations like land, feedstock, and other restrictions.

While volume expansion is not achieved, however, we have kept improving our product portfolio. One example is continued development of new PMMA grades. Under drastic economic growth, consumer behaviors in the Asian region have been rapidly changing. Thus, we have focused on capturing market trends, and developing products with higher functions that satisfy new customer needs by leveraging our technologies.

For instance, one of the strengths in PMMA's polymer property is transparency. Our strategic focus has therefore been on automotive applications like mirrors or lamps, given that demand for vehicles has kept rising here in Asia in the context of impressive levels of economic growth. ■

Image courtesy of Shutterstock

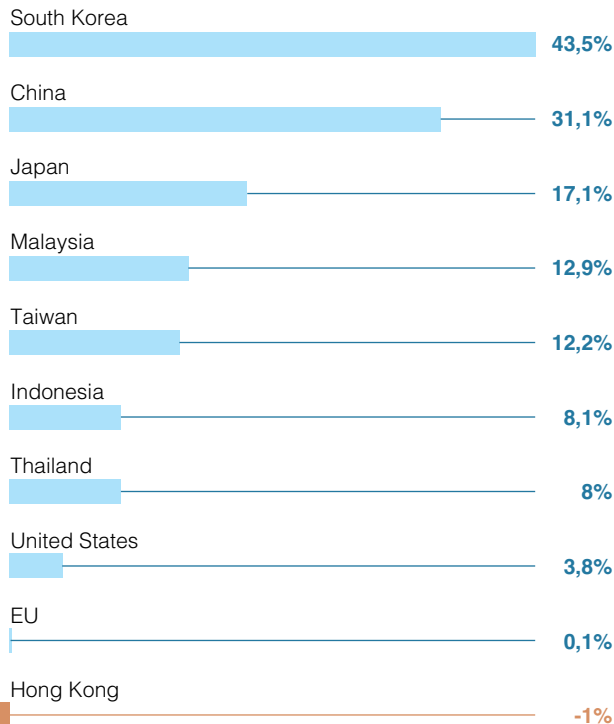
Paints and Coatings

The last decade has also seen steady regional growth in the paints and coatings industry, with Asia now accounting for 50% to 55% of global production. Paints and coatings remains one of the most heavily regulated subsectors of chemicals in the world, while at the same time with one of the largest growth potential, particularly in the adoption of low-solvent and solventless technologies. Singapore's manufacturers are particularly benefiting from the increasing regional demand for these sustainable and innovative solutions. Celanese completed its vinyl acetate-ethylene (VAE) emulsion production facility in 2016 and is supplying to Southeast Asia, India, Japan, and South Korea. "The new production facility will give Celanese a strong platform to grow the business across the region. [...] We have seen the increased adoption of the VAE emulsion across the region due to its good environmental profile with low volatile organic compounds (VOCs), low odor, as well as requiring little to no coalescence," said Belur Krishnamurthy Sethuram, managing director, India, Japan and SEA-ANZ at Celanese. Dow Chemical has also been prioritizing the adoption of new innovative, sustainable products, as demonstrated by the 754 patents it obtained in 2016. Following the DowDupont merger, the company's Materials Science Division will focus on three market-leading segments: performance materials and coatings, industrial intermediates and infrastructure, and packaging and specialty plastics. In addition, Singapore portends as a regional HQ for a number of Dow's other divisions, as well as a regional R&D center.

Others are going all-in. AkzoNobel Paints chose Singapore to be its global HQ for marine, protective, and yachts coatings and regional HQ for decorative paints. The company has prioritized growth in the region with powder coatings emerging as a key sub-sector for growth. "Powder coatings is an interesting sector that we, as the market leaders, will look to consolidate. It is one of the fastest growing sectors due to its logistical and applicatory benefits and its zero VOC content," said Jeremy Rowe, managing director of decorative paints, South East and South Asia and Middle East for AkzoNobel Paints.

GROWTH RATES OF NON-OIL DOMESTIC EXPORTS TO TOP TEN MARKETS IN 2017

Source: Economic Survey of Singapore 2017



Hafnium believes that there is an opportunity to leverage the capabilities of these established speciality chemicals SMEs in the developed market and bring them to bear in the faster-growing Asia Pacific region. This approach represents a unique, not well-tapped value creation opportunity. Southeast Asia is a strong growth market in its own right with medium-term growth of 7.6% and is home to a number of growing end-user markets. Hafnium brings substantive insights for its European partners into the relative suitability of the different countries in the region, taking into consideration areas such as IP and 'know how' protection, legal frameworks, manufacturing costs, local government agency support, sales effectiveness and distribution efficiency



- Francis Tan,
Executive Director,
Hafnium Hafaway



Jeremy Rowe

Managing Director of Decorative Paints,
South East and South Asia
and Middle East
AKZONOBEL PAINTS



With a footprint spanning the whole continent, do differing regulations on paints affect your business opportunities across the region?

There are different sets of regulations across the whole of Asia. At AkzoNobel, we keep to two key principles. We must meet all country specific regulations as well as our own higher internal regulations. Typically, we are ahead of most countries with respect to regulations. In the region, China is moving particularly fast with its regulations in areas such as solvents, VOC and emissions in general. One area of concern for us is that some countries do not have formal laws against the usage of lead in paint – something we removed from our paint many years ago. Although this gives a cost advantage to competitors, we continue to prioritize sustainability, health and safety.

Singapore is a leader in the region when it comes to developing regulations through its system of governance, measurement and incentives. This is why Singapore sets ambitious targets on green buildings. What is positive is that many countries in the region use Singapore as a reference point for building regulations, which increases regional standards.

How is government regulation driving the adoption of sustainable solutions across Asia Pacific?

We believe that Singapore's Green Building scheme is a great example where a government is driving change. As it is incentive-based, it is business friendly as well. It is beneficial for the developer as well as they receive higher ratings for creating Green Buildings. In other countries, like India and in the ASEAN, these solutions are driven a little more by developers to help market and make their properties distinctive. However, we see governments moving quickly and already have local Green Building Councils in almost every country that we operate in. ■

Paul Fong

Singapore and Malaysia Country Manager
DOW CHEMICAL



What do you foresee for the Materials Science Division following the DowDuPont merger?

The Materials Science Division will be a premier, materials science-solutions provider with a focus on three market-leading segments – Performance Materials and Coatings, Industrial Intermediates and Infrastructure, and Packaging and Specialty Plastics. We will have robust technology, as well as scale and competitive capabilities to enable truly differentiated materials science solutions for our customers. Singapore will remain a key regional hub for Dow, as a regional business headquarters for packaging and specialty plastics, coatings and consumer solutions businesses, and as a regional R&D center.

Can you tell us about some of Dow's recent sustainable solutions?

Dow has been leading the development of innovative and sustainable products, and obtained 754 patents in 2016. Some key examples include the ECOGROUND™ technology – one of 10 winners at the 2017 R&D 100 award. It is a waterborne acrylic binder for making rubberized running tracks, playgrounds and walkways that significantly

mitigate exposure to materials with volatile organic compounds (VOC). Another key solution is the FORMASHIELD™ formaldehyde-abatement technology – an industry-first binder technology for latex paint that helps remove harmful formaldehyde from indoor air. A final example is a recently developed polyolefin-based coating to eliminate Bisphenol A (BPA) in the interior lining of tin cans. The CANVERA™ Technology won the 2017 Kirkpatrick Chemical Engineering Achievement Award and 2017 Edison Award for Innovation.

Can you tell us about Dow's ambitious goals towards sustainability for 2025?

We have set seven 2025 Sustainability Goals, which include Advancing a Circular Economy, Safe Chemistry for a Sustainable Planet, and Delivering Breakthrough Innovations. For example, in Malaysia we have partnered with the Malaysia Plastic Manufacturing Association to create a plastic recycling-awareness campaign in schools. The alignment with governments on sustainability issues is also key in helping us achieve our targets. For example, China is now a key driver in reducing VOC [volatile organic compounds] content in the atmosphere. ■

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Image courtesy of Lanxess

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In the past year, we have acquired three engineered materials companies: Softer, Nilit Plastics and Omni Plastics. Through Nilit Plastics, we acquired a compounding facility in China, but most importantly, it gives us two new engineered-materials product platforms: nylon and elastomers.

- Belur Krishnamurthy Sethuram,
Managing Director,
India, Japan and SEA-ANZ,
Celanese



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Vinod Agnihotri

Managing Director ASEAN and Head of Material Protection Products (MPP) – Asia Pacific
LANXESS



Can you introduce us to LANXESS' operations and recent developments?

Last year in the ASEAN region, we saw double-digit growth. We have strengthened our footprint in the region with new offices in Thailand and Indonesia to add to our existing ones in Singapore, Malaysia and Vietnam. The idea is to consolidate and expand our presence in these countries. For new LANXESS, with respect to operations, we currently have one production site in ASEAN - a material protection products (MPP) facility in Singapore.

Can you tell us more about some of the innovative solutions being developed by LANXESS in Singapore?

LANXESS is constantly prioritizing innovative solutions into its R&D capabilities. Examples of these include the engineering plastic material, Tepex. Tepex is replacing the undertrays of car engines. It is much lighter than steel, very impact-resistant, and helps to increase the longevity of car engine batteries. Another innovation is our LewaPlus software suite of reverse osmosis (RO) and ion exchange (IX), which offers

recovery rates of up to 98 percent in the reverse osmosis process of water purification, compared to 75 to 85 percent traditionally.

What challenges is LANXESS facing here in Singapore in the ASEAN region?

In the ASEAN region, some countries have no clear regulation or guideline on separating the usage of pesticidal chemistries and formulations for non-agricultural uses. It conflicts with global regulations under BPR OR EPA/FIFRA, thereby potentially affecting the development of robust scientific sustainable solutions in specific areas in the industries.

What current market trends are you seeing with respect to biocides?

Although the biocides market in ASEAN is not well regulated, the potential is quite significant. Low VOC products and Green solutions are now being continuously mentioned, with the demand for environmentally friendly products increasing in most segments. We are seeing a positive trend from biocide producers and suppliers to address the increasing market demand. ■

TACKLING TOMORROW'S CHALLENGES TODAY

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ARKEMA, DESIGNER
OF MATERIALS
AND INNOVATIVE SOLUTIONS

ARKEMA
INNOVATIVE CHEMISTRY

Danny Foong

General Manager
ARKEMA



Arkema recently announced a 6% to 9% price increase for its Kynar range of fluoropolymers. Where this demand is coming from?

The demand is linked to the growth in wealth. Fluoropolymers are being used in the mega trends identified by Arkema, specifically in water filtration, PV solar panels and in the storage of energy in lithium batteries.

With respect to further expansion in the region, is Singapore seen as an ideal destination for a new production facility?

Singapore has always been identified as a candidate for a new facility but as a global company we need to follow the growth of our customers. We have a lot of interest in Singapore, not only in manufacturing but also in R&D with lot of support from the EDB and research institutions like National University Singapore and Nanyang Technological University. We are aiming to building partnerships with both universities and are looking into the R&D ecosystem in Singapore to see how we can aid the system and increase our growth.

Arkema continues to focus on R&D and an open innovation strategy. Can you tell us about the R&D work that is being carried out here in ASEAN?

We are one of the most innovative specialty chemical companies in the world. We have identified six mega trends which have strong potential including new energies like solar panels, portable water technology, electronic solutions and home efficiencies.

Can you give a final message to our readers?

Arkema is the global specialty chemicals leader. We have a unique innovative position with our capability to combine advanced materials and adhesives. With this, we can bring forward sustainable development through collaboration with our customers, government agencies, academic institutions and our employees. In this process, we strive to minimize the environmental footprint of our activities, be among the top chemical companies in terms safety, promote development of our employees and foster dialogue among our stakeholders. ■

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Belur Krishnamurthy Sethuram

Managing Director, India,
Japan and SEA-ANZ
CELANESE



Celanese is celebrating its 100th year anniversary in 2018. Can you give us an update on the company's operations in Singapore?

Celanese has built and operated a wholly owned chemical plant in Singapore to supply the Asia market for over 20 years now. We added a vinyl acetate-ethylene (VAE) emulsion-production facility to this complex in 2016. Prior to that, the only other two facilities in Asia were in Nanjing, China. As the Nanjing capacity became full, it became increasingly difficult to service other markets. Moreover, emulsions are products that demand close proximity to customers so it made sense to open another production facility.

We had a three-phase plan when the VAE production facility came online. Our first phase was to replace what we were supplying out of China to Southeast Asia, India, Japan and South Korea with our Singapore facility. Our second phase was to focus on new customer growth. Currently, our third phase is to gain further growth and convert customers that are currently using other products to VAE.

What has been the main challenge in increasing awareness of VAE?

The most important part of our customer growth plan is ensuring product quality and convincing customers about what we have to offer. When a customer is already working with another product, it is important to demonstrate the technical benefits of the VAE product. For example, VAE has a good environmental profile with low VOCs; it requires little or no coalescence and is low odor.

As VAE has a positive green profile, are new sustainability regulations, most prominently in China, increasing prospects of customers transitioning to it?

The drivers vary dramatically across the whole region. What is happening in China is very different than both Southeast Asia and India. In those regions, the change to VOC and low odor is not driven by regulation or the government but by market forces. Due to this, we have a fourth phase, which involves convincing our customers to design products that incorporate VAE. Interestingly, we are seeing this shift happening, both in India and SEA. ■

Image courtesy of Croda



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Life Sciences

The middle class in ASEAN is forecast to more than double over the eight years from 2012 to 2020 to 400 million people, constituting 55% of the global population (Nielsen). This will bring a new surge in demand in a host of end-user markets for personal-care products, pharmaceuticals, and food. These opportunities are driving investment to the region. Sumitomo Chemical Asia, for instance, has expanded production capacities to meet them. Motoyuki Sakai, president of the company, emphasized that the company's strategy towards population growth included increased food production – through its supply of agricultural chemicals and animal-feed additives – and the preservation of the environment and energy.

As the ASEAN is one of the most diverse regions of the world – think different cuisines, cultures and languages – companies feel additional pressure to strategically understand each jurisdiction they are serving. A number of companies, including Corbion, DSM, Croda, Syngenta and Henkel, are utilizing Singapore as a center for research. They can develop new applications and technologies in Singapore and then use the jurisdiction as a launch pad to connect with their localized hubs across the region. Croda has taken this ap-

proach one step further, not only setting up laboratories in Singapore but also moving to a direct-selling model that might undercut traditional distribution channels and give the company a strategic advantage. "The performance improvements in Asia reflect the benefits of increased proximity to local and regional customers [...] We want to continue to grow our customer base by reaching as many customers as we can where we can create niche applications and value for them," said Marc Teo, Regional Managing Director, South Asia for Croda.

Digitalization is another way that producers are aiming to reach their end-user customers more directly. Syngenta, a global leader in agribusiness and agrochemicals, set up a Digital Innovation Lab in Singapore to raise smallholder productivity and improve the experience of its channel partners. "We knew that connecting with our intended customers through conventional means would be frustrating, bureaucratic and too slow for what we need to achieve. Instead, we have 'digital champions' based at a local geography level who are the heartbeat of the work that we are doing," said David Ryan, Head of Commercial Excellence for APAC at Syngenta. ■

Pieter Nuboer

Vice President, Animal Nutrition and Health,
and President, Nutritional Products

**DSM NUTRITIONAL PRODUCTS,
ASIA PACIFIC**



How have the human and animal nutrition divisions performed in recent years?

Within our region, DSM's human nutrition division has performed well. Globally, the same division tremendously expanded its footprint, both organically and inorganically. Our portfolio has widened through various merger & acquisitions, particularly in the category of nutritional lipids. We have also significantly expanded our micronutrient customization capabilities and footprint through global and local investments and acquisitions. As a result, in Asia, we now have unmatched proximity to our customers. The animal nutrition has done and continues to do very well; similarly, through expansion, we now operate 11 plants in Asia Pacific, not including China. Poultry is already a sizeable industry in Asia while aqua has been fast-growing. Due to fluctuating crop prices, the animal industry is rapidly changing. So, we need to be even faster and more local in reacting to frequently changing micronutrient needs.

DSM opened the Asia Pacific Nutrition Innovation Center in 2015. Are there any updates on its development?

The industry is becoming more insight-driven, and the Center has brought us closer to both customers and their consumers. At the center we offer externally facilitated needs exploration and typically a new idea comes out of our workshops, such as an ingredient or label claim. We host multinationals and large regionals in workshops to go deeper into the industry's needs – a recent example would be our fourth Sustainable Evidence-based Actions for Change (SEACHange) summit that was recently held in Singapore. It brought about new collaborations amongst non-profit organizations (NGOs), United Nations agencies, government and private sector organizations for projects on improving nutrition and nutritional products. The Center anchors DSM's status as the world's premier nutrition-solutions provider while enhancing our ability to address the needs of our regional customers, wherever they may be.

Could you explain the partnership between DSM and Singaporean Universities?

DSM has actively supported a unique master's program in science and tri-sector collaboration at Singapore Management University (SMU). Students are trained to become the change in bringing together business, society and government stakeholder to address issues associated with sustainability. Our partnership with the Singapore Institute of Technology (SIT) is also related to establishing an ecosystem and open innovation and is linked to the government's strategy of making Singapore an innovation hub. As part of their

food-technology curriculum, students get to work on real-life applications, dealing with the challenges brought by novel application in the field of supplements, food and beverages, stability and shelf-life.

What is your vision for DSM in Singapore and further afield?

In our industry, digital technology and tools will be transforming, if not disrupting the sector not least by providing us with deeper and faster insights into the effect of nutrition on both humans and animals. For example, breakthroughs in big data can already help predict diseases among animals based on their behavior. Precision nutrition will increasingly be a theme for us. ■



Brighter living for our future

DSM's innovation and creativity represents our commitment to a brighter, sustainable future. With a constant focus on dynamic collaboration and performance, DSM's diversity of ideas and people work together to enrich the world.



Frank Goovaerts & Jacky Soh Chion Kiat

FG: Regional VP Sales APAC & Managing Director APAC

JS: Business Development Director, Biochemicals

CORBION



FG



JS

Can you briefly introduce our readers to Corbion and its operations in Singapore and the region?

FG: Corbion, previously known as CSM, was formed in 2013, following the divestment of CSM Bakery Supplies and is built on the foundations of both Caravan Ingredients and Purac. The name is a compilation of over 100 years' experience and a new collaboration - reflecting how we work with partners - and the bio-based products we produce. Corbion is an industrial biotech innovator, a global market leader in lactic acid, lactic acid derivatives, and a leading company in emulsi-

fiers, functional enzyme blends, minerals, vitamins and algae ingredients.

Singapore is currently the company's APAC HQ and our footprint in the region includes a large production facility in Thailand - chosen for the availability of sugar cane - and sales offices in Japan, South Korea, Thailand, China, India and Singapore. Moreover, we have a laboratory in Singapore, which acts as an application and innovation center, although basic research and developing is carried out at our global HQ in Netherlands and in the United States.

Could you tell us more about the production process of lactic acid and the derivatives that are produced?

FG: We produce lactic acid, in its most basic form through fermentation, as an acidifier in chemical applications but also as a food-grade flavor enhancer in food applications. We are constantly researching, developing, and producing derivatives of lactic acid: in the food industry, derivative technology is used for food preservation. Today, environmentally friendly methods are important across all markets, therefore naturally fermented lactic acid is in high demand. We do not use synthetic chemistry and synthetic lactic acids are rarely used in the food industry.

JS: Lactic acid and its derivatives are also used in the fortification of food and drinks as well as in home and personal care products, including moisturizers and bacterial preventatives. Increasing consumer demand for safe, sustainable products is driving growth, and we help to increase awareness of lactic acid and its benefits.

What is the technological and commercial vision for the company?

FG: Europe and North America currently occupy a considerable share of Corbion's global turnover. Given Asia's exponential growth, increasingly sophisticated consumer base, and growing awareness of the crucial importance of sustainability, our aim is to increase our footprint in the region and bring Corbion Asia to its full potential.

JS: We constantly strive to find more applications for lactic acid and its derivatives, as alternatives to less environmentally friendly products, and are excited about the new PLA factory in Thailand, opening the door for sustainable plastics to fulfill the demand of the Asian market and beyond. ■

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Paul Nai

Managing Director

LUBRIZOL SOUTHEAST ASIA



Can you introduce our readers to Lubrizol and your capabilities across the ASEAN region?

Lubrizol first came to Singapore in 1984, working primarily in additive distribution. Today, in addition to lubricant and fuel additives, we also have our advanced materials portfolio of personal and health Care and engineered materials. We set up the operations here because we can serve the entire ASEAN from Singapore, which is a very exciting region. It has approximately 560 million people and a very young population, with a median age of 30. In addition to growing end-user markets, we are seeing an upgrade in the market demand; higher quality and specificity across our portfolio are increasing. One example in the personal care area is the demand for skin lightening by Asian consumers.

Singapore is ideally placed, as many of our customers have their own research and innovation labs here to focus on front-end innovation. Singapore has also developed a strong eco-system that allows industry to partner with local university and the

A*STAR research institute. As an example, we see Singapore as a center of excellence for packaging and electronics application. The supply chain is also important, and we have spent years developing our network here and are very well positioned to move things in and out of Singapore efficiently.

The additives industry has greatly benefited from increasing demand in a number of end-user industries including automotive. How have you been strategizing growth?

We have developed growth strategies that involve locating ourselves very close to our markets. While technology has traditionally been developed in Western markets, it is becoming more prevalent throughout Asia. Countries like China are beginning to lead in terms of technology development, and we are ready to provide the solutions that they need. China's stringent fuel economy and emission standards are also growing the market for lubricant and fuel additives. ■

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being essential

At Lubrizol, our mission is straightforward: We improve lives as an essential partner in our customers' success, delivering efficiency, reliability or wellness to their end users. Through the efforts of our talented and knowledgeable employees, we combine market insights with chemistry and application capabilities to deliver valuable solutions to the global transportation, industrial and consumer markets.

Lubrizol

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Marc Teo

Regional Managing Director, South Asia
CRODA



When we last interviewed Croda in 2016, the expansion of the Alkoxylation Plant on Jurong Island had just been completed. Can you update us on Croda's operations in the region?

Asia continues to be the company's growth engine, with record profits and robust top and bottom line organic growth across all market sectors. The performance improvements in Asia reflects the benefits of increased proximity to local and regional customers following the transfer of distributor sales to a direct selling model.

Our relentless focus on innovation is a big driver of our growth story. At Croda, we have identified four key mega trends – changing demographics; fragile world; demand for transparency and trust, and digitalization – which shapes our strategy, business model and our innovation efforts. We will continue to invest in fast growth technologies, both organically and by acquisition; in R&D, through our successful Open Innovation and Smart Partnering programmes with NUS, NTU, A*Star and ICES to meet the needs of consumers arising from these mega trends.

With a 'fragile world' being a key global mega trend affecting Croda's business strategy, how are you prioritizing sustainability?

Sustainable product innovation is at the core of our business strategy. Most notably, renewable raw materials are being implemented as a solution for reducing our net-environmental impact. A key example of this is our bio-surfactant plant, opening Q2 2018 in Delaware, USA that will lead to the production of 100% renewable, 100% bio-based non-ionic surfactants through the use of ethylene oxide derived from bio-ethanol. This will have implications on Croda's operations worldwide, drastically reduce our carbon footprint as well as those of our customers. Across all industries, there is a strong consumer demand for increased bio-based renewable content in finished products. Ethoxylates have a wide use in many of the industries we serve, including personal care, where over 50% of skin and hair care products launched over the past 20 years globally contain such ingredients. ■

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Thomas Holenia

President
HENKEL SINGAPORE



Can you update our readers on the latest developments at Henkel since the completion of the global supply chain hub?

Our global supply chain hub in Singapore serves as a global center of excellence for supply chain, Industry 4.0, digitalization, talent management and sustainability. In line with this, we have been expanding the team and driving forward various initiatives.

We have established an ecosystem of global and regional suppliers in Singapore, which includes those based on Jurong Island. Our team has also qualified all our strategic global and regional suppliers based in Asia-Pacific – close to 500 of them – under the global 'Together for Sustainability' initiative. Another achievement is the certification of the hub to the international ISO 9001:2015 and 14001:2015 standards for quality and environmental performances only eight months after inauguration.

To accelerate digitalization, we have established a digital hub for Asia within the global supply chain hub and are actively working with start-ups and local universities on various innovation projects. Additionally,

under the leadership of our Industry 4.0 experts, our adhesive-technologies business has implemented 11 smart factories in Asia and is on track to establish another four for a total of 15 smart factories in the region by 2019.

Following Henkel's record-profit year in 2017, with annual sales exceeding 20 billion euros for the first time, how is the APAC region contributing to the company's growth?

In 2017, our organic sales growth in the region was 5.9 percent. At more than 3 billion euros, the Asia-Pacific region accounted for 17% of Henkel's global net sales. Moving forward, there remains a huge opportunity in this market. Industry manufacturing is set to increase, while a growing middle class will continue to drive up demand.

In Singapore, we are strengthening our adhesives business by leveraging our expertise as the global market and innovation leader in adhesive technologies. We will continue to focus on forging closer collaboration with our customers and delivering high impact solutions. ■

Mobility

China's increasing demand for commercial vehicles as well as environmentally friendly vehicles is another area that presents new opportunities for Singapore's additive manufacturers. The four largest additives producers – Afton Chemical, Lubrizol, Infineum and Chevron Oronite – account for 80% to 85% of global business and have a major presence in the island-nation. They continue to strengthen their hand across a number of APAC's end-user markets, not only in engine-oil additives and fuel lubricants for the automotive industry but also additives for personal care and food. Afton Chemical recently expanded its Singapore operations with a second-phase expansion, set to be completed in late 2018, that aims to develop dispersant technologies to meet China's growing demand in the automotive industry.

The needs of the automotive industry have also increased global demand for synthetic

rubber. Tire production has seen an annual growth of 3% to 4%, with ASEAN growth at 5% to 6% and China at 7% to 8%. Although the industry suffered from volatile feedstock prices, global demand for synthetic rubber market is expected to grow by 5.16% annually from 2017-2021. Consumers increasingly prefer synthetic rubber to natural rubber due to lower costs and wider varieties and applications. For example, ARLANXEO, a joint venture between Saudi Aramco and LANXESS, now has butyl rubber and neodymium butadiene rubber (NDBR) production facilities in Singapore. Given the former's access to the raw materials required for synthetic rubber, the company believes it can capitalize on growing regional demand. Lastly, the fuel additives and lubricants market is seeing particularly dynamic growth. As with the synthetic rubber industry, this growth is driven by increasing demand for passenger cars and commercial vehicles in APAC, most notably in China, which is currently producing 20 million cars a year. China's new cleaner emission regulations are adding to this demand for additives. ■

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There is not only a desire from the customer for new vehicles but also from the government for improved fuel economy and emission controls. We are meeting the lubricants-technology demand to enable this with the development of solutions for vehicles equipped turbo charged injectors and particulate filters.

- Sean Spencer,
Vice President and
Managing Director –
Asia Pacific,
Afton Chemical
Asia



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Joosang Kim

Managing Director and
Regional Head of APAC
ARLANXEO



ARLANXEO was recently established in April 2016 through a joint venture. Can you introduce us to the company?

ARLANXEO was formed through a joint venture between Saudi Aramco and LANXESS. Saudi Aramco, as the largest oil producer in the world, was a perfect platform for LANXESS in having access to the raw material needed to make synthetic rubber. We currently have a global footprint of 20 plants in nine countries with eight R&D centers and four application laboratories. We have a clear identity as a synthetic rubber producer with two different business units - Tire & Specialty Rubbers (TSR) and High Performance Elastomers (HPE). TSR is focused on producing rubber for the tire industry with two products - butyl rubber and butadiene rubber. HPE is used in a wide range of industrial applications, including automotive, cable, gas, and oil industries.

When we launched ARLANXEO, the global synthetic rubber industry was undergoing a challenging time but since then, it has been very positive. ARLANXEO's global revenue in 2016 was €2.7 billion and in

2017, it was €3.2 billion. The synthetic rubber demand is related to the tire industry and Asia is contributing to over 50% of global tire production.

ARLANXEO recently opened a new neodymium butadiene rubber (NDBR) plant on Jurong Island. Can you tell us about your manufacturing capabilities in Singapore?

We have two manufacturing facilities in Singapore. The first plant produces butyl rubbers with an annual capacity of 100,000 mt. The recently opened 140,000-mt NDBR plant is the largest in the world. NDBR is used for high-performance tires as well as for all luxurious brands of golf balls.

Can you tell us about ARLANXEO's green-tire technology?

Tire producers have started using silica, which offers great advantages to carbon black tires. Green-tire technology will guarantee better fuel efficiency, durability, and safety. We have contributed greatly to the Asian tire producers penetrating this market. ■



Sean Spencer

Vice President and Managing Director – Asia Pacific
AFTON CHEMICAL ASIA

Can you give us an update on Afton Chemical in Singapore with a focus on the recent expansions to the Jurong Island facility?

Asia is the fastest growing market for fuel and lubricant additives driven by the demand for passenger cars and commercial vehicles, combined with higher-technology demands to meet the increasingly stringent fuel economy and emissions standards in the region. China is driving this hard.

Both phase one and phase two expansions of our Jurong Island facility have been preparing for Afton's growth in APAC. Phase one focused on bringing our manufacturing capabilities into Asia and integrating them with our blending and distribution networks. Phase two focuses on developing dispersant and anti-wear technologies which are key enablers to the lubricants required in both commercial and passenger vehicles in Asia over the next 10 years. Our capacities are globally connected to support the regional and global business continuity. Since we last spoke, Afton has also acquired Aditivos Mexicanos, S.A. de C.V. (AMSA), which provided additional capacity and technologies to our global capabilities.

How have you seen the fuel additives and lubricants market evolve in the past five years in APAC?

The pace of change in the market is highly dynamic and has evolved rapidly. Six years ago, China was utilizing products from a product lifecycle perspective that were eight to ten years behind the West. By 2020, China will be ahead of the West and leading the market in terms of quality, demand and change. There is a desire from

the customer for new vehicles and from the government for improved fuel economy and emission controls. We are meeting the lubricants technology demand to enable this with the development of solutions for vehicles equipped with turbo-charged injectors and particulate filters.

Sustainability is a key focus for many businesses in Singapore. What is Afton doing to prioritize sustainability and is E-Mobility a focus for the company?

Our overall mission is to enable emission reduction, increase fuel economy and extend equipment life. This is seen throughout our product development. As a company, we are reducing waste and our carbon footprint. Sustainability has been an ongoing priority for Afton and will continue to be a key focus. E-Mobility is very much on the horizon for the automotive industry and it is clearly going to have an impact on the industry over the next 20 years. In the short term, hybrid vehicles will have the biggest influence and we focused on developing solutions for them.

How are the fuel and lubricants industry likely to change in the coming five years?

China is looking to develop its automotive industry as much as possible. There will be a significant shift with China moving from a consumer to developing its own technology. We are seeing this in its new regulatory standards. The level of R&D investment that an additive and oil company will need to maintain these standards will increase. Although the industry will be more complicated, it will lead to higher quality products and better solutions for the consumer. ■

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Consumers are becoming far more sophisticated. They are well informed with fast changing taste. For example, they are able to tell the difference between shampoo A and shampoo B. Consumers are also faced with many choices; example, it is challenging to understand how to pick and choose different lubricants. For us, we are faced with rising costs and increasing competition. We need to bring innovative new products to market fast and innovate our supply chain.



- Paul Nai,
Managing Director,
Lubrizol Southeast Asia

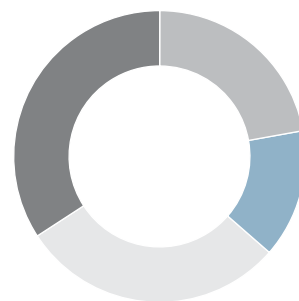
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Textile Chemicals

China has dominated textiles in recent years, following a manufacturing shift to the eastern part of the country due to advantageous low-cost labor. Yet there is now a growing trend of manufacturers going back to the United States, as labor arbitrage and cost structures have narrowed, along with energy costs. Rohit Aggarwal, president of the textiles effects division at Huntsman highlighted that productivity in APAC will be central to companies' maintaining global competitiveness. "The brands are focusing on fast retailing and the emphasis on speed, agility and inventory management will become ever more important. Cost and shorter lead times will drive the supply chain in the next few years. We can expect efficiency and enhancement in logistics and supply chain management to cope with the trends of speed and agility. Singapore will play an even greater role as a creator hub as well as a logistics base," said Aggarwal. ■

Fixed Asset Investments by Industry Clusters (2017)

Source: Economic Survey of Singapore 2017



● Services Clusters	34%
● Electronics	22%
● Chemicals	14%
● Others	29%

Petrochemicals

In the coming decade, APAC is expected to contribute two-thirds of total global demand for petrochemicals (KPMG). If a major petrochemical player is yet to have set up in the region, they will most likely strategize a plan to do so given these opportunities. Braskem, the largest petrochemical company in Latin America, initially came to Singapore in 2011 to carry out market intel-

ligence but its office quickly began focusing on trading and sales to cater to APAC. Renato Teodoro Goebel, Head of APAC at Braskem, sees a slew of opportunities for investment and trading in the region. "It is culturally and economically diverse, where a convergence of very developed and developing countries meet. We are going to pay close attention to the changing dynamics of

the region, and I believe Braskem's presence in Asia will grow substantially over the coming years," said Goebel.

As China and the ASEAN continue their economic ascent and rapid urbanization, major regional players and MNCs are monitoring how best to meet demand and capitalize on opportunities. Singapore has been proactively modernizing its refining and petrochemical industry through technological advancement, energy efficiency and reduced reliance on importing feedstock by increasing its liquefied natural gas (LNG) capabilities. Singapore LNG Corporation achieved provisional acceptance for its fourth storage tank in March 2018, which will add 260,000 m3 of storage capacity to bring the terminal's total storage capacity to 800,000 m3.

Despite the slowdown in the first half of 2018, Jurong Island's petrochemical producers are still well positioned for future growth. Low crude oil prices and growing demand in a number of end-user industries including plastics, packaging and transportation in APAC are the main contributing factors. Mitsui Chemicals Group has, for instance, continued to expand its footprint in Singapore by opening its Prime Evolve plant in April 2017, the only Evolve plant outside of Japan producing Evolve™ branded MLLDPE. The plant is a prime example of how companies leverage Singapore as a base to tap into the growing ASEAN middle class.

ExxonMobil has had an equally busy year, completing its new grease and synthetic lubricants facilities in June 2017. The expansion of the Jurong lubricant plant increases the company's capability of meeting grow-



Image courtesy of Shell



For our olefins - which includes C2, C3, C4 and C5 - APAC is a major export market for C2 and C4. We also bring Aromatics such Toluene and PX, and MTBE - ETBE every time the arbitrage to Asia is open. More specifically, for the Butadiene we export 50% of the total production in Brazil and 75% of this is sent to APAC. Ethylene is also brought to the region, generally delivered to northeast Asia using large vessels.

- Renato Teodoro Goebel,
Head, Asia Pacific Region,
Braskem



ing demand for grease and synthetic lubricants products in the region. Furthermore, ExxonMobil completed the acquisition of Jurong Aromatics Corporation's Jurong plant, one of the largest aromatic facilities in the world. "The plant has an annual production capacity of 1.4 million tonnes, presents operational and logistical synergies for ExxonMobil's integrated refining and petrochemical complex nearby. As a leading global manufacturer of aromatics, the addition of this aromatics plant to our existing operations in Singapore will help us better serve our customers in key Asian growth markets," said Gan Seow Kee, Chairman and Managing Director of ExxonMobil APAC. ■

TOGETHER WE'LL TRANSFORM THE FUTURE.

At Braskem, we're always seeking new ways to help transform the future and improve people's lives. And we do that by using our knowledge of chemistry and plastic to develop innovative and sustainable solutions that help grow our client's business and create a better future.



Across the Johor Strait: Malaysia's Potential

Malaysia's emergence as a Southeast Asian manufacturing hub continues to take shape alongside Singapore, despite political uncertainty. As power is changing hands for the first time in over 60 years, there is an air of excitement but trepidation about governance, as Mahathir Mohamed's new government has announced that addressing his country's growing national debt is its top priority. Mohamed also put forth a blueprint for the country's infrastructural and industrial projects in light of the debt issue, which included the postponement of the Kuala Lumpur-Singapore high-speed rail. Singaporeans will keep a close eye on these developments next door. The single most important development in Southeast Asia's petrochemicals industry is the Pengerang Integrated Petroleum Complex (PIPC). Just across the Tebrau Straits

from Singapore, the PIPC is a 20,000-acre (thrice the size of Jurong Island), US\$27-billion development that includes oil refineries, naphtha crackers, and petrochemical plants. The project is set to generate US\$4.5 billion in gross national income by 2020 and help create 8,600 high-skilled jobs. Key to PIPC is the joint venture between PETRONAS and Saudi Aramco for the Refinery and Petrochemicals Integrated Development (RAPID) project, which includes a US\$7-billion investment from Aramco, the largest-ever foreign direct investment in Malaysia. RAPID is expected to be completed by early 2019, and the refinery will produce gasoline and diesel to meet Euro 4 and Euro 5 fuel specifications. The expansion of Malaysia's petrochemical capabilities is a harbinger of things to come in the region. In 2016, petroleum projects including petrochemicals in Malaysia recorded the highest investments approved, amounting to US\$3.83 billion. Although they are not

involved at the PIPC, both Lotte Chemicals Titan and Nylex (Malaysia) Berhad, two of the largest petrochemical producers, believe they will be able to continue prospering despite the magnitude of the project due to the growing end-user demands of APAC. "There will be some short-term impact when RAPID comes on-stream but we believe that the market in this region is big enough for both of us and together we can contribute to the growth and development of Malaysia," said Philip Kong, executive VP for Corporate Planning at Lotte Chemical Titan.

The market is indeed big enough to accommodate PIPC as a neighbor, as 60% of global demand for petrochemicals is in Asia. Singapore's petrochemicals hub, however, will have to continue differentiating itself from its close neighbor by producing higher value-added derivatives while benefiting from the increased trading opportunities offered by PIPC. ■

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Renato Teodoro Goebel

Head, Asia Pacific Region
BRASKEM

Can you introduce our readers to Braskem?

Braskem is one of the largest petrochemical companies globally, and was created in 2002 following a merger between six companies in Brazil. Following consolidation in the Brazilian market through mergers and acquisitions, we internationalized by acquiring Sunoco and Dow Chemicals' polypropylene businesses in 2010. We carried out our first greenfield project outside Brazil in Mexico with the Braskem-Idesa Integrated Polyethylene Production Plant: the plant started its operation in 2016, before the first wave of crackers based on U.S shale gas. Today, Braskem has production assets in Brazil, Mexico, the United States and Germany.

As the largest petrochemical company in Latin America, what were Braskem's motivations for opening an office in Singapore in 2011?

We initially came to Asia to carry out market intelligence, as it is the largest growth market, accounting for the biggest parcel of global petrochemical demand growth. Based on its geography and ease of doing business, we chose Singapore. The office quickly focused on trading and sales, catering for the APAC region. Currently, 50% of what we export in basic chemicals from Brazil is going to APAC with a tripling of growth between 2016 and 2017.

Braskem's chemicals portfolio includes olefins, aromatics, fuels, solvents and specialties. What products are you exporting to the APAC market?

For our olefins - which includes C2, C3, C4 and C5 - APAC is a major export market for C2 and C4. We also bring Aromatics such Toluene and PX, and MTBE - ETBE every time the arbitrage to Asia is open. More specifically, for the Butadiene we export 50% of the total production in Brazil and 75% of this is sent to APAC. Ethylene is also brought to the region, generally delivered to northeast Asia using large vessels.

We also export across the four other segments, including nonene, tetramer and specialties. As our products are delivered from the other side of the world, a reliant, optimized logistics and supply chain is essential, we have built strong relationship with our customers and prioritize effective communications.

How are you prioritizing sustainability?

Sustainability is a priority for Braskem, and we take it into account our whole product

cycle, including usage and recycling, to minimize both social and environmental impacts. We have formulated our core sustainable strategy around ten strategic macro goals linked to the 17 Sustainable Development Goals (SDGs) of the United Nations, and established targets for the results to be achieved by 2020. As part of our plastics division, we have developed a plastic - I'm green™ - that is 100% from natural resources, specifically sugar cane, whilst also retaining the exact same properties as normal plastics. The green polyethylene product line has been gaining global presence with over 150 brands in a number of end-user markets including packaging and products. We will be supplying the product for LEGO's 'botanical' elements range in 2018.

What is the ease of doing business between Brazil and Singapore with current trade regulations?

In May, Brazil and Singapore signed a comprehensive agreement for avoidance of double taxation (DTA). The agreement will lower barriers to cross-border investment and will offer greater opportunities for Brazilian companies to do business in Singapore. This puts Singapore further in line with the ASEAN, where there are no barriers for the products that we trade.

Due to lower feedstock prices and tighter margins, a number of petrochemical companies are looking further downstream. Is Braskem?

There is a clear trend of companies going further downstream and identifying niche specialty business areas. Low feedstock prices, especially in the United States and Middle East, allow for a competitive advantage. Braskem is also open to explore downstream opportunities in different value chains. For basic chemicals, intermediates or specialties, we are aiming to grow either by organically investing in Brazil or through joint ventures worldwide.

What is your vision for Braskem in Singapore and APAC?

APAC is an economically growing region with a great deal of opportunities for investment and trading. It is culturally and economically diverse where a convergence of very developed and developing countries meet. We are going to pay close attention to the changing dynamics of the region and I believe Braskem's presence in Asia will grow substantially over the coming years. ■

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COMMUNITY AWARENESS & EMERGENCY RESPONSE

We openly communicate with the community about the safety, health and environmental aspects of our plant operations. We ensure that each facility has an emergency preparedness plan and is able to respond rapidly and effectively to emergencies.

DISTRIBUTION

We seek to prevent harm to the public or environment posed by the storage, handling and transportation of chemicals by evaluating and eliminating risks as well as providing emergency response support in the event of a chemical distribution emergency.

EMPLOYEE HEALTH AND SAFETY

We identify and assess hazards, prevent unsafe conditions and foster training and communication in order to protect the health and safety of those who work at or visit our facilities.

POLLUTION PREVENTION

Our goal is to reduce or even eliminate waste materials and emissions at our plants by improving processes and procedures and the use of strict operational controls.

PROCESS SAFETY

We strive to prevent accidents and hazardous situations by ensuring that our facilities are designed, built, operated and maintained according to sound practices, and reviewed periodically for conformance.

PRODUCTS STEWARDSHIP

We make health, safety and environmental protection a priority in the development of new products and processes so that the chemicals we produce can be manufactured, transported, used and disposed safely.

Masayuki Kinoshita

Managing Director and CEO
**MITSUI CHEMICALS ASIA
PACIFIC**



Can you update us on the recent developments at Mitsui Chemicals Group?

Mitsui Chemicals Group had the opening ceremony in April 2017 for Prime Evolve Singapore Pte. Ltd. (EVLS), a manufacturing plant that produces Evolve™ branded MLLDPE. Evolve™, in line with the growing demands in South East Asia, is used mainly for packaging, especially retort packaging. The expansion rate of packaging materials in Southeast Asia is expected to exceed 10% per year, and EVLS makes its presence increasingly in this growing market.

In November 2017, Mitsui Chemicals Group published our 2025 Long-Term Business Plan, with a focus on three targeted business domains - mobility, health care and food & packaging. We will also place emphasis on new and next-generation businesses (R&D-focused) and continue to provide high-quality products and services. Currently in Asia Pacific, mobility and food & packaging business domains make up 90% of our manufacturing activities, but we are also in the process of expanding our focus in healthcare, which will soon take up a larger percentage.

What was the reason behind Mitsui Chemicals Group's recent expansion into Thailand?

We have always had a presence in Thailand, but we believed setting up a direct sales team there was necessary. The reason for establishing Mitsui Chemicals (Thailand) Co., Ltd (MCTH) is to expand sales to Thailand and its neighboring countries, which is an important market in Mitsui Chemical's three priority business areas, mobility, Food & Packaging and Health Care. In Thailand, the eyeglass lens production amount is the second largest in the world after China. At the same time, by using Thai language as a common language, we aim to expand cross-regional marketing.

Why was Singapore an attractive location to base your R&D facility?

In 2011 Mitsui Chemicals set up the utmost important R&D facility outside Japan in Singapore in order to cater for region-specific demands from here. Singapore also serves as the regional headquarters for Mitsui Chemicals Group in Asia Pacific region. And because of Singapore's business-friendly environment and logistical positioning, we are able to place focus on Asia Pacific oriented studies and generate new business throughout this region.

What is your vision for Mitsui Chemicals Group going forward?

In the Asia Pacific region, we are seeing a continued increase in demand for our products and we have the potential to expand our businesses and contribute to the region's success. Through this, we can improve the overall Quality of Life for everyone in the region. One other key to Mitsui Chemicals Group sustainability is to produce quality products that have Value Contribution Elements, which include response to declining birth-rates and an aging population, the advancement of medical and pharmaceutical fields and a response to food waste with an improvement of food productivity. Therefore, we developed another internal certification, Rose Value™, on top of the Blue Value™ to complement our contribution to the overall sustainability in both environment and society.

We want to continue be a holistic partner to our customers, and support them as best as we can so that they can succeed in their respective areas as well. ■

World-changing progress ideas come from radical shifts in thinking.

The power of chemistry can change our perspectives to create substance of significance from out of the void.

At Mitsui Chemicals, we harness this power with assurance to bring you solutions in mobility, healthcare, and food & packaging.

**0→1
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Mitsui Chemicals Group
group.mitsuichemicals.com



Gan Seow Kee

Chairman and Managing Director
EXXONMOBIL ASIA PACIFIC

Last year, ExxonMobil completed its 84-megawatt cogeneration plant on Jurong Island. What was the rationale behind this project?

The new 84-megawatt cogeneration plant will increase the refinery's energy efficiency, help reduce emissions and strengthen the facility's long-term competitiveness. With the completion, ExxonMobil now has more than 440 megawatts of cogeneration capacity in Singapore and is able to meet the majority of its integrated refining and petrochemical complex's power and steam needs. The additional cogeneration capacity builds on ExxonMobil's interests in more than 100 cogeneration installations at more than 30 locations around the world. It is an example of our commitment to using energy more efficiently. We continue to make strategic investments that help improve our manufacturing competitiveness in Singapore while minimizing environmental impact.

The new cogeneration plant is expected to improve the Singapore Refinery's energy efficiency by 4% to 5% and result in a net reduction of 265 kilotons per year of CO₂ emissions due to efficiencies gained from a combined cycle power generation process. This emissions reduction is equivalent to removing more than 90,000 cars from Singapore's roads.

What were the reasons behind the recent acquisition of Jurong Aromatics Corporation's Jurong Island plant?

The plant, one of the largest in the world with an annual production capacity of 1.4 million tonnes, presents operational and logistical synergies for ExxonMobil's integrated refining and petrochemical complex nearby. As a leading global manufacturer of aromatics, the addition of this aromatics plant to our existing operations in Singapore will help us better serve our customers in key Asian growth markets.

Singapore is home to ExxonMobil's largest integrated refining and petrochemical complex, which has a crude oil-processing capacity of 592,000 barrels per day and includes two world-scale steam crackers. Acquisition of the Jurong aromatics plant will increase ExxonMobil's Singapore aromat-

ics production to over 3.5 million tonnes per year, of which 1.8 million tonnes is paraxylene.

Our growth in Singapore is driven by the expected increase in global demand for chemical products over the next decade of nearly 45%, or about 4% per year. Nearly three-quarters of the increased demand is expected to be in Asia Pacific.

In Singapore's Year of Climate Action, how is the impending carbon tax likely to impact ExxonMobil?

The risks of climate change warrants thoughtful action. ExxonMobil is taking action by reducing greenhouse-gas emissions in its operations, helping consumers reduce their emissions, supporting research that leads to technology breakthroughs and participating in constructive dialogue on policy options.

ExxonMobil understands the need for carbon tax to encourage emissions reduction as we work to address the risks of climate change and meet the world's growing energy needs. ExxonMobil remains committed to working together with the government to find the right balance between providing affordable energy and products to support human progress, while addressing the risks posed by greenhouse-gas emissions and ensuring Singapore's competitiveness.

ExxonMobil is an industry leader in energy efficiency. We are proactively reducing greenhouse-gas emissions with ongoing initiatives to boost energy efficiency at our manufacturing facilities. Here in Singapore, our energy efficiency investments include the three cogeneration facilities at our integrated-manufacturing site, which supports most of our energy and steam needs.

ExxonMobil also applies a Global Energy Management System (G-EMS) to drive its efforts to manage energy use at its refineries and chemical plants worldwide. G-EMS has enabled ExxonMobil's to drive towards leading-edge energy efficiency performance. From 2002 to 2016, our initiatives have led to about a 25 percent improvement in energy efficiency at the Singapore integrated-manufacturing complex. ■

Andreas Krobjilowski

General Manager

SHELL JURONG ISLAND



Can you update us on your current operations and capabilities in Singapore?

Singapore is Shell's largest petrochemical production and export center in the Asia Pacific region. We have Shell's largest wholly owned refinery on Pulau Bukom, an oil and petrochemicals site that is integrated via subsea pipelines to Shell Jurong Island, our chemical intermediates manufacturing site. The intermediates that Shell Jurong Island makes goes into a range of everyday products, from paints, washing liquids, pillows, to plastic bottles, cars and computers. Together, the two sites make products that are sold across the globe. We have been consistently investing in the two sites over the years – Bukom and Jurong Island combined is our largest oil and chemicals integrated site globally, and we will continue to be open to opportunities to grow our capability and our business further.

Shell is currently working with local SME Avetics to deploy drones for plant

maintenance and inspection. With Industry 4.0, can you tell us more on how you are leveraging new technologies?

The government has been very supportive in encouraging the process industries in Singapore towards what is called Industry 4.0. We, as Shell, are very interested in this and have in parallel made strides to make Shell Singapore a living lab of innovations. We pitched in when the government was developing the Singapore Smart Industry Readiness Index, which is a world-first industry transformation tool to help companies – across all industries and sizes – harness the potential of Industry 4.0 in a systematic and comprehensive way. On our own front, for the manufacturing sites, we have put in place a multi-disciplinary team to deliver innovations. We leverage opportunities, collaborating externally with commercial partners and local agencies of the Singapore government, and also encouraging open collaboration within our company. ■

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Dato' Siew Ka Wei & Robin Ling

SKW: Group Managing Director

RL: Deputy Chief Executive Officer

NYLEX (MALAYSIA) BERHAD



SKW



RL

Nylex (Malaysia) Berhad has 16 subsidiaries operating across the ASEAN. Can you introduce our readers to the company?

SKW: The chemicals business began in 1982 under PKG and is still one of the main components of the Nylex Group. We have three business units: the polymer, industrial chemical distribution and the industrial chemicals manufacturing unit. Within the latter, we have three chemical plants in Malaysia producing ethanol, phosphoric acids and adhesives, respectively. In all of these industries, we are either in first or second place. We are heavily involved in distribution and logistics and the idea is to be end-to-end from the plant, to the transportation, to the customer, and we are doing this regionally.

RL: Our growth goals are not exclusively reliant on the Malaysian domestic market; in 2007, we expanded into Indonesia and Vietnam. We also have operations in Singapore and an integrated supply chain across the region.

To move onto the current market now, how have you seen the Malaysian chemicals industry evolve over the past five to 10 years?

RL: A great deal of the Malaysian manufacturing sector is export-orientated, as domestic demand is very low. The global downturn precipitated a decrease in global demand, so the Malaysian industry was negatively affected. It was also negatively affected by the non-competitiveness between domestic manufacturers and Chinese manufacturers; with China exporting much of their products to the same Western end-user markets, we faced competition from low-cost products. We have also faced growth problems due to a labor shortage. Due to low wages and long hours, we have faced difficulties finding the right local workers, and are dependent on foreign workers from the sub-continent. Over the past three to four years, most of our customers' demands have remained stable, however, which is positive. ■



Lee Dong Woo

President and CEO
LOTTE CHEMICAL TITAN

Lotte Chemical Titan was founded in 1989 and has over a dozen production facilities now in Malaysia and Indonesia. Can you introduce the company to our readers and walk us through its evolution?

Lotte Chemical Titan Holding Berhad began as a joint venture between The Chao Group International and Permodalan Nasional Berhad Equity Resources Corporation. We initially built a cracker and polypropylene plant in the early 1990s with a second cracker plant and other plants built in 2000. In Malaysia, we have 12 plants in Johor Bahru – located at Pasir Gudang and Tanjung Langsat. Our principal trading-hub company in Malaysia is responsible for exporting and distributing our products regionally. In Indonesia, through our acquisition of PT Lotte Chemical Titan Nusantara, we have three polyethylene plants. We are also planning to build a one million-tonne cracker and downstream integrated facility in Indonesia with construction starting in 2019 and completion in 2023/2024.

When Lotte Chemical Corporation took over Lotte Chemical Titan Holding Berhad in 2010, it initiated a number of expansion plans. Lotte Chemical Titan Holding Berhad was publicly relisted in Malaysia in 2017 with the South Korean conglomerate Lotte Chemical Corporation retaining approximately 76% of the shares.

The company made its debut on the main market of Bursa Malaysia in July 2017. What was the rationale behind this?

Lotte Chemical Corporation has strong operational excellence and has contributed significantly to the enhancement and upgrade of Lotte Chemical Titan Holding Berhad's operations since the takeover in 2010. In the past few years, Lotte Chemical Titan has produced good financial performance, which has led to the listing to raise funds to support its expansion plans and become a major petrochemical player in Southeast Asia.

Lotte Chemical Titan now has a comprehensive list of olefin and polyolefins. How has your product portfolio changed over time?

Previously, ethane crackers were more popular as the feedstock was cheaper than naphtha crackers. As a result, naphtha crackers were largely ignored. However, in

recent years, demand for naphtha crackers has grown, as ethane crackers only produce ethylene not the other derivatives created from naphtha like propylene or butadiene.

With the expectation that the new government will be more fiscally responsible and potentially invest in major industrial projects, what impact do you think the recent political elections will have on Malaysia's chemicals industry?

The new government will be a great change for the country, as it is committed to observing strong governance, preserving integrity and enhancing professionalism. Currently there is some impact in terms of foreign investment outflow, depreciation of the ringgit leading to the softening of the market. In the long term, if the government sticks to its agenda, Malaysia will grow to be a successful nation.

How was Malaysia's olefin and polyolefin industry evolved over the past decade and how has it been impacted by the reduction in feedstock prices?

The petrochemical business is a margin game, and we buy naphtha from the Middle East, which forms 80% of our costs. However, supply and demand of our products impacts us far more than feedstock prices. If there is limited supply and strong demand for our products, our margins will increase. The supply and demand cycle used to be five to seven years but is now unpredictable due to world dynamics. When petrochemical companies make a lot of money, they will start expanding, building additional capacity, and creating a surplus. When this happens, the margins will be squeezed. With increased world population and positive GDP growth, this business will continue to thrive.

What role will Malaysia and Lotte Chemical Titan play moving forward?

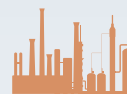
Lotte Chemical Titan Holding Berhad pioneered the petrochemical industry in Malaysia in the 1990s and has built a huge customer base in the Southeast Asia region. There will be some short-term effect when RAPID comes on stream, but the market in this region is big enough for both of us. Indonesia is a critical market for us and we are focusing on our next phase of expansion there, as the country is a net importer of petrochemical products. ■

PENGERANG INTEGRATED PETROLEUM COMPLEX (PIPC)



 **2019**

beginning of operations



Will house oil refineries, naphtha crackers, petrochemical plants, LNG terminals and a regasification plant

 **80km²**

area

 **\$27B**

investment

 **\$4.5B**

in GNI to be generated by 2020

 **8600**

jobs created by 2020

 **55km**

from Changi Airport

Includes JV between PETRONAS and Saudi Aramco for the Refinery and Petrochemicals Integrated Development (RAPID) project, a \$7-billion Aramco investment

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Logistics

"There is now a significant number of logistics players in the market, both global and local, resulting in a very competitive environment. Another key evolution is that chemicals companies continue outsourcing their logistics services to logistics companies so as to focus on core competences – manufacturing and selling their products – acknowledging specialist global logistic companies are best-equipped to transport and deliver the product."

- Paul Budden,
Director Global Southeast Asia and Australasia,
Den Hartogh



By Land, Sea and Air

Asia-Pacific's Forward-Thinking Logistics Hub

"Cogent One-Stop Logistics Hub is one of Singapore's largest one-stop integrated logistics hub. Based on Cogent's award-winning design, the Cogent One-Stop Logistics Hub boasts the world's first and only container depot located on its rooftop. The rooftop depot is what differentiates the structure and we store all the heavy cargo on the sixth floor."



**- Edwin Wan,
Deputy General Manager & Head
of Division for Warehouse,
SH Cogent Logistics**

Singapore's integrated and connected logistics system has long been the city-state's backbone in its transformation from a low-income country to one of the world's wealthiest. Despite being a small local market, the island nation has developed its infrastructure to serve every part of the international logistics chain. Its status is now mostly undisputed. Singapore has ranked as Asia's top logistics hub for 10 years and came fifth in the most recent Logistics Performance Index global rankings by the World Bank. Moreover, it is the world's second busiest port in terms of total shipping tonnage as well as home to Changi Airport, voted the top-rated international airport for six consecutive years (World Airport Awards). In 2017, Menon named Singapore the leading maritime capital in the world, ranking highest in a number of categories including shipping, ports and logistics as well as attractiveness and competitiveness.

Singapore is also not resting on its laurels. Construction began in 2016 on the Tuas mega port, whose capacity of 65 million twenty-foot equivalent units (TEU) is more than the combined capacity, 50 million TEUs, of the city's existing terminals. It will be the largest container terminal in the world and the single largest fully automated terminal. This expansion dovetails with

"We have observed an increasing number of chemical companies partnering with logistics service providers (LSPs) on their supply chain activities allowing them to invest and focus on utilizing internal resources to improving specific areas of their businesses such as R&D. Many are also trying to further optimize their working capital through the digitalization and automation of their process through LSPs who are already investing in the landscape to facility these services."



**- Satoshi Akasaka,
Regional Vertical Head of Chemicals - Asia,
Damco Logistics Singapore**

"To a ship owner, Singapore is a great location and a one-stop shop, because it is fast, efficient and now has a much more transparent bunker market with the mandate of the use of mass flow meters."



**- Mike Beviss,
Director - Special Projects,
Eastport Maritime**



Lieven Vander Elstraeten

CEO

BERTSCHI SINGAPORE

Can you give us a brief overview on your recent developments in Singapore?

Since 2016, Bertschi Singapore has doubled its storage capacity with a second warehouse, which has been in operation since January 2018. The entire infrastructure has been built to accommodate dangerous-goods storage. We also doubled our drum-filling capacity, quadrupled our steam-heating capacity and have been working to extend our license range to include a wider range of dangerous goods. Previously we were working with only class 3, 4.1, 6.1, 8 and 9. We have included 2.1, 2.2, 2.3 (gases), the full range of class four (4.1, 4.2, 4.3), which are flammable solids reactive with water or air, as well as 5.1 and 5.2 (oxidizers and explosive-precursor products). Moreover, we have tripled our manpower to 120 employees and will look to further expand to between 150 and 170 employees in 2018. We have further diversified our client base and are now serving 30 companies in Singapore.

Becoming a leader in the regional-ISO bulk-liquid tank market was very much a priority two years ago. How have you consolidated your regional presence in this respect?

Since Bertschi arrived in Singapore, S\$90 million was invested in our facilities and equipment, which ties in to our desire of becoming a leading ISO-tank operator in the region. The ISO-tank business has been growing aggressively and, in 2017, we increased our fleet to 14,000 tanks, an increase of 3,000 units compared to 2016. Moreover, we have built our own ISO tank-cleaning

station. Globally and in Asia in particular, the industry has seen reduced demand in ISO tanks over the past few years. We increased our investment and took an opportunity with a cheaper steel price. As Bertschi is a family-owned business, we can think more long term, without pressure, and take calculated risks. One of our strengths is that we conduct all our work out of one location in Jurong Island, which reduces transportation costs for our clients. This fits in with the government's goal for Singapore to move all the dangerous chemicals onto Jurong Island and away from residential areas.

What are the current prospects for Singapore's chemicals sector?

The Singapore chemical sector has been relatively slow as there have been limited new projects over the past two years. From a logistics standpoint, however, we have been able to increase our market share as we have diversified our client base and we have been commercially quite aggressive. To counter the general slowdown in production, the EDB has focused on developing the specialty chemicals market with smart solutions to integrate logistics, the facilities and the chemical producers to make Singapore a smart destination for investment. It is no secret that the chemicals sector is rapidly developing in China and Vietnam, due to the low cost of production, and so Singapore is focusing on specialty chemicals. Singapore is still able to differentiate itself from the rest, as Jurong Island is very well integrated and minimizes risks and offers several synergies. ■

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PROVIDING INNOVATIVE LOGISTICS SOLUTIONS FOR THE CHEMICAL INDUSTRY

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Non hazardous and hazardous material
warehousing & isotank storage
Trucking
Isotank heating
Drum heating
Blending
Onsite logistics management solutions
Global Isotank Operations
Freight forwarding

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Jason Goh

CEO Asia

YANG KEE LOGISTICS



What have been the most notable recent developments for Yang Kee?

Yang Kee made four acquisitions in 2017; the largest two being Axima from Australia, and the Fliway Group from New Zealand, which makes us the first and largest Singaporean 3PL player to operate in the Oceania region. We also acquired SST International in the US and a local company, Container Connections. The combined Yang Kee group now has a headcount of over 1,250 employees in 12 countries across Australia, China, Hong Kong, New Zealand, South-east Asia and the US.

Currently in Singapore, 75% of our revenue comes from the petrochemicals industry. The total revenue from Singapore, which in-

cludes our transportation and international freight arm, is 20% of our global revenue.

Yang Kee is set to unveil its new Tuas South Link 1 logistics hub in July 2018. Can you tell us more about Yang Kee's facilities in Singapore?

We have two facilities running in Singapore, at Jurong Pier and Tuas South, that predominantly deal with petrochemical and dangerous-goods storage as well as fashion and fast-moving consumer goods (FMCG) products. Being forward-looking, our third and newest Singapore logistics facility, the Yang Kee Integrated Logistics Hub at Tuas South Link was built in line with the nation's Industry Transformation Map. Located just two minutes from the future Tuas mega port, it will be a six-story ramp-up warehouse with a total floor area of 66,000 square meters, ideal for regional distribution centre (RDC) operations. There are plans to build an automated container depot next to the building. This new facility and the total logistics services we are offering – from contract logistics, transportation, international freight to depot management services, strengthened by our acquisition of Container Connections and an entire logistics ecosystem we are building – provide us with a unique positioning in the market.

How will the Tuas mega port impact Yang Kee's operations?

Our new Tuas South Link facility is very close to the future Tuas mega port. All of the port operations are going to move there over time. Our logistics facility is currently the largest and most modern in the area. Furthermore, this new logistics facility is very close to other established industrial parks such as Lube Park, the Tuas Bio-medical Park, the JTC Chemicals Hub, as well as Jurong Island, which is ideal for serving the growing chemical market.

What current opportunities do you see in the ASEAN logistics market?

The chemicals industry continues to grow in the region and I see companies starting to increase their production capabilities in other ASEAN countries. There is a growing middle class in the region, and this had led to increased demand for specialty chemicals. Generally, Southeast Asia will see an increased requirement for petrochemicals logistics, but currently the infrastructure does not support dangerous goods storage facilities. The problem lies in lax regulation enforcement. The supply has not matched the demand with respect to dangerous goods storage facilities in the developing nations of ASEAN and this represents a great opportunity for Yang Kee. ■

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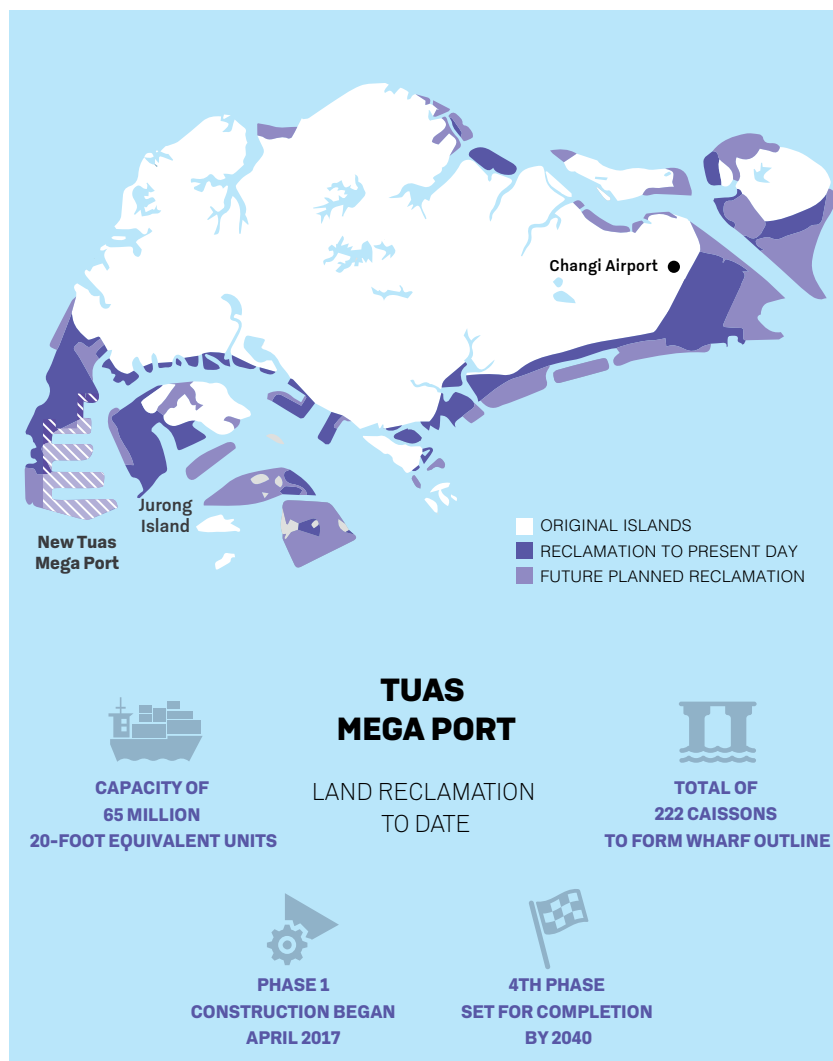
YANG KEE LOGISTICS
WE MOVE TOGETHER

the government's industry-transformation program, which aims to cement Singapore's future as an innovative and forward-thinking logistics hub. A separate road map for logistics is set to add US\$8.3 billion in value to the sector and create 2,000 jobs by 2020 (Ministry for Trade and Industry). "We are excited for the development of the new port, which will further underline Singapore's connectivity to the world and its strategic regional dominance in the field of chemicals," said Lieven Vander Elstraeten, CEO, Bertschi Singapore.

Yang Kee Logistics, the largest homegrown logistics provider, is set to benefit from the construction of Tuas. With two facilities currently operating in Singapore at Jurong Pier and Tuas South, the company is set to open a third logistics facility later this year. "Yang Kee's integrated logistics hub at Tuas South Link was conceptualized and built in line with the nation's Industry Transformation Map for the logistics sector, to continue securing Singapore's position as a globally leading logistics hub that is underpinned by operational excellence, innovation and a strong Singaporean core. Strategically located two minutes from the future Tuas Mega Port, it will be a six-story ramp up warehouse with a total floor area of 66,000 square meters, and ideal for regional distribution center operations," said Jason Goh, CEO Asia, Yang Kee Logistics.

Rising demand for ISO tanks

Singapore's logistics firms are also strengthening their hands in anticipation of demand growth across the region. Bertschi Singapore doubled its storage capacity with a second warehouse completed on Jurong Island in January 2018 that accommodates dangerous-goods storage. Following a downturn in the ISO tank market due to overcapacity, both Bertschi and Suttons Group have recently begun expanding again. Bertschi increased its fleet by 3,000 in 2017, purposely making the investment when steel prices were low. "Last year we made an investment of 800 ISO tanks and we have just placed an order for an additional 1,000. There is an ongoing program to expand and upgrade our global fleet," said Jochen Krapp, regional director of Southeast Asia, Suttons Group.



Going digital

Industry 4.0 is further encouraging logistics providers to augment and improve their customers' operations. Damco, a freight forward and supply-chain management service company with its regional HQ in Singapore, has launched Twill Logistics – a digital forward – that simplifies and digitalizes customer experience around quoting, booking, billing, cargo tracking and dashboarding. Moreover, BDP International has incorporated digitalization into their process to make their customers' supply chains more seamless. "We integrated a transportation management system to help our customers manage their businesses with maximum productivity and efficiency. We have also provided complete end-to-end visibility to our customers for over a decade with our BDP Smart® technology. BDP

Smart® is a market-facing visibility tool that aggregates data, tracks our customer's inventory, and provides instant traceability including documentation timeliness, amongst others," said Gary Chan, Managing Director for APAC at BDP International. Goetz von Dresky, managing director at Out of the Box Logistics, also sees Industry 4.0, and new technologies, positively affecting logistics through greater efficiency in the supply chain: "currently, a lot of customers entering the supply chain do not look at the main drivers of cost, namely infrastructure and inventory costs. It is only possible to find a balance through simulation, using algorithms based on accurate sales from an operating plan. Automation and data-driven decision-making plays a huge role, not only for improving costs but also efficiency and quality," said von Dresky.

Jochen Krapp

Regional Director
SUTTONS GROUP



Can you tell us more about the structure of Suttons and its strategy?

Along with many of our competitors, we went through a difficult period. We tried diversifying our services from only specializing as a tank operator to providing a wide range of logistics services. Since then, we have returned to our roots to focus on our ISO tanks business. We want to help our customers who have very complex supply chains and difficult products with different hazardous grades. Last year we invested in 800 ISO tanks and recently placed an order for additional 1,000. There is an ongoing program to expand and upgrade our global fleet. Additionally we invest into specialized tank containers such as lined tanks and electrical-heated tanks. We are also a market leader in providing baffle tanks for shipping products with a high, specific gravity

Can you tell us about your operations in China?

When we went to China 20 years ago, we were one of the first international tank container companies in the market. Our

customers were MNCs and Chinese manufacturers, who appreciated international standards in logistics. Due to tougher regulations in China for transporting hazardous goods, it has become more difficult to put infrastructure on the ground, in particular to clean and maintain tank containers. However, the increased regulations are good news for us, as it elevates the overall standard and quality.

Is the larger ASEAN region embracing stricter regulation as well?

We are operating in almost all of the countries in Southeast Asia and have identified a need to share our knowledge when it comes to quality and safety. Suttons trains and coaches its agents and suppliers to enhance their safety standards and carries out regular safety audits. We are very selective about approving new suppliers in ASEAN, as we want the same high service levels in Indonesia and Thailand as we provide elsewhere. Even if certain countries are not actively supporting increased regulations, we set the highest standards. ■

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Gas rises: shipping and IMO 2020

The introduction of the International Maritime Organization's mandate (IMO 2020) to reduce marine fuel-sulfur content from the current limit of 3.5% to 0.5% is set to have a major effect on bunkering ports, with fuel costs expected to rise by up to US\$60 billion annually from 2020 according to PCI Wood Mackenzie. IMO 2020 would in theory hurt Singapore's business as a bunkering port, but Mike Beviss, Director of Special Projects at Eastport Maritime, does not believe this will be the case. "We have heard that there is some concern that Singapore might lose some of its volumes to China because China has a lot of surplus gas oil, but we do not anticipate that happening to any great extent. To a ship owner, Singapore is a great location and a one-stop shop, because it is fast, efficient and now has a much more transparent bunker market with the mandate of the use of mass-flow meters," said Beviss.

On the other hand, IMO 2020 rendered the bulk-storage market more inconsistent by creating volatility in the oil bunker market. Tony Quinn, Director and CEO at



Image courtesy of Bertschi Singapore

Tankbank International, believes that IMO 2020 has created difficulties and is changing the market. "Initially companies tried to deal with this by retro installing scrubbers, which was an inefficient process due to cost and refit timescale. Blending fuel oils has become a preferred process for traditional

fuel oil terminal businesses. They are thinking about becoming blend farms or mini refineries. The downturn in fuel oil is due to this uncertainty. There is still the same demand for fuel but transporting it anywhere is difficult because of the uncertainty," said Quinn. ■

Goetz von Dresky

Managing Director
OUT OF THE BOX LOGISTICS



Can you introduce us to Out of the Box Logistics' operations in Singapore?

At Out of the Box Logistics we provide consulting in the areas of supply chain management and logistics outsourcing, with a specific focus on chemical logistics, combining 3PL and 4PL services across Asia. Our clients are usually chemical manufacturers and 3PL providers, but we also support private equity and overseas corporations venturing into the Asia markets.

The logistics business seems very opaque, and separate from the chemicals industry. Are you seeing this evolve in Asia at all?

At this stage, we observe a very fragmented approach, driven by frequent tendering exercises, where the focus is on procuring a single specific service at the lowest cost. While this should theoretically ensure the lowest costs across the board, in reality it leads to fragmented supply chains with frequent handovers and a lack of transparency involving too many stakeholders with a lack of overarching optimization.

Case in point: once the warehouse provider has won the most recent tender exercise, at break-neck rates, will he identify excess warehousing cost to his customer? Will the 3PL, for whom contract logistics is just another revenue stream, highlight ageing inventory to his customer? Probably not, so while the customer's procurement establishes the lowest operation cost, the supply chain is bloated with increased inventory, lack of transparency, and increased working capital. The alternative doesn't work in Asia: none of the established 3PLs has a sufficient footprint across all of Asia, providing all services, along the chemical supply chain. Most global 3PLs have invested in solid and capable logistics capabilities (people, processes and assets) for industry verticals such as automotive, pharma and retail, but not in chemicals.

This is not only the case in terms of assets, but even in HR, where there is insufficient knowledge and training when it comes to dangerous goods (DG) regulations, special equipment such as tank containers or gas transportation and the other intricacies of chemical logistics. Chemical logistics is by no means rocket science, but special know-how is required like in any other logistics vertical!

Instead, many 3PLs even reduced their so-called "chemical logistics" to non-DG services, only. For the 3PLs, this creates a

dangerous mindset: all and any chemical logistics services should always be undertaken based on a DG-mindset.

How do you think the adoption of Industry 4.0 technologies like blockchain and automation will affect the logistics sector?

Industry 4.0 technologies will have a very positive impact. Currently, many customers do not look at the main drivers of cost in the supply chain, namely infrastructure and inventory. It is only possible to find a balance through simulation, using algorithms based on accurate sales from an operating plan. Automation and data-driven decision-making improves costs, efficiency and quality. Furthermore, there is no better way to monitor a logistics process than via blockchain and a shared ledger. Singapore has shown a lot of vision for reinventing itself, creating economies of scale, encouraging service providers to foster innovation. I am sure that in 10 years, we will all ask ourselves how we ever managed global Supply Chains without blockchain technology. ■

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John Ng

Chief Executive Officer (CEO)
SINGAPORE LNG CORPORATION



Can you update us on the latest developments at SLNG?

Actually, there was quite a bit more that SLNG did in 2017 to demonstrate our terminal's new capabilities. In April 2017, we officially launched the country's first LNG truck-loading facility, which was developed in collaboration with the Maritime and Port Authority of Singapore. It is a small step, but nonetheless an important one, towards enabling the development of LNG trucking and LNG truck-to-ship bunkering businesses in Singapore. It is also a testimony that SLNG is willing to take bold first steps where necessary to help facilitate the growth of LNG-related businesses in Singapore. To date, we have completed more than 20 LNG truck loadings at the terminal and, depending on the demand, the SLNG terminal's design masterplan provides for at least another four truck-loading bays to be built.

In June 2017, following a detailed ship shore compatibility study, we tested and proved the terminal's capability to support small-scale LNG deliveries when we successfully carried out the gas-up, cool-down and reload of the 6,500 m³, Cardissa, the smallest LNG vessel so far to berth at our Terminal. This was no small feat given that the jetty used to carry out this operation is originally designed to accommodate LNG vessels from 60,000 m³ onwards. The success of the operation effectively demonstrates to the market that the SLNG Terminal has the capability to play the role of LNG supply hub, by facilitating deliveries of small volumes of LNG to other terminals in the region. This capability could also be used to facilitate delivery of LNG as bunker fuel to ships in our port.

In December 2017, we successfully executed our first Jetty-to-Jetty (JTJ) LNG transfer, which is essentially a simultaneous transfer of LNG cargo from one vessel berthed at one jetty, to another vessel berthed at the other jetty, without the cargo going through the storage tanks. ■

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Tony Quinn

Director and CEO
TANKBANK INTERNATIONAL



Can you introduce our readers to TankBank International's operations in Singapore?

TankBank International began in 2003 with a focus on liquid terminal development globally. To date, we have successfully originated nearly S\$3 billion worth of projects across 23 terminals around the world. Origination and development has been core to our business as well as the purchase and asset sales of terminals, specifically oil and chemical liquid terminals. Our business offering diversified following the 2008 financial crisis due to a change of focus by the finance industry (GFC). Consequentially, we created our annual Tankbank Conference, this year in Marseille, and TankChat – diversifying our business network and our service offering.

TankChat was set up in 2010 as a niche business social outlet system for the bulk-liquid, tank-storage community and currently has 8,500 vetted active users specific to the industry. We are a GDPR approved platform and are one of the few companies who can advertise directly to the industry.

Following the financial crisis in 2008, banks have been more reluctant to take on risk. What advice do you give financial institutions investing in the liquid bulk space?

Unlike some parts of the supply chain, the bulk liquid terminal network has been a stable part of the chemicals and liquids supply chain for many years. Prior to 2005, there was little investment externally from financial institutions as much of the industry was privately held in family businesses, like Oiltanking companies - Odjell and Stolt-Nielsen. More recently, there have been more investment from pension funds, institutional investors and private equity firms. The storage terminal business is globally not overbuilt so it is still relatively low risk. As an originator and advisor, one of our roles is to make sure there is not an oversupply or undersupply in a specific region. For example, there is currently an oversupply in Indonesia and Malaysia, especially in the oil sector but an undersupply in Vietnam. ■

Gary Chan

Managing Director Asia Pacific
BDP INTERNATIONAL



Can you tell us about the recent developments at BDP?

In 2017, BDP opened new offices across the globe, including Hyderabad and Vadodara (India), Paita (Peru), and Copenhagen (Denmark), and in 2018 we expanded to Nairobi and Mombasa (Kenya), a second office in Cairo (Egypt), and most recently, in Dublin (Ireland).

We continue to leverage our expertise in handling specialty shipments and dangerous goods to expand our reach to customers in other pivotal industries such as life sciences and healthcare. A key to BDP's success is our unwavering focus on our customers' needs when identifying new markets and frontiers. With such a clear objective, we evaluate the markets based on the needs or anticipated needs of our customers instead of economic 'hype'.

How is BDP incorporating digitization into its operations?

BDP has always focused on ways to simplify and streamline processes, making our customers' supply chains seamless. We integrated a transportation-management system to help our customers manage their businesses with maximum productivity and efficiency. We have also provided complete end-to-end visibility to our customers for over a decade with our BDP Smart® technology. BDP Smart® is a market facing visibility tool that aggregates data, tracks our customer's inventory, and provides instant traceability including documentation timeliness, amongst others.

With blockchain technology being a major discussion point across industries, we are ahead of the curve, as BDP Smart® has employed facets of this technology for years (email and documents elimination, paperless documentation, track-and-trace,

etc.) and continues its evolution. The next-generation version of BDP Smart® is well positioned to serve as a key decentralized application (Dapp) on the global logistics blockchain. It will continue to be the front end and the customer's point of access to this new world order. We envision a world whereby shippers will use BDP Smart® to digitally sign their blockchain bills of lading over to designated consignees. Carriers will be offered transparency to key data elements through public and private keys to improve on-time performance and ultimately achieve improved efficiency.

It is important to have an integrated approach as a logistics company. Are companies more willing to outsource their technical systems to you?

BDP offers much value to the chemicals space especially during such current times of spinoffs and mergers. These mergers run into difficulties when leveraging their IT systems, which is where BDP comes in. We handle these processes differently but under the same ownership of a company. Companies need to outsource such integration process to reduce time and costs. Our strengths lie in our knowledge of systems and complex trade requirements, and that we are able to work across many different platforms.

Companies can utilize "outsourcing" in a variety of ways – one of which can be a method to reduce overall spend. We deploy certain facets of our internal processing as a way to manage costs. We have three Excellence, Process & Innovation Centers ("EPI Centers") located in York, Pennsylvania; Prague, Czech Republic and our largest EPI Center in Kuala Lumpur, Malaysia, where our team of 330 professionals ensures seamless data flow and order management for our global customers. ■



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Distribution and Trade

"We have been continuously strengthening our position as a connected marketplace. We build regional and global networks, which add to Singapore's position as a world class logistics and supply chain management hub. To grow, the chemicals trading sector require such services."

- Satvinder Singh,
Assistant CEO,
Enterprise Singapore

Distribution: Streamlining the Channels

In recent years, there has been an awakening in specialty chemical distribution across the globe. From 2012 to 2017, specialty chemical distribution increased by a compound annual growth rate (CAGR) of 5.6% each year, which was far greater than the chemical industry's growth of 2.9% and specialty chemicals consumption of 4.9% in that same period, according to Boston Consulting Group (BCG). Moreover, during this five-year period, Asia Pacific distributors experienced the fastest growth globally at a CAGR of 6.8%. This is expected to remain high at 6.2% from 2017-2022 (see graph). But what lies behind the increase in specialty chemicals distribution? The central reason is that there is still a relatively low share of sales through distributors for specialty chemicals (17%) compared to 80% in pharmaceuticals, according to BCG. Singapore's market itself is also changing, which presents opportunities for companies who are thinking ahead. Moving away from simply being a 'middle man' to reach small customers in the value chain, distrib-

utors can now add value to suppliers and consumers alike through their expertise in market research, application laboratories, increased R&D capabilities, and logistics services. For distributors operating in the ASEAN, this means understanding each country's differing regulatory framework, meeting the growing demand from customers and suppliers for value-added services, and streamlining distribution relationships. At the same time, these opportunities to serve the entire ASEAN region and further afield poses serious challenges. The region's customer base is quite diverse, and so applying a one-size-fits-all approach cannot carry the day. Instead, distributors must build trust and long-lasting partnerships with the major chemical producers across a range of jurisdictions. In many cases, this landscape gives family-owned businesses and small and medium-sized enterprises (SMEs) advantages. Behn Meyer, the first German company to arrive in Singapore in 1840, founded an R&D company, Behn Meyer R&D services, to

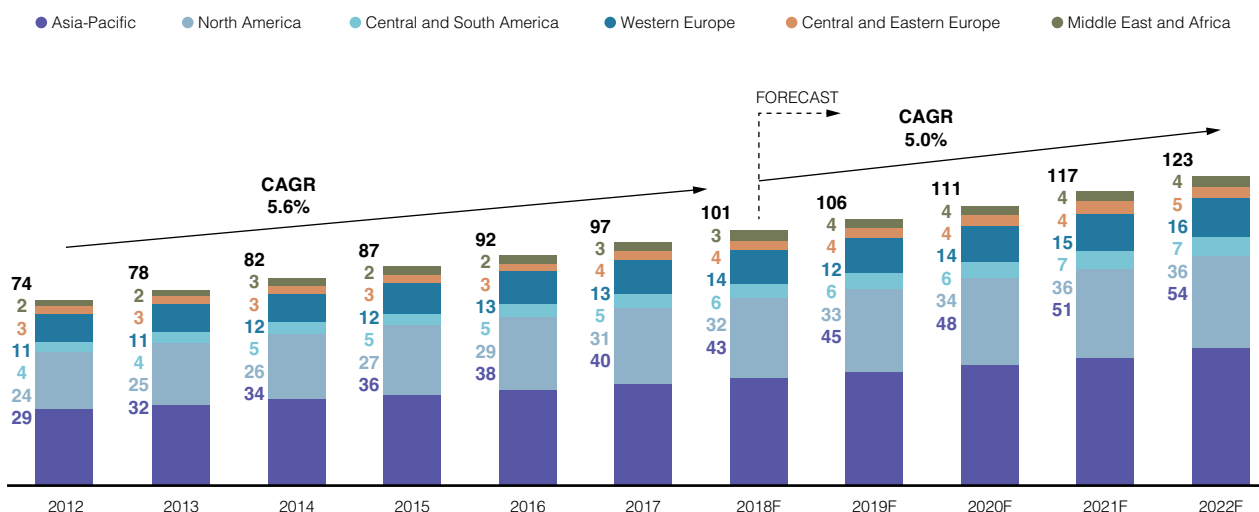
"We decided to develop a larger number of labs in the ASEAN region because most of our customers do not have access to technical expertise, in particular the small and medium sized companies. Providing our services to them in an accessible manner, is of critical importance. High quality application development takes place at these labs, and we share this knowledge with our clients across multiple industries. We are currently working to develop our existing labs further, and also investing in a new centre of excellence focused on agrochemicals in China."

- Laurent Nataf,
CEO and
President APAC,
Azelis



SPECIALTY CHEMICAL DISTRIBUTION BY REGION (€billions)

Source: Boston Consulting Group



support its business units across the region and carry out quality assurance/quality control (QA/QC) for its production units. The company has grown its capacity for co-development with its customers by opening a number of application laboratories across the region. These include rubber and latex and food laboratories in Malaysia as well as an aquaculture research center, WetLab, in Southern Vietnam. Dirk Lorenz-Meyer, member of the board at BehnMeyer, did highlight that despite the company's growing R&D and production capabilities, its identity will remain as a specialty distributor. "This is our DNA. But the addition of own production signals to our partners that we are truly committed to these industries, and that is why we are willing to increase our investments," said Lorenz-Meyer. Jebesen and Jessen Ingredients have also moved away from the traditional distribution model and recently invested in three new regional innovation laboratories for Asia. Marc Deschamps, regional managing director for Jebesen & Jessen Ingredients, underscored the company's movement further downstream and into new jurisdictions: "we have set up a new strategy, expanded from six to nine countries and brought in new technologies. We have moved further into food ingredients, personal care, pharmaceuticals and agrochemicals as we opened the emerging markets of Myanmar and Cambodia in 2010," said Deschamps.

More discerning and upscale customer preferences are also driving Brenntag to expand its service offerings. "There is a real demand in the food and beverage space driven by changes in consumption behavior. Upward trends include the pharmaceutical, personal care, coatings, lubricants and blending industries: these are spaces in which we provide services to our customers and our suppliers. There is added regulatory demand from our customers and suppliers. One place where we see a good opportunity is supporting SMEs, as we can offer safety and technical services," said Henri Nejade, CEO and president of Asia at Brenntag.

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Marc Deschamps

Regional Managing Director
**JEBSEN & JESSEN
INGREDIENTS**

What have been some of the milestones for Jebsen & Jessen Ingredients (JJ-ING) in recent years regionally?

We have set up a new strategy, expanded from six to nine countries and brought in new technologies. We have moved further into food ingredients, personal care, pharmaceuticals and agrochemicals as we opened in the emerging markets of Myanmar and Cambodia in 2010. In 2017 we signed a manufacturing joint-venture with our UK supplier and now JV partner, Muntons Ingredients, and built a 7000-tpa malted ingredients plant in Thailand, formed another joint-venture with our sister company Jebsen & Co. in Hong Kong, and have taken over responsibility for their ingredients business in China. Jebsen & Jessen Ingredients is no longer just a distributor, we are now also a manufacturer and have invested in three new regional innovation laboratories for Asia. In the last five years we have grown by more than 150 people.

There was no national distribution channel for agrochemicals in Myanmar and Cambodia in 2010. We talked to the leading players in agrochemicals like Bayer CropScience, Dow, Syngenta, etc. and decided to open a new agribusiness line in these emerging markets in SEA. We are now one of the leading distribution channels in both countries. This region had been neglected in the past but we have now provided it with an integrated portfolio.

Singapore is an important hub for the chemicals industry in the region, but not the most economical - do you see Singapore remaining the prime HQ location for Jebsen & Jessen Southeast Asia?

We believe in being close to our customers and the biggest markets. For Jebsen & Jessen Ingredients, Singapore is important

due to its position as a supply chain and a business hub. While our Jebsen & Jessen Ingredients HQ is located in Bangkok, Singapore is also very relevant to us as many of our key principals have headquarters in Singapore. For example, Evonik's regional hub for Asia South is in Singapore and we have been their most important distributor in Southeast Asia for the last 40 plus years. Singapore is also leading in the region in many aspects. Consumer products are very important to us and there are 600 million plus consumers in Southeast Asia alone, with Singapore being the most educated, mature and organized. It sets the standards for how to protect consumers, as well as leading on issues such as the circular economy, sustainability and compliance.

IP protection is also guaranteed so it is also a knowledge powerhouse for many global and regional customers and suppliers. Jurong Island is a landmark for the petrochemical industry where we have many customers who need the ingredients we supply. Malaysia and Singapore are also becoming more integrated and many companies have moved from Singapore to Malaysia. This year we have merged our Singapore and Malaysia teams to benefit from the obvious synergies.

Can you give an example of how JJ-ING is adapting to changing consumer trends?

As communicating with consumers happens more online nowadays, going digital is a core part of our strategy. Jebsen & Jessen Ingredients is working jointly with other member companies in the Jebsen & Jessen group on a B2B platform, as well as B2C so as to reach the consumer more quickly. Increasingly, communication is being done using social media platforms. We are also creating our own brands in ar-

eas which were previously not accessible, as well as selling our suppliers' brands.

How does JJING plan to diversify even further?

M&A is on our agenda and we know what we are looking for; we have scanned more than 140 companies in the last two years. There are quite a few exit strategies for SMEs in Southeast Asia and if they have interesting technologies, as well as reliable and fully compliant business models, something which is very important to Jebesen & Jessen, we are interested. However, often the negotiations break down due to a mismatch of business culture and models. We want to stay true to who we are: a specialty ingredients distributor that focuses on long-term relationships and has a mainly technical salesforce. We have chemical engineers, food engineers and nutritionists, veterinarians etc. and they can all advise customers in Asia on applications and innovate together with our customers in our regional innovation laboratories.

What is Jebesen & Jessen Ingredients' vision for 2018 and beyond?

2018 will be a year where we consolidate our significant development of the last years. However, we will expand beyond our existing five locations in China into central China, upgrade our technologies further and offer a fuller range of services to our customers. There are many technology partners that want to work with us because of our innovation capabilities. Going forward, business is changing in that China will source more from Southeast Asia and there will be more production in the region, for the region. Huge opportunities will also come from Indonesia and we will continue to put more focus on it for M&As. Southeast Asia's GDP will likely continue to grow by 4% to 8%. ■

UNITING SPECIALITY INGREDIENTS & CONSUMERS IN ASIA

DEVELOPING INNOVATIVE APPROACHES

SOLVING INDUSTRY CHALLENGES



JEBSEN & JESSEN
INGREDIENTS

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Supply: the fickle factor

In the past, distributors would generally source their products from the West and developed Asian nations Asia such as Japan and Taiwan, but distribution channels have shifted somewhat over the past decade. China now portends as a supply source due to its cheaper, more efficient product offerings. The Chinese government's anti-pollution drive, however, upended this calculation and prompted the closing of numerous refineries and plants and a supply shortage. Lim Chin Leong, managing director at Vistachem, identified these contradictory developments as the greatest difficulty that distributors face in planning for the future. Although we constantly monitor the situation and prepare in advance, it has become increasingly difficult. However, due to our strong international network, with connections in India and China, as well as our diverse product offering, we have been able to survive," said Lim Chin Leong. Nicholas Lim, Managing Director at Unilite, also mentioned China's new strict laws on pollution as a key factor in altering the company's strategy. At the end of the day, however, he sees this development as an enabler rather than a hindrance. "As prices have increased and supply has decreased, we have not had to compete with the lower-cost Chinese chemical products as much in the market," said Lim.

Teng Chen Ji, Country Head for Singapore at WWRC, notes that supplies from Europe and the United States are even returning to the market as a result. More producers have also moved into Southeast Asia to take advantage of the ASEAN Free-Trade Agreement. "We are increasingly sourcing our products from outside of China. One example is India, which continues to underline its capabilities especially with respect to life sciences, more specifically pharmaceuticals. Across Southeast Asia we have been utilizing a number of new local companies, for example in Thailand's petrochemicals space. We have also identified opportunities in the United States as the shale gas revolution has made US products more competitive," said Teng. ■

"Profitability of commodities is now very low, so we are looking at either increasing volume or moving into specialties. We have already added some specialties to our portfolio. We are also considering low-scale manufacturing such as blending."



**- Shamsher Zaman,
Managing Director and Founder,
Linkers (Far East)**

"Traditionally, distributors in Singapore are family-owned businesses but recently we have observed global distributors backed by private equity firms starting to acquire some of the local distributors. It is heartening to notice that the government has been supportive of local SMEs through various channels, be it through grants or productivity boosts. Enterprise Singapore, for example, is working on incentivizing local players to expand regionally."



**- Teng Chen Ji,
Country Head Singapore,
WWRC**

"In terms of demand, the ASEAN market is the most important for us, and so I am constantly needing to analyze regional growth. For supply, we have traditionally been buying from Europe, the United States, and Japan, but China's ability to supply will impact the company in terms of prices. China recently passed strict laws on pollution caused by coal, which has affected chemicals and in turn pricing."



**- Nicholas Lim,
Managing Director,
Unilite Chemicals**



Henri Nejade

CEO and President Asia
BRENTTAG

Can you give us an update on Brenntag's operations in the Asia-Pacific region (APAC)?

Our strategy has always been clear: we are a service-oriented company that offers different categories of services. We specialize in sales and marketing and technical services, with over 27 application labs in the region. We continue to develop strong relationships with our customers, most prominently in specialty chemicals. Geographically, we are present across the Asia-Pacific region, except Japan and Pakistan, where we will be expanding into. Recently in Singapore, Brenntag acquired TAT group, which focuses on a modern blending operation and EPChem, which is a specialty wax business. EPChem exceeded our expectations and we increased business by 40% in the first 11 months following the acquisition.

Brenntag has been serving the Asia-Pacific region for over a decade now. What is the company's current focus in the region?

Every country has a different dynamic. China is the largest chemical market in the world, and consequentially, has the greatest market for distributors. It is a heavily regulated market meaning the market is becoming concentrated and consolidated. In China our focus is on dangerous goods and business is going very well. Vietnam is another interesting market with a focus on specialty chemicals for food and beverages. Our business has been growing organically with double figure growth every year for the past seven years. Although Singapore is a small market in terms of chemicals consumption, it is a good regional hub where we can easily serve the surrounding countries. This is of importance as we continue to grow organically and through M&A activity in the ASEAN region. Finally, the Indian government is making a concerted effort in terms of regulatory infrastructure and all indicators are positive. We announced our acquisition of Raj Petro, a \$200-million business, which services the lubricants industry.

Can you tell us about market and regulatory trends happening in the region's chemicals industry?

The chemicals industry is growing rapidly in APAC - mainly in China, Vietnam, India, Indonesia, and Singapore. There is a

demand in the food and beverage space driven by changes in consumption behavior. Other upward trends include the pharmaceutical, personal care, coatings, lubricants and blending industries: these are spaces in which we provide services to our customers and our suppliers. There is additional regulatory demand from our customers and suppliers. One place where we see a good opportunity is supporting SMEs, as we can offer safety and technical services.

As China emerges as an exporter, are you using more suppliers in the North-East Asian region, rather than in Europe and the United States?

When looking at our supplier portfolio, we still have a number of MNCs that operate out of the USA and Europe. However, Brenntag Global Sourcing in China enables us to source from suppliers in North-east Asia and sell in the EU and USA. As a global distributor, we do not want to compete with our existing suppliers in the US and in Europe - so we have become more selective. We select a product with a need in the USA and Europe markets, for example cyclic acid. There are limited producers of cyclic acid in Europe whilst China has seen an evolution in the quality and consistency of cyclic acid.

What are the advantages of basing your regional headquarters in Singapore?

There are a number of positives in Singapore. It is easy to travel and quality of life is excellent. In terms of the industry, there is good infrastructure and support from the government. Talent is not impossible to find, but it is expensive to attract and retain. As a distribution company, we need to attract the right people and prioritize training, education and retention strategies.

What is your vision for Brenntag in Singapore and also further afield in the ASEAN region?

We have achieved a great deal in the past 10 years - most notably with the company's growth and revenue, which with the acquisition of Raj will be at \$1.5 billion. Other than exploring new market segments such as electronics, we will continue providing quality service to our existing customers as well as investing in resources to remain the leading service partner they have become accustomed to. ■

Lim Chin Leong

Managing Director
VISTACHEM



As Vistachem prepares to celebrate its 10th anniversary next year, can you introduce our readers to your operations?

Vistachem was conceived in 2009 as a two-man team focusing on the distribution of specialty chemicals in the food and electronic flux industries. We have since evolved to cater for construction chemicals, the flavored fragranced industry, which generates 40% of our revenue, cleaning, surface technology, animal feed and pharmaceuticals. Singapore continues to be our HQ due to its strong logis-

tics and its chemicals base. We import and trade over 1,000 different chemicals and our customer base ranges from MNCs to local SMEs, with a focus on three regions - Thailand, Indonesia and Singapore.

In the Singapore market, we are very active in the flavor fragrance industry. We incorporated a value-added service - a vendor management program - which is serving most of our MNC customers. This is key to the industry, as both food flavoring and perfumes demand over 50 aromatic chemicals in each formulation. If

one of the 50 raw materials is unavailable, this will impact the whole process.

With a growing trend of suppliers being found in APAC, where do you source your products from?

Through our experience, we have learnt from customers where to source specific products from. Some are sourced by the customers themselves, finding the approved vendors and suppliers, but the majority of the materials are sourced ourselves from a range of countries, including China, India, UK, Germany, Japan and USA. Primarily, we are now importing from India and China. We are aware there are many new factories producing chemicals in the region, especially in the two above-mentioned countries, and it is my role to introduce the factories to the customers and evaluate the products. From here, we export to our end-user markets where the chemicals are diluted and sold.

What is the biggest challenge facing Vistachem, and other distributors, within the current market?

The biggest challenge facing distributors is the sudden shortage of chemicals. Although we constantly monitor the situation and prepare in advance, it has become increasingly difficult. However, due to our strong international network, with connections in India and China, as well as our diverse product offering, we have been able to survive.

What is your vision for Vistachem over the coming two to three years?

We are looking to further expand into both Indonesia and Thailand but we will retain Singapore as our headquarters. Indonesia remains a challenging country as importing materials for the local population is a difficult process, but we are 100% focused on continuing to expand there as it serves as one of the major growth markets as well as the world's 4th most populous country. Moving forward, we expect significant growth in the fragrance industry in Indonesia, as well as growth in Singapore's flavor industry. These are the two industries showing the most significant growth and we will continue to strongly invest into them. ■

VISTACHEM
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Email: csr@vistachem.com.sg
Web: www.vistachem.com.sg

Nicholas Lim

Managing Director
UNILITE CHEMICALS



Could you please provide us with an update on Unilite's most recent developments since our last meeting?

In the current climate, with the downcycle, we have used this time to advance and upgrade our operations. We upgraded our warehouse, introduced a racking system, and changed the lighting systems to increase productivity. This year, we will be upgrading digitizing our operations and will incorporate Internet of Things (IoT) into our logistics and warehousing system to increase productivity and optimize the utilization of the space. The use of IoT is made possible with the Capability Development Grant given by Spring Singapore to SMEs. There is now more movement in our business and with our upgrades, Unilite is well positioned to take advantage of this uptick.

How have you seen Unilite's operations change during the downcycle?

Although we are still focused on distributing a similar product line, we have tried to identify new geographical areas of growth

and have explored doing more business in ASEAN. We have an office in Malaysia and have worked to grow the market there. We have also been exploring other possibilities aside from the distribution of chemicals, including exploring downstream products. In Singapore, we were trying to produce disinfectants, but the market does not have space for this. We are also thinking about integrating upwards into logistics and transportation and are currently exploring possibilities. In Malaysia, we are in discussion with an institutional and industrial detergent company to purchase the company so to move into manufacturing our own products. For a company to grow, one needs to look both vertically, with potential joint ventures or acquisitions, and/or horizontally, an expansion of the existing business. The last few years, horizontal growth was reduced. However, since the second half of 2017, we saw an increase in business with a number of new manufacturers on Jurong Island. 2018 may be the year where we resume our horizontal business as well. ■

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40 YEARS OF DEDICATED SERVICE



Unilite is your home grown Singaporean chemical distributor of choice! From Food, Industrial Manufacturing, to Water and Waste Treatment, we have a strong foothold in Singapore and the region. We are an integrated chemical distributor with efficient logistics support. Unilite's warehouse is upgraded and modernised to meet the needs of our ever-growing customer base.

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Dirk Lorenz-Meyer

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Member of the Board
BEHN MEYER

Behn Meyer was the first German company to arrive in Singapore. Can you tell us about the company's history and current operations in the region?

Behn Meyer has its origins in Singapore in 1840 and in 1891, the company ventured out of the city-state with a branch in Penang, later becoming the largest German shipping and trading house in the region. Following numerous troughs in the 20th century, Behn Meyer strengthened its hand to become a leading distributor for major German chemical producers, including Bayer and BASF. However, with such partners setting up their own operations, from 1990, Behn Meyer evolved to become the chemical business it is today. We currently have 1,200 employees globally and more than 1,000 in Southeast Asia. Behn Meyer is predominantly focused on Southeast Asia with over 90% of our business in the region.

With four major business units, what specific sectors does Behn Meyer serve?

BM Agricare concentrates on crop protection and fertilizers where we are one of the top providers in Malaysia, and own several compaction plants around the region. Secondly, BM Ingredients focuses on natural additives for the food and feed industries. BM Polymers supplies additives to the plastics and rubber industries. Moreover, through our daughter company Performance Additives we have invested in our own production facilities, building a factory in Malaysia that produces processing aids based on renewables, namely palm oil fatty acids. Our fourth business area, BM Performance Chemicals, focuses on coatings and water treatment, which is of most relevance in Singapore. Through acquisitions in the Netherlands and Italy, we have gained proprietary technologies for water treatment.

Water scarcity continues to be a pressing issue in the region. Can you tell us more about Behn Meyer's water business area?

Our water business specifically focuses on two areas: treatment of industrial wastewater and reducing chlorine in municipal water. The wastewater treatment focuses on the removal of heavy metals and the reduction of sludge from customers' filtration systems. Since sludge needs to be properly disposed of, decreasing its amount leads to lower disposal charges and thus brings down the total process cost. Regarding the municipal drinking water, we focus on eco-friendly and safe disinfection and cleaning technologies. Chlorine has been

receiving a lot of negative press lately, and we are seeing our water business gain more traction as the enforcement of environmental regulations begin to filter across the region.

Can you tell us about Behn Meyer's R&D capabilities?

We founded a dedicated R&D company called Behn Meyer R&D Services, which supports all our business units across the region, as well as carrying out quality assurance/quality control (QA/QC) for our production units. We have ventured into production, R&D and co-development with our customers and have a large number of application laboratories. For example, we have rubber and latex laboratories in Malaysia supporting the tire and glove industries. Our aquaculture research center - WetLab - in Southern Vietnam works with our customers to better the sustainability of the industry by improving feed efficiency and introducing natural remedies to diseases. For the food business, we have a baking lab in Kuala Lumpur that tests enzymes and bread improvers and a meat processing lab in Vietnam, where we enhance customer recipes for sausages, to name a few. Being close to our customers, these application laboratories have become the joint testing ground for consumer needs, and we are constantly tailoring innovative solutions to serve them.

As Singapore celebrates 2018 as its Year of Climate Action, how is Behn Meyer prioritizing sustainability?

For us, sustainability first and foremost means food security for future generations. Our Agricare business introduces bio-pesticides to reduce the use of agrochemicals and our feed business with the tagline 'Inspiring Natural Solutions' has acquired a company in the Netherlands that develops medication without antibiotics – an exciting, forward-looking technology. We have set up our factories in close proximity to their major raw material inputs (palm oil in Malaysia and asphalt in the U.S.) to reduce our carbon footprint and will now install solar panels on our warehouse near Kuala Lumpur.

What role does Singapore play for Behn Meyer?

Singapore is our home turf and will always be at the heart of our activities. We value Singapore for its compliance, transparency and certainty for rule of law. Besides our operating units, we have three holdings in the city-state. ■



Trade:

Looking to the Long Haul

Trade has been a hot topic in 2018, but not for the right reasons. The Trump Administration's implementation of levies on steel and aluminium imports has set alarm bells ringing across the globe. The current trade war between the United States and China could negatively affect global GDP by 1% to 3%, leaving global business operators hopeful it subsides. Geopolitics aside, the petrochemical and chemical trading landscape is shifting in a number of ways, thanks to relatively low crude oil prices, the continued effects of the shale gas revolution in the United States as well as new gas supplies from Australia, Canada, and elsewhere, and China's next-wave ethane-cracker projects.

Singapore is expected to play an even larger role than in the past in the current trading environment because of its location along major trading routes, business acumen, and cultural and linguistic connections. Gina Fyffe, executive director at Integra, highlighted that the seismic changes happening in both China and the United States will elevate Singapore's significance to global trade. China's market is becoming more diverse and complicated due to new producers and domestic traders entering the market. "Any company working in China needs to develop an expertise to survive.

Singapore is already Asia's largest commodity hub. With its strategic geographic location, robust financial and shipping infrastructure, reliable legal, regulatory and tax framework and innovative technology, Singapore has potential to become world's largest trading commodity hub in decade ahead. Moreover, as trade flows shift towards Asia, Singapore will continue to play an important role in this region.

- Shamsher Zaman,
Managing Director & Founder,
Linkers (Far East)



Image courtesy of Behn Meyer



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China is a vibrant, exciting market and our understanding of it is greatly benefited by being based in Singapore. [...] Singapore is finely balanced between East and West and can play a key role in bridging and understanding the relationships between the United States and Northeast Asia as well as the Middle East and North-East Asia. China is still challenging in some aspects and recently we have noticed a growing number of traders setting up camp in Singapore,” said Fyffe.

The Importance of Free Trade Agreements

In a time of increased populism, protectionism, and ramped up tariffs from the United States, nations continue to underline their commitment to free-trade agreements (FTA) and collaboration with other jurisdictions. At the time of writing, the EU and Japan had just signed a landmark trade deal, which included the free flow of personal data between both parties, creating the world’s largest area covered by mutual agreement on data protection standards.

Singapore has benefited tremendously from trade ever since it signed its first FTA in 1992 – the ASEAN Free Trade (AFTA). The opportunity for a jurisdiction of its size to

export bilaterally or multilaterally with no tariffs is a massive advantage – transferring its market of less than six million to more than 580 million in the ASEAN. Since then, the city-state has signed 18 FTA agreements and is the EU’s largest trading partner in the ASEAN according to the European Commission. The EU-Singapore FTA, which completed goods and service negotiations in 2012 and investment protection in 2012, is still in the process of being ratified – it is expected in 2019. The current EFTA-Singapore Free Trade Agreement eliminates tariffs on 99.8% of Singapore’s domestic exports to the European Free Trade Area. Moreover, Singapore’s key end-user markets are India, with the India-Singapore Comprehensive Economic Cooperation Agreement (CECA), and China, with the China-Singapore Free Trade Agreement (CSFTA). Together, these two agreements cover tariff elimination of 82% and 95% of Singapore’s domestic exports, respectively (Enterprise Singapore).

Riding the LNG wave

Singapore previously relied on gas imports via pipelines from Malaysia and Indonesia to serve its energy needs. Since 2013, however, Singapore’s liquefied natural

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Singapore’s fortuitous geographical location puts us in a highly advantageous position to develop as an LNG trading hub, using the SLNG Terminal as platform and leveraging on our already well-established economic and financial infrastructure. We see the services that we offer, especially LNG storage, breakbulk and reload, as helping to facilitate traders access the regional market. However, Singapore cannot become an LNG hub on its own. What is needed is an entire ecosystem of LNG terminals and players to build up trade flows within the region. As such, we welcome any development in the region that would lead to greater LNG trading activities and greater market liquidity, as they would consequently lead to greater demand for our terminal’s services.

**- John Ng,
Chief Executive Officer (CEO),
Singapore LNG Corporation**



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Gina Fyffe

Executive Director
INTEGRA

Can you tell us which global trends are having the strongest impact on trading operations nowadays?

We have particularly been looking at the United States and China as we believe there is a strong relationship, product wise, between the two. The USA in particular needs China and North-East Asia, and North-East Asia definitely needs the USA and Europe. Trade wars apart, we see a great deal of synergy. At Integra we are currently increasing our numbers in Houston. It is going to start getting busy as the balances are changing, especially between the USA and the rest of the world. Europe is going slightly lighter as it imports U.S. ethane and LPG. Given the emergence of new crackers with a polyethylene, polyolefin or general ethane base, the balance will change even more.

With respect to Asia, it is still a naphtha and condensate-dominated market. Taiwan and South Korea are looking at ethane and propane and are slowly lighting their feedstock to LPG. China is also looking at ethane but also has coal to olefins and methanol to olefins. These are unique to China and that has its own set of balances. We are seeing seismic changes in the USA and China. Despite the excitement over U.S. shale, very few are talking about it in China. Singapore is finely balanced between the west and east and can play a key role in bridging and understanding the relationship between the USA and North-East Asia and the Middle East and North-East Asia. China is still challenging in some aspects and recently

we have noticed growing number of traders setting up camp in Singapore.

With such dynamic shifts in the market, how have Integra's operations adapted?

We need to continue to diversify and reinvent ourselves. We are looking at how we work in the Middle East and at increasing our regional presence. Other than the United States, we have opened a new office in Zug, Switzerland. Most importantly, we are looking at how we relate to China from Singapore. We have been very successful in China, but the market is becoming more and more diverse and complicated. There are new producers all the time and more domestic traders entering the market. Any company working in China now needs to develop an expertise to survive.

What is your vision for Integra in the coming year or two?

We have been in the industry for over 30 years. Our vision is increasing growth across all regions. China is transforming and we are changing to accommodate. There is more we can do in Eastern Europe, as there is a great deal of localized business there. Moreover, we are expanding our product portfolio, especially with respect to LPG. We see LPG as a logical step in our progress as it fits into propylene dehydrogenation units, and butane fits into on-purpose projects. LPG is a very diverse market, and we are not interested in becoming an LPG trader but having LPG as part of our portfolio. ■

Image courtesy of Shell

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LNG is set to replace crude oil from an energy perspective. Crude oil is moving into petrochemicals further downstream. Singapore is currently leveraging this with the expansions to its LNG terminals. Due to this, LNG trading is seen as a natural extension for Singapore.

**- Ajay Bhattacharya,
Managing Director,
Fortrec Chemicals & Petroleum**



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gas (LNG) capabilities have boomed. It recently completed a third phase of expansion to the regasification facilities at its LNG terminal, bringing overall capacity to 11 million tonnes, enough to meet its total gas demand. For an island nation with no natural resources, this further enhances Singapore's energy security and commercial competitiveness.

At the same time, Singapore is also emerging as an LNG-trading hub. There are now 45 LNG companies in Singapore and, with the increasing commoditization of LNG, volumes are being accumulated for greater optimization. According to a survey by Deloitte, 80% of senior industry leaders identified Singapore as the most likely destination for Asia's next LNG-trading hub. With its ever-growing LNG infrastructure, robust regulatory framework, and historical trading know-how, Singapore can add another string to its bow. ■

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China will continue to greatly influence regional and global trends. Current liquid chemical exports from China are still at a fraction of imports, however, export rates are rapidly growing as China keeps building and buying raw materials. This gives SE Asian shippers more return cargo opportunities to bring their ships south bound. On the other hand, India, which is also a significant market for SE Asian suppliers, will continue to grow. Though its exports are also growing, due to a range of factors, I do not expect it will have a similar growth rate to China.



**- Chye Poh Chua,
Founder and CEO,
ShipsFocus**

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Tim Rockell & Peter Godfrey

TR: Director, Energy & Natural Resources Sector, Singapore KPMG

Chairman

BRITCHAM ENERGY & UTILITIES GROUP

PG: Managing Director - Asia Pacific THE ENERGY INSTITUTE

Member

BRITCHAM ENERGY & UTILITIES GROUP



TR



PG

From your respective experiences at the Energy Institute and KPMG, how are you seeing the chemicals landscape, especially related to supply chain, change in the ASEAN?

TR: Companies are breaking down their supply chain and trying to understand how they serve different markets. There are some policies in some countries which mandate a certain amount of local content. We are doing a lot of work in Indonesia, which is emerging as the fourth largest country in many metrics, and are also using technology to help many companies improve their supply chains.

China's Belt and Road Initiative should draw a lot of demand along its developing trade routes. The RAPID project at the Pengerang Integrated Petroleum Complex (PIPC) will help lead to the creation of a regional hub alongside Singapore's infrastructure. There are also new builds in Vietnam with investment coming particularly from the Middle East.

PG: Fundamental structural change is occurring in the chemicals industry. In the past, the industry was built on advantaged feedstock and location, but there has been a shift from investment by multinationals to investment by national oil companies, driven partly by growth in China and India. Middle Eastern companies are also recognizing that integrated petrochemical projects must be built in host countries. The oil price will not change this dynamic.

Secondly, whilst previously multinationals looked for the biggest margins for their upstream business and to sell technologies, technology is now more commoditized and margins are being squeezed as products themselves have become increasingly commoditized. Therefore, there is demand for a new breed of service companies, reinforced by trends such as digitalization and artificial intelligence. ■

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Tim Philippi & Peter Meinshausen

TP: Executive Director

PM: Chairman of the SGC Chemical Industries Committee

SINGAPOREAN-GERMAN CHAMBER OF INDUSTRY AND COMMERCE (SGC)



TP



PM

Could you please introduce our readers to the German Chamber of Commerce?

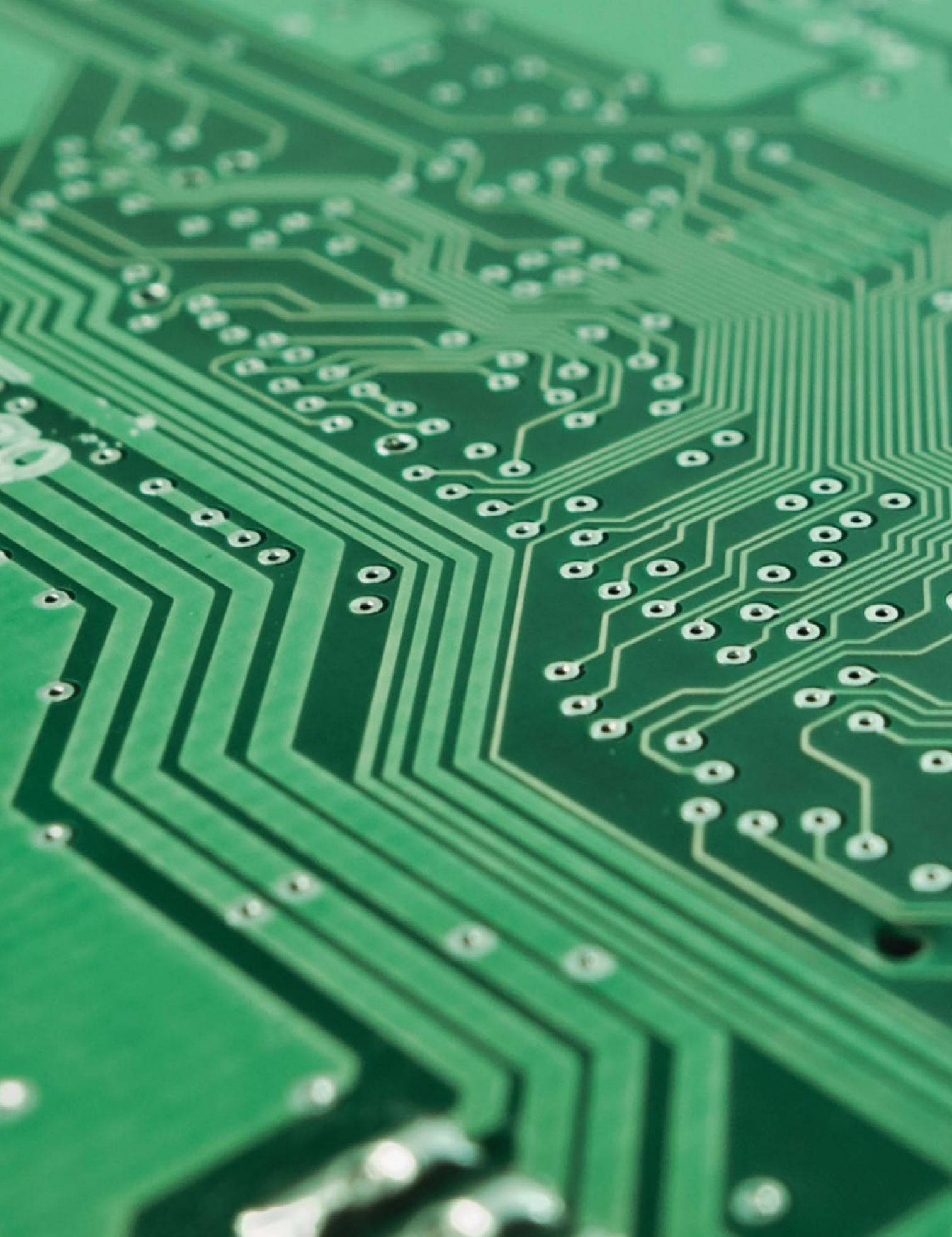
TP: The Singaporean-German Chamber of Industry and Commerce is a bilateral chamber, consisting of about 550 members from Singapore and Germany. Our aim is to promote trade between the two countries. We help German companies to find business and distribution partners in Singapore by organizing business delegations as well as trade fairs, amongst other activities. We also support Singaporean companies to enter the German and European market. The chamber is part of an extensive network of German bilateral Chambers abroad that consists of 140 offices across 92 countries.

PM: The Chamber has 12 expert committees, which include the Chemical Industries Committee, launched a few years ago. This allows us to discuss and voice topics of mutual interest with the government and its agencies, for example regulatory and ESH issues. We foster the relationship with government and agency representatives, for instance the EDB or Enterprise Singapore, to exchange our views and experiences.

What is the make up of German companies currently operating in Singapore?

TP: In total there are about 1,700 German companies in Singapore. Large, publicly listed German companies are mostly all present in Singapore, and Singapore is usually their regional headquarters for ASEAN. Besides that, many German small and medium-size companies, which we refer to as 'Mittelstand', have entered the Singaporean market. They usually start by setting up a small sales entity that expands over time. Once this is successful, they might start a small manufacturing facility, followed by R&D.

PM: From a chemical industry perspective, companies in particular from the "German Mittelstand" see a growing potential in ASEAN as an entry into Asia. We ensure that we are informing German companies about the opportunities in Singapore and the larger region. ■





Industry 4.0 Solution Providers

"The government plays an integral role in connecting technology providers, like Yokogawa, to our end users. They proactively engage with companies and provide support to transform their operations and boost productivity, to generate growth. These initiatives enhance Singapore's position as a global center for business and innovation. With more technology companies developing their R&D centers in Singapore, technology providers like Yokogawa have the best possible environment to focus on real industry challenges whilst customers are provided with the latest technologies."

-Joseph Lee Ching Hua,
Head of Co-Innovation Centre & General Manager -
Singapore Development Centre,
Yokogawa Engineering

Singapore's Industry 4.0: Evolution or Revolution?

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The dawn of Industry 4.0, or the Fourth Industrial Revolution, is well and truly upon us. For a country that has always prioritized increased productivity and efficiency to forge ahead, the adoption of new technologies is the next logical step. In the World Economic Forum's Readiness for the Future of Production Report 2018, Singapore was among the top 25 countries set to benefit most from the rise of advanced manufacturing and smart factories. It was also identified as one of the early leaders in this space. Clearly, scale is not a prerequisite for future readiness.

Two years ago, some may have been asking themselves what Industry 4.0 was and wondering whether it was simply another buzzword. Since then, however, the concept and what it can achieve has started invigorate all levels of the value chain. Jonas Barge, Senior Director of Applied Technology at Emerson, highlighted that "over the past two years, digital transformation has become a larger discussion, with a top-down approach accelerating its adoption."

In theory, Industry 4.0, Digitalization, or Digital Transformation is a meeting of

trends and technologies that are set to reshape a number of processes in dynamic ways. Senthil Ramani, Digital Business Lead of APAC for Accenture, noted that whereas in 2016, the digital focus was on cloud, mobility and analytics-driven concepts that could create efficiencies and cost reductions, there is now a drive to build new business models through the digitalization of the manufacturing process. One example of this is predictive maintenance, which, in addition to manufacturing, can also reshape supply chains and revolutionize client-customer relations. For instance, Prüftechnik's VIBSCANNER – a high-speed data collector with triaxial sensors – can collect both portable and online data to implement predictive maintenance for its customers. "We analyze portable data at regular intervals; in most cases, we will run it through our analytical machinery on a monthly basis to analyze changes and trends over time. When we identify potential issues, we can then use our specialized software to run a deeper analysis and predict any issues that may arise," said Arun Nair, managing director for Singapore at Prüftechnik. 96>>

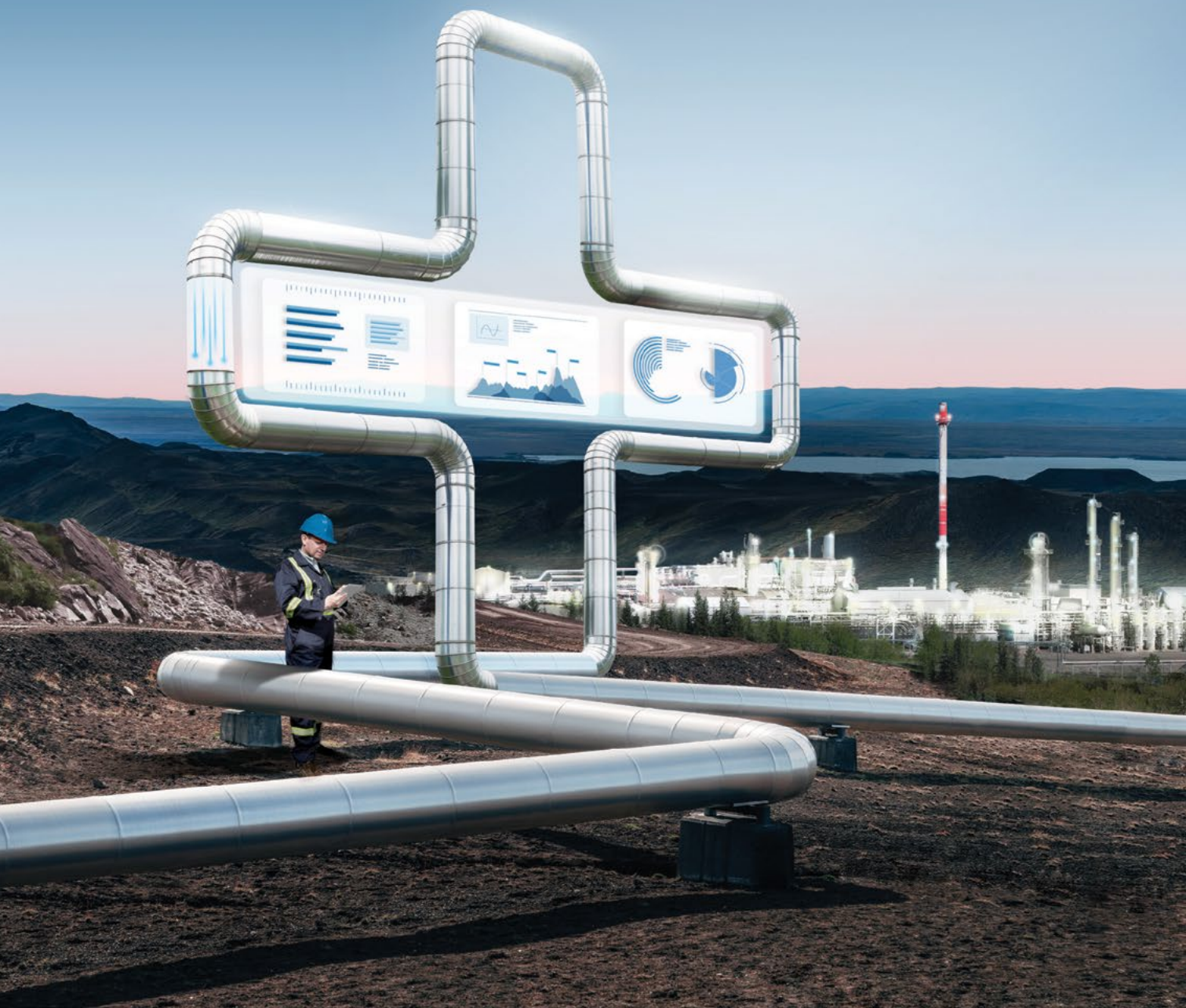
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Singapore has an industry that is ready to adopt these technologies and I would say that every chemical manufacturer currently has a program for digital transformation (DX). What also drives DX is that all these companies have operational excellence initiatives, and it is a tool for them to take the next step. That is where our operational certainty program helps them achieve this.

- Jonas Barge,
Senior Director -
Applied Technology,
Emerson



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Image courtesy of Yokogawa Engineering Asia

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Early Implementers

The vast majority of Jurong Island's producers are already in the process of adopting some level of advanced manufacturing solution. Chevron Oronite's plant on the island has piloted an Industrial Internet-of-Things (IIOT) solution for its manufacturing process. With the use of a tracker system to boost worker safety and efficiency, the company has started saving roughly 30,000 man hours a year. It then plans to expand this pilot scheme in the future to include energy-efficiency improvements and predictive-maintenance solutions. Shell has also developed its own Smart Torque System, which uses digital technology to enhance flange maintenance-execution quality. In doing so, this improves overall plant safety and performance. Lastly, Syngenta opened a Digital Innovation Lab at Foundry Unilever's LEVEL3 collaborative space with five strategic digital initiatives focused on increasing smallholder productivity. "We established an innovation lab, specifically in Singapore, with the goal of providing a portal between the Syngenta organization and the digital ecosystem that exists in Singapore," said David Ryan, Head of Commercial Excellence for APAC and Leader at the Digital Innovation Lab, Syngenta.

Numerous local small and medium-sized companies are also embracing the new opportunities created by the arrival of Industry 4.0 to enhance their business models. Avetics – winners of Shell's Livewire competition in 2014 – has been using a fleet of drones to service petrochemical plants, which has increased operational efficiency and safety. Another company, CYC International, has created a range of tank-cleaning robots that it has deployed to a number of major petrochemical plants. SourceSage, meanwhile, has built an app and an electronic platform to facilitate physical trades, specifically of oleochemicals.

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Maximizing productivity and cost-effectiveness are major trends at the moment, and additive manufacturing contributes to this through the redesigning of parts and overall faster and cheaper production. The range of what our metal printers can produce is far wider than traditional manufacturing.

- Matthew Waterhouse,
CEO, 3D Matters & 3D Metalforge, Singapore



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"We initially went into oil and gas and petrochemical plants in 2014 after winning Shell's Livewire competition. Shell gave us the opportunity to provide our service to their plant. As Shell are such a large household name, it was a huge endorsement to have their approval for what was deemed a fairly dangerous activity - trying to fly a drone in a petrochemical plant."

**- Weiliang Zhang,
Founder,
Avetics**



"Digitizing the market is the most efficient and easiest way to allow for longevity and I feel the middle man will play an important part in this ecosystem. I see that people will be forced to adopt technology and we want to be there before things change."

**- Jian Min Sim,
CEO and Co-Founder,
SourceSage**



"Our product focus is low-cost automation; we produce today robotic arms, the igus 'roboLink' or delta robots, or only the moving tribo polymer components at a very cost-competitive prices. This industry represents substantial growth opportunities for us and we are assessing our approach in APAC in depth currently."

**- Carsten Haecker,
Head of Asia Pacific,
Igus**



"The legacy of lean manufacturing and the idea of Industry 4.0 has already been debated at round tables and conferences. A smart factory handling its operations on its own, is no longer a mere concept but already a reality. Customers reap the benefits of IoT and lean principles such as increased efficiency and productivity. To experience the smart factory concept, Pepperl+Fuchs itself has transformed and implemented the concepts in our manufacturing facilities and our Global distribution centers."

**- Shane Parr,
Managing Director and Executive Vice President
APAC Process Automation,
Pepperl+Fuchs**

Andreas Hauser & Jacky Tan

AH: Director, Digital Service

JT: Senior Program Manager, Industry 4.0

TÜV SÜD ASIA PACIFIC



AH



JT

Can you introduce our readers to TÜV SÜD's Digital Service in Singapore?

AH: We have set up the Center of Excellence Digital Service in Singapore early 2016 to serve as one of the key units driving TÜV SÜD's digital transformation. We actually started Digital Service here in Singapore first followed by similar unit located in our headquarter in Munich. Three years on, we have reached a critical mass of 30 employees already and plan to double this number in the next two years.

We focus on the development of next-generation advisory, testing, inspection and certification services covering new frameworks and methodologies to ensure the safety, security, and reliability of smart systems. With this approach we establish trust of the users and operators in the new technologies, which is imperative for large-scale deployment and usage of smart products and solutions. We therefore consider ourselves the enabler for upcoming technologies.

We develop these new services and incubate new businesses in the areas of autonomous vehicles, smart healthcare, smart inspection and Industry 4.0. data analytics, software engineering and cyber security combined with the corresponding domain expertise are the key competences our development is based on.

JT: We have an established consultancy services and business model framework to support companies in realizing their Industry 4.0 transformation initiatives. This includes evaluation of the maturity of specific facilities, the development and realization of transformation roadmaps combined with training and knowledge sharing. We are also developing a next-generation certification service to ensure that robots and industrial IoT systems are implemented in a reliable, secure and safe approach.

Can you introduce the Smart Industry Readiness Index to our readers and highlight the current industry gaps with regards to Industry 4.0?

JT: The Index is an Industry 4.0 diagnostic tool that companies – across all industries and sizes – could use to better understand Industry 4.0 concepts, evaluate the current state of their facilities, architect a comprehensive transformation roadmap and deliver concrete, sustained business value. There is not one Industry 4.0 solution; the key point is for the companies to interpret

what Industry 4.0 means for their businesses and develop a comprehensive strategy and roadmap. For this, the Index acts as a checklist and guideline to ensure that all relevant aspects are considered in a systematic way. For instance, besides technological or process related aspects, the leadership team of a company needs to be aware of future manufacturing practices and market trends, otherwise there will be no successful transformation.

With cyberattacks on the rise, how can companies protect themselves from its potential threat?

AH: Cyber security is about protecting technologies from people, whereas safety concerns protecting people from technologies. As systems are becoming more connected, such as an autonomous car or a smart production system connected to the cloud, they can be hacked and misused. One of the key hurdles for new technologies and their functional safety is the question of how secure they are against external threats. Another essential aspect in this context is data privacy and data ownership. If we do not address these questions, we will not see large-scale implementation of these new technologies.

Are chemicals companies given proper attention to the impact of Industry 4.0 on product lifecycles?

JT: In the Index assessment workshop, we always discuss the relevance of product lifecycle management. One of the key stages is related to the services of a product; it covers for instance how customer feedbacks are collected, analyzed and managed by the manufacturer. We also share how critical a controlled and seamless data thread is along the lifecycle resulting in an accelerated introduction of new products. We observe a certain gap in the chemicals industry compared to, for example, the automotive industry, which is very focused on exploiting data collected across the entire product lifecycle.

AH: There is no reason why the chemicals industry cannot think along these lines. Although they produce a continuous product, it is also sold in units; the 'Lot Size One' idea tells us the benefits of smaller, tailor-made batches. Refineries often only look at their current client order rather than the wider supply chain. Integrating the value chain means also getting closer to the customer by cutting out the middle man. ■

Jonas Berge

Senior Director - Applied Technology
EMERSON



Can you tell us about Emerson's new US\$3 million hub in Pandan Crescent?

We launched our new solutions center in November 2017 to make Singapore a hub for the delivery of Digital Transformation (DX) solutions, including Industrial Internet of Things (IIoT)-based services for our customers across Asia Pacific. It provides companies with a new way to understand and experience new advanced technologies that may feature in their plant.

How have attitude towards digital transformation changed in recent years?

The dramatic change occurred over the past two years when the DX of how a plant is run and maintained became a key focus. DT has mainly focused on maintenance, energy efficiency and reliability. On Jurong Island, we are seeing an increased adoption of these technologies. Singapore has an industry that is ready to adopt these technologies and I would say that every chemical manufacturer currently has a program for DX.

Can you tell us more about Emerson's current product offering?

With DX, customers needed something that was very simple so we created a digital ecosystem that provides an integrated system, whilst also being compatible with a plant's current existing platform. We found that although there is a lot of buzz surrounding Industrial IoT, most customers wanted to start DX on premises. The plant digital ecosystem works multiple ways, both on premises and cloud-based.

How is Emerson tackling issues surrounding sustainability?

When looking at increased energy efficiency and reducing carbon emissions, our steam trap monitoring, which has a direct impact on energy consumption and one's carbon footprint is a key example. Another technology is relief valve monitoring, which reduces flaring and product loss. Although these inspection tasks can be done manually, it is a much more effective to automate it to stop losses sooner. A final example is the heat exchanger monitoring solution, which monitors the efficiency of heat exchangers underlining whether they need to be cleaned or overhauled. ■

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Joseph Lee Ching Hua

Head of Co-Innovation Centre & General Manager of Singapore Development Centre
YOKOGAWA ENGINEERING ASIA



Can you update our readers on the Co-Innovation center in Singapore as well as your developments in the past two years?

We have recently started introducing the Synaptic Business Automation, an Industrial Automation business concept which examines our customer's shift to a digitized smart manufacturing model. We have also set up a new Security Operations Center to ensure all data is secure. Furthermore, since 2016, we have acquired KBC Advanced Technologies, a provider of software and consultancy to the global oil and gas industry, and Soteica Visual Mesa (SVM), an energy management technology provider, to expand our position in the rapidly growing EMS market in the process industries. We also collaborate with several companies, relating to IIOT, security and voice activation including Microsoft.

What technologies are being developed to combat issues associated with cyber security?

We are investigating the best technology to work on this issue, including blockchain, and we are collaborating with companies

developing these technologies. Other than technology, we have to build up confidence with our customer, who seek reassurance that their data will not be leaked, hacked or lost. Our current strategy is to demonstrate the value of our solution before we move their sensitive information up into the cloud. This step-phase approach helps customers believe its value and accept the transition. By demonstrating the end goal, we help customers understand that digitization will generate value from a management perspective, and improve energy efficiency.

The Singaporean government has always been at the forefront of driving technology. What is the current level of support towards innovation?

The government plays an integral role in connecting technology providers, like Yokogawa, to our end users. They proactively engage with companies and provide support to transform their operations and boost productivity, to generate growth. These initiatives enhance Singapore's position as a global center for business and innovation. ■

Arun Nair

Managing Director Singapore
PRÜFTECHNIK



Can you introduce our readers to Prüftechnik and your operations in the region?

Prüftechnik was founded in Germany in 1972 supplying monitoring devices to industrial manufacturing companies. Having identified a need in the market for more sophisticated alignment technologies, our founder Dieter Busch pioneered a laser-alignment system, OPTALIGN, and brought it to market in 1984. Through this, we moved into the development of our product line providing machinery and software

with a wide range of applications for industrial maintenance and quality assurance across a number of industries. We consider ourselves to be a pioneer and market leader in this technology. We entered Singapore early, opening our first subsidiary in 1989, and have now developed agencies and subsidiaries on every continent.

Our customers can either acquire our equipment and software or hire us as a contract service provider to carry out the maintenance. In Asia, we work predominantly as a contractor, when there is particularly high staff turnover. Having Prüftechnik work on a contractual basis enables companies to avoid training new staff in how to use our equipment and software, maximizing staff productivity.

What industries is Prüftechnik predominantly serving?

Most of our demand has been in shipyards, but this has decreased in the past five years. However, we have, over time, diversified into a number of industries including chemicals and pharmaceuticals. Although these two industries have traditionally been conservative, the rate of adoption of our products is quite high with 60% to 70% of portfolio being applicable to them.

What does your condition monitoring system entail and how have your technologies developed in recent years?

A key part of our portfolio is the VIB-GUARD, an online conditioning monitoring system that protects machines from

damage, providing production security, and improves the efficiency of one's assets. We have advanced the software so it is Internet of Things (IoT)-based, allowing clients' machines with highly dynamic processes and complex monitoring tasks, to be included in a reliability-oriented maintenance schedule. OPCR: Our condition-monitoring solutions offer four possible maintenance strategies: reactive, proactive, preventative, and predictive. By monitoring the condition of machinery, we are able to identify problems with temperature, vibrations and a number of other variables. We focus primarily on rotating machineries, measuring vibration as the main sign of an issue.

We began further enhancing our product range five years ago by including IoT-based cloud connectivity and web-based monitoring as our customers demanded greater productivity, faster answers, and easier-to-read results. There has been a shift in demand towards preventative maintenance; the driving goal is to be able to develop a solution before the problem has even fully developed, as this will avoid the need to shut down operations.

What is your vision for Prüftechnik moving forward in the region?

Our vision moving forward in APAC is to continue increasing our presence to be closer to our customers, so that we can serve them far more efficiently. Growth into Indonesia is already becoming a big milestone for us and we are receiving strong positive responses from our customers there. ■



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Lim Khay Guan

Managing Director
**ENDRESS+HAUSER,
SINGAPORE**



Can you introduce our readers to Endress+Hauser?

Endress+Hauser is one of the world's largest, non-publicly listed, process-automation companies, providing instruments that feed measurements, information and process data to a control system. We have one of the largest instrumentation portfolios covering flow, level, pressure, temperature and analytical parameters. We have a test center dedicated to the interoperability of our instruments with the distributed control systems (DCS) of all major solution providers.

Our differentiation is our people and their application expertise in providing fit for purpose-instrumentation solutions for the seven industries that we serve, which includes water and waste water, life sciences, oil and gas/marine, power and energy, food and beverage, primaries and metal, and chemical. Innovation has been the driving force of the company since its origin; of our net sales, 7.6% is spent on R&D to develop new, innovative solutions.

As you occupy a very specific niche, how has the company strategized its expansion?

When identifying a growth strategy, we have looked at adjacent areas, specifically upstream into the laboratory space. In the past few years, we have acquired three companies: Analytik Jena, which specializes in laboratory analysis; SpectraSensors, a leading manufacturing of laser-based gas analyzers; and Kaiser Optical Systems, which specializes in Raman spectroscopy.

How has Endress+Hauser been involved in the government's push to consolidate Singapore as global bunkering hub?

In 2009, E+H was invited by the Singapore Chemical Standard Council to participate in a working group to develop a standard on bunker mass-flow metering. The result was the launch of the Technical Reference for Bunker Mass Flow Meter (MFM), also known as TR48, in 2016. The Maritime and Port Authority of Singapore (MPA) mandated that all barges be equipped with these meters by 1 January 2017. Currently, about two out of three barges operating in Singapore have an E+H bunker MFM system installed. ■

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A Helping Hand

While some Industry 4.0 applications and technologies have already gained wide-scale traction across the chemicals industry, companies still do not fully understand how to leverage them. Moreover, this technology wave is one-size-fits-all; each company seems to develop its own customized approach. Some are also more ready and willing to turn to Industry 4.0 than others. To encourage them to do so, the EDB, in a partnership with TÜV SÜD PSB, devised the Smart Industry Readiness Index (SIRI), as a company-specific interpretation of the abstract concepts of Industry 4.0. "There is not one Industry 4.0 solution; the key point is for the companies to interpret what Industry 4.0 means for their businesses, and to develop a comprehensive strategy and roadmap. For this, the Index acts as a checklist and guideline to ensure that all relevant aspects are considered in a systematic way," said Jacky Tan, Senior Program Manager at TÜV SÜD Singapore.

But what are the benefits of adopting these technologies and when will a company expect to see real benefits? In a recent McKinsey global survey, 50% of CEOs said that they did not see a positive return on their company's digital investment. Doan Hansen, Head of McKinsey's Chemicals and Agriculture Practice in Southeast Asia highlighted that to support digitization, one needs a flexible IT architecture in their middleware. "It can be a major investment that can be worth it, if there is still a good business case in the context of the company's IT infrastructure requirements," said Hansen. Companies should not, in other words, rushing headlong into Industry 4.0 simply because it exists.

Why Singapore can emerge as a global digital hub

Every company and country will have to undertake their own journey of Industry 4.0 to reap the potential benefits, but there is a particularly strong case for companies to do in an advanced, forward-thinking market like Singapore. This is proven by the numerous solution providers, and even manufacturers, who have opened digitalization hubs and centers of excellence in the city-state over the past few years, including GE, Accenture, McKinsey, Emerson, Yokogawa, Siemens and TÜV SÜD. "Singapore's Smart Nation initiative sets the right framework for the early adoption of innovative technologies. We always position ourselves in regions where these new technologies are deployed to develop our services as close to partners and customers as possible. Our decision has been vindicated over the last three years," said Andreas Hauser, director for Digital Services at TÜV SÜD Singapore. 102>>

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The ability to collaborate, engage and foster Singapore as a hub of knowledge and technological development has a chance, therefore, to give the chemicals industry (as well as other industries) a competitive advantage. SICK Automation, one of the leading manufacturers of sensors and safety systems for factory automation, specifically chose Singapore to base its R&D and production operations for its advanced research and forward-looking ecosystem. "Singapore has a very good talent pool and its two universities NTU and NUS were in the top ten in recent global rankings and one criteria for assignment is the research projects they performed based on Industry 4.0 technology. Second, Singapore has not

just strong IP protection but IP compliant enforcement as well," said Jack Goh, Managing Director APAC at SICK Automation.

Long Road Ahead

The adoption of Industry 4.0 applications and technologies is likely to be far more evolutionary than revolutionary. Companies looking for guidance on where to start their Industry 4.0 journey may be best served by looking at SIRI. And there are certainly some technologies that represent 'low-hanging fruit,' with the quickest step being digitalizing one's supply chain. Ramani at Accenture predicts companies can

see monetary and efficiency improvements in their supply chains within 12 weeks of implementation, but a gradual, step-by-step approach is likely to reap greater rewards. Adnan Abdul Rahman, General Manager of Automation and Engineering, Vertical Sub-Segments at Siemens underscores that digitalization is evolutionary. "Siemens' task is to facilitate the transition in small stages, by considering where the customers are today and also their expectations. Digitalization is not a solution – it is a journey, and every company will have their own destination. It is unique to each user, and to every site," said Rahman. ■

Adnan Abdul Rahman

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General Manager, Automation and Engineering Vertical Sub-Segments
SIEMENS



Can you tell us about Siemens new digitalization hub as well as the recent developments of Siemens here in Singapore?

At the new digitalization hub, we are using our expertise to help customers become more competitive, efficient and flexible in their production. In the past few years, we have seen more engagement with the user, in various topics such as manufacturing, process development and, increasingly IT, as it affects productivity. We use a multitude of disciplinary engineers and experts to work with the customer. We spend time listening to the user, and finding a solution that best matches what they want.

As regulations become stricter, it is necessary to conform and show up to date documents. We are introducing tools to the market that help document the engineering drawings or processes better, turning them into dynamic documents. Users are also re-

alizing they need to have more transparency in their operations. Siemens has been working with a leading chemical company, using our development tool called XHQ, to create an application that analyzes plant information from multiple sites around the world. This allows us to detect a fault in a key component in time to prevent downtime.

Our next step is to move information onto Siemens' MindSphere platform. Many of our customers are asking for more analytics, but they are limited by their data. Imagine with MindSphere the analysis could be done by accessing multiple data sources within the same company but from different locations. It would produce a clearer picture of what could be improved on the Singapore site. The data is on a common platform and with Apps we provide predictive feedback to the client on what the problem might be before it happens.

Singapore currently hosts 50% of South-east Asia's data center capacity. Can you tell us about the benefits of basing your operations in Singapore?

Within Siemens, we have digitalization reaching out to different parts of the world. Singapore is an ideal location to reach out to the ASEAN market because a lot of our clients have their regional headquarters here. A lot of our activity involves working with the client in a creative space before developing applicable solutions on a small scale that can be produced at a larger scale in other geographic areas. The government has underlined its intention of making Singapore a test hub and a smart nation. In terms of infrastructure, solutions and a digital network, there are many advantages.

What is the vision for Siemens in the ASEAN region and Singapore?

Siemens stands for engineering excellence, innovation, reliability and quality. Siemens is here to stay in Southeast Asia, and we will further build on the digitalization platform. Siemens is a leading supplier of efficient power generation and power transmission and pioneer in infrastructure solutions as well as automation, drive and software solution for industry. We will be focusing significantly in digitalization solutions because we believe that is where the next wave will be. Siemens will be there holding the hands of our customers. ■



Senthil Ramani

Digital Business Lead – Asia Pacific
ACCENTURE

With Accenture opening its new Digital Hub late last year, can you update us on developments over the past two years?

We had an opportunity to host 540 client sessions in the past two years. We learnt immensely from these interactions and helped us personalize the digital journey for our clients into three categories: optimize, transform and disrupt. The underlying theme two years back was to optimize, to identify opportunities and apply technologies such as mobility to build point solutions. We now see the next wave in the form of step change transformation. Leaders have now recognized that digital for them is about an insight-driven organization. People and data is at the heart of this transformation. We hence see a number of areas where analytics and AI is being applied across the value chain. The four key themes across the value chain are digital manufacturing, digital assets, digital supply chain and digital talent. The next wave, disruption, is here already with a few of the clients, leading the charge on leveraging block chain for payments, supply chain and identity management.

Can you provide examples in the four key areas the Digital Hub has been working in?

Within digital manufacturing and operations, there has been a lot of work on applying machine learning and artificial intelligence on assets, energy management and corrosion management. A third area has been in the turnaround – effectively when a plant is shut down – and how we can leverage digital to make this process more efficient.

The most important area of interest for clients has been through the digitization of the supply chain, as they will see monetary and efficiency results within 12 weeks of implementing new technologies. This may include applying AI or machine learning on inventory analytics, market and supplier intelligence. Digital infrastructure around security has been a key area. We have focused on deploying AI-led security solutions at scale across plant, well infrastructure. Finally, digital talent, focusing on upskilling employees, has looked at providing engineers with more hybrid skills. The intersection of corporate wisdom and decision-making is very critical and working by judgement is what the future will entail.

As digital transformation continues, how important will it be to prioritize cybersecurity?

Picture this...cyber attacks have risen more than 27 percent, from an average of 102 to 130 each year. Managing cybersecurity is considered an imperative – and a challenge. Digitalization is heightening vulnerability to cyberattacks, and protecting a growing array of connected hardware, software, networks and platforms is becoming increasingly complex. There are multiple attacks each week and, although there are regulations and standard in place, these standards need to be more dynamic. Each attack costs U.S.\$2.4 million on average as remediation costs. The problem is that we do not know where these attacks are going to come from. Standards give you assurance but one needs to go beyond this through proactive defense: knowing exactly what your opponent is going to do and actively defending your perimeter. No client can completely guarantee safety, and we need to constantly evolve to stay ahead.

Will companies implement blockchain in the near future?

I thought blockchain would take some time to permeate into the industry but I think it is going to radically and structurally change processes. Blockchain transcends traditional processes and gives transparency to do business much faster. Blockchain is everywhere but within the proven cases its application in digital supply chain and procurement is very high. Digitally supported track-and-trace solutions – like blockchain – allow companies to efficiently and safely exchange information across all phases and steps of a product life cycle. Another example is the application of block chain around molecule traceability.

What is your vision for the Accenture Digital Hub?

We want to support our clients by understanding their challenges and apply technologies like AI, blockchain. I wish every company takes AI seriously as it is about complementing human wisdom by using human wisdom. The whole idea is to make sure they can register their corporate knowledge within the AI tool that they build. The opportunity is huge for chemistry and advanced materials companies to become digital leaders, but the value that digital transformation can create is not guaranteed. ■



Jack Goh

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Managing Director
**SICK PRODUCT CENTER
ASIA**

Could you briefly introduce our readers to SICK Product Center Asia's operations in Singapore?

SICK is one of the leading manufacturers of intelligent sensor and sensor solutions for factory automation, logistics automation and process automation and the chemicals industry is one major segment of our business. The rationale for starting R&D and production operations in Asia was to be in the region for the region. In the city-state of Singapore, we have R&D, product management and strategic procurement, while production operations is in Malaysia.

Could you provide more insight into how Industry 4.0 is affecting your service offering?

For the past three years, companies have been doing a lot of research into data collection and presentation, then utilizing this data to monitor and control processes along the whole process chain from the feedstock to the end-product. The next step is how to use the information collected from the different process chains to drive decisions autonomously and provide predictive analysis. This shift towards big data requires equipping and adapting our sensors towards digital-information system design and applications. For example, we have gas analyzers installed in our tunnels, which assess the level of carbon monoxide and in turn activate a giant exhaust fan once the defined threshold level is reached, to suck out the bad air and bring in fresh air from outside. This is an example of how simple logic with defined parameters can drive decisions autonomously to operate alongside other devices in an intelligent system.

What is driving demand for SICK in APAC?

There are two key areas driving demand from the chemical industry. First is safety both for humans and assets, given some chemicals are explosive or corrosive. Second is the negative impact on the environment, the carbon tax, and the need for clean air and resources. There is of course much competition, but we focus on more collaborative partnerships to expand and leverage our reach into the market while at the same time differentiating our product offerings through advanced materials and innovative performance. So rather than compete, we develop collaborative strate-

gies and work with many Tier 1 companies or legislation organizations to define standards and as partner-system integrators in implementing our sensor solutions.

Many businesses are concerned by cyber security and system breakdowns. What limitations do you see in sensors?

In a large production facility, even one small system breakdown can disrupt the whole chain. It is a mandatory requirement for safety sensors to have backups so that if one system fails another one will kick in immediately. We are working on implementing this for chemical sensors as well. Some sensors also have pre-servicing warnings built into the device. Now, through internet connectivity, we can monitor the health of our customers' products offsite and recommend servicing schedule. The key issue that we are working on now is data protection given that more data is being put onto the cloud. To continue to improve our product, we need this data but there is often the question of who owns it. Clear understandings with stakeholders are needed to define its ownership and accountability. At same time, we do not put any sensitive data on the cloud, rather operating data such as chemical composition, temperature, moisture, and gas levels. SICK is investigating with polytechnic and research institutes on the possibility of encrypting data using block-chain technology, which would further enhance data security.

What is your vision for the product center in Singapore and SICK in the region?

Apart from focusing on technological development in terms of Industry 4.0, we see an urgent need to redesign our organization as a 'learning' organization that does not remain stagnant and that learns and adapts to the external environment. This will be important if we are to continue our journey towards becoming more responsive to Industry 4.0. Whereas in the past our main focus was productivity, now we include the need for agility and also believe that disruptive innovation creates the greatest value for us. SICK wants to internalize Industry 4.0 so that our employees understand where we are going. Furthermore, our strategy emphasizes synergy and so, both internally and externally, we seek collaboration to achieve common goals. ■

Christophe Begat

Oil&Gas and Petrochemicals Asia Pacific,
Vice President
Industry Business Unit
SCHNEIDER ELECTRIC



How has Schneider's control system evolved over time?

When Schneider Electric was founded, we were very focused on electrical distribution and automation. Recently we invested in process automation. So, from electrical distribution and automation we came into process. This has given us a significant differentiation in the market. Schneider has been investing in process automation. Previously we provided our petrochemical customers with electrical or distribution equipment, but now we are able to discuss the process: pain points, goals, objectives, KPIs, and how we can help the client reach their KPIs – not from an equipment perspective, but from the constructing process. Post 2014, we began a transformation to focus on strategic segments and understand their processes.

Do you have an example of a Petrochem or chemical company in Singapore that you have been able to help reduce their capex or opex costs?

Schneider supports Exxon and Shell, but maybe the most successful example of support from Singapore is Petrobras in Brazil. Petrobras has a lot of oil and gas fields and floating production storage and offloading (FPSO). Petrobras had an FPSO assembled, and we sub-contracted to EPC, as they had a yard in Singapore. Then we started to do some business in this sub-segment and discovered that the main EPC actors for Petrobras are in the region. This was a new model for us, where we provide an FPSO, but they operate it and sell the oil. Petrobras wanted remote monitoring of assets, they didn't want to send a helicopter each time they wanted to check a circuit-breaker. A person onshore could view all the assets on the FPSO. That is part of the digital transformation; to provide systems to workers to allow remote operations. We do it with some IoT solutions that were not existing before. ■

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Service Providers

"It is inevitable that our future resides in increasingly automated working conditions, even if part of construction and operation will always remain manpower-intensive. Plants will become more digitized and automated, and the Singaporean government is very aware of that trend. Historically, the government and its agencies had the foresight of anticipating such fundamental changes to help the workforce adapt and come out ahead."

- Arnaud Despierre,
Partner,
Spencer Stuart



Service Providers

"The profitability challenges of refineries and petrochemical plants were linked to overcapacity, fluctuating prices of crude and products, and a reduced global demand for certain products. As a consultancy that focused on improving energy efficiency, we were affected, as such services typically fall into the 'nice to have' category. However, it is now more positive for us, as the industry has recovered and plants are starting to run at full capacity."

**- Norman Lee,
Founder and Owner,
ACTSYS Process
Management Consultants**



"Manpower has always been a challenging issue, perhaps even more so in Singapore. We are observing a talent gap, largely between the mid-30s to late-50s demographic. Many highly experienced staff in the industry are starting to leave either the workforce or leave Singapore, making it increasingly challenging to find suitable candidates from the local talent pool."

**- Quek Kian Hui,
Executive Director,
Mun Siong Engineering**



"Human resources remain a key challenge for the government, particularly pertaining to foreign quotas for workers and a lack of home-grown engineers. Many individuals leave university with engineering degrees and move into less technical fields. Although the government is providing a lot of grants at the moment, I do feel it could have been put to better use a few years ago. On the flip side, a key positive of the city-state is the strongly recognized 'Singapore brand' that we benefit from wherever we go."

**- Kristen Lau,
Business Development Manager,
Alstern Technologies Group**



Engineering and construction

Singapore's engineering and construction services have yet to reach anywhere near the growth levels that preceded the 2014 downturn. The sector shrank by 8.4% in 2017, a reversal of the 1.9% growth in 2016 (MTI), and it is set to remain lackluster in 2018 as a lack of demand, particularly from the private sector, continues to dampen activity in the construction sector. Wayne Yap, executive director at ASPRI, still sees rising business costs as the main headwind for most of Singapore's businesses. "We observed an overly competitive environment for the process construction and maintenance (PCM) companies. A barometer of this is that ASPRI's corporate memberships have not gone down but in fact increased slightly. This is consistent with a highly fragmented industry resulting from a price sensitive structure," said Yap.

John Halfweeg

Regional Director – APAC
MAMMOET



Can you update us on Mammoet's developments over the past two years in APAC?

The last two years were defined by a number of groundbreaking projects for Mammoet, including the RAPID refinery in Johor, Malaysia; the Jangkirk floating platform unit in Karimun, Indonesia; and S-Oil's Daelim Residue Upgrading Complex (RUC), South Korea. Mammoet was involved in eight of RAPID's heavy-lifting segments – 80% of the heavy-lift assignments, including the coordination of 11 shipments. Despite numerous challenges ranging from ground issues and lightning, which we safeguarded by using lightning monitors on our employees, we overcame each challenge. Mammoet achieved time-saving efficiencies on the project as a whole, ensuring the work was completed safely and on-schedule. A great deal of the preparatory work occurred in Singapore and logistically, Singapore's close proximity to the Pengerang Integrated Petroleum Complex (PIPC), made it the ideal location to work from.

With the completion of your capital work on RAPID, in what capacity will Mammoet be involved at the Pengerang Integrated Petroleum Complex (PIPC)?

The 'closing comments' on RAPID will take some time as the whole plant maintenance, turnaround and service contract need to be undertaken. This is a key reason why we moved our yard closer to the PIPC from Kuala Lumpur as it will provide us with the flexibility to carry out our own plant maintenance. We are targeting the maintenance service agreement (MSA) for RAPID and have put forward a well-defined plan.

Can you expand on Mammoet's current project portfolio in the APAC region?

This year has been a transition from the large projects of 2017. In 2018 we have had many more capital projects, albeit on a smaller scale. For example, in Australia, with the current uptick in mining, we have been involved in a number of capex investments. We have also seen a real push towards renewable energies, including in Australia, Taiwan and Thailand, and have been investing in specialized heavy equipment for this purpose. ■

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To survive, construction companies are diversifying their capabilities into other sectors as well as identifying opportunities across ASEAN in growth markets including Vietnam, Myanmar, Indonesia, and Malaysia. For example, following the downturn in the energy sector, HSL Constructor began focusing more on the water industry and benefited from a number of public contracts, including the Changi Water Reclamation Plant Phase 2 and the Tuas Desalination Plant 3 (opening July 2018), both for the Public Utilities Board (PUB). Regional assignments for HSL have included power projects in Malaysia, Indonesia, and Myanmar.

Returning to the pre-2014 heyday, which was driven by large EPC projects across Singapore's chemicals industry, remains unlikely for now, but there are opportunities for service providers to take advantage of new capex and opex projects in ASEAN. A number of companies have benefited from the construction of the nearby Pengerang Integrated Petroleum Complex (PIPC), most notably Mammoet,



Image courtesy of Mun Siong Engineering

Wayne Yap

Executive Director

**ASSOCIATION OF
PROCESS INDUSTRY (ASPRI)**



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who were involved in eight of Refinery and Petrochemicals Integrated Development's (RAPID) ten heavy lifting segments. When discussing the project, John Halfweeg, regional director for APAC at the company highlighted that, despite challenges ranging from ground issues and lightning, the safety of employees was assured with the use of lightning monitors. "Mammoet achieved time-saving efficiencies on the project as a whole, ensuring the work was completed safely and on-schedule. A great deal of the preparatory work occurred in Singapore and logistically, Singapore's close proximity to the PIPC, made it the ideal location to work from," said Halfweeg.

Manpower constraints a persistent burden

Heavily linked to the process industry, the lack of manpower continues to be a major issue in Singapore. Industry 4.0 technologies, especially advanced-robotics-enabled procurement, will reduce the need for manpower in parts of the value chain, but other areas, where high-skilled labor is required but underrepresented, cannot be addressed simply with technology. Bertschi's Vander Elstraeten says that the manpower shortage and lack of quality is still his biggest challenge. "We hope the government will put in place smart actions and make the necessary changes to the existing foreign-quota system to address the extreme shortage of manpower, as it is slowing down our growth and further development on Jurong Island," said Vander Elstraeten.

Jon Proctor, regional director for Asia at Brunel, highlighted that the Ministry of Manpower has made it increasingly difficult to obtain foreign-worker permits, as they prioritize a Singaporean workforce.

What has been the progress on the ASPRI-Westlite Dormitory-Papan since 2016 and what other initiatives has ASPRI been working on?

ASPRI-Westlite Dormitory – Papan, in collaboration with Centurion, is the first dormitory in Singapore that embodies a Live, Learn and Play concept. This workers' accommodation, which was soft-launched in May 2016, plays a vital role in increasing productivity and training PCM industry workers. Located close to Jurong Island, home to more than 100 global energy and chemical companies, the accommodations help reduce travel time and fatigue.

In Q3 2016, our training division, ASPRI-Institute of Process Industry (ASPRI-IPI), commenced operations at ASPRI Integrated Training Centre (AITC). With this new facility, residents are now empowered through 90% subsidized courses to upgrade themselves with ASPRI-IPI's comprehensive range of training courses encompassing IT & Literacy, Workplace Safety and Health, Teamwork, Quality & Productivity and Technical skills.

Early results have been promising. In 2017, ASPRI-IPI conducted 125,000 training hours for 8,600 trainees (of which 3,300 are residents), a four-fold increase from before shifting to AITC.

ASPRI-IPI aspires to be a premier SMART training center that promotes digitization through technology such as Virtual Reality (VR)/ Augmented Reality (AR) as well as online interactive training.

What is ASPRI doing to help its members?

The Process Construction and Maintenance Management Committee (PCMMC) has been tasked with improving productivity for the sector, which led to the establishment of our dormitory. ASPRI is

strongly represented in PCMMC and liaises with the government to calibrate manpower policies and lobby on behalf of our members companies. The government's Workforce Skills and Quality Framework (WSQ) looks at a more holistic development for general workers; this is where ASPRI comes in to train workers quickly and effectively. The Ministry of Manpower has been listening to the industry more in the last few years, for example from 2017 to 2019 they are enhancing the workers' levy criteria and have been engaging our Association closely for views and suggestions.

What regulations will affect the industry greatly?

The Ministry of Manpower and Workplace Safety & Health Council have come together to reinforce the "Vision Zero" movement, to drive excellence in the workplace and safety and health (WSH) outcomes, starting with Jurong Island. Fundamentally, Vision Zero requires a mindset that all injuries and health issues arising from work are preventable and that zero harm is possible. To achieve this, ASPRI is working closely with our counterparts to spread awareness and change safety mindsets.

Where would you like to see the industry and ASPRI in the next few years?

The launch of Singapore's Energy and Chemicals Industry Transformation Map (ITM) in October 2017 marks a renewed commitment to position this sector for the future. The ITM details Singapore's plan to transform its existing base of chemicals manufacturing through the adoption of innovative Advanced Manufacturing technologies to improve productivity and safety, rejuvenate assets and overcome resource constraints. ■

Charles Quek

CEO

HSL CONSTRUCTOR



Can you firstly introduce our readers to HSL?

HSL began in 1994 as a small contractor with a focus on the process industry. We have since moved into larger EPC projects, including with Exxon Mobil, Shell and Jurong Aromatics between 2006 and 2012. In 2014, the Temasek-linked Dymon Asia Private Equity (DAPE) made an investment of \$15 million in the company. This coincided with the beginning of the downturn in oil and gas, which spurred us to move away from the process industry and more into the water industry, which included a water-reclamation project in Changi and the Tuas desalination plant. In the past four to five years, we have been involved in numerous power projects in Malaysia and have consolidated our footprint in Indonesia and Myanmar. Water projects now represent 40% of our portfolio, with 30% energy and the remaining 30% in marine works, such as jetty and port construction.

HSL implemented an Energy Management System in 2012 to reduce the company's electricity output. What other

sustainability initiatives are you undertaking?

The energy committee is working on a number of initiatives, including as rainwater harvesting, solar plants and an industrial-farming project in collaboration with a Dutch consortium. We have been trying to implement the use of bio diesel but have faced compatibility issues. Looking forward, we want to place solar panels on all our marine vessels and become the first green-marine piling company. Moreover, we are also looking at using turbines on our floating barges.

What are some key milestones for the company?

We are looking forward to the opening of the third desalination plant in July 2018. It is our first EPC project with the Singapore's National Water Agency (PUB). We are also excited for the opportunities in the ASEAN region and potentially India. Although we have received enquiries for marine works from as far as Mozambique and Kuwait, we will remain regionally focused due to the abundance of opportunities. ■

Wong Heang Fine

Group CEO

SURBANA JURONG



Can you introduce our readers to Surbana Jurong?

Surbana Jurong took shape three years ago following a merger between two technical arms of the Singapore government - Surbana International Consultants and Jurong International Holdings. Surbana International has a focus on public housing including new technologies in city management and urban planning, while Jurong International is involved in industrial planning, industrial state design and other concepts including the Jurong Rock Caverns (JRC) to store feedstock. Both Surbana International and Jurong International have had a role in almost everything that Singapore has built in the past 50 years, including the construction of over a million homes and designing Jurong Island.

How is Surbana Jurong helping construct Changi International Airport's Terminal 5 (T5) and Tuas Mega Port?

For the Tuas Mega Port, the largest of its kind in Asia, we have created 222 concrete caissons each weighing 15,000 tonnes. The design was specifically engineered to accommodate Singapore's lack of certain resources, such as sand. The other mega project, Changi Airport's T5, will increase the airport's total passenger numbers from 82 million to 150 million and introduce the latest technological capabilities. We

have recently been appointed as master civil consultants to T5 and will provide consultancy services for the design of infrastructure at the landside and airside areas outside of T5's buildings.

Surbana Jurong aims to increase revenue to S\$3.8 billion in the next five years. How will you do it?

We are looking at both organic and inorganic growth. We are currently operating in 40 countries, predominantly in Asia, but have yet to tap into Europe and the Americas. Moreover, there are numerous industries into which we can expand. Nevertheless, the company's future growth will focus on utilizing our experience in urbanization and industrialization. We are accustomed to designing large engineering projects in an intense environment, due to our experience in Singapore. Consequently, we have been able to successfully export our industrialization concept. The China-Singapore Suzhou Industrial Park (SIP) is an example of how we created a smart city with an even higher quality of life than in Shanghai. More recently, we completed the master planning and feasibility studies for the 8,000-km2 city of Amaravati in India, and are creating a smart and green city, New Clark City in Manila, with the first phase set to be completed by 2022. ■

Dan Sherwood

Business Development Manager
WOOD



Can you please introduce our readers to Wood, the new company formed when Wood Group and Amec Foster Wheeler came together last year?

Wood is a global leader in the delivery of projects, engineering and technical services in the energy and industrial markets. We have a footprint spanning 60 countries, providing performance-driven solutions throughout the asset life cycle, from concept to decommissioning across a range of industries including in oil and gas, power generation, clean energy solutions, chemicals and petrochemicals.

Wood Group's acquisition of Amec Foster Wheeler last year was an important milestone, further strengthening our downstream operations especially in refining and chemicals. It has brought together the power of three organisations with rich heritage and highly skilled professionals. We have long-standing partnerships both globally and regionally founded on our ability to consistently deliver successful outcomes. Regionally we now have major execution centres in Singapore, Kuala Lumpur, Thailand and China to deliver across our extended service offering.

Where are you seeing new opportunities for growth in Singapore?

The MARPOL (International Convention for the Prevention of Pollution from Ships) limit on sulfur content from the current 3.5% to 0.5% in marine fuels comes into effect in 2020. Singapore is both a shipping and refining hub and with the cleaning up of shipping fuels, and we see considerable opportunities to reduce the amount of heavy fuels within our clients' inventories.

How are you incorporating Industry 4.0 technologies into your operation?

We continue to invest in our digital and automation and control services, which includes systems design, configuration, implementation, commissioning and software solutions. Moreover, we have a global collaboration agreement with IBM, which provides us with a key advantage in how we execute our projects. For existing clients, our partnership with IBM can assist with advancing their systems, through utilizing data analytics to improve their operations. We are looking at areas where we can be smarter with our operations, exploring the possibility of operating teams off of Jurong Island for example. ■

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Quek Kian Hui

Executive Director
MUN SIONG ENGINEERING



As Mun Siong Engineering celebrates its 50th year anniversary in 2019, can you update us on the company?

We have been holding steady for the past two years due to the continued slowdown in the industry and competitive rates, which have made it difficult to make strategic decisions and evaluate long-term plans. However, we can see more foreign investment coming in with much talk about future projects in the coming years. Mun Siong has also invested internally, though our investment has been mainly driven by maintenance and operations works than in new builds, as construction works currently tend to be extremely competitive due to limited demand. This is despite the company being involved in multiple projects at a FEED (Front End Engineering Design) stage, and providing engineering design for a few of them.

Moving forward, we see maintenance budgets increasing and are thus investing in the digitization and integration of our processes, and in a new range of automation and mechanization for our work, such as for hydroblasting, pipe-spool production and

other services. These will further improve productivity while reducing man-hour requirements.

How do you read the future in terms of petrochemicals and oil & gas capex projects?

Singapore has always been an oil-processing hub, but global momentum appears to have shifted towards gas processing and its derivatives. We cannot make predictions at this time, but realize that oil is not as attractive as it used to be. The local focus has moved towards petrochemicals and specialty chemicals.

I would imagine this will create a more competitive landscape for plant owners in this region, but it may negatively impact construction jobs as well as their service providers. We see companies venturing out of Singapore into countries such as Vietnam, Thailand, Myanmar and the Middle East to look for opportunities to expand and grow. Mun Siong is also evaluating options to expand into a number of countries regionally. ■

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Nevertheless, Proctor sees this challenge as an opportunity for Brunel. “Singapore has depended on foreign labor for many years, particularly in heavy industries, but it has become increasingly difficult to bring in blue-collar workers, especially in high volume. We are having to educate our clients with respect to this situation. These restrictions have, however, allowed us to leverage more local talent, and we now understand the local manpower market very well,” said Proctor.

Although parts of construction and operations in the chemicals industry will always remain manpower-intensive, workforces are becoming leaner as automated working conditions are becoming more common. Singapore’s industry transformation maps (ITMs) and Smart Industry Readiness Index (SIRI) are fast-tracking digitalization and automated processes that are reducing manpower needs across the industry. This has, of course, led some workers to ponder what their future working prospects will consist of. Arnaud Despierre, partner at Spencer Stuart, emphasized that the government has historically shown its ability to anticipate fundamental changes in the labor force. “Government policies are very thoughtful when coming to reskilling the impacted workforce, as well as helping individuals whose jobs are at risk,” said Despierre.

SkillsFuture Framework

From Despierre’s comments, it is little surprise then that the Singapore government is tackling the issue head on. A key component of the ITMs is the SkillsFuture Framework, which aims to upskill Singapore’s workforce so as to be best equipped to benefit and thrive from the opportunities arising from Industry 4.0. Jointly developed by SkillsFuture Singapore (SSG), Workforce Singapore and the Singapore Economic Development Board (EDB), together with the

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BRUNEL



JP



WV

Can you give us an overview of Brunel's operations in Singapore?

JP: Brunel is a projects-solutions provider with a strong background in the oil and gas business. Due to the recent downturn in that industry, we have looked into other verticals including engineering, chemicals and heavy construction, which have become the core pillars of Brunel's operations. Recruitment and manpower are key parts of what we do at Brunel, but over the past few years we have provided more of a consultancy service to our clients. This includes payroll, taxation and immigration services.

How has your involvement in the petrochemical industry changed since 2013?

WV: Our petrochemicals portfolio still represents 50% of our work here in Singapore, primarily in project and operations support as well as recruitment. We also have a lot of upstream-related construction activity here, since Singapore is home to some of the world's largest shipyards. In the oil and gas downturn, we have focused on growing our work in chemicals.

What new opportunities in the ASEAN and China are Brunel identifying?

WV: There has been growth in the petrochemical and chemicals space particularly in China. There are considerable opportunities with sizeable investments happening in China but they come with challenges.

There are already thousands of local players with low-cost options. Despite this, our global reach will be of importance, as a lot of our clients will look to move personnel or a refinery into China, which will help build our market share and increase our understanding of the market.

JP: Compliancy is an integral part of our business, from obtaining the right visa to paying the right tax. As we are publicly listed and position ourselves as a trusted partner, we cannot fall victim to a grey area, which in some countries is quite large. We often find ourselves losing opportunities to competitors who do not prioritize compliancy. We hope that European clients will further invest in China, as our clear stance on bribery and anti-corruption will appeal to them.

What is vision for Brunel in the region for the coming three to five years?

JP: Brunel has an ambitious global growth strategy, which can only be achieved through diversification. Like many companies, we have been affected by the downturn in the oil and gas industry but are confident in our growth plans into new industries. We expect to expand into a number of countries in the ASEAN region, including Vietnam and Myanmar. We see Vietnam as a big growth market due to its large population and supply of technical expertise. ■

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Arnaud Despierre

Partner

SPENCER STUART



How are you seeing the business environment change in Singapore with respect to chemicals and how the city-state is positioning itself regionally?

There are pendulum swings between Singapore and Shanghai as a hub for the Asia-Pacific region. If you look back 20 years, Hong Kong was a big hub but over the last decade or so many chemicals players have shifted their regional headquarters to Shanghai or Singapore. Shanghai is obviously key for companies with large operations in Mainland China. However, Singapore, due to its geographical location at the center of the Asia-Pacific region, as well as its cultural, social and logistical benefits has convinced many chemical companies to relocate their HQs to Singapore. Multinationals are no longer finding Shanghai substantially cheaper as a base and are also struggling to find talent with regional competency, in addition to dealing with the linguistic barriers that Singapore does not pose.

How do you expect digitization and automation to change the need for manpower?

It is inevitable that our future resides in increasingly automated working conditions, even if part of construction and operation will always remain manpower-intensive. Plants will become more digitized and automated, and the Singaporean government is very aware of that trend. Historically, the government and its agencies had the foresight of anticipating such fundamental changes to help the workforce adapt and come out ahead.

Which segment of the chemicals market seems to have the highest growth potential for Spencer Stuart?

The emerging opportunity for our leadership services are local Asian companies that are growing in ASEAN, China and beyond, who increasingly need diverse and versatile talent. With respect to countries in ASEAN, there is still considerable interest in Indonesia as the sizeable demographics and economics cannot be ignored, despite recurring challenges to doing business in the country. Smaller countries from a manufacturing standpoint, like Vietnam and Myanmar, are also beginning to attract a lot of attention and investments, as they are largely untapped markets with high-growth potential. ■

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The government is trying to drive students that study technical degrees into more industry-related jobs. They really want to push locals into their trained skillsets for a career they believe is right for them. This competes with the creative side of Singapore, which is linked to the millennial generation.

- Tom Reid,
Director - APAC,
Spencer Ogden



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industry associations, training providers, organizations and unions, the Framework for Energy and Chemicals covers a total of 53 jobs, offering training on generic and technical skills and competencies. Skills in demand now, and in the future, include digitalization skills – for example, internet of things management; data analytics system design; robotic and automation technology application – and product development and innovation skills – for example, applied research and development; innovation management; and product design and development. Individuals, meanwhile, have opportunities for education and career guidance, as well as subsidies, fellowships and internships.

A Thought for the Future

Singapore's rapid development is testament to its well-defined and structured education system. It consistently ranks at the top of global primary and secondary educa-

tion tables including The Programme for International Student Assessment (PISA). Yet if you remove the importance of core subjects like math and science and identify what will be needed in the future of our dynamic world – entrepreneurship, creativity and innovation - Singapore has yet to fully embrace this within its educational system and across society as a whole. Its collaborative ecosystem of research and technology, nevertheless, has positioned it as high as ninth in Martin Prosperity Institute's Global Creativity Index 2015, while its technology and talent indicators ranked seventh and fifth, respectively. At the same time, Singapore surprisingly ranked relatively low in terms of tolerance at 23rd. As the city-state continues its relentless pursuit towards an ecosystem of utopian standards, Industry 4.0 will take it on a new course. This evolution will demand economic, social, and educational change. How Singapore manages these changes, having advanced so rapidly and efficiently since independence, will be a central question moving forward. ■



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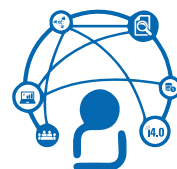
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Individualised understanding of Industrie 4.0 concepts: I4.0 readiness assessment, training, benchmark, gap analysis and actionable roadmap



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