THE MAGAZINE OF THE INSTITUTION OF ENGINEERS, SINGAPORE

www.ies.org.sg

THE SINGAPORE ENGINEER

August 2021 | MCI (P) 020/03/2021

COVER STORY:
The Sembcorp Tengeh Floating Solar Farm officially opens

PLUS

SUSTAINABILITY: Helping small and medium enterprises achieve energy efficiency
CHARTERED ENGINEER PROFILE: Validation boosts career development opportunities
RAILWAY & ROAD ENGINEERING: On-demand community mobility service

CHARTERED ENGINEER

(SINGAPORE)



❑ ***AEROSPACE***

❑ ***RAILWAY & TRANSPORTATION***

❑ ***PORT & MARINE***



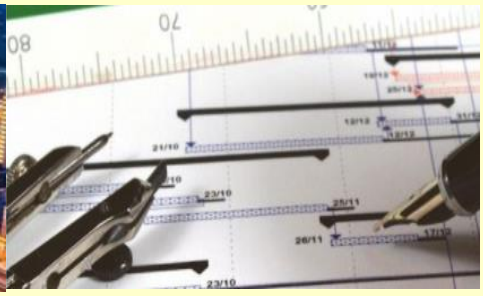
❑ ***ENERGY***

❑ ***ENVIRONMENTAL & WATER***

❑ ***SYSTEMS***

❑ ***DIGITAL (New!)***





❑ ***CHEMICAL & PROCESS***

❑ ***INFRASTRUCTURE***

❑ ***ENGINEERING PROJECT MANAGEMENT***

****** Get your skills and competency Certified! ******

****** Apply Now! Visit us at www.charteredengineers.sg ******

(Terms and Conditions Apply: Washington Accord Degree, 4 years working experience and be an IES member)

CONTENTS

FEATURES

President
Dr Richard Kwok

Chief Editor
T Bhaskaran
t_b_n8@yahoo.com

Publications Manager
Desmond Teo
desmond@iesnet.org.sg

Snr Publications Executive
Queek Jiayu
jiayu@iesnet.org.sg

Editorial Panel
Dr Chandra Segaran
Prof Er Meng Joo
Dr Ang Keng Been
Mr Gary Chiam
Dr Victor Sim
Mr Syafiq Shahul
Dr Alexander Wiegand

Media Representative
Multimedia Communications (2000) Pte Ltd
sales@multimediacomms.sg

Design & layout by **2EZ Asia Pte Ltd**

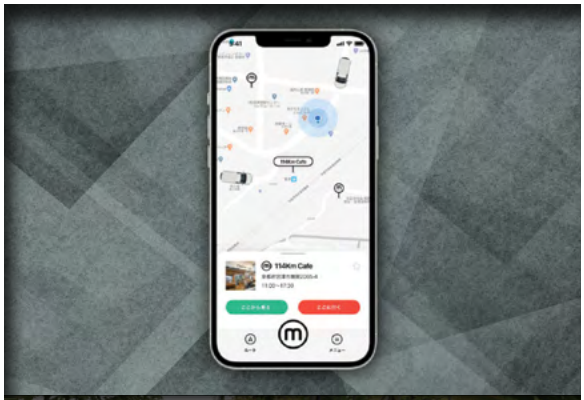
Cover designed by **Irin Kuah**

Cover images by **Sembcorp Industries**

Published by
The Institution of Engineers, Singapore
70 Bukit Tinggi Road, Singapore 289758
Tel: 6469 5000 I Fax: 6467 1108

Printed in **Singapore**

www.ies.org.sg



REGULAR SECTIONS

The Singapore Engineer is published monthly by The Institution of Engineers, Singapore (IES). The publication is distributed free-of-charge to IES members and affiliates. Views expressed in this publication do not necessarily reflect those of the Editor or IES.

DELTA SHOWCASES CONTAINERISED PLANT FACTORY

AND BUILDING AUTOMATION SOLUTIONS

Delta, a global provider of power and thermal management solutions, has introduced a containerised smart plant factory and its building automation solutions at Punggol Digital District (PDD), Singapore's first smart business district which is planned by JTC.

As one of four initial corporations joining the district, Delta integrated a broad range of energy-efficient industrial automation, thermal management and LED lighting systems to create a 12 m containerised smart plant factory capable of regularly producing vast amounts of pesticide-free vegetables. When compared with traditional farmland, the smart plant factory has only a fraction of the carbon footprint and space requirement, as well as less than 5% of the water consumption.

Speaking at the inaugural 'Punggol Digital District: Connecting Smartness 2021' event, held recently, Mr Alvin Tan, Assistant Chief Executive Officer, Industry Cluster Group, JTC, said, "Delta's activities in Punggol Digital District truly embody the district's vision of test-bedding and nurturing next-generation talent in smart living innovations. We look forward to welcoming more collaborative partnerships in our district".

The event was held in the presence of Singapore's Minister for Trade & Industry, Mr Gan Kim Yong; Senior Minister and Coordinating Minister for National Security, Mr Teo Chee Hean; and Senior Minister of State, Ministry of Communications and Information, and Ministry of Health, Dr Janil Puthucheary.

Ms Cecilia Ku, General Manager of Delta Electronics Int'l (Singapore), said, "Delta is committed to enabling a sustainable future through conservation of precious resources such as energy and water, in line with our corporate mission, 'To provide innovative, clean and energy-efficient solutions for a better tomorrow'. As the world suffers from the scarcity of natural resources, Delta constantly innovates with smart green solutions that can foster sustainability in essential industries, such as manufacturing, buildings and agriculture. We are very excited to be partnering with JTC as well as international players, academia and trade associations to accelerate innovation in Singapore".

The containerised smart plant factory integrates Delta's industrial automation, DC brushless fans and LED lighting systems, to create optimal environmental conditions for the cultivation of high-quality, eco-friendly vegetables. For example, up to 144 kg of Caipira lettuce can be produced per month in one 12 m container unit. Unlike most vertical farms based on hydroponics, Delta's smart farm solution adopts a modular system, providing flexibility in terms of the scale of production. The solution can also be customised to produce up to 46 different types of vegetables and herbs and, at the same time, ensure a stable and constant supply of quality produce. Compared with a traditional farmland of equivalent size, on average, a container unit may have up to 10 times the output of vegetables, while consuming less than 5% of the water required by the traditional farmland. The solution allows for monitoring and data analytics of the environmental and machine metrics, to enable farmers make more informed decisions about their production process.

The interior of Delta's containerised plant factory at Punggol Digital District.

In addition, Delta retrofitted the PDD site gallery with its building automation solutions, to nurture companies and educate next-generation talents on smart living solutions. Building systems, such as air conditioning, lighting, energy management, Indoor Air Quality (IAQ) monitoring and surveillance, are all managed on a single platform, by adopting LOYTEC's IoT-based building management platform and building control systems.

Delta's building automation solutions installed in the PDD gallery offer benefits such as human-centric lighting control in accordance with circadian rhythms, IAQ monitoring and control, smart energy metering, crowd detection and people-counting. These functions are all seamlessly integrated into PDD's Open Digital Platform, which allows remote monitoring and machine learning of usage patterns, to obtain the building operation performance and achieve Delta's goal of smart, healthy, safe and efficient living.

This year, Delta is celebrating its 50th anniversary under the theme 'Influencing 50, Embracing 50'. The company expects to organise a series of activities focusing on energy conservation and carbon reduction for its stakeholders.

FARMING IN SINGAPORE GOES DIGITAL

WITH SPTEL'S IOT-A-A-S PLATFORM

An artist's impression of AbyFarm at an Ang Mo Kio carpark rooftop.

SPTel recently announced an initiative that supports the development of next generation urban farms in Singapore through its Internet of Things-as-a-Service (IoT-a-a-S) platform. Beginning with the implementation of IoT-a-a-S with local agritech player AbyFarm, the platform will enable fast and scalable deployment of IoT applications that enhance modern food production processes as well as improve productivity and crop yield.

"As urban farms become a vital component of Singapore's '30 by 30' vision, IoT technology will continue to prevail as a core enabler of smart farming in Singapore. Enabling smart urban farms, such as Abyfarm, to leverage IoT to reduce manpower requirements and improve crop yield, will be critical to the long-term success of Singapore's urban farming programme", said Ms Susan Loh, VP, Marketing and Business Development, SPTel.

"SPTel's IoT-a-a-S platform is a one-stop solution that manages the end-to-end IoT deployment so that farmers can focus on their business of providing quality crops, instead of having to worry about managing multiple vendors. The platform is also built on an 'as-a-service' model, making the solutions accessible without the need for farmers to make heavy upfront investments to build and maintain their own platforms", she added.

As urban farms adopt IoT applications in their processes, including those for monitoring environmental conditions, to help them manage crops more efficiently, they face challenges in sourcing and identifying appropriate applications, sensors, and technologies. This often results in the use of multiple IoT devices from different vendors, with hefty investments made on multiple platforms.

SPTel's IoT-a-a-S platform addresses these challenges with its multi-protocol configuration that provides an integrated platform for urban farms to monitor and manage various sensors and applications, regardless of their gateway deployment requirements. The integrated platform allows urban farms to connect IoT sensors that can transmit data for key variables that affect plant health and growth, such as temperature, humidity, and nutrient levels.

The platform also enables urban farms to connect additional IoT sensors with ease, as they expand, allowing the farmer to retain centralised control of all devices and applications on the platform. In addition, through SPTel's extensive network of secure hubs across the island, urban farms can leverage a ready IoT platform with island-wide reach for fast deployment across multiple sites.

"SPTel's IoT-as-a-service solution for sensor data collection and analysis allows us to track multiple sensors simultaneously. Through this deployment, we are able to become a sustainable self-regulating urban farm with IoT, automation and crop blockchain ledger that enables farm-to-table traceability for improved food safety and security. AbyFarm is now on the express lane to make smart, sustainable smart farms a reality for Singapore",

said Ms Phoebe Xie, Abyfarm Director and Co-Founder.

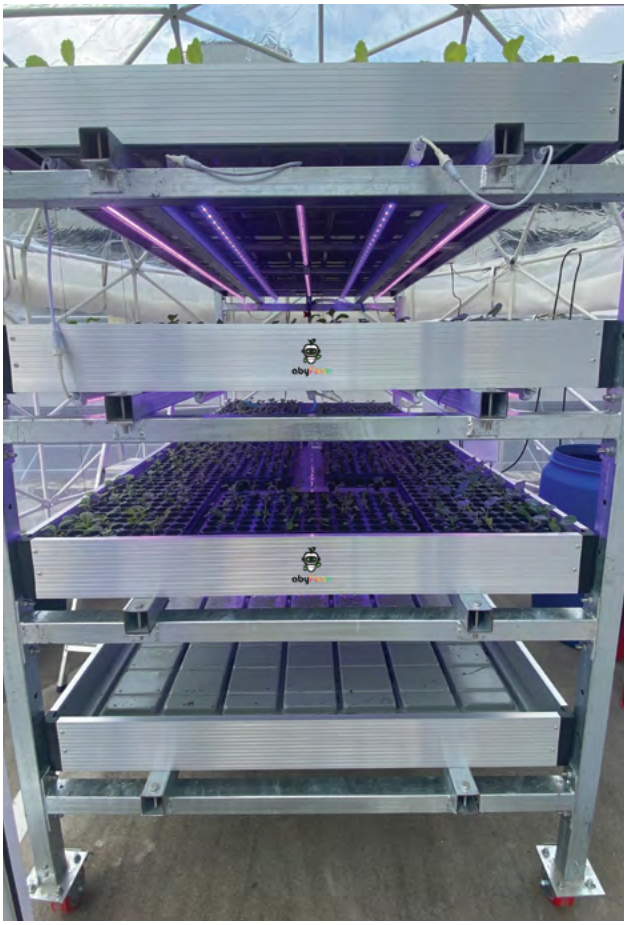
The Ministry of Sustainability and the Environment has outlined its goal for Singapore to produce 30% of its nutritional needs by 2030. Known as the '30 by 30' strategy, the vision would require a combination of factors, such as adequate spaces for urban farming and an increase in production, which is dependent on the adoption and deployment of technology. Local agri-food companies and urban farms looking to leverage SPTel's IoT-a-a-S platform can defray digitalisation costs through an Enterprise Singapore (ESG) grant.

SPTel

SPTel is a joint-venture company of ST Engineering and SP Group. SPTel uses unique fibre pathways that combine leased SP Group infrastructure and owned fibre pipes, laid alongside the power network cables. Through this, SPTel provides a differentiated design and diverse business class digital network solution for discerning, best-in-class enterprises and mission critical businesses.

AbyFarm

AbyFarm is a Singapore-based agri-tech company with a fully-integrated, unmanned, self-sustainable smart farm-to-table platform, based on the use of IoT, AI and cloud computing.



Vegetables are grown in AbyFarm, using a high-tech, unmanned, flood drain system, running 24/7.

Cognizant acquires TQS Integration

Cognizant recently announced that it has agreed to acquire TQS Integration, a privately owned global industrial data and intelligence company based in Lismore, Ireland. TQS delivers manufacturing data intelligence, global technology consulting and digital systems integration to help manufacturers accelerate their digital transformations. Founded in 1998, TQS services clients in the life sciences, food and beverage, and energy and renewables industries.

As manufacturers embrace Industry 4.0 and realise the power of data, industrial data platforms and services are critical to obtain a complete view of the value chain and make analytical, data-driven decisions to improve overall operations. TQS's data intelligence capabilities, which will be combined with Cognizant's core Industry+ and digital competencies, use artificial intelligence (AI) and machine learning to collect, contextualize and analyse manufacturing data. This allows manufacturers to make smarter decisions and improve speed of implementation, product quality and yield, and reduce operating costs.

"TQS enhances Cognizant's end-to-end smart factory capabilities, helping clients realise information and operational technology convergence and drive digital transformation in their manufacturing operations. With TQS, Cognizant not only becomes one of the industry's most comprehensive solutions for Manufacturing 4.0 for life sciences, we also strengthen our data historian and analytics capabilities to help all our manufacturing clients harness the power of data intelligence to compete in new ways", said Mr Srinivas Shankar, Senior Vice President and Global Markets Lead, Life Sciences, Cognizant.

TQS helps nine of the top 10 global life sciences companies enable smart manufacturing. Cognizant, which previously strengthened its life sciences manufacturing capabilities with the 2019 acquisition of Zenith Technologies, will combine TQS's expertise with its own to help clients transition to Industry 4.0 and expedite the production of life-changing medicines. These service solutions, expertise and thought leadership will benefit Cognizant's current life sciences clients, as well as clients in the broader manufacturing landscape.

"Our world-class team of data intelligence and technology consultants has built a tremendous track record in helping our life sciences manufacturing clients transform their businesses. Together with Cognizant, we look forward to broadening our impact to manufacturing clients in other industries who are looking to embrace Industry 4.0", said Ms Máire Quilty, Corporate Managing Director, TQS.

LOGOS AND ENGIE TO BUILD

A RENEWABLE ENERGY PLATFORM

LOGOS and ENGIE have established a partnership to build a Regional Renewable Energy Platform to provide solar generation and renewable energy options for LOGOS' Asia Pacific portfolio. This initiative underlines LOGOS' ambition to build sustainable logistics infrastructure and confirms ENGIE's capability and intention to accelerate energy transitions globally.

Under the partnership, ENGIE and LOGOS will jointly look to deliver options for the development and financing of renewable energy generation and storage assets throughout Asia Pacific, with an initial focus on rooftop solar PV in Singapore, Australia and New Zealand. The parties will seek to scale this solution by delivering renewable solutions to LOGOS' existing portfolio of assets and customers, as well as on its extensive pipeline of development projects across the region.

The first project under the partnership has been agreed on, with the global logistics leader, DHL, who has committed to an approximately 5 MW solar installation at its Singapore facility at a LOGOS estate in Singapore. DHL's commitment is in line with its Environment, Social and Governance agenda to operate all its owned or leased facilities at Net Zero Carbon by 2025, with the solar initiative playing an important role in this.

LOGOS is a co-investor and manager of over 4 million m² of roof top space within its existing logistics portfolio, serving top-tier international corporations comprising mostly specialised storage operators as well as e-commerce, retail and 3 PL customers. It is developing over 1 million m² of warehouse space and roof tops per annum. This provides considerable opportunity for LOGOS to work with ENGIE on establishing a scalable platform and aiming to supply long-term sustainable power to businesses in the region through corporate power purchase agreements. The new platform is expected to have 50 MWp to 150 MWp of renewable generation capacity annually.

Mr Trent Iliffe, LOGOS' Managing Director and Co-CEO, said, "Sustainability is a key part of our business philosophy and this new partnership with ENGIE is an important step forward in our social obligation and commitment to creating a positive environmental impact through the options available via our portfolio and beyond".

"As we move into a world where governments, corporates and consumers are looking to move to renewable energy options to support their growing power needs, we are excited to be able to contribute to the move away from fossil fuels, by working with our capital partners, customers and ENGIE as leading Corporate PPA provider, to help shape the future of energy supply in Asia. This partnership will provide LOGOS' capital partners and customers with access to a sustainable, renewable energy solution that can be incorporated on both existing and new assets", Mr Iliffe added.

Mr Thomas Baudlot, ENGIE South East Asia CEO, said, "This type of partnership allows ENGIE to be at the forefront of Asia Pacific's transition towards a low carbon economy. By providing fully integrated and financed solutions that reduce energy needs and provide access to green energy, ENGIE has the value proposition to help its customers to reduce their carbon footprint while increasing their competitiveness. ENGIE is excited to partner with a leading player like LOGOS, with whom we share common values and concern for the greater good".

"As the world's leading logistics company, we are committed to making every aspect of our business sustainable. We are excited to be working with LOGOS and ENGIE for the solar panel installation in our Singapore facility. This commitment is a testament to our continued effort to reduce our carbon footprint, and this initiative brings us closer to Deutsche Post DHL Group's mission to reduce all logistics-related emissions by 2050", said Mr Jerome Gillet, CEO, DHL Supply Chain, Singapore, Malaysia and the Philippines.

A mock-up of the ENGIE Renewable Energy Installation on DHL's facility at a LOGOS estate in Singapore.

SCHNEIDER ELECTRIC APPOINTS

MANISH PANT AS ZONE PRESIDENT IN EAST ASIA AND JAPAN

Schneider Electric, a leader in the digital transformation of energy management and automation, has announced the appointment of Manish Pant as Zone President East Asia and Japan (EAJ).

Mr Pant assumed his role as Schneider Electric Zone President East Asia and Japan, on 1 July. Based in Singapore, he will oversee the company's continued drive to promote smart energy management solutions, in order to help the region's homes, enterprises and organisations operate more sustainably, while championing technology's role in the transition from carbon-intensive energy sources.

Commenting on his appointment, Mr Pant emphasised Schneider Electric's commitment to automation and efficiency to build a new energy landscape.

"I am excited to have the opportunity to lead the zone into the next stage of its strategic development. Asia holds enormous potential to embrace smart technology and digitally enabled energy systems that are pivotal to enabling a net-zero future", he said.

Mr Manish Pant

Mr Pant has more than 30 years of experience in electrical distribution and in various management roles. He joined Schneider Electric in 1998 and has overseen operations in China, Thailand, and India. In the past seven years, he has led as the Executive Vice President of the Home and Distribution Division, with a focus on introducing sustainable energy management innovations to residential and small businesses markets.

SIGNIFY APPOINTS RAMI HAJJAR AS THE NEW CLUSTER

LEADER FOR SOUTH EAST ASIA

Signify, a world leader in lighting, has appointed Mr Rami Hajjar as the new Cluster Leader for South East Asia, with effect from 1 April 2021. He succeeds Mr Alok Ghose.

Mr Rami Hajjar

Mr Hajjar is responsible for further entrenching Signify's leadership position in the lighting industry, by bringing innovative connected lighting solutions to its customers in Southeast Asia. The former President Director of Signify Indonesia will be based in Singapore and will report to Ms Maria Letizia Mariani, Chief Commercial Officer of Signify.

"We are pleased to announce the appointment of Rami as our new Cluster Leader in South East Asia. With a lineup of illustrious successes under his belt, his appointment is a strategic step for Signify to bolster its growth and elevate its business in South East Asia to greater heights", said Ms Mariani.

"I am very honoured to embark on a new chapter with Signify in Southeast Asia at an opportune time. I look forward to working with the team to strengthen Signify's position as the world leader in various lighting segments, be it professional, consumer, smart lighting, system and services, UV-C, animal-centric lighting, and horticulture, in Southeast Asia, whilst helping the markets unlock the extraordinary potential of light for brighter lives and a better world", said Mr Hajjar.

Mr Hajjar joined Signify in the Middle East as Marketing Director, in 2010, and later served as the Head of Professional Channel and General Manager for the Middle East, excluding Saudi Arabia. After contributing to substantial growth of the company, that enabled it to assume market leadership among lighting companies, Mr Hajjar was appointed the General Manager in 2013. During his tenure in the Middle East, he has helped the company record major regional successes by winning all EPD projects in the Middle East, becoming the first lighting company to be ESCO-certified, and co-developing the Philips Dubai lamp with the government. The Philips Dubai lamp is said to be the most energy-efficient lamp in the world.

Hailing from Lebanon, Mr Hajjar graduated with a degree in Environmental and Civil Engineering from the American University of Beirut in Lebanon, and holds an MBA from INSEAD in France. Before joining Signify, he worked in engineering design and consultancy, contracting, sales, marketing and management consultancy.

Geneco launches green add-on

Geneco, one of Singapore's leading electricity retailers, has announced the nationwide launch of Power Eco Add-on - a customisable green add-on.

Power Eco Add-on is part of Geneco's strategic approach to reach its goal of encouraging Singaporeans to adopt a greener lifestyle. The add-on was developed on the basis of five key considerations - flexibility, affordability, impact on the environment, simplicity, and authenticity - and on Geneco's commitment to further spur the awareness and adoption of green electricity.

The Power Eco Add-on will continue the brand's momentum as one of the key enablers of sustainability in Singapore.

Choices for customers

With the continual efforts across the industry to increase the uptake of green electricity, Geneco streamlined its six existing plans to three - 6-month, 12-month and 24-month - in tandem with the unveiling of the Power Eco Add-on. The green add-on will be a key complementing feature with the three plans, aimed at encouraging Singaporeans to make gradual changes, at their own pace, for a greener tomorrow.

Geneco has designed its new add-on option at varying green contribution levels - at 25%, 50%, 75% and 100%.

Eco Add-on also provides customers additional flexibility to choose between getting Carbon Credits (CCs) or Renewable Energy Certificates (RECs) from just SGD 0.40 more each month.

"The emergence of Singapore Green Plan 2030 presents new possibilities for us to pledge our commitment to sustainability and together as a nation, embark on a journey towards building greener homes for all. Power Eco Add-on provides customers, who are cost- yet green-conscious, with complete control in adopting a greener lifestyle and gradually contributing to saving the environment. We are confident that the flexibility provided by this new green add-on to customers' electricity plans can empower our consumers to be fellow stewards of sustainability", said Mr Lim Han Kwang, Chief Executive Officer of Geneco.

SIEMENS ENERGY TO ELECTRIFY FIRST-OF-ITS-KIND

BIOREFINERY IN GERMANY

The Finnish company UPM-Kymmene selected Siemens Energy to supply electrification, automation, and digitalisation (EAD) packages for a next-generation biorefinery currently under construction in Leuna, Germany.

The biorefinery will be the first industrial-scale facility of its type ever built. It will apply novel process innovations to sustainably convert 100% wood into bio-based mono-ethylene glycol (MEG), mono-propylene glycol (MPG) as well as renewable functional fillers (RFF).

MEG, MPG, as well as functional fillers, have traditionally been produced using fossil-based raw materials.

UPM will provide alternatives to considerably reduce the CO_2 footprint of end-products such as PET bottles, packaging materials, textiles, or rubber products used in various automotive applications.

Siemens Energy's scope of supply for the project includes:

- Electrification: mill-wide medium- and low-voltage power distribution system and drive system (motor control centre, variable speed drives, motors).
- Automation: Distributed control system (DCS) for multiple process areas and remote I/O cubicles (total of 9,000 process objects), including safety and ATEX functions for explosive atmospheres.
- Digitalisation: Complete digital twin for the entire plant, covering the mill's whole life cycle, from integrated engineering to integrated operation.

The Leuna Biorefinery will be a big step for UPM to expand its business into wood-based biomolecular products and solutions.

"We are confident that the bio-based mono-ethylene glycol, mono-propylene glycol, and renewable functional fillers made in Leuna will meet the strong demand of customers and end-users looking to change towards a truly sustainable portfolio", said Mr Juuso Konttinen, Vice President UPM Biochemicals.

"By implementing Siemens Energy's digitalisation solutions and digital twin, we can help ensure safe and efficient operations", he added.

The biorefinery is scheduled for start-up in late 2022. When fully operational, it will have a total annual capacity of 220,000 tons.

"As a global leader in industrial decarbonisation, we are proud to be selected as a trusted partner and facilitator for this groundbreaking project", said Ms Jennifer Hooper, Senior Vice President, Industrial Applications Solutions for Siemens Energy.

"We look forward to helping UPM reduce the world's reliance on chemicals produced from fossil fuels as we move toward creating a more sustainable world", she added.

An example of a biorefinery similar to the one UPM-Kymmene is building in Leuna, Germany. Image: UPM-Kymmene.

SINGAPORE ORGANISATIONS URGED TO EVOLVE CYBERSECURITY

STRATEGIES TO BOOST RESILIENCE

Organisations across Asia Pacific that adapted quickly to the pandemic by accelerating their digital transformation could have their hard-won resiliency threatened due to misalignment between business priorities and technology strategies, but a holistic, carefully-aligned security approach and the right partnerships would help them retain their resiliency gains.

A new InfoBrief by IDC, a leading provider of global IT research and advice, spotlights this imperative and reality, reinforcing the commitment by cybersecurity leader, Fortinet, to helping Chief Information Security Officers (CISOs) and their security teams remain relevant in a digital-first world.

Sponsored by Fortinet, the IDC InfoBrief 'Stop Reacting, Start Strategizing' outlines the unique trends, risks and challenges for businesses in six economies across the region, alongside a pattern of mismatched business and technology concerns.

Paradox of misaligned priorities

According to IDC's research, CxOs cited building resilience/mitigating risk (61%) and cost reduction/optimisation (63%) as top business priorities. For technology teams, both IT security investments and a shift to hybrid cloud models have been proven to address the risk issues of continuity and security. Yet, IDC has found that implementing security technologies to reduce risk (33%) is one of the lowest ranked technology priorities.

CISOs in all markets are challenged with recruiting talent which is critical to the success of IT security teams. In contrast, improving the ability to attract and retain the workforce was seventh in terms of C-suite business priorities for 2021.

Within this paradox of misaligned priorities, CISOs and cybersecurity strategies must evolve to complement the business and achieve true resiliency.

Threat landscape

According to IDC, as a developed market, Singapore's risk concerns are markedly different to the rest of the region. Systems hosting personally identifiable information (38%) tops the list of concerns.

In addition, the latest 'FortiGuard Labs Global Threat Landscape Report', from the first half of 2021, demonstrates a significant increase in the volume and sophistication of attacks targeting individuals, organisations and, increasingly, critical infrastructure. The expanding attack surface of hybrid workers and learners, in and out of the traditional network, continues to be a target. The report indicated that manufacturing, retail, and healthcare, in Singapore, were the most heavily targeted sectors for ransomware attacks. The findings also showed that technology, banking, and social networks sectors were popular sectors targeted by phishing attacks.

Organisations face risks and a threat landscape with attacks on all fronts. However, IDC's Asia/Pacific Digital Resiliency Scorecard revealed that only 34% of organisations in Singapore have a robust approach to cybersecurity.

Best practices

Taking these trends and challenges into account, organisations are urged to adopt a range of business and security strategies to ensure they can continue to operate successfully and stay resilient as IT architectures and security risks evolve at pace. The recommendations include:

- Ensure Alignment of Business and Technology Priorities and Processes: Effective security requires ongoing reinforcement from the executive level down. Organisations have to review their security strategy and make sure it is aligned with their business priorities. Employees now work from anywhere in the new normal and to secure a remote workforce, organisations must align business processes such as finance and HR with best practices around communication privacy and authentication. These processes should also align with cultural processes that promote effective communication in an agile, trust-based environment.
- Deploy a holistic security solution: As organisations accelerate their digital innovation, ensuring their security can keep up with today's fast-evolving threat landscape is critical. What used to be known as the 'network perimeter' is now splintered across the infrastructure due to the explosion of network edges, work from anywhere, and multi-cloud models. Organisations need a broad cybersecurity strategy, implementing a platform with end-to-end security, and a single pane of glass approach to management, offering full visibility across the entire attack surface.
- Adopt a zero trust approach: To respond to increasing and evolving threats, best practices now stipulate a 'trust no one, trust nothing' attitude towards network access. IT teams must move towards a zero trust approach to cybersecurity, which means all users, all devices, and all web applications from the cloud must be trusted and authenticated, and have the right amount of access privilege.

The IDC InfoBrief 'Stop Reacting, Start Strategizing' report drew on the findings of various recent IDC surveys.

DEBURRINGEXPO 2021 TO BE STAGED

AS A PHYSICAL EVENT IN GERMANY

This year's DeburringEXPO will be held, from 12 to 14 October 2021, as an 'attendance event', at the Trade Fair Center Karlsruhe in Germany. Users from various industries, with a wide range of activities relating to deburring and surface finishing, will be able to exchange information with suppliers in face-to-face discussions and find out about improved as well as new solutions. The integrated expert forum, with simultaneously translated presentations (German to English and English to German), will also enable the transfer of knowledge on current developments and trends in these manufacturing sectors.

DeburringEXPO is organised by fairXperts GmbH & Co KG, Germany.

Demand is booming again in many industries and industrial sectors, including the automotive and supplier sector, machine and equipment industry, and medical device and pharmaceutical industries, as well as sectors such as measurement, precision mechanics and sensor technology, tool and mould-making, energy, and environmental technology.

The component manufacturing sector, however, is facing new and changed tasks. This is due to transformation processes, different production technologies such as additive manufacturing, new and optimised materials, the trend towards the automation and digitisation of production processes, as well as new regulatory requirements.

As different as these may be in the various industries, burr-free and optimally-finished surfaces are playing an increasingly important role.

As an information and communication platform, DeburringEXPO makes it possible to compare technologies and services in a targeted and efficient manner. This is also reflected in the fact that nearly all market and technology leaders are represented at the forthcoming event.

Solutions for a range of industries

The diverse solutions presented by the exhibitors are designed to effectively meet current and future requirements. For manufacturers of medical products, one of the key issues is to meet the requirements of the European Union's new Medical Device Regulation (MDR) which came into force on 26 May 2021. For the first time, the MDR also focuses on particles for sterile products. These can arise from burrs, for example, which must therefore be reliably removed in a traceable process.

In the automotive and supplier industry, the significant growth in demand for electric and hybrid vehicles is leading to an expansion of capacities for component manufacturing. Burr-free and high-precision surfaces are essential for numerous parts, including housings and rotor shafts. As far as internal combustion engines are concerned, the focus is on further developments and

The clear focus on deburring technologies and precision surfaces at DeburringEXPO 2021, will enable visitors to find out about the latest developments, in person. Image: fairXperts GmbH & Co KG.

improvements aimed at lowering fuel consumption and emissions even more.

The quality of the relevant surfaces plays just as important a role as burr-free precision machining, for example with ECM processes or laser technologies. The ever-stricter cleanliness specifications for precision parts used, for example, in measuring devices, the optical and sensor industry, and manufacturing equipment for printed circuit board production, also mean that these parts have to be reliably deburred.

Likewise, the quality of subsequent processes such as joining, sealing, coating or assembly, can be ensured only by burr-free and appropriately finished surfaces.

DeburringEXPO 2021 will also address these tasks in a theme park titled 'Cleaning after deburring'.

The 'AM Parts Finishing' theme park is dedicated to post-processing tasks for additively manufactured components. Solutions for removing support structures and powder residues, for smoothing and polishing surfaces and for preparing components for subsequent heat treatment or coating will be showcased.

In order to produce parts faster, better and more cost-effectively, the automation and digitisation of deburring and surface finishing operations is gaining in importance across all industries. Against this backdrop, DeburringEXPO 2021 will be presenting innovative and practical solutions in the 'Automated Deburring with Industrial Robots' theme park. Here, a compact robot cell will be used for a live demonstration of all the steps, from parts feeding, position detection, handling, burr detection by camera or sensor technology, and deburring with integrated tool change right through to quality control and the final placement of parts in goods carriers.

More information on the event may be obtained from www.deburring-expo.com.

THE SEMBCORP TENGEH FLOATING

SOLAR FARM OFFICIALLY OPENS

A major step towards achieving energy sustainability in water treatment.

Sembcorp Floating Solar Singapore, a wholly-owned subsidiary of Sembcorp Industries (Sembcorp), and National Water Agency PUB, have officially opened the Sembcorp Tengeh Floating Solar Farm at the Tengeh Reservoir. With 122,000 solar panels spanning across 45 hectares (equivalent to about 45 football fields), the 60 megawatt-peak (MWp) solar photovoltaic (PV) farm is one of the world's largest inland floating solar PV systems.

The commencement of the solar farm's operations marks a significant step towards enduring energy sustainability in water treatment, making Singapore one of the few countries in the world to have a 100% green waterworks system while contributing to the national goal of quadrupling solar energy deployment by 2025.

The electricity generated from the solar farm will be sufficient to power Singapore's five local water treatment plants, offsetting about 7% of PUB's annual energy needs and reducing PUB's carbon footprint. This is equivalent to powering about 16,000 four-room HDB flats and reducing carbon emissions by about 32 kilotonnes annually, the same as taking 7,000 cars off the roads.

The launch ceremony was officiated by Guest of Honour, Prime Minister Lee Hsien Loong; Minister for Sustainability and the Environment, Ms Grace Fu; and Permanent Secretary of the Ministry of Sustainability and the Environment, Mr Albert Chua; together with Chairman of Sembcorp Industries, Mr Ang Kong Hua; Chairman of PUB, Mr Chiang Chie Foo; Group President & CEO of Sembcorp Industries, Mr Wong Kim Yin; and Chief Executive of PUB, Mr Ng Joo Hee.

A new logo created, based on PUB's iconic 'Make Every Drop Count' water droplet was unveiled at the event, to mark this achievement of a fully green water treatment system. The droplet features an iconic sun and rays of sunlight to highlight how clean water is now produced from clean energy. It signifies PUB's commitment to combat climate change by ensuring end-to-end sustainability in its operations, contributing towards the sustainability goals under the Singapore Green Plan 2030.

Mr Ng Joo Hee, Chief Executive of PUB, said, "With this floating solar power plant, which we believe to be one of the largest in the world, PUB takes a big step towards enduring energy sustainability in water treatment. Solar energy is plentiful, clean and green, and is key to reducing PUB's and also Singapore's carbon footprint".

Mr Wong Kim Yin, Group President & CEO of Sembcorp Industries, said, "The Sembcorp Tengeh Floating Solar Farm is a crown jewel in our portfolio, and a showcase

Prime Minister Lee Hsien Loong was the Guest-of-Honour at the official opening of the Sembcorp Tengeh Floating Solar Farm.

A new logo created, based on PUB's iconic 'Make Every Drop Count' water droplet, was unveiled at the event, to mark this achievement of a fully green water treatment system. Image by PUB, Singapore's National Water Agency.

for Singapore. As the leading homegrown renewable energy player, Sembcorp has over 3,300 MW of renewable energy assets around the world. We are committed, and have the track record and competencies, to support the Singapore Green Plan".

Driving operational excellence through innovation

Construction of the floating solar PV system commenced in August 2020. Designed, built, owned and operated by Sembcorp, the project was completed on time with full safe management measures in place, despite manpower and supply chain constraints due to the unprecedented COVID-19 pandemic.

New and innovative ways of working were needed to mitigate the impact, and one such way was conceptualising and implementing a new engineering and construction technique to design a custom-built jig that increased the rate of solar panel assembly by up to 50%.

With 122,000 solar panels spanning across 45 hectares (equivalent to about 45 football fields), the 60 megawatt-peak (MWp) Sembcorp Tengeh Floating Solar Farm is one of the world's largest inland floating solar PV systems.

This project is also the first in the world to deploy advanced drone electroluminescence image technology on a utility-scale PV system. This has been achieved through a partnership with Quantified Energy Labs, a technology spinoff from National University of Singapore. Drone electroluminescence imaging captures X-ray-like signals emitted by PV modules to accurately and rapidly pinpoint defects that could be caused by a variety of factors from the manufacturing to installation stage. Identifying and replacing defective modules from the start has ensured that the PV system is running in optimal condition.

Ensuring water quality and mitigating environmental impact

PUB's main concern with deploying solar panels on reservoirs was the potential impact on the surrounding environment, biodiversity and water quality. A comprehensive Environmental Impact Study, which included biodiversity surveys, water quality monitoring and modelling, along with consultations with nature groups, was carried out between 2015 and 2018. Results from PUB's testbed deployed at Tengeh Reservoir in 2016 showed no observable change in water quality nor significant impact on surrounding wildlife.

Referencing the study, the Sembcorp Tengeh Floating Solar Farm was carefully designed to minimise impact on the reservoir's water quality, flora and fauna. Sufficient gaps were incorporated between solar panels to improve the airflow and allow sufficient sunlight to reach aquatic life. Additional aerators were also put in place to maintain oxygen levels in the reservoir.

Floats deployed are made using high-density polyethylene (HDPE) - a certified food-grade material that is recyclable, UV-resistant and corrosion-resistant. In addition to having a comprehensive environmental management and mitigation plan, PUB and Sembcorp will continue to monitor the reservoir closely, and take necessary measures to maintain biodiversity and water quality.

Sembcorp aims to continue innovating and deepening its capabilities in renewable energy such as solar, wind and energy storage, and be a leading provider of sustainable solutions.

All images by Sembcorp Industries, unless otherwise stated

SOIL INVESTIGATION AND PILE DRIVING ANALYSIS

These steps are essential to ensure a strong foundation for the Power Conditioning Systems (PCS) that are installed in the reservoir.

ERECTION OF TENTS AND LAUNCHING RAMPS

Tents are erected to house the solar panels and floats as well as to segregate workers into zones for safe management measures.

Ramps are also constructed at the shoreline to launch the solar panel arrays into the water using tugboats.

CONSTRUCTION OF CONTROL BUILDING ON LAND

In the control building, engineers will run the solar farm's daily operations. It also houses a state-of-the-art digital monitoring system to monitor power output and perform routine checks remotely.

CHECKING CABLE CONTINUITY

These checks along the PV module strings ensure that the solar PV panels are connected correctly as per the electrical design.

INSTALLATION OF SWITCHGEARS, TESTING AND COMMISSIONING

The 22 kV switchgears serve as an important interface between the floating solar plant and Singapore's power grid. After installation of the switchgears, testing and commissioning of various sub-systems are carried out to ensure the installations are done according to design, as well as local regulations & standards.

ELECTROLUMINESCENCE (EL) INSPECTION TEST

Sembcorp Tengeh Floating Solar Farm is the first in the world to deploy EL test on a utility-scale PV system to identify defective solar panels for replacement, ensuring that the system runs in optimal condition.

Significant construction milestones.

ASSEMBLY OF POWER CONDITIONING SYSTEM (PCS) PLATFORMS

16 platforms are set on piles above the reservoir to house the PCS. PCS plays an important part to convert electricity from Direct Current (DC) to Alternating Current (AC).

CONSTRUCTION BARGES DEPLOYED IN RESERVOIR

The barges, equipped with cranes, are deployed in the reservoir for the lifting operation of sinkers, PCS platforms and PCS.

LAYING DC CABLES FROM PV MODULES TO PCS

DC cables are laid along the floating arrays, connecting the solar PV panels to their respective PCS.

LIFTING OF PCS ONTO THE PLATFORMS

Workers weld the PCS into place once they are lowered.

TURN ON OF FLOATING PV SYSTEM AND INTEGRATION WITH SEMBCORP'S MONITORING PLATFORM

Sembcorp's floating PV system connects directly to Singapore's power grid, providing green electricity. With Sembcorp's digital monitoring platform, Sembcorp engineers monitor the renewable energy output of the system in real-time.

DRONE TECHNOLOGY FOR REMOTE INSPECTION

Drones are used for regular operations and maintenance checks to ensure that the panels operate optimally. The drones cover large areas rapidly and effectively, shaving manual inspection costs by about 30%.

CLIMATE CHANGE WIDESPREAD

AND RAPID AS WELL AS INTENSIFYING

The UN's Intergovernmental Panel on Climate Change (IPCC) releases the first instalment of its Sixth Assessment Report which will be completed in 2022.

Scientists are observing changes in the Earth's climate in every region and across the whole climate system, according to the latest Intergovernmental Panel on Climate Change (IPCC) report, released recently. Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion - such as continued sea level rise - are irreversible over hundreds to thousands of years.

However, strong and sustained reductions in emissions of carbon dioxide (CO_2) and other greenhouse gases would limit climate change. While benefits for air quality would come quickly, it could take 20 to 30 years to see global temperatures stabilise, according to the IPCC Working Group I report, 'Climate Change 2021: the Physical Science Basis', approved by 195 member governments of the IPCC, through a virtual approval session that was held over two weeks.

The Working Group I report is the first instalment of the IPCC's Sixth Assessment Report (AR6) which will be completed in 2022.

"This report reflects extraordinary efforts under exceptional circumstances. The innovations in this report and advances in climate science that it reflects, provide an invaluable input into climate negotiations and decision-making", said Hoesung Lee, Chair of the IPCC.

FASTER WARMING

The report provides new estimates of the chances of crossing the global warming level of 1.5° C in the next decades, and finds that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5° C or even 2° C will be beyond reach.

The report shows that emissions of greenhouse gases from human activities have been responsible for approximately 1.1° C of warming since 1850 to 1900, and finds that averaged over the next 20 years, global temperature is expected to reach or exceed 1.5° C of warming. This assessment is based on improved observational datasets to assess historical warming, as well as progress in scientific understanding of the response of the climate system to human-caused greenhouse gas emissions.

"This report is a reality check. We now have a much clearer picture of the past, present and future climate, which is essential for understanding where we are headed, what can be done, and how we can prepare", said Valérie Masson-Delmotte, IPCC Working Group I Co-Chair.

EVERY REGION FACING INCREASING CHANGES

Many characteristics of climate change directly depend on the level of global warming, but what people experience is often very different to the global average. For example, warming over land is larger than the global average, and it is more than twice as high in the Arctic.

"Climate change is already affecting every region on Earth, in multiple ways. The changes we experience will increase with additional warming", said Panmao Zhai, IPCC Working Group I Co-Chair.

The report projects that in the coming decades, climate changes will increase in all regions. For 1.5° C of global warming, there will be increasing heat waves, longer warm seasons and shorter cold seasons. At 2° C of global warming, heat extremes would more often reach critical tolerance thresholds for agriculture and health, the report shows.

But it is not just about temperature. Climate change is bringing multiple and different changes in different regions - which will all increase with further warming. These include changes to wetness and dryness; to winds, snow and ice; and to coastal areas and oceans. For example:

- Climate change is intensifying the water cycle. This brings more intense rainfall and associated flooding, as well as more intense drought in many regions.
- Climate change is affecting rainfall patterns. In high latitudes, precipitation is likely to increase, while it is projected to decrease over large parts of the subtropics. Changes to monsoon precipitation are expected, which will vary by region.
- Coastal areas will see continued sea level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion. Extreme sea level events, that previously occurred once in 100 years, could happen every year by the end of this century.
- Further warming will amplify permafrost thawing, and the loss of seasonal snow cover, melting of glaciers and ice sheets, and loss of summer Arctic sea ice.
- Changes to the ocean, including warming, more frequent marine heatwaves, ocean acidification, and reduced oxygen levels have been clearly linked to human influence. These changes affect both ocean ecosystems and the people that rely on them, and they will continue at least, throughout the rest of this century.
- For cities, some aspects of climate change may be

amplified, including heat (since urban areas are usually warmer than their surroundings), flooding from heavy precipitation events and sea level rise in coastal cities.

For the first time, the Sixth Assessment Report provides a more detailed regional assessment of climate change, including a focus on useful information that can inform risk assessment, adaptation, and other decision-making, and a new framework that helps translate physical changes in the climate - heat, cold, rain, drought, snow, wind, coastal flooding and more - into what they mean for society and ecosystems.

HUMAN INFLUENCE ON THE PAST AND FUTURE CLIMATE

"It has been clear for decades that the Earth's climate is changing, and the role of human influence on the climate system is undisputed", said Masson-Delmotte.

Yet the new report also reflects major advances in the science of attribution - understanding the role of climate change in intensifying specific weather and climate events such as extreme heat waves and heavy rainfall events.

The report also shows that human actions still have the potential to determine the future course of climate. The evidence is clear that carbon dioxide (CO_2) is the main driver of climate change, even as other greenhouse gases and air pollutants also affect the climate.

"Stabilising the climate will require strong, rapid, and sustained reductions in greenhouse gas emissions, and reaching net zero CO_2 emissions. Limiting other greenhouse gases and air pollutants, especially methane, could have benefits both for health and the climate", said Zhai.

THE WORKING GROUP I REPORT

The IPCC Working Group I report, 'Climate Change 2021: the Physical Science Basis', addresses the most updated physical understanding of the climate system and climate change, bringing together the latest advances in climate science, and combining multiple lines of evidence from paleoclimate, observations, process understanding, global and regional climate simulations. It shows how and why climate has changed to-date, and the improved understanding of human influence on a wider range of climate characteristics, including extreme events. There will be a greater focus on regional information that can be used for climate risk assessments.

AR6 Working Group I in numbers

- 234 authors from 66 countries
- 31 coordinating authors
- 167 lead authors
- 36 review editors
- 517 contributing authors
- Over 14,000 cited references
- A total of 78,007 expert and government review comments

Originally scheduled for release in April 2021, the report was delayed for several months by the COVID-19 pandemic, as work in the scientific community including the IPCC shifted online. This is the first time that the IPCC has conducted a virtual approval session for one of its reports.

IPCC

The Intergovernmental Panel on Climate Change (IPCC) is the UN body for assessing the science related to climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide political leaders with periodic scientific assessments concerning climate change, its implications and risks, as well as to put forward adaptation and mitigation strategies. In the same year, the UN General Assembly endorsed the action by the WMO and UNEP in jointly establishing the IPCC. It has 195 member states.

Thousands of people from all over the world contribute to the work of the IPCC. For the assessment reports, IPCC scientists volunteer their time to assess the thousands of scientific papers published each year, to provide a comprehensive summary of what is known about the drivers of climate change, its impacts and future risks, and how adaptation and mitigation can reduce those risks.

Net Zero Asset Managers Initiative attracts new signatories

A total of 41 leading asset managers, representing USD 6.8 trillion in assets, recently joined the Net Zero Asset Managers Initiative. New signatories based in North America and Europe are joined by a number of Asian managers, as part of the initiative.

The additional signatories mean a total 128 investors, collectively managing USD 43 trillion in assets, are now part of the initiative which was launched only in December 2020. The initiative is now close to representing almost half of the entire asset management sector globally, in terms of total funds managed.

The investors will work with clients to reach net zero emissions alignment across their portfolios, by 2050 or sooner, and set interim 2030 emissions reduction targets.

The Net Zero Asset Managers Initiative is managed globally by six founding partner investor networks - Asia Investor Group on Climate Change (AIGCC), CDP, Ceres, Investor Group on Climate Change (IGCC), Institutional Investors Group on Climate Change (IIGCC) and Principles for Responsible Investment (PRI).

The initiative is accredited by the United Nations Framework Convention on Climate Change Race to Zero campaign and has an advisory group drawn from representatives from signatory asset managers.

HELPING SMALL AND MEDIUM ENTERPRISES

ACHIEVE ENERGY EFFICIENCY

Professor Lock Kai Sang

The Energy Efficiency Technology Centre (EETC) at Singapore Institute of Technology (SIT) was launched in 2019, as a result of the collaboration between SIT and the National Environment Agency (NEA).

Since its launch, the centre has been helping companies discover and implement energy efficiency improvement measures, as well as build up local industrial energy efficiency capabilities.

EETC also trains SIT engineering undergraduates and upskills existing energy efficiency practitioners, in industrial energy efficiency.

'The Singapore Engineer' finds out more about the work done by EETC, from Professor Lock Kai Sang, Professor, SIT and Head, EETC. Professor Lock is also Emeritus President, IES.

The Singapore Engineer (TSE): What are the main areas where significant energy savings can be achieved? Would they include HVAC systems, electrical systems, machinery condition monitoring and maintenance etc?

Professor Lock Kai Sang (LKS): The EETC is poised to provide counsel and energy-efficient assessment to small and medium enterprises (SMEs) in areas such as building heating, ventilation, and air-conditioning.

Significant energy savings can be achieved in renewable energy-based electricity systems. Singapore's limited physical land mass prevents the installation of large facilities that deploy major renewable energy sources such as wind energy and photovoltaic solar energy. With this limitation, we need to re-pivot our focus and seek more sustainable means of energy savings whilst catering to evolving demands.

The EETC has a plethora of systems which we have knowledge on, such as pump and piping networks, Air-conditioning and Mechanical Ventilation (ACMV) systems, fans and mechanical ventilation systems, boilers and steam systems, compressed air systems and electrical installations. These systems are utilised in all industrial facilities, many of which are in operation throughout the entire day. It is important that we look to maximise these systems in a way that would not only lower operating cost and cut down on carbon emissions but also keep up with the operating processes, improving the way they are controlled as part of an integrated building system.

TSE: Which industrial sectors offer the greatest scope for energy savings?

LKS: Industrial sectors including Building Services, Mechanical Engineering, Manufacturing and Electrical Power Engineering offer the greatest scope for energy savings. According to EMA's Energy Consumption Report of Singapore in 2019, industrial-related sectors account for 41.5% of the total energy consumption islandwide. Since the EETC encompasses the core of the Engineering faculty at SIT, industrial sectors are the key markets in which it can offer expertise and counsel on energy efficiency improvement assessments and capabilities.

The EETC provides support and knowledge on the various systems that I had mentioned earlier. These are used interchangeably across these different industrial sectors. Whilst we continue to collaborate with other SMEs in the market, these sectors are currently where the most effective improvements can be made.

TSE: How do you see the response of SMEs to the setting up of EETC?

LKS: The centre has made energy assessments more accessible for SMEs especially considering that they typically lack the capabilities and resources to identify and implement energy efficiency improvement measures on their own. SMEs receive a diagnosis of their energy performance and recommendations on areas of improvement, and their staff are trained in energy assessment skills for continual improvement.

The feedback from SMEs has been great. So far, since EETC's inception in 2019, nine assessments have been completed for organisations spanning the industrial and manufacturing sectors, including Far East Packing Industrial, Aalst Chocolate and Denka Advantech.

The EETC has been able to aid these SMEs in lowering operating costs, reducing carbon emissions and building a better brand image. With our in-depth diagnostics and analysis of their current energy processes, the EETC has also helped in implementing energy efficiency improvement measures, which builds up local industrial

energy efficiency capabilities. Furthermore, the staff on the ground are also trained in the relevant energy assessment skills, which allows them to be self-sufficient at continually improving their capabilities.

The EETC's assessment takes on a holistic perspective to energy efficiency and is seen as a least-cost measure in Singapore's vision of a more sustainable future. While certain energy efficiency measures can be achieved by using established energy-efficient technologies, it is also worth looking at the human aspect which goes into the execution. The EETC goes a step further and reviews how human behaviour and business operations could be improved as well.

TSE: What are the main concerns of SMEs in adopting the energy-efficiency measures and how are these being addressed?

LKS: The main concerns that SMEs have, in adopting energy-efficient measures, surround the lack of capabilities and resources needed to help identify and implement these initiatives. The EETC provides SMEs access to support and knowledge on different systems. This catalyses their ability to reduce energy costs and become more competitive in their respective markets. The way that this is being executed is through a two-pronged approach. Participating SMEs would receive professional grade energy assessments at a low cost, which identify the shortfalls in their current operations.

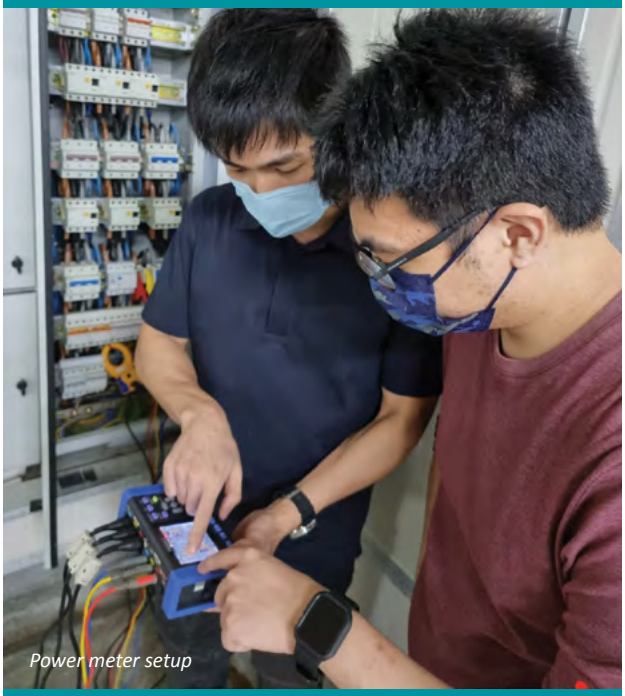
TSE: How would the upskilling programmes benefit energy professionals?

LKS: The EETC conducts a series of intensive Energy Efficiency Upskilling Programmes (EEUP) for energy managers in the industry. The EEUP is a five-day specialised training programme which dives into the major industrial systems such as compressed air systems, boilers, steam systems and electrical power systems. Each EEUP comprises two parts - a three-day classroom-sharing by experienced instructors on key principles and theories, followed by a two-day authentic energy audit and assessment of the industrial system. The holistic infusion of theories and hands-on experience will enable course participants to confidently take on energy-efficiency auditing opportunities at their industrial plants.

The EETC has launched two upskilling programmes for existing professionals this year - the Electrical Installation Audit and Analysis Programme in May and the Energy Efficiency Upskilling Programme in January.

TSE: Any other information that you would like to provide?

LKS: The EETC works closely with SMEs to strengthen their industrial efficiency capabilities, as they typically lack the capabilities and resources to identify and implement energy efficiency improvement measures. It is important to note that this does not preclude the important role played by ESCOs (Energy Services Companies) who conduct energy assessments for the industry. The EETC welcomes opportunities to collaborate with ESCOs to enhance confidence in the energy services sector and help promote the growth of the industry.



Power meter setup

Flow meter setup

EETC trains SIT engineering undergraduates and upskills existing energy efficiency practitioners, in industrial energy efficiency, through a holistic approach, with hands-on experience complementing theory classes.

COMMERCIAL AND INDUSTRIAL SPACES

WARMING UP TO HEAT PUMPS

by Chia Peng Kiang, Growth Application Manager, Industrial Refrigeration (Rest of Asia), Johnson Controls

Cleaner and higher efficiency heat pump technology helps meet sustainability goals.

Heat pump technology is emerging as a clean alternative to address the global need for efficient heating and cooling. From hospitals to office buildings, air needs to be heated, cooled or dehumidified, and hot water is required. Large heat pump systems are a solution for these applications.

The technology is available but underutilised in Asia Pacific. This could stem from the low awareness in the region about using heat pumps to meet the heating, cooling and hot water requirements for residential, commercial and industrial applications. Fuel subsidies offered by governments in the region have made it relatively cheaper to run boilers, which has resulted in the reluctance of many local industries to switch to heat pumps. A knock-on effect of fuel subsidies is a longer payback period (of five years or more, based on small-scale trials) for using the alternative technology.

Bill Gates, co-founder of Microsoft Corporation, wrote in his book that achieving net zero emissions is necessary to avoid a global catastrophe. He argues that given the pervasive use of energy in modern life, meeting the net zero goal would require wholesale changes in all aspects of society, economics and politics [1]. According to Mr Gates, saving money is possible by replacing an oil-powered furnace (for heating) or an electric air-conditioner (for cooling) with an electric heat pump.

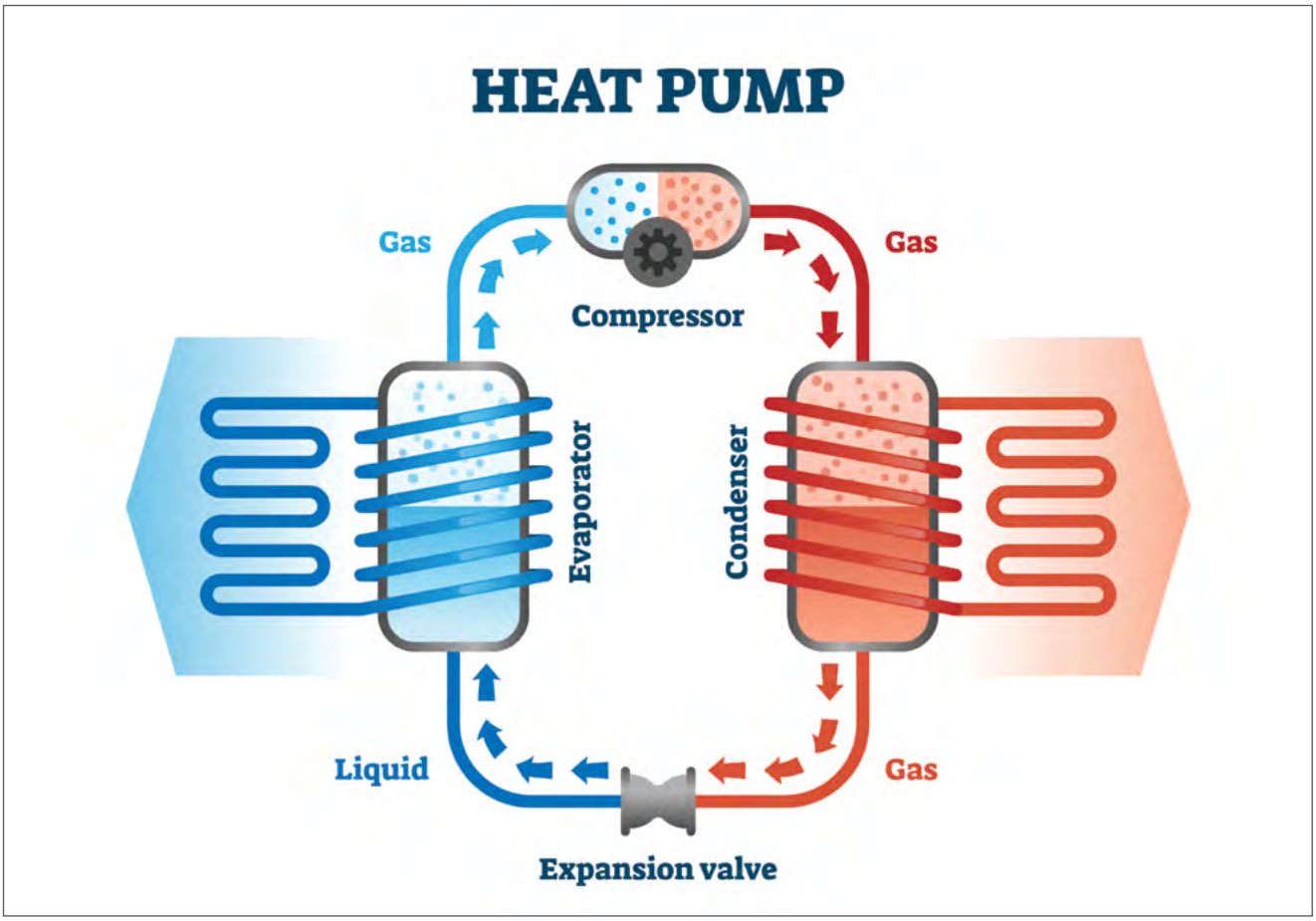


Figure 1: Schematic on how a heat pump works.

What is a heat pump?

Broadly speaking, a heat pump operates on the same physical principles as a refrigeration system. Key components in both systems include elements such as compressors and heat exchangers. The difference is that a heat pump produces hot water as the main output instead of chilled water. In addition, a heat pump offers both heating and cooling options which give more flexibility to building owners.

Figure 1 illustrates the basic working of a heat pump. A heat pump transfers heat by circulating a refrigerant in an evaporation and condensation cycle. A compressor pumps the refrigerant between two heat exchanger coils. The refrigerant is then evaporated in the evaporator at low pressure and absorbs heat from its surroundings or through a heat source. It is then sucked and compressed by the compressor to a higher temperature and pressure in the condenser, where it rejects heat and is condensed back as a liquid refrigerant. The condenser cooling water picks up the heat from the condenser and turns into hot water, creating a heat sink for the heat pump cycle.

There are three basic types of heat pumps currently available - air-source heat pump, water-source heat pump, and ground-source (geothermal) heat pump. They collect heat from the air, water, or ground outside a facility, respectively, and concentrate it for use inside.

Heat pumps, especially the water-source types, can be applied in many industries where hot water is used, such as in food production, brewing, meat processing, semiconductor, manufacturing and petroleum refining, as well as in hotels (Figure 2). They are also used in the dehumidification process for air handling units (AHUs) in processing facilities and clean rooms, and in the heating process for pulp and paper production. In general, heat pumps are three to four times more energy-efficient than boilers and furnaces, due to the thermodynamic refrigeration cycles employed in their design.

A cleaner and more energy-efficient option

There are several ways in which heat pumps are better for the environment. Firstly, instead of 'generating' thermal energy through fuel combustion (as in the case of boilers), heat pumps simply 'transfer' thermal energy through the compression/expansion of refrigerants. Hence heat pumps are able to transform ‘waste heat’ produced in industrial processes to high-value heat that can be used elsewhere in the process or sold for other uses. This is also one of the opportunities highlighted in a report commissioned by Singapore’s National Environment Agency (NEA) [2]. However, a common challenge is in the matching of the heat source and heat sink - for example, within a single plant, there could be a lot of heat produced without a need for it, or there could be a need for a lot of heat and no heat is produced. Successfully combining multiple plants to match heat sources and heat sinks is as much a business model consideration which involves different parties. Now, in China, there are steel plants and petrochemical plants building heating stations to harness their waste heat and selling it to municipal heating companies.

Secondly, some estimates suggest that switching to heat pumps will result in a reduction of up to 80% of direct greenhouse gas emissions. Heat pumps run on electricity and render the heating process carbon-neutral when paired with renewable energy. Moreover, the CO_2 intensity of electricity is expected to decrease, due to widespread use of zero-emitting resources, renewable energy

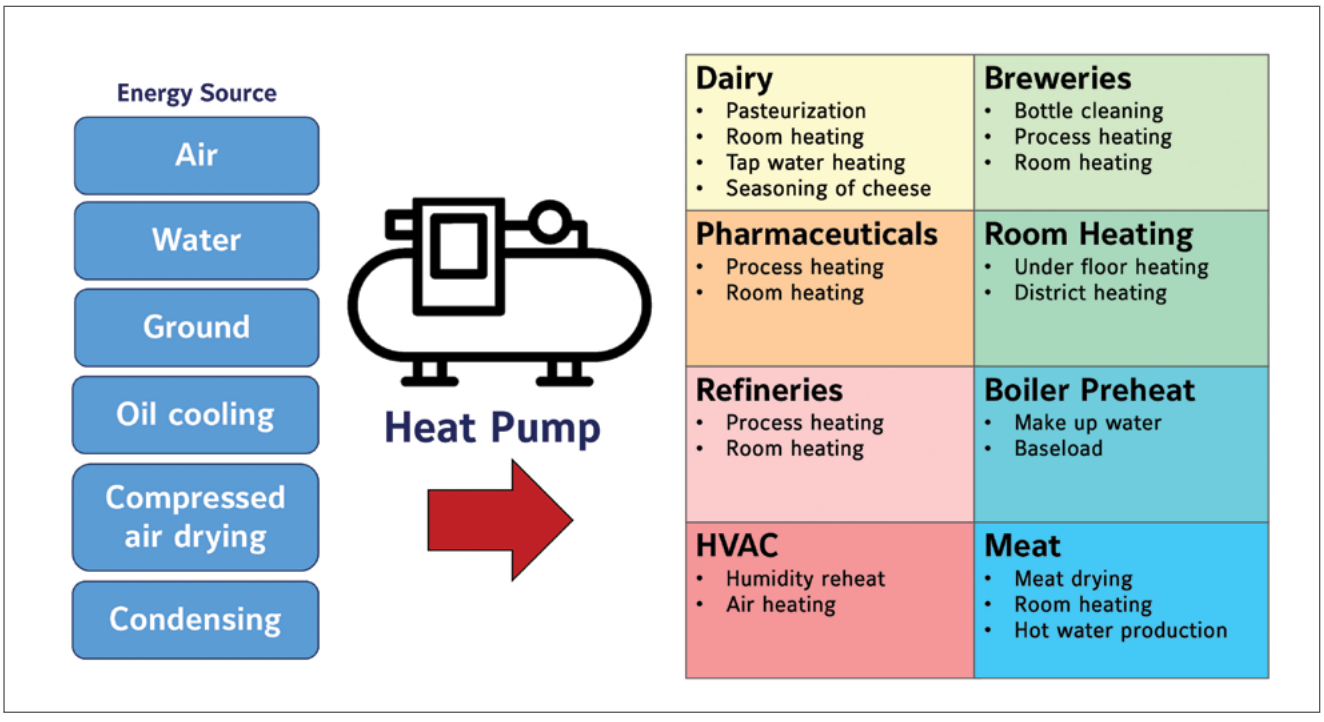


Figure 2: Application areas for heat pumps.

and nuclear energy. For example, the use of heat pumps in Europe is expected to save 50% of the building sector's carbon emissions and 5% of the industrial sector's. This is equivalent to a reduction of 1.8 billion metric tons of CO_2 per year [3].

Thirdly, heat pumps are more energy-efficient. The efficiency of a heat pump is measured in terms of its Co-efficient of Performance (COP) which is a ratio of heating energy output to the work done in the form of electrical energy used to run the heat pump cycle (mainly in the compressor). The higher the COP value, the more efficient is the heat pump. The typical COP of a heat pump cycle ranges from 4 to 7, compared to the traditional boiler, which is typically less than 1, due to the inherent inefficiency of the boiler fuel combustion process. The NEA study further revealed that the average thermal efficiency of the boiler system is 89%, which falls short of the best practice thermal efficiency of 92% [4].

Currently, most commercial and industrial heat pumps are able to deliver hot water from 50° C to within the range of 100° C, depending on the compression ratio of the chosen compressor, and the output conditions of the heat pump design. Some new models can even produce 120° C steam. In a typical situation, where high temperature (>100° C) superheated steam is needed, a more sustainable approach is to combine a heat pump with a small secondary boiler to generate the additional heat requirement.

Hence in the drive towards reduction of CO_2 emissions to achieve a net zero goal, heat pumps are integral to ensuring a sustainable future for heating applications.

Heat pumps on the rise in Europe

The European Union (EU) market for heat pumps is expanding quickly. The combination of government policies, including incentive plans for heat generation from renewable sources, and emission reduction targets, is pushing the market to surpass USD 15 billion by 2026 [5]. Water-source heat pumps, in particular, are gaining popularity across Europe - driven by the quick financial payback and the long operational life of such pumps.

Another trend within Europe is the use of natural refrigerants for heat pumps and other refrigeration applications. With the recent F-gas regulation and the use of low global warming potential (GWP) gases in the EU, heat pumps there are switching to natural refrigerants such as ammonia (NH_3) and carbon dioxide (CO_2). The EU industries are also looking into using a new hydrofluoro-olefins (HFO) refrigerant, a fourth-generation fluorine-based gas with a GWP of less than 10, for heat pumps. But scientists are still evaluating the long-term environmental impact of these HFOs.

Johnson Controls helped a Spanish food company save EUR 141,000 a year in fuel costs, by optimising an industrial refrigeration system with a heat pump installation. The ham maker, Dehesa de Guijuelo, is famed for producing slow cured, high quality ham under exacting conditions. By installing a Sabroe heat pump to generate hot water for cleaning and drying in one phase, the Spanish food manufacturer is able to cut its carbon emissions by 16%, attesting to the fact that heat pumps can be nine times more efficient than traditional boilers. The EUR 340,000 investment in the heat pump system paid back within two years for the food maker, while enabling the company to reduce production costs and improve its pricing policy.

Asia warming up to heat pumps

The adoption of heat pumps is low in Asia, for several reasons. The region has traditionally relied on fossil fuel-based boilers for generating hot water and steam. The higher initial set up costs relative to boilers make the switch to heat pumps unattractive. Many governments within Asia provide fuel subsidies to local industries to ease their cost of business operation, which also skewed the payback period of using heat pumps. Moreover, for many industrial operations, the use of boilers is adequate to meet all forms of heating applications, ranging from the production of under 90° C hot water to high steam temperatures of more than 100° C, in their facilities.

However, this will change in the near future, as Asia is poised to embrace heat pump technology. This can be attributed to the introduction of government regulations, like the carbon tax, to reduce CO_2 footprint, and increasing awareness of the need to achieve sustainability, among companies. In fact, recent studies suggest that heat pump investment payback is much faster than expected, depending on the energy consumption, and the increase in fuel prices seen today, worldwide.

The Beijing Municipal Administrative Center in China is a low-carbon, eco-city showcase highlighting the efficient use of geothermal energy. Working in close partnership with the centre, Johnson Controls built an efficient, intelligent and reliable large-scale district

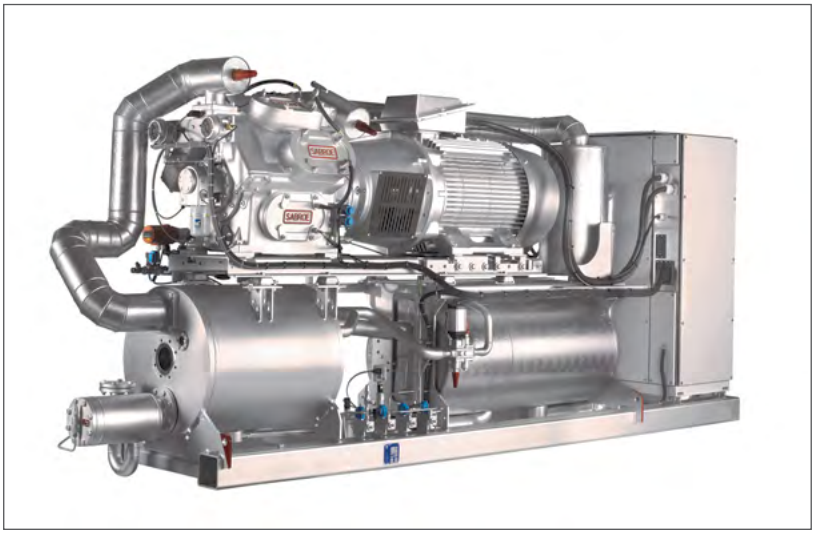


Figure 3: A Sabroe HeatPAC ammonia heat pump unit.

heating and cooling system. In a single heating season of four months, the heat pump system is able to replace 12 million m^3 of natural gas consumption, or the equivalent of a reduction of 40,000 MT in CO_2 emissions. The solution comprises four ground-source heat pump systems with a total capacity of 39 MW installed in one of the energy stations. The geothermal energy provides efficient central heating and cooling for the administrative offices occupying a total building area of about 960,000 m^2.

The food and beverage industry in Australia and New Zealand has been using heat pumps since 2018. Some companies in New Zealand's packaged meat industry, for example, are using heat pumps to replace inefficient direct coal-fired boilers. It is estimated that these heat pumps will emit 90% less CO_2 than the coal boilers. The reduction will be about 18,000 MT of CO_2 each year.

Closer to home, The Singapore Green Plan 2030 signals clear commitment to sustainable development. There is a marked increase among local companies and MNCs who are considering the switch to heat pumps that can handle both chilling and heating options. Government incentives like the Energy Efficiency Funds, aiming to support industrial facilities to improve energy efficiency and reduce the carbon footprint, could nudge local companies towards adopting heat pump technology. The domestic carbon tax that is due for a review by 2023, will help to incentivise companies and consumers to switch to low carbon footprint products, services and activities, while promoting industry innovation and new green technology growth.

Furthermore, Singapore has recently ratified the Kigali Amendment to the Montreal Protocol to reduce the consumption and production of hydrofluorocarbons (HFCs) which are greenhouse gases.

Johnson Controls sets the pace for heat pumps

There is growing global demand for a 360° net zero carbon solution. Businesses, government and global coalitions have all set ambitious sustainability goals over the next two decades, with many aspiring for decarbonisation by 2030. These have spurred the switch to heat pumps in commercial buildings, factories and public facilities across the globe, and increasingly, within Singapore. Heat pumps could satisfy 80% of global heating and cooling needs with a lower carbon footprint than boilers using fossil fuels.

Johnson Controls is taking the lead to promote sustainability through the use of heat pumps. Together with the company's OpenBlue platform, digitalisation is another key enabler for organisations to achieve net zero by 2050 or earlier. Getting equipment connected to the cloud, with analytics for optimisation, will help achieve greater energy efficiency and a corresponding cut in carbon emissions.

References

[1] 'How To Avoid Climate Disaster, The Bill Gates Way', Forbes, 5 February 2021. https://www.forbes.com/sites/tilakdoshi/2021/02/05/how-to-avoid-climate-disaster-the-bill-gates-way/?sh=2ecf686179a0

[2] 'Final Report on Heating Systems (for Industry)', National Environment Agency, 4 June 2021. https://www.nea.gov.sg/docs/default-source/our-services/energy-efficiency/final-report-on-heating-systems.pdf

[3] European Heat Pump Association. https://www.ehpa.org/technology/key-facts-on-heat-pumps/

[4] 'Final Report on Heating Systems (for Industry)', National Environment Agency, 4 June 2021. https://www.nea.gov.sg/docs/default-source/our-services/energy-efficiency/final-report-on-heating-systems.pdf

[5] Source: Global Market Insights Inc.

Figure 4: A geothermal heat-pump system provides heating and cooling in the low-carbon, Beijing Municipal Administrative Center.

VALIDATION OF CREDENTIALS BOOSTS CAREER

DEVELOPMENT OPPORTUNITIES

Ms Cillian Toh

Ms Cillian Toh, Deputy Director, JTC, believes that the Chartered Engineer programme has provided an avenue for engineers who have transitioned into positions in Project Management, such as herself, to attain professional accreditation for their competencies.

'The Singapore Engineer' finds out more from Ms Toh, on her career challenges and achievements, since her graduation with a 1st Class Honours degree in Civil Engineering from RMIT University, Australia, in 2000.

Ms Toh obtained the Chartered Engineer certification, under the Engineering Project Management category, in 2020.

The Singapore Engineer (TSE): Could you provide a few highlights of your education and career to-date, including the awards and commendations received?

Ms Cillian Toh (CT): I graduated from RMIT University, Australia, with a Bachelor of Engineering (Civil Engineering) degree in 2000. After graduation, I trained as a Structural Engineer for two years and then as a Site Engineer for three years. After taking a break from Civil Engineering for six years to assume a homeland security marketing role, I returned to the construction industry as a Project Manager at JTC, in 2012. Starting out as an Assistant Project Manager, I am now a Deputy Director of JTC's Public Projects Division, mentoring a team of seven experienced Project Managers handling public projects. Below are some interesting projects I managed in JTC, between 2012 and 2020.

JTC Trendspace
From February 2015 to August 2018, I project managed JTC's Trendspace, an eight-storey industrial building at Sungei Kadut, which obtained TOP in 2019. The development adopted precast columns and beams, and a 'lotus root' connection system. The prefabricated construction was as high as 70%. This was one of the first industrial developments where off-site manufacturing was employed to increase productivity and shorten the construction lead time.

Trendspace received several awards, from design-related to safety awards. They include:

- 2017 BCA Green Mark Platinum Award
- 2017 BCA BIM Awards - GoldPlus
- 2020 ACES Design Award - Merit
- 2020 Workplace Safety and Health Award - Recognition for Projects

Seletar West Industrial Estate
Another project involved the development of 38.8 ha of greenfield land at Sengkang West into a new industrial estate for JTC. The scope of the project included the construction of 2.8 km of dual two-, three- and four-lane roads as well as sewers, drains, all necessary road furniture, built-in ICT duct network and cycling paths to support motor-less travelling. To increase productivity, the automated kerb extrusion method was adopted, which uses sensors and guides to extrude lines of road kerb - almost like piping whipped cream onto a cake. This method of construction reduces the need for manual placement and connecting kerb segments, which reduces manpower and eliminates quality issues associated with workmanship.

Rejuvenation of JTC Summit
To rejuvenate JTC Summit, I project managed the renovation and fitting-out of 20 floors, while the building was in full operation. The project scope included space planning to maximise office space use, structural strengthening works to enhance security hardening, and meeting the requirements of the Green Mark Platinum Standard.

Developing standardised substation design templates
I was the Project Manager of a joint innovation-cum-development project for developing two sets of standardised 66 kV substation design templates, pre-approved by relevant authorities for future plug-and-play use, which will help reduce project timelines. This was followed by full construction at Bulim and Cleantech Park. The standardisation design received the MTI Firefly Borderless Award.

TSE: What is the most meaningful career achievement for you so far, and why?

CT: During the onset of COVID-19 in 2020, I was roped

into JTC's task force to join the nation's fight against the virus. I was assigned to convert an existing JTC flatted factory into a temporary dormitory to house migrant workers, in a bid to reduce the rate of virus transmission in dormitories. During this unprecedented period, I witnessed the whole-of-government coming together with a single, common goal, with everyone working tirelessly, almost 24/7, for months. Although it was hard work in a stressful and high-risk environment, I am glad that I was able to contribute, in my little way, to fight the pandemic and be recognised for my effort.

TSE: Could you briefly describe the scope of your current duties? What are some of the projects that you are currently involved in?

CT: I was promoted in November 2020 to the position of Deputy Director, which is a Head of Department (HOD) role in JTC's Public Project Division. In my team, there are seven senior to senior principal project managers, handling a wide spectrum of projects. As HOD, I take on the Project Director's role in the projects managed by my team, overseeing the progress and development, as well as guiding team members in overcoming project challenges and engaging stakeholders in order to resolve issues involving consultants or contractors. I also mentor team members on career development and professional skills upgrading, so that they can benefit from the opportunities available for career advancement.

TSE: What motivated you to become a Chartered Engineer?

CT: As the Chartered Engineer certification process involves rigorous assessment by an internationally recognised, independent professional body, I view this certification as a validation of my competency and credentials as a professional in Project Management. I believe this will help in my career development and advancement.

TSE: How do you think becoming a Chartered Engineer has assisted you in the progression of your career so far?

CT: In JTC, it is a requirement for staff to attain professional certifications as an added testament of their technical proficiency, for progression under the Technical Track. The Chartered Engineer certification is one of the recognised professional certifications and my company has been supportive in sponsoring the relevant training programmes and support required. I am appreciative of JTC's recognition of my efforts in skills upgrading.

TSE: How do you think becoming a Chartered Engineer will assist you in the future?

CT: I believe the Chartered Engineer title will validate the portability of my Project Management skills, be it across JTC's technical divisions, or other appointments in the engineering industry, thereby opening future career opportunities.

TSE: What advice would you give engineers who aspire to obtain the Chartered Engineer certification?

CT: I would advise engineers to share the experience they have accumulated in their engineering career, especially in the area of innovation and in the work they have done that pushed boundaries. They should also share the ideas that they are most passionate about as well as their aspirations to uplift the engineering industry to the next level.

TSE: Any other information that you would like to provide?

CT: I would like to thank IES for creating the Engineering Project Management category, under the Chartered Engineer certification programme. This has provided an avenue for engineers who have transitioned into Project Management to attain professional accreditation for their competency in this area. Hopefully, this will make engineering more attractive to budding engineers, as a career to pursue over the long term.

JTC's Trendspace, an eight-storey industrial building at Sungei Kadut, has received several awards, from design-related to safety awards.

ACCELERATING THE TRANSFORMATION OF THE FM INDUSTRY

There are a several ongoing and new initiatives that will assist in achieving this objective.

At the opening of the Singapore International Facility Management Association's (SIFMA) new office recently, Minister of State for National Development & Communications and Information, Mr Tan Kiat How, shared on new and ongoing initiatives that will accelerate transformation in the FM industry.

These include a new Certified Facilities Management Company (CFMC) accreditation scheme that will raise the competency and service quality of FM Companies (FMCs). He also announced the awardees of the Smart FM Proof-of-Concept (POC) Grant for projects that will help demonstrate the business case of integrated and aggregated FM to the wider FM industry.

Raising the professionalism of the FM industry through accreditation

To raise the professionalism of the FM industry, and the capabilities and service quality of FMCs, the tripartite Facilities Management Implementation Committee (FMIC) co-created a set of base criteria, in October 2020, to benchmark FMCs.

The criteria cover four broad areas for the accreditation of FMCs, including their financial status, plans for manpower development, processes to enhance service quality, and plans to develop and adopt technology. SIFMA is the first industry association to develop an accreditation scheme based on these criteria.

Driving the adoption of integrated and aggregated FM

To encourage the shift towards stronger partnerships and reduce industry fragmentation, the FMIC, in 2020, proposed a longer term transformation towards integrated and aggregated FM. To kickstart the process, a grant call for the Smart FM PoC Grant was launched in October 2020.

To apply for this grant, interested projects had to present innovative solutions that could demonstrate more than 20% overall improvement in the productivity of FM services. This would need to be achieved through the integration of multiple FM services, and aggregation of FM services across a cluster or portfolio of buildings.

The grants have now been awarded to two projects - from Certis CISCO Security Pte Ltd and from Ngee Ann Polytechnic. Both projects were awarded as they were able to illustrate significant productivity gains from the adoption of both integrated and aggregated FM.

The proposed solutions under the projects will also leverage data and predictive analytics, and will deploy a common data standard to better integrate the multiple FM services such as cleaning and security across their buildings.

Mr Kelvin Wong, CEO of BCA said, "During the review of the current state of the FM industry, the industry saw the need to have clear standards to benchmark FMCs. Hence the FMIC co-created a set of base criteria for accreditation schemes with the industry, to recognise the more progressive FMCs who are committed to raising their competency and service quality. This initiative, together with the Smart FM Proof-of-Concept grant given to Certis Cisco Security and Ngee Ann Polytechnic, will pave the way forward to transform and uplift the FM industry".

Accelerating the pace of FM industry transformation

Transforming the FM industry to become more manpower-lean and productive is important, given Singapore's ageing local workforce and building stock. This has created manpower challenges and an increase in demand for building maintenance, for the FM industry.

Since 2018, the tripartite FMIC has co-created a suite of FM industry transformation initiatives to address the challenges, across four key areas of transformation:

- Design for Maintainability (DfM), which looks at designing buildings for ease of maintenance, to reduce maintenance workload for FM firms and sustain building performance.
- Smart FM, which looks at leveraging technology to enhance the productivity of FM services.
- Procurement, which looks at restructuring FM contracts to place greater emphasis on progressive procurement practices, including outcome-based contracting and integrated FM.
- Manpower and Industry Development, which looks at developing the capabilities of FMCs and the FM workforce to support industry transformation.

Under these four areas of transformation, key initiatives undertaken by the FMIC include the Maintainable Design Appraisal System (MiDAS), Guide to Smart FM and FM Skills Framework.

ON-DEMAND

COMMUNITY MOBILITY SERVICE

by Alan Quek Ming Huat, Director and General Manager, Global Business Development and Corporate Management, WILLERS Pte Ltd, Singapore

Mr Alan Quek Ming Huat

Towards sustainable and inclusive mobility.

Current transport challenges

According to the United Nations, the total world population is forecasted to increase by more than 25% to reach 9.7 billion people in 2050. The World Economic Forum (WEF) has also projected that the world's vehicle population will reach 2 billion by 2040, from today's 1.3 billion vehicles. This translates to a whopping 54% increase which is more than double the increase in the human population. It is not a sustainable trend in the long run.

With rapid urbanisation, many countries and cities are facing serious transport and societal challenges such as traffic congestions, accidents, noise and air pollution, declining birth rates, ageing population and shortage of commercial and public transport drivers. Rural and suburban regions are also faced with poor transport networks and infrastructure, resulting in limited connectivity and accessibility.

While the transport industry was still grappling with the on-going mobility and societal challenges, the COVID-19 pandemic has thrown a curveball which no urban transport system in the world was prepared for.

This crisis has caused a major shift in human behaviour and travel patterns in the past one and a half years. It has literally affected the way we live, work, study and play. Companies are embracing the idea of working partially from home, even after the pandemic. As a result, there is increased shorter-distance travel. Morning and evening peak hour crowds have not returned to pre-COVID levels and there seems to be more travelling during off-peak hours. And as compared to the past, passengers now have higher expectations for clean and hygienic transport.

On a positive note, the pandemic has accelerated digital transformation and IT adoption in Singapore and many other countries. The elderly have had to adapt and upskill to become more tech-savvy, to utilise mobile phones for purposes such as contactless payment, online purchases and scanning of QR codes, apart from just making calls as well as sending and receiving text messages. Coupled with the digitalisation efforts, contactless payment has now become the preferred mode of payment. Without the pandemic, this would likely have taken a much longer time to achieve.

Building a modern urban transport system is based on demand momentum over time and the pandemic has disrupted that momentum. Hence, it is time to reflect on and review the current transport situation and readiness levels to meet the 'new normal' in each country. It is essential to innovate and build resilient mobility solutions that go beyond the conventional transport systems, to tackle these new travel patterns and behaviour and their expected long-term impacts.

Mobility-as-a-Service

Mobility-as-a-service (MaaS) is an evolving mobility concept that has the potential to address the persistent and growing mobility challenges that most cities and suburban areas are facing today. It aims to provide commuters seamless mobility solutions based on their travel needs, including bundled transport services (covering existing and new transportation modes) that are ordered and paid for, through an integrated digital mobile app. It presents opportunities for new value creation and potential changes in lifestyles, thereby changing travel patterns and enhancing the individual's overall journey experience.

If adopted appropriately, MaaS can facilitate seamless travel for short- and long-haul journeys and mitigate first- and last-mile challenges. Thus, MaaS is not just a smartphone app or transport mode, but should be seen as a distribution model for mobility.

The availability of more efficient mobility options for users and better use of assets by transport operators will encourage greater movement in cities and rural areas, creating more active outings and visitorship to public and commercial facilities. With an overall boost in movement, the economies of the cities and towns can be revitalised, and people's lives may be enriched and transformed.

However, a one-size-fits-all MaaS platform will not work. In order for MaaS to be effective and acceptable, it needs to be customised for different regions, towns, cities, countries and communities. Therefore, besides establishing a sustainable and acceptable pricing strategy, it is also essential to have a deep understanding of the needs and wants of the local users. Only then can the MaaS platform be truly user-centric and more appropriately suited to the cultures and travel patterns of the users.

MaaS, when used with new emerging vehicular technologies such as electric vehicles, autonomous shuttles,

connected vehicles (connectivity achieved through vehicle-to-vehicle or vehicle-to-infrastructure communications) and on-demand shared mobility, can potentially contribute to a new form of mobility. We will be able to realise cleaner movement in urban and rural areas, reducing carbon dioxide emissions, thereby contributing to decarbonisation and environmental sustainability.

By encouraging people to drive less and reduce car ownership, MaaS has the potential to contribute towards Singapore's car-lite vision. This would free up land resources and reduce pollution by shifting commuters towards more sustainable forms of transport.

On-demand community mobility service

WILLERS Pte Ltd, a subsidiary of WILLER Inc Group of Japan and as the headquarter (outside Japan) for the growing Asia Pacific region, aims to deliver seamless, new mobility services that are simple, comfortable and safe for users. We believe that MaaS, which puts users at the core of the mobility service, can mitigate societal and mobility challenges, by taking away the stress that comes with mobility. But this requires a paradigm shift from the current mindset, in the way the transport system is being used and operated. One of our key initiatives is the introduction of the 'community mobility' service, centred on the MaaS concept. The result is a demand-responsive (or on-demand) and flexible shared mobility service that is affordable and personalised for users within a specific community.

Named 'mobi', our AI-based, on-demand community mobility shuttle service is used to mitigate first- and last-mile travel challenges, fill in the gaps and be an integral part of the transport network, as an affordable and convenient means of moving people around quickly and safely within a defined geographical area. It offers users a new option for commuting to amenities within a radius of 2 km - a distance that is deemed to be either too large or inconvenient to cover on foot (under the hot sun and on rainy days), or too short to travel by car or uneconomical to cover by cab.

Launched in Shibuya and Kyotango in Japan, in July 2021, mobi acts as an alternative to fixed route and scheduled feeder bus services, private cars, micro-mobility devices and P2P ride hailing services, to cover the '2 km radius from home'.

Today, in many rural/suburban areas or small towns where there is a lack of public transport networks and connectivity, private cars are indispensable in the daily lives of the residents, as they need to commute for grocery and general shopping, hospital checkups etc. With the introduction of mobi, the reliance on family

mobi mobile app.

members for one's transportation needs, or the financial burden on having to own two or more private cars in one family, can be greatly reduced. In addition, by providing them with greater freedom of mobility, the elderly can enjoy outings as frequently as they want, even after returning their driving licences.

In cities, people can similarly use mobi for their daily, essential commuting needs, including going to key public transport nodes, commuting for grocery shopping, sending children to tuition centres or enrichment classes etc. It aims to connect people and communities with an efficient, sustainable and inclusive mobility.

With a relatively low and affordable, monthly, fixed subscription rate, mobi eliminates unnecessary stress and financial burdens, and family members have unlimited access to the service to fulfil various usage patterns, which improves the quality of lives.

The five key features of mobi are:

- Quick pick-up upon request, to wherever the users want to go, within the specified geofenced area.
- Artificial Intelligence (AI) routing technologies to identify the optimal route to the user's desired location, based on the time of booking and traffic condition.
- Unlimited rides at a low, flat monthly subscription rate.
- A simple, easy-to-use mobile app for booking.
- Familiar drivers' faces to ensure that children and the elderly feel more secure, using the service.

Looking ahead

Beyond Japan, WILLERS will be expanding the mobi service to cater to different needs in the Southeast Asian region. In Singapore, such last-mile, on-demand mobility services will play an integral role in realising the objective of '20-minute Towns', where all door-to-door journeys to the nearest neighbourhood centre and amenities should be completed within 20 minutes, under the latest Land Transport Master Plan 2040. With the prevalent use of smartphones and mobile apps, it allows users to plan door-to-door journeys with combinations of transport modes that best meet their commuting needs.

In addition, with WILLERS currently engaged in the operation of autonomous shuttle bus services in Gardens by the Bay and Jurong Lake Gardens, we plan to integrate this state-of-the-art transport mode that is electricity-driven, as part of the last-mile on-demand community mobility service in the near future, as we move towards a smart urban mobility ecosystem that is sustainable and inclusive.

Auto Rider at Gardens by the Bay.

Autonomous shuttle in Jurong Lake Gardens.

REMOTE RISK ASSESSMENT METHODS

FOR THE NEW NORMAL

Mr Nantha Marimuthu

by Nantha Marimuthu, Vice President, Operations Engineering Manager (Asia), FM Global

The approach is based on a mix of old and new tactics.

Loss prevention engineers love to roll up their sleeves, put on a hard hat and protective gear, and get their hands dirty assessing a property up close, searching for risks to business operations. Often, they travel long distances to visit plants and facilities for that vital first-hand perspective.

This was all before a pandemic halted human movement and altered the economic landscape, resulting in many commercial premises such as factories, warehouses, commercial buildings and power plants, being closed or continuing to function with reduced capacity, while others were put to new uses and stretched to their limits.

The explosion at a factory in Tuas, Singapore, earlier this year, that led to a ministerial inquiry, highlights just how prone industrial premises are to disaster. In a disrupted economy, the impact on a business can often be exacerbated, putting pressure on finances and people, so it is crucial that essential checks are carried out to ensure that operational and building integrity are maintained and risks are identified. There have been other incidents in the region too, such as the recent explosion at a plastics factory in Bangkok, Thailand, as well as a fire in a logistics warehouse in China.

But in this new normal, where frequency of cross-border travels would still remain low, given how businesses remain cautious about this, how does a loss prevention engineer assess a property or plant from a distance, with the same level of robustness and accuracy? The answer lies in a mixed approach comprising old and new tactics.

THE APPLICATION OF REMOTE SERVICING TECHNOLOGIES

To solve this dilemma, loss prevention engineers have turned to remote servicing technologies to get the real-time data needed for precision risk assessment. Calls, video conferencing and virtual walk-throughs have become a way for engineers to get real-time visual information, in order to advise on loss prevention strategies.

Recently, engineers who were unable to visit a large glass bottle manufacturing plant, due to travel restrictions, carried out their risk evaluation remotely. In a span of two months, multiple video conferences were held and hundreds of files were transferred to the loss prevention

Planning on the ground at customer's factory for a first-time site assessment.

Carrying out a 'boots on the ground' visit.

engineers. From these inputs, the engineering team was able to analyse the data and propose a loss prevention solution. When a 'boots on the ground' visit was finally completed in late 2020, no new major recommendations had to be made, validating the robustness of the remote analysis. Loss prevention engineers noted that the rigour of the remote process meant they were able to get more and better information right from the start.

Augmented reality for visual assessments

Engineers are also using augmented reality to connect virtually and make a visual assessment of the situation on the ground. Take, for example, a company that was keen to design a complex fire protection solution to meet its risk improvement goals for its high hazard processing facility, but border closures meant it was not possible to get a specialist engineer on site. Working together with the property owner, engineers utilised a newly created 'Remote Visit' app to conduct a four-hour virtual tour of the site, enabling collaboration between the client's engineers and a specialist. The knowledge gained from this virtual visit enabled the engineering team to develop the fire protection solution, involving a combination of drainage, interlocks and deluge water protection.

Tapping unique tools

In some cases, a complex problem calls for something extra. Unable to visit a warehouse site, an engineer toured the facility remotely, using the 'Remote Visit' app to analyse rack storage, conduct visual valve inspection and review churn testing records in the fire pump room, in order to enable the verification and completion of a physical exposure control plan. To further support this process, the property owner virtually shared recent aerial drone footage of an area under construction and an updated flood emergency response plan, and photos of recently installed and approved flood abatement equipment. The engineering team continues to conduct regular assessments by remotely attending the testing of the flood abatement equipment using the 'Remote Visit' app.

SUMMARY

Indeed, the approach to risk management has adapted over the last year, since the pandemic forced various safe-distancing measures on to us. We have done 15,000 remote servicing reports, compared to only around 30 a year, prior to the pandemic- the highest in recent years. While we predict remote servicing will not permanently replace in-person visits, they have proven to be a robust way to complement boots on the ground and even improve the quality of risk assessments in the interim. The maturity of new technology tools and an adaptive mindset have enabled engineers to continue protecting client facilities throughout the pandemic. This ensures continuity to clients' need for risk assessment and improvement, as well as management of impairments, regardless of the distance.

With restrictions on movements continuing in some countries, this hybrid approach will become the new normal, where engineers can conduct analysis remotely through various tools, with reduced costs and environmental impact, and allow them to be 'onsite' almost immediately, supported by increasing use of data and analytics, augmented and virtual reality tools, and satellite imagery.

Using the Remote Visit App to conduct remote risk assessments of the site.

OIL & GAS COMPANIES RESPOND TO THE CHALLENGES OF PRODUCTIVITY AND SUSTAINABILITY

A global leader in industrial software is assisting energy companies to deal with the changed scenario.

The Singapore Engineer (TSE): Can you describe what AVEVA does, the industries it serves, and the type of technology solutions offered to the energy sector?

Mr Emon Zaman, Senior Vice President, Asia Pacific, AVEVA.

Mr Emon Zaman (EZ): AVEVA is a global leader in industrial software that helps to drive digital transformation and sustainability for customers across several industries such as energy, chemicals, food & beverage, marine, and power & utilities, to name a few. Specifically, for the energy sector, AVEVA's solutions have fundamental capabilities that positively impact the asset and operations lifecycle.

We have over a four-decade long history of partnering with oil & gas companies. This strong collaboration has resulted in documented savings of USD 320 million per year for this industry. AVEVA customers include 19 out of the top 20 oil & gas companies, with solutions deployed in over 300 refineries for plant optimisation, and 900,000 miles of pipeline to enable monitoring and control, and with 90% of offshore oil & gas assets designed with AVEVA technology.

As a software company, AVEVA's sweet spot is around three areas and they are all related to how we handle data.

Firstly, our solutions allow you to consolidate different forms of data - including engineering data, operations data or maintenance data. Secondly, we have capabilities to visualise that data in context, so you can look at the inter-relationships of data and that data starts to become useable 'information'. And finally, we have applications that can use that 'information' to drive optimal decisions to run your business processes.

This is how within the energy sector, AVEVA's solutions are used in diverse areas such as developing a 3D model with AVEVA E3D during the design of a new plant, or providing an operational data management platform (PI) for that same plant to store operations data. And we then have applications that can sit on top of that operations data to optimise that plant to reduce energy consumption (AVEVA Process Optimization) or provide predictive capabilities to improve equipment reliability (AVEVA Predictive Analytics). So, within the energy sector, our solutions offer capabilities to efficiently design the assets and then operate them with higher reliability and efficiency.

TSE: Globally, energy consumption has contracted enormously, due to COVID-19, while major oil & gas companies are taking significant cost-cutting measures. Can the use of technology (AI, IIoT and APM) assist these oil & gas firms to achieve greater efficiency?

EZ: Oil & gas companies, in general, know that they need to adapt or become obsolete. Many of them are taking some bold steps in re-inventing themselves for the paradigm shift that is happening, in how the consumers want to consume energy. So, while there are pressures on budgets related to capital investment, it is usually not to the detriment of the sustainability initiatives. The variable we are seeing widely played out within the oil & gas companies is to look at how any capital investment decisions impact their net zero objectives.

So, the role of technologies, such as AI (Artificial Intelligence), IIoT (Industrial Internet of Things) and APM (Asset Performance Management), become even more important in this new world order. On the one hand, companies need to make existing operations more efficient and, on the other hand, any new investments they make need to consider the aspect of efficient and sustainable operations as a core tenet before making the final investment decisions. This latter area is a new area of growth with many of our customers in this sector.

The adoption of technology offers the opportunity to positively impact process yield, energy usage, throughput optimisation, and carbon footprint reduction for new asset builds. Here are some key areas to consider:

- Designing for optimal operation: Development of a process digital twin during the detailed design of a new plant, allows companies to optimise the process and control design. This serves as a foundation for continuous improvement in operations, based on the engineering model.
- Optimising project efficiency for sustainability: AVEVA's solutions can optimise project delivery while improving collaboration on new build projects and facilitating the digital modernisation of existing plants and refurbishments. Efficiencies are driven by delivering accurate first-time design, fabrication and construction to achieve this result.
- Leveraging operational data and AI to improve asset reliability: By leveraging operational historical information and AI, we can identify potential anomalies before they happen and thus prevent equipment malfunction and

take preemptive corrective action. This reduces down-time and overall operations and maintenance costs.

- Leveraging operations data with modelling to reduce energy consumption: A complete 360° view of the value chain represented digitally as an operational digital twin allows all aspects of the enterprise to be visualised, analysed, and optimised. Inputs to the enterprise, such as feedstock and raw material availability and price, are analysed in real-time, to support optimal planning, scheduling and distribution. Rapid optimisation with visualisation and reporting allows the impact of uncertainties and market changes to be evaluated and actioned in real-time.

TSE: To achieve targeted sustainability goals, oil & gas companies need to handle maintenance and ensure a safe working environment always. How does AVEVA's AI-driven predictive maintenance enable this to be achieved?

EZ: AVEVA's APM system is a solution that helps companies across various industries to manage reliability goals. A prominent feature of the APM portfolio is the use of AI to enhance predictive maintenance capabilities.

APM 4.0 delivers proactive asset performance management enabled by predictive alerts and prescriptive analytics. This can lower costs, reduce unplanned downtime, and optimise labour usage and equipment performance.

Through predictive and prescriptive analytics, companies will be able to implement asset strategies, to avoid unplanned downtime for their most critical assets - while also deciding which preventative or corrective asset strategy is the best course of action to take, for their less vital equipment.

AVEVA predictive maintenance is based on machine learning. This is a type of pattern recognition and anomaly detection, leveraging big data to create digital signatures of assets and their performance.

The detection of any deviations from expected patterns provides early warning of potential problems and inefficiencies, as a result of errors in the design or operations process. Big data can come from a variety of sources, including sensors, data lakes, data historians, calculated values, audio, video etc.

AVEVA's AI techniques enable businesses to increase the longevity and performance of their assets while ensuring a safe and reliable environment for the workforce. AVEVA's solutions help businesses to automate complex industrial processes and provide valuable data-driven insights to make real-time decisions which will have a direct impact on the sustainability of the business.

TSE: Could you share examples of customers in the energy sector who have benefitted from the use of AVEVA's technology solutions?

EZ: I can share a couple of them.

The first example is that of Abu Dhabi National Oil Company (ADNOC). With AVEVA's solutions, ADNOC is able to combine cutting-edge technologies using IIoT, big data, advanced visualisation and AI, to integrate and maximise return across asset and operation value chains.

A good illustration is ADNOC's Panorama Digital Command Centre that provides operational visibility across the entire hydrocarbon value chain, from exploration to distribution of products, by breaking down information silos and providing real-time operational insights based on a single, trusted view. This not only improves operational efficiencies, it also uncovers new pathways to optimise performance.

The Panorama solution was developed using AVEVA's System Platform and InTouch Operations Management Interface (OMI). These products enabled integration across various enterprise resource planning systems as well as business and IT applications.

This has enabled visibility across operations for improved business agility, by integrating and monitoring over 10 million tags across 120+ dashboards. Next, AVEVA's Unified Supply Chain Management was used to develop an end-to-end model of the entire operations, which ADNOC could optimise, based on market and business requirements. The use of the Unified Supply Chain Management solution has been proven to deliver an integrated, accurate and centralised, monthly operating plan.

ADNOC's digital transformation has resulted in savings between USD 60 million and USD 100 million, through optimised operations.

The second example is that of British Petroleum (BP). The oil major has revolutionised its oil & gas downstream business with AVEVA's cloud-based Unified Supply Chain Management solution.

BP had clearly defined goals to achieve, in its digital transformation journey. The company wanted to simplify and standardise its oil & gas downstream supply chain management, enhance data management & transparency, reduce IT cost of ownership, and increase agility in control management.

There were challenges, such as a lack of transparency and duplication of effort across the supply chain, the inability to make quick decisions that could benefit the business, and the disconnected tools and processes sitting in silos.

BP was able to implement more robust and lower risk plans with the assistance of AVEVA's team. It enabled BP to run complex models that were not possible before. The company could execute precise analysis with improved calculation speed, reducing the time needed, from seven hours to just over three minutes.

With the use of technology, decisions on feedstock purchasing and planning operations, that previously took two business days, can now be made in two hours and instantly shared across the enterprise. This transformation has enabled BP to remove technology limitations so that the business can focus on the human aspect of process improvement.

SECURING
THE HYBRID DATA CENTRE

by Gary Gardiner, Head of Security Engineering, Asia Pacific & Japan, Check Point Software Technologies

Gary Gardiner

The varied requirements of digitalisation come with higher risks.

Against the backdrop of the rise of the remote workforce and the growing prevalence of sophisticated attacks such as ransomware, zero day malware and supply chain attacks, CISOs (Chief Information Security Officers) have been forced to rethink their security architecture. Today, with the need for distributed applications to support their business and security needs, organisations are leveraging hybrid data centres and security architectures.

A hybrid data centre combines on-premise and cloud-based infrastructure with orchestration that allows data and applications to be shared between them over the network, enabling organisations to experience the capabilities and benefits of both. Hybrid data centres span public and private clouds and on-premise environments, and organisations that have adopted this approach need to ensure cybersecurity resilience, security visibility and ease of security management across the entire architecture.

No longer just the data centre but also the cloud

Ultimately, the differing natures of the on-premise data centre and cloud mean that organisations need to ensure security and operational parity across the entire architecture. When organisations have their own data centre architecture, it means this has been developed over a long period of time and the security controls they have in place are mature and work very well. However, when they move inside the public cloud, teams need to be aware of the shared responsibility model when it comes to securing assets. While cloud providers may provide some degree of security and have performance agreements offering some shared culpability, at the end of the day, organisations are still responsible for the data, and cannot be absolved from legal or other ramifications in the event of a cybersecurity incident.

Migrating services very quickly to the cloud can also invariably create a less resilient environment because of the specific security requirements of the cloud. Even a minute change made by the provider or the organisation can affect its security posture. For example, when a business creates a data base server instance in the cloud that has direct access to the Internet, this puts the data at risk of exposure. Cloud security posture management is key, and having visibility into where the data is residing and the traffic crossing the cloud environment is important.

Effectively securing the hybrid data centre

So what should organisations consider, when looking at solutions to secure their hybrid data centre?

Here are six factors to take into consideration:

- Security for hybrid data centres must be unified and offer a single interface for monitoring and managing the security of multi-cloud and on-premises assets.
- As organisations adopt DevOps, they need security that can keep pace. This requires support for automation, including integration with CI/CD pipelines, programmatic management, automated incident response workflows, and dynamic updates that eliminate the need for humans in the loop.
- Hybrid data centres are complex ecosystems, requiring deep and granular visibility and security management. Securing these environments requires the ability to perform in-depth traffic inspection including tailored threat intelligence; content, code and image analysis; monitoring user and app interactions; configuration changes; and other account activity.
- Cloud environments provide access to dynamic and flexible infrastructure. Securing hybrid data centres requires solutions that can grow with the needs of the business.
- Data centres offer high availability and redundancy to support business functions. Security must provide the same guarantees to minimise disruption to operations.
- Hybrid data centre security solutions should ingest data from across the entire environment and use it to develop adaptive and context-aware security policies that ensure consistent security across the board.

These policies should adapt dynamically to reflect changing configurations of the data centre's infrastructure, minimising the need for manual change controls where possible.

The modern data centre and network require the flexibility of a hybrid cloud security architecture that uses automation and artificial intelligence (AI) to scale threat prevention performance on demand, on premise and in the cloud, with a simplified and unified management system. Organisations should adopt a security framework that encapsulate as many security layers as possible, to reduce the possible attack or intrusion surfaces from threat actors, and to afford effective resilience actions whenever security policies are breached.

APPROVAL OF TEST CASES FOR VALIDATING 5G

NEW RADIO DEVICES IN STANDALONE MODE

Enabling modem and device vendors to speed verification of radio frequency transmission performance.

Keysight Technologies Inc, a leading technology company that delivers advanced design and validation solutions, has announced that it is the first to gain approval by the Global Certification Forum (GCF) of test cases for validating the radio frequency (RF) performance of 5G new radio (NR) devices that support 5G NR standalone (SA) mode in frequency range 2 (FR2) spectrum bands.

GCF approval of these test cases means modem and device vendors can use Keysight's 5G Device Test Platform to speed verification of RF in both non-standalone (NSA) and SA mode across FR1 and FR2 (mmWave) 3GPP-specified bands. This achievement indicates that the wireless industry is evolving beyond the use of NSA mode, which relies on an 4G LTE evolved packet core (EPC). Nearly 80 mobile operators are now investing in 5G SA deployments, using a 5G Core (5GC) to deliver advanced connectivity services.

“Keysight continues to offer a comprehensive range of GCF test cases for validating the RF and protocol performance of 5G devices on a single 5G wireless test platform. Early access to 5G test cases in FR2 spectrum enables vendors to capture revenue opportunities associated with data-hungry use cases that rely on wide bandwidths to deliver high data rates and throughput”, said Muthu Kumaran, General Manager of Keysight’s device validation solutions business.

More than 11% of all commercially available 5G devices now support both sub-6GHz and mmWave spectrum, according to the Global mobile Suppliers Association (GSA). 5G NR deployment in SA mode and in FR2 is expected to support applications such as fixed wireless access (FWA), which uses customer premises equipment (CPE) to deliver wired-broadband data speeds to homes and businesses.

Keysight's 5G network emulation solutions for FR2 leverage the company's UXM 5G Wireless Test Platform and 5G over-the-air (OTA) compact antenna test (CATR) range chambers to access a variety of 5G NR test cases. The use of common hardware and software platforms across an ecosystem consisting of chipset and device vendors, test houses and mobile operators, accelerates and simplifies device testing.

It has also been confirmed that Keysight continues to support a leading number of 5G NR RF/RRM and protocol conformance test cases. Early access to validated test cases enables device vendors to continuously evolve with the latest specifications and cost-effectively meet market demand in a timely manner.

Supporting orchestration of innovative 5G services at network edge

Keysight has announced that it has joined Google Cloud’s partner initiative to support agile orchestration of innovative 5G services at the network edge.

A growing number of mobile operators are leveraging cloud and edge computing to bring high-speed, low-latency and secure connectivity to the network edge while optimising operational efficiencies. Keysight joined Google Cloud's partner initiative to enable a cloud-centric 5G ecosystem to connect a software-driven infrastructure from the edge of the radio access network (RAN) to the core.

"As a Google Cloud partner, Keysight will support service providers transitioning to cloud and edge computing, which are needed for delivering advanced applications and use cases such as streaming media, cloud gaming, connected vehicles, private wireless networks and immersive experiences. Keysight’s solutions across wireless and wireline technologies enable hyperscalers and mobile operators to create unified, heterogenous networks that support a wide range of use cases, requirements and applications”, said Scott Bryden, Vice President of Keysight’s Operator Industry Solutions Group.

Telecom providers are migrating network and application operations to cloud-native, container-based solutions. 5G deployments in standalone (SA) mode using commercial off-the-shelf (COTS) hardware with open standard interfaces are accelerating virtualisation RAN architectures and network slicing technology. This digital transformation is unlocking innovation at the network edge with real-time data processing that is closer to where data is collected and consumed.

“Low latency access to cloud capabilities and applications is increasingly important for businesses operating at the network edge. We are delighted to partner with Keysight to help communications service providers roll out cloud native 5G quickly and cost-effectively, and ultimately to enable greater connectivity for customers at the edge”, said Tanuj Raja, Global Head, Strategic Partnerships at Google Cloud.

LG HVAC VIRTUAL EXPERIENCE

SHOWCASES COMPANY'S LATEST SOLUTIONS

LG Electronics (LG) has launched the LG HVAC Virtual Experience, a new, interactive online showroom that gives visitors the opportunity to browse and learn all about its extensive portfolio of heating, ventilation and air-conditioning (HVAC) solutions, anywhere, anytime. Helping customers to make better decisions for their families or valued employees, the intuitive, online space makes it possible to view the company's latest solutions in a variety of virtual environments and discover their many benefits, such as greater comfort, improved indoor air quality and seamless control.

Upon entering the LG HVAC Virtual Experience, visitors can choose from several business and living space categories - Residential Apartment, Residential Villa, Office General, Office High-Rise, Retail and Hotel. Visitors can then freely explore their selected 3D environment using a mouse or touchscreen device, clicking on straightforward menus as they go on to access additional information like specifications, features, product videos and case studies for each model. Simple to use and easy to navigate, LG's new virtual platform is a tool for consumers, industry professionals and partners looking to create healthier and more comfortable indoor spaces.

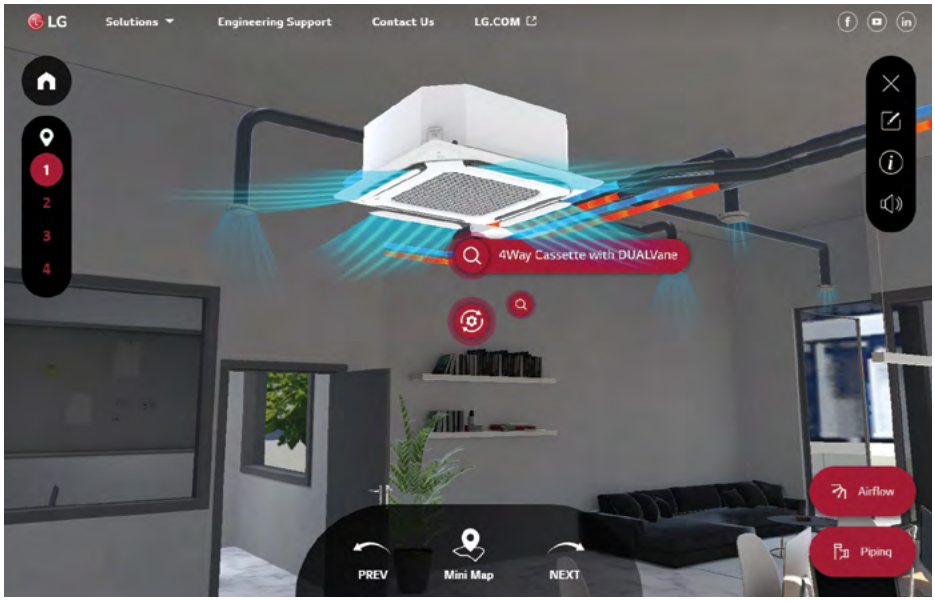
Furthemore, the virtual showroom allows visitors to see the behind-the-scenes details and technologies. By pressing the on-screen Airflow and Piping buttons, visitors can uncover how air travels in an air conditioner or air purifier and how pipes direct water and refrigerant through a system. They can even virtually switch operational modes and observe how airflow changes from one air conditioner to another. Beyond the technology and science, the showroom is a place to check out all the products' designs to see how they match various virtual interiors.

LG HVAC Virtual Experience is an engaging online resource that can give visitors a thorough understanding of the company's latest, optimised HVAC solutions for different kinds of spaces, helping them figure out which products are best suited to their specific needs. The showroom also demonstrates LG's commitment to ensuring a sustainable future, by highlighting innovative LG technologies, such as the energy-efficient R1 Compressor, and the company's early adoption of the eco-friendly R32 refrigerant.

LG Virtual HVAC Experience can be accessed via a PC or smartphone.

"The LG Virtual HVAC Experience delivers greater accessibility for anyone to experience our latest solutions, whenever and wherever you are. The platform also offers a compelling and informative way to engage users and establish a lasting impression. We will continue to work tirelessly to create HVAC products that not only make homes and businesses more comfortable, but are better for users, the environment, and the future of our planet", said Mr Justin Seong, Product Director of LG Electronics (Singapore) Air Solutions.

LG Dual Vane Cassette installed in a high-rise office.



LG HVAC Virtual Experience is a new, interactive online showroom that gives visitors the opportunity to browse and learn about the company's portfolio of HVAC solutions.

THERMAL MANAGEMENT SOLUTIONS

FOR HIGH-DENSITY IT APPLICATIONS

Vertiv, a global provider of critical digital infrastructure and continuity solutions, recently unveiled its latest line of thermal management solutions designed for high-density IT applications. The company's Liebert XD family offers sensible cooling in row, rack or room design, with provision for scalability and flexibility for future expansion. The Liebert XD family is now available in Southeast Asia, Australia and New Zealand.

The Liebert XD family utilises refrigerant-based systems to cool IT equipment. By adopting a waterless design, the solution is ideal for use around electrical equipment, reducing hazards and supporting sustainability targets for businesses working to eliminate water usage in the data centre.

Ideal for high-density computing applications and enterprise data centres, the Liebert XD family can be implemented via a hybrid approach, using a combination of floor-mounted mission-critical cooling units and cooling from the Liebert XD Series as supplemental or primary. In addition, its compact design allows for targeted cooling closer to the heat source, allowing for potential energy savings of up to 70% when deployed as primary cooling and up to 30% savings as supplemental cooling, compared to traditional data centre cooling solutions.

The Liebert XD family has two types of heat rejection modules available - the Liebert XDP which utilises the building's existing chilled water system as well as the Liebert XD pumped refrigerant unit which can cool up to 200 kW of IT load; and the Liebert XDC air-cooled variant which can support up to 130 kW of IT load, for businesses that do not have existing chilled water systems in their buildings.

As the Liebert XD cooling solutions are scalable, components may be added and the cooling system re-configured to react to changes in the environment as heat loads increase.

The Liebert XDP and Liebert XDC units can be used in conjunction with a variety of cooling modules to address unique room cooling challenges. The Liebert XDH can be used for in-row cooling, the Liebert XDO for overhead cooling, and the Liebert XDV for above-rack cooling. Each cooling module supports either air-cooled or chilled water, depending on customer requirements and provision for scalable growth. The cooling modules can be placed where the heat loads are, thereby enabling a flexible approach to provide cooling exactly where it is needed.

"Cooling has one of the biggest energy requirements within the data centre space. This is no surprise, considering the huge amount of data that is being processed, stored and analysed, as many organisations ramp up their digital transformation programmes. As more organisations today strive to balance energy efficiency and sustainability goals with their overall business goals, the Liebert XD family is the perfect solution to support high-density applications", said Ms Rebecca Ng, Head of Thermal Management at Vertiv Asia.

The Liebert XD family offers sensible cooling in row, rack or room design, with provision for scalability and flexibility for future expansion.

ENERGY AND DATA COMBINED

IN NEW HYBRID CABLE FOR SEW MOTORS

New generations of motors are expected to be small, compact and fast. To achieve this and to save space, more and more drive manufacturers are turning to hybrid technology. Accordingly, igus has now expanded its range of hybrid cables with a new cable especially for SEW motors with the MOVILINK DDI interface. Users in the material handling industry, for example, can now rely on a durable cable specifically developed for e-chain applications.

Hybrid cables for drive technology are characterised by their ability to combine energy and data transmission in one cable. The result is that the number of cables required is halved. In the case of the new SEW motors with the MOVILINK DDI interface, the drive manufacturer relies on a coaxial element for the transmission of motor information.

In order to be able to safely supply the compact motors with energy and data, while they are in motion, igus has now developed the new hybrid cable.

“The challenge with cables with coaxial elements is that they quickly become susceptible to faults at high dynamics. That is why we have made it our task to develop a durable and flexible cable that also functions reliably in motion”, said Andreas Muckes, Head of Product Management chainflex cables at igus GmbH.

To this end, igus can draw on its more than 20 years of expertise in the field of coaxial cables for highly dynamic applications.

For the new hybrid cable, CF280.UL.H207.D, four energy cores have now been combined with one coaxial core and two control pairs. By merging two cables into one, users can save 40% space in the energy chain. At the same time, the weight that has to be driven by the system is reduced, which means that less energy is consumed. The new cable with a PUR outer jacket can be used for applications with a bending factor of up to 15xd and is therefore suitable for a wide range of industries, from machine tools and material handling to the automotive industry.

With 28 different cable types for motors from Siemens, Beckhoff, SEW and Bosch Rexroth, igus already has one of the largest portfolios of hybrid cables for the energy chain, from stock. With the expansion of the CF280 series, igus is following the ongoing trend of hybrid technology. The cable specialist also offers its CF280 cable series with a PVC outer jacket as CF220. In this way, additional costs can be reduced in the hybrid cable segment. The chainflex cables can be purchased already harnessed or by the metre. As with all its cables, igus also provides a guarantee of up to 36 months on the new SEW hybrid cable.

With the new hybrid cable from igus for the SEW MOVILINK DDI interface, users save space at the motor and in the energy chain. Image: igus GmbH.

Trials scheduled for wireless electric car charging in Hong Kong

Technology start-up Dynamic Solutions HK Limited (Dynamic Solutions) has revealed that it will begin trialling wireless charging devices that will charge electronic vehicles as they are parked. The innovative induction pads are installed at the firm’s test centre, with in-depth trials expected to have started in August.

According to the company, its wireless electric vehicle charging pads will eliminate the need for large, unsightly charging points which are beginning to clutter cities. The pads will be built into the ground, and they will pump out alternating ultrasonic waves that convert into electricity when the car is parked above.

Once the trials begin, engineers from Dynamic Solutions will test the technology in various situations, for speed, accuracy, and robustness, under different weather conditions. They will also test how easily the technology can be incorporated into older electric vehicles.

The company says that electric vehicle manufacturers are now incorporating induction charging technology with their new models. However, there is only a small number of induction-enabled electric vehicle charging points installed throughout Hong Kong at the moment. Dynamic Solutions aims to help change that in Hong Kong and throughout Asia.

NEW SOLUTION

FOR TOWING CARTS

Danish manufacturer, Mobile Industrial Robots (MiR), recently announced the launch of MiR250 Hook, an autonomous mobile robots (AMR) solution that can automatically collect and tow carts.

MiR Hook 250 is a top module for MiR250, the company's fastest and most compact robot which smoothly and efficiently navigates in highly dynamic environments with people. The new and patented cart-towing robot solution is an update on the MiRHook version from 2016 and is characterised by a faster and more agile base robot along with improved software for the hook.

Many companies want to optimise their internal logistics in order to increase productivity and profitability and to free employees for higher value tasks. MiR meets this need with the MiR Hook 250. This user-friendly technology can easily automate the internal transport of loaded carts weighing up to 500 kg.

"It is easy, manageable and economical to automate the internal transport of the different carts and transport cages, which companies, logistics centres and hospitals already use. You do not need to modify the layout or purchase new carts, since MiRHook can locate and connect to almost any type of cart via QR codes or AprilTags", said Mr Søren E Nielsen, President of MiR.

The new generation of MiRHook robots is patented. MiR250 Hook automatically attaches to a cart and delivers it at the cart's destination, without any human involvement. The invention increases the range of applications of an AMR. The new solution is robustly designed and has been created for use in industrial environments. It can move at speeds of up to 2 m/s and navigates safely and efficiently. There are no limitations to the number of carts that a MiR250 Hook robot can collect and tow to different positions and the robot can collect carts of different sizes and heights. The speed, flexibility, and industrial design of MiR's new MiR250 Hook solution is said to optimise workflows significantly.

For example, it creates more efficient and automatic flow of components at an assembly line, when they are delivered on time, which means the employees can spend their time assembling products, rather than collecting material and parts during the assembly work. At the same time, the company saves space because the carts with components are delivered in time from stock, rather than the components being left in the production area, taking up space.

Very little preparation is needed before the MiR250 Hook can be put to use in the workplace. QR codes or AprilTags are attached to the existing carts or cages at the workplace, so that the MiR250 Hook can identify each cart or cage. The robot maps its surroundings, when it is operated manually along its routes for the first time, or the mapping can be done with a few clicks, by importing a map of the buildings and premises into the robot's software. The robot can also communicate with elevators and doors, so that it can freely move between departments.

Companies who already own a MiR250 robot can simply purchase the actual cart-towing MiR Hook 250 top module. Other customers can quickly automate the internal transport of carts by investing in a MiR250 robot and a MiR Hook 250, which MiR presents as a complete solution, ready to be put into use.

The MiR250 Hook automatically attaches to a cart and delivers it to its destination, without any human involvement.

CHARTING A PATHWAY TO ENGINEERING LEADERSHIP WITH SYSTEMS THINKING

As part of the Young Engineers Career series, the IES Young Engineers Committee (IES-YEC) have lined up 10 monthly webinars, which will run until April 2022.

Through this, the YEC hopes to provide young engineers with industry insights into evolving trends and inspire the next generation of engineers. By connecting students with engineers, the YEC is also working towards growing the engineering and IES community.

Organised by committee members Engr. James Bautista, Mr Syed M. Subukutheen, Mr Isakkipandian, Ms Dawn Teo and Er. Deckson Ang, the first webinar in this series took place on 27 July 2021.

Titled "Pathway to Engineering Leadership", IES Immediate Past President Professor Yeoh Lean Weng shared his insights and experiences with 120 participants from Singapore and other countries, such as Malaysia, the Philippines, India, and even as far as the United States. About half the participants were young engineers aged 21 to 30.

Prof Yeoh began his presentation with a poignant quote from Singapore's founding Prime Minister, Mr Lee Kuan Yew: "I do not yet know of a man who became a leader as a result of having undergone a leadership course."

He exhorted participants to seek out practical learning experiences to sharpen their capabilities, while being aware of key tenets such as having knowledge and competency, being decisive and taking ownership, protecting one's subordinates and superiors, and knowing how to gain influence and exert authority.

On systems thinking, he shared that engineers think in systems, and, rather than just being systematic, it is about the understanding that in the ebb and flow of life, everything is in flux, yet linked.

With an analytical engineering mind that possesses systemic problem-solving skills, an engineer can also achieve excellence in non-engineering fields. For example, in terms of business transformation, there are many decisions to be made and being able to assess the various factors while seeing the big picture will help one formulate more effective business strategies.

The talk ended with an engaging question and answer session, the participants' diverse professional and cultural experiences adding an insightful layer to the valuable exchange of opinions during well-received webinar.

"I liked the new approach that you took in explaining leadership and challenges. Definitely learnt a lot," said Prof Madhavi Srinivasan, the Cluster Director for Energy Storage at the Energy Research Institute @ NTU.

"The parallels drawn by Prof Yeoh of his past experiences to the key points of his sharing – that made it much more relatable and I was able to appreciate the points shared better," opined Mr Kelvin Lim, one of the Singaporean participants.

An e-cert of appreciation was "presented" to Prof Yeoh for sharing his knowledge at the webinar.

THE HEART & VOICE OF ENGINEERS

IES Membership

1) Professional Development

- Eligible for Chartered Engineers Certification Application (subject to registration criteria and conditions)
- Enjoy preferential rates for IES conferences, seminars and workshops
- Enjoy 10% to 15% discount for IES Academy Courses (T&Cs apply)

2) International Affiliations

- Interaction with overseas engineering institutions in joint programmes

3) Networking

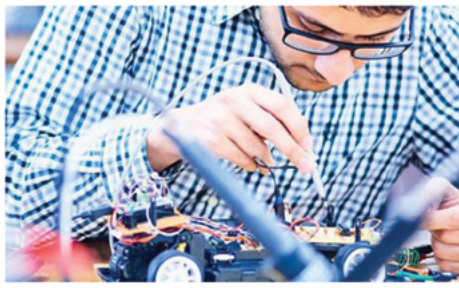
- Exclusive FREE Members' Night (T&Cs apply)
- Enjoy preferential rates for networking activities
- Join our Sports Interest Groups
- Join our Social Events

4) Communication

- Enjoy free subscription of IES weekly e-Newsletter
- Free monthly e-zine – The Singapore Engineer
- Free Annual IES Directory containing the business contacts of all members
- Get the latest updates on government regulations and the activities of allied institutions

5) Others

- Enjoy special rate for IES professional Indemnity Insurance Schemes
- Enjoy exclusive merchant benefits
- Free parking in IES premises
- Get a 5% discount off your membership subscription when you pay by GIRO (T&Cs apply)



Join Us!

www.ies.org.sg
64695000

Marshall Cavendish
Business Information

WHO'S WHO IN ENGINEERING, SINGAPORE
(THIRD EDITION)

A prestige publication that showcases over 250 Singapore's prominent engineers and their outstanding contributions in the respective industries.

S$128.40* each

(incl. GST)

* While stocks last

SCAN THE QR CODE
TO PURCHASE YOUR COPIES NOW!