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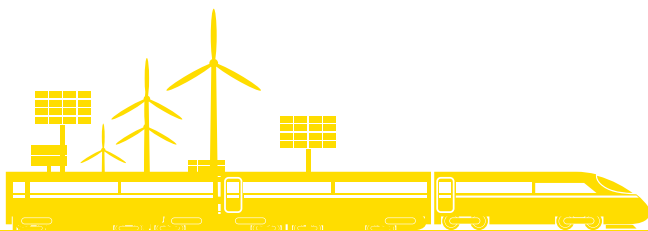
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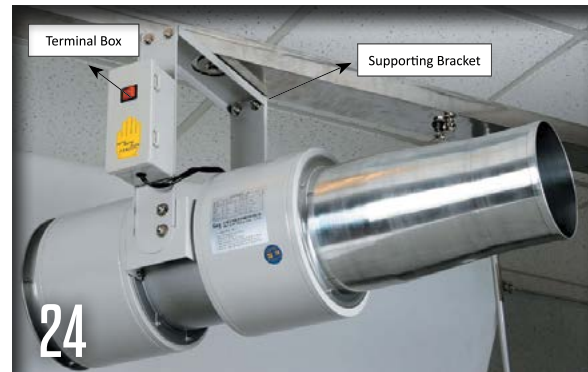
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Singapore commences first renewable energy electricity import via regional multilateral power trade

The Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP), for the supply of up to 100 megawatts (MW) of renewable hydropower from Lao PDR to Singapore via Thailand and Malaysia, using existing interconnections, commenced recently. This marks a historic milestone as the first multilateral cross-border electricity trade involving four ASEAN countries, and the first instance of renewable energy import into Singapore.

The LTMS-PIP serves as a pathfinder in realising the broader ASEAN Power Grid (APG) vision of multilateral electricity trading, beyond neighbouring countries in the region. The APG is a key regional initiative to enhance interconnectivity, energy security and sustainability, through existing electricity interconnections. This provides opportunities to tap on low-carbon and renewable energy sources in the region, and contributes towards economic development and improving energy security and stability.

Singapore is tapping on regional power grids to access cleaner energy sources beyond its borders. Regional power grids can help accelerate the development of renewable energy projects and promote economic growth and bring greater energy security to the region. The LTMS-PIP is one of the electricity import trials that Singapore's Energy Market Authority (EMA) has been working on, to pave the way for larger scale electricity imports of up to 4 gigawatts (GW) into Singapore by 2035.

As part of the LTMS-PIP, Keppel Electric Pte Ltd (Keppel Electric), a subsidiary of Keppel Infrastructure Holdings Pte Ltd (KI), and Electricite du Laos (EdL) have signed an initial two-year power purchase

agreement, following the announcement of the signing of an exclusive framework agreement in September 2021. Keppel Electric is also the first entity to be issued an electricity importer licence by EMA.

The LTMS-PIP demonstrates the feasibility of multilateral power collaboration, as technical, commercial, legal and regulatory arrangements were finalised, with extensive collaboration among the various parties, including Keppel Electric and EdL, Electricity Generating Authority of Thailand (EGAT) and Tenaga Nasional Berhad (TNB), and with the support from the governments of the four member ASEAN countries. Keppel Electric and EdL will continue to work closely with EGAT and TNB for the successful implementation of the power supply project.

Mr Ngiam Shih Chun, Chief Executive of EMA, said, "The commencement of electricity imports from Lao PDR marks a significant milestone in our regional energy cooperation. The LTMS-PIP is a key project to advance multilateral power trade in Southeast Asia and complements existing efforts towards realising the ASEAN Power Grid vision. Interconnected power grids can accelerate the deployment of renewable energy, promote supply diversification and strengthen grid stability for the region as a whole. We would like to thank our regional partners for their strong support and close collaboration in moving towards a cleaner energy future for the region".

Dr Daovong Phonekeo, Minister of Ministry of Energy and Mines of Lao PDR, said, "With its vast renewable energy potential, Lao PDR targets to be a major supporter of renewable energy in the region. Lao PDR has exported over 6,000

MW cross-border electricity to its neighbouring countries including Cambodia, Myanmar, Thailand and Vietnam. The country has more than 8,000 MW of installed hydropower capacity, which is set to grow in the near future to support its domestic demand and future exports. We continually support the ASEAN Economic Community, Greater Mekong Subregion, and ASEAN Power Grid implementation, and this project proves that we are on the right track as we promote the development of clean energy resources including solar and wind power".

Ms Cindy Lim, Chief Executive Officer, KI, said, "Keppel is honoured to be the first electricity importer licensee in Singapore and to collaborate with EdL and the other esteemed LTMS-PIP partners on this significant project to promote greater energy infrastructure connectivity and sustainability in the region".

Mr Chanthaboun Soukaloun, Managing Director, EdL, said, "We are grateful to be part of ASEAN to support the clean renewable energy movement to reduce carbon within our region. This project started in 2014 during the ASEAN Energy Track to complement the ASEAN Economic Community and ASEAN Power Grid to interconnect the region for energy security and stability".

In addition, Keppel and EdL are also collaborating on the establishment of renewable energy tracking, verification and assurance through Renewable Energy Certificates (RECs) as well as other long-term renewable electricity supply projects, in support for the Singapore Green Plan 2030 as well as to meet the growing demand for renewable energy and energy transition in the ASEAN region.

Record clean energy spending expected

Global energy investment is set to increase by 8% in 2022 to reach USD 2.4 trillion, with the anticipated rise coming mainly in clean energy, according to a new report by the International Energy Agency (IEA). Although encouraging, the growth investment is still far from enough, to tackle the multiple dimensions of today's energy crisis and pave the way towards a cleaner and more secure energy future.

The fastest growth in energy investment is coming from the power sector – mainly in renewables and grids – and from energy efficiency, according to the IEA's World Energy Investment 2022 report. The rise in clean energy spending is not evenly spread, however, with most of it taking place in advanced economies and China. And in some markets, energy security concerns and high prices are prompting higher investment in fossil fuel supplies, most notably on coal.

“We cannot afford to ignore either today's global energy crisis or the climate crisis, but the good news is that we do not need to choose between them – we can tackle both at the same time. A massive surge in investment to accelerate clean energy transitions is the only lasting solution. This kind of investment is rising, but we need a much faster increase, to ease the pressure on consumers from high fossil fuel prices, make our energy systems more secure, and get the world on track to reach our climate goals”, said IEA Executive Director, Dr Fatih Birol.

Clean energy investment grew by only 2% a year in the five years after the Paris Agreement was signed in 2015. But since 2020, the pace of growth has accelerated significantly to 12%. Spending has been underpinned by fiscal support from governments and aided by the rise of sustainable finance, especially in advanced economies. Renewables, grids and storage, now account for more than 80% of total power sec-

tor investment. Spending on solar PV, batteries and electric vehicles is now growing at rates consistent with reaching global net zero emissions by 2050.

Tight supply chains are also playing a large part in the headline rise in investment, though. Almost half of the overall increase in spending is a reflection of higher costs, from labour and services to materials such as cement, steel and critical minerals. These challenges are deterring some energy companies from picking up their spending more quickly.

From a low base, there is rapid growth underway in spending on some emerging technologies, notably batteries, low emissions hydrogen, and carbon capture utilisation and storage. Investment in battery energy storage is expected to more than double to reach almost USD 20 billion in 2022.

However, despite some bright spots, such as solar in India, clean energy spending in emerging and developing economies (excluding China) remains stuck at 2015 levels, with no increase since the Paris Agreement was reached. Public funds to support sustainable recovery are scarce, policy frameworks are often weak, economic clouds are gathering and borrowing costs are rising. All of this undercuts the economic attractiveness of capital-intensive clean technologies. Much more needs to be done, including by international development institutions, to boost these investment levels and bridge the widening regional divergences in the pace of energy transition investment.

Another warning sign comes in the form of a 10% rise in investment in coal supply in 2021, led by emerging economies in Asia, with a similar increase likely in 2022. Although China has pledged to stop building coal-fired power plants abroad, a significant amount of new coal capacity is coming onto the Chinese domestic market.

Russia's invasion of Ukraine has pushed up energy prices for many consumers and businesses around the world, hurting households, industries and entire economies – most severely in the developing world where people can least afford it. Some of the immediate shortfalls in exports from Russia need to be met by production elsewhere, notably for natural gas, and new LNG infrastructure may also be required to facilitate the diversification of supply away from Russia. While oil and gas investment is up 10% from last year, it remains well below 2019 levels.

Overall, today's oil and gas spending is caught between two visions of the future. It is too high for a pathway aligned with limiting global warming to 1.5° C but not enough to satisfy rising demand, in a scenario where governments stick with today's policy settings and fail to deliver on their climate pledges.

Today's high fossil fuel prices are generating pain for many economies but are also generating an unprecedented windfall for oil and gas producers. Global oil and gas sector income is set to jump to USD 4 trillion in 2022, more than twice its five-year average, with the bulk of it going to major oil and gas exporting states.

These windfall gains provide a once-in-a-generation opportunity for oil and gas producing economies to fund the much needed transformation of their economies, and for major oil and gas companies to do more to diversify their spending. The share of spending by oil and gas companies on clean energy is rising slowly, with what progress there is driven mainly by the European majors and a handful of other companies. Overall, clean energy investment accounts for around 5% of oil and gas company capital expenditure worldwide, up from 1% in 2019.

Clean energy technologies require a host of critical minerals and, for the first time, the World Energy In-

vestment report includes a detailed review of investment trends for critical minerals. Higher and more diversified investment is needed to curb today's price pressures and create more resilient clean energy supply chains. Worldwide exploration spending rose 30% in 2021, with the increase in the United States, Canada and Latin America offering the prospect of more diversified supply in the years ahead.

Nuclear power can play an important role

As the world contends with a global energy crisis, nuclear power has the potential to play a significant role in helping countries to securely transition to energy systems dominated by renewables, according to a new special report by the International Energy Agency (IEA).

In countries that choose to continue or increase their use of nuclear power, it can reduce reliance on imported fossil fuels, cut carbon dioxide emissions and enable electricity systems to integrate higher shares of solar and wind power.

IRENA and OPEC Fund join forces to unlock investment in energy transition

The International Renewable Energy Agency (IRENA) and the OPEC Fund for International Development (OPEC Fund) are ramping up efforts to advance renewable energy investment and enable access to sustainable finance in emerging and developing economies.

A Memorandum of Understanding (MoU) signed recently in Vienna by IRENA's Director-General, Mr Francesco La Camera and the Director-General of the OPEC Fund, Dr Abdulhamid Alkhalifa, formalises the cooperation. In pursuit of the common objective of a just, inclusive and equitable energy transition aligned with the 2030 Agenda for Sustainable Development and the Paris Agreement, both sides agreed to mobilise finance, unlock investment and support project development on the ground.

IRENA's Director-General, Mr Francesco La Camera, said, "The global energy transition must dramatically accelerate. To achieve net zero and universal energy access, our World Energy Transitions Outlook shows that we must nearly treble the speed of deployment of renewables and massively redirect investment towards transition. Our cooperation with the OPEC Fund will help unlock much needed capital in developing countries



An MoU was signed recently in Vienna by IRENA's Director-General, Francesco La Camera and the Director-General of the OPEC Fund, Dr Abdulhamid Alkhalifa, to formalise the cooperation between the two organisations.

to bring economic growth, sustainable prosperity and jobs to people through renewables projects on the ground".

OPEC Fund Director-General, Dr Abdulhamid Alkhalifa, added, "We promote an inclusive and just energy transition that leaves no one behind. Our cooperation with IRENA will help to provide the necessary funds and facilitate access to innovative financing solutions, knowledge and technologies, as well as technical assistance for project development and capacity building, to support the energy transition in our partner countries, particularly in Africa".

At a practical level, both sides will closely collaborate to

provide technical assistance and capacity building to project developers, creating a pipeline of bankable projects ready to be financed. They will also work to attract potential investors. The parties will also explore cooperation under the IRENA-managed Energy Transition Accelerator Financing (ETAF) Platform, the Climate Investment Platform (CIP), and OPEC Fund initiatives such as the planned Energy Access and Transition Trust Fund.

Both sides will also closely collaborate at UN Climate Conferences COP27 in Egypt, in November 2022, and COP28 in the United Arab Emirates, in November 2023.

CDL's Integrated Sustainability Report 2022 zeroes in on bolder decarbonisation targets

City Developments Limited (CDL) has published Integrated Sustainability Report (ISR) 2022, its 15th sustainability report since 2008. Themed 'Zero in on Future Value', the digital report communicates CDL's progress towards its material Environmental, Social and Governance (ESG) goals and targets under the CDL Future Value 2030 Sustainability Blueprint which is aligned with global climate goals.

In the year under review (1 January to 31 December 2021), CDL achieved a 42% reduction in carbon emissions intensity from base-year 2007, meeting its interim 2021 target and is on track to achieving its Science Based Targets Initiative (SBTi)-validated target of a 59% reduction by 2030. From 2012 to 2021, CDL reported energy savings of over SGD 34 million across all its commercial buildings.

Mr Sherman Kwek, CDL Group Chief Executive Officer, said, "Sustainability has become mainstream on political and business agendas, with rising expectations for companies to step up ESG integration into their businesses and set clear decarbonisation pathways. As one of Singapore's pioneers in real estate and green buildings, we have been proactively aligning our business with global and national goals to mitigate the negative impact of climate change. With CDL's Future Value 2030 Sustainability Blueprint established in 2017 as the bedrock of our ESG goals and strategies, we have a clear carbon-reduction action plan that positions us well towards our net zero goals. Contributing to a sustainable future and embracing a triple bottom line approach will remain integral to our business".

Blended reporting framework and robust external assurance

Over the years, CDL's robust sustainability reporting has evolved into a blended model using GRI

Standards as its core, since 2008. Providing comprehensive disclosures ahead of growing and diverse expectations, CDL embraced CDP, since 2010; Global Real Estate Sustainability Benchmark (GRESB), since 2013; Value Reporting Foundation (VRF)'s Integrated Reporting Framework, since 2015; Sustainable Development Goals (SDG) Reporting, since 2016; Task Force on Climate-related Financial Disclosures (TCFD) framework, since 2017; Sustainability Accounting Standards Board (SASB) Standards for Real Estate Sector, since 2020; and Climate Disclosure Standards Board (CDSB) Framework, since 2021.

CDL's sustainability reports have been externally assured since 2009, and the scope of assurance was expanded to cover SASB and CDSB in ISR 2021. This year, the company raised its assurance level for GRI and SASB Standards to reasonable assurance and also became the first Singapore company to externally assure its TCFD framework.

Decarbonising and innovating towards a Net Zero Future

In 2021, CDL raised its carbon emission reduction targets and commitments, which includes targets validated by the SBTi, under which CDL will reduce its Scope 1 and 2 Green House Gas (GHG) emissions by 63% per square metre (m²) leased area by 2030, from a 2016 base year. CDL will also reduce its Scope 3 GHG emissions from purchased goods and services by 41% per square metre (m²) Gross Floor Area (GFA) by 2030, from 2016. It will also reduce absolute Scope 3 GHG emissions from investments by 58.8% by 2030, from 2016, including from hotels managed by CDL's wholly-owned hotel subsidiary, Millennium & Copthorne Hotels Limited (M&C).

In February 2021, CDL became the first real estate conglomerate in Southeast Asia to sign the WorldG-

BC Net Zero Carbon Buildings Commitment. This global pledge to achieve net zero operational carbon, by 2030, covers new and existing wholly-owned assets under its direct management and operational control.

At COP26 in November 2021, CDL joined 44 companies worldwide to extend its pledge towards a net zero whole life carbon emissions approach. CDL pledged to achieve maximum reduction in embodied carbon and compensate for residual operational and upfront embodied emissions via offsetting for new developments, by 2030, and achieve net zero carbon for all buildings, by 2050.

CDL's ESG performance is widely recognised by leading global sustainability benchmarks. These include the Global 100 Most Sustainable Corporations in the World by Corporate Knights, where CDL ranked fifth overall and maintained its position as the world's most sustainable real estate company for the fourth consecutive year.

In November last year, CDL was one of 45 global companies and the only Singapore company to be awarded the inaugural 2021 Terra Carta Seal by His Royal Highness The Prince of Wales, through his Sustainable Markets Initiative.



CDL's 80 Anson Road (the former Fuji Xerox Towers) achieved the first BCA Green Mark Platinum Super Low Energy Certification for residential building and serviced apartments, office and retail buildings. Artist's impression.

Lendlease appoints new Head of Data Centres

International real estate group, Lendlease, recently announced the appointment of Ms Sunita Bottse as Head of Data Centres.

Based in Singapore, she will report to Mr Andrew Gauci, Head of Telecoms and Data Infrastructure, Asia.

Ms Bottse will be responsible for leading Lendlease Data Centre Partners, the Group's USD 1 billion joint venture (JV) with a large institutional investor to invest in data centres in the Asia-Pacific. The JV is currently developing a 120 MW

hyper-scale data centre in Greater Tokyo, Japan, with construction due to commence in June 2022. She will be in-charge of both sourcing and developing data centre assets across Australia, China, Japan, Malaysia and Singapore.

Ms Bottse has a strong track record in the data centre space, with more than a decade of experience in building and managing Tier IV data centres in the region. She was most recently CEO of SUPERNAP (Thailand), the company behind the

first carrier-neutral hyperscale data centre in Thailand.



Ms Sunita Bottse

Prior to her role at SUPERNAP, Ms Bottse was the Vice President of Ctex data centre where she managed data centre operations and drove the attainment of Tier IV certifications. She has also been recognised as a leader within the data centre space, receiving several accolades.

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New Shaw Tower set to capture the spirit of 21st century Green Singapore

Construction has commenced on the new Shaw Tower which will be redeveloped into a 200 m future-grade mixed-use tower which is central to the ongoing rejuvenation of the Ophir-Rochor corridor, as part of the evolution of the Downtown Core into a work-live-play precinct.

Owners, Shaw Towers Realty Pte Ltd, has appointed Lendlease to manage the redevelopment and the subsequent operating asset.

Award-winning design

The design of the new Shaw Tower received recognition at the 2021 International Architecture Awards. The development will comprise 435,000 ft² of Grade A office space with a spectacular view amidst the new CBD and a 5-storey podium with 15,700 ft² of retail and F&B offerings, including a rooftop restaurant. Community-centric facilities, taking up 21,500 ft², include a multi-purpose hall with auditorium, meeting and training facilities.

Sustainable features

The new Shaw Tower is designed for sustainability and will target BCA Green Mark Platinum (Super Low Energy) accreditation. The tower will also have leading credentials in Health & Wellness and Building Technology provisions.

The building will respond to the state's developmental agenda of modernising the built environment to meet contemporary needs, by introducing technology-enabled sustainable features for a scalable, pandemic-resilient and sustainable workplace that is essential today.

The flexible workplace can be adapted to different configurations to suit each tenant's unique needs, with floor plates ranging between 17,000 ft² and 19,000 ft². This flexibility is made possible from configuration of the space with multiple knock-out panels, for seamless connectivity between floors to encourage closer collaboration at work.



At the groundbreaking ceremony for the new Shaw Tower are, from left to right, Mr Charlie Benson, Principal, Arup Singapore Pte Ltd; Mr Kim Tae Hee, Chief Operation Officer, Hyundai Engineering & Construction Co Ltd; Mr David Hutton, Group Head of Development, Lendlease; Mr Alfred Yeung, General Manager, Shaw Towers Realty Pte Ltd; Ms Ng Hsueh Ling, Managing Director, Singapore, Lendlease; Mr Tony Ang, Managing Director, Singapore, Aedas Pte Ltd; and Mr Stephen Perkins, Senior Technical Director (Building Services), Beca.

Access to the workplace within Shaw Tower will be safe, seamless and secure, with pandemic-resilient features supported by top-grade technologies, such as facial recognition, contactless entry, destination control lifts equipped with automatic UV sterilisation and smart lighting with IoT.

Prioritising the well-being of its occupants, the new Shaw Tower will promote healthy lifestyles. Its biophilic design will feature lush greenery in the form of outdoor breakout/collaboration spaces, a fitness/yoga deck, two sky terraces, rooftop gardens and end-of-trip facilities such as secure indoor/outdoor bicycle parking and locker and shower facilities. Air quality is optimised through ultra-filtered recirculation and bi-polar ionisation, while rooftop solar photovoltaic panels generate renewable energy.

The new Shaw Tower will also play the role of a community hub by supporting the mission of community organisations, with spaces spanning four levels, dedicated to social enterprises/social service agencies.

Preserving its heritage as a symbol of Singapore's modern identity

At the centre of Shaw Tower's redevelopment is a critical mission to retain the heritage of the previous tower and its place in modern Singapore's nation-building.

Guided by its placemaking approach to create spaces that are meaningful to people, Lendlease has engaged professors from the Department of Architecture, National University of Singapore (NUS) as its heritage consultant, for an in-depth understanding of the cultural history and significance of Shaw Tower, as well as to identify opportunities for heritage experiential design and interpretation.

To preserve Shaw Tower's legacy in Downtown Singapore's placemaking history, heritage elements of the original building will be thoughtfully woven into the new building, reinstating Beach Road's historic character of leisure and entertainment in its streetscape and public spaces for the local community.

These include, but are not limited to, the original Shaw Brothers logo from the roof façade, previous Shine auditorium seats, ticket stubs from New Alhambra and Marlborough Theatre as well as from Jade 1 and Prince 2 cinema, film memorabilia, and film editing and splicing machines.

Mr Raymond Chan, Managing Director of Shaw Group of Companies, Hong Kong, said, “We are deeply committed to preserving Shaw Tower’s place in Singapore’s

nation-building journey, as a symbol of its modern identity. Just as it did during an exciting time for post-independence Singapore, we hope the new Shaw Tower will again capture the zeitgeist of Singapore today in its sustainability journey and represent a breakthrough in how culture and history can be melded with cutting-edge technology, to bring to life the future of workplaces”.

Ms Ng Hsueh Ling, Managing Director, Singapore, Lendlease,

said, “With tech-enabled features for pandemic resilience, the new Shaw Tower will continue to lead the evolution of the workplace. The combination of heritage elements of the original Shaw Tower with best-in-class sustainability features and innovative design will ensure its legacy extends into the next chapter of its illustrious story”.

The development is targeted for completion in 2025.



Exterior view of the new Shaw Tower. Artist’s impression. Image: Shaw Towers Realty Pte Ltd.



Rooftop gardens and terraces will provide luscious greenery and breathtaking views of Singapore’s city skyline. Artist’s impression. Image: Shaw Towers Realty Pte Ltd.

CapitaLand Investment secures highest position in global clean energy ranking

CapitaLand Investment Limited (CLI) is ranked the top real estate company globally and top Singapore company on the 2022 Carbon Clean 200 (Clean200). This is the fourth consecutive year that CapitaLand has been listed on the index – an annual recognition by Corporate Knights and As You Sow, of the world’s publicly traded companies that are leading the way, among their peers, to a clean energy future.

Ms Lynette Leong, Chief Sustainability Officer, CLI, said, “As a global sustainability leader in real estate, CLI is committed to doing our part in addressing climate change and reducing our carbon footprint in over 250 cities across 30 countries where we have presence. We integrate environmental, social and governance (ESG) considerations into everything we do, from our investment process to our property design, development and operations. We are also using renewable energy in operating our properties, intensifying our global search for innovations through our CapitaLand Sustainability X Challenge and stepping up our adoption of sustainable finance, among others”.

This year’s Clean200 companies rose to the top of a pool of 8,480 global firms, based on rigorous assessment of the amount of revenue each company earns from products and services aligned with the Corporate Knights Clean Economy Taxonomy.

Lowering the carbon footprint

CapitaLand’s 2030 Sustainability Master Plan launched in October 2020 includes a carbon emissions reduction target which is validated by Science Based Targets Initiative. CapitaLand has been increasing the use of renewable energy and has installed solar panels atop seven buildings in Singapore, as at 31 December 2021, with more installations in the pipeline. The seven properties are 1 Changi Business Park Avenue 1, 2 Senoko South



LogisTech is Singapore’s first BCA Green Mark Platinum ‘Super Low Energy’ logistics building.

Road, 9 Changi South Street 3, 37A Tampines Street 92, 40 Penjuru Lane, LogisTech and Techpoint.

Energy generated through this renewable source will contribute to lowering CapitaLand’s carbon footprint. Renewable energy has been powering the company’s corporate offices in Singapore since 2020. The solar panels will generate a total of 11,462 MWh of renewable energy. This will help to avoid over 4,676 tonnes of carbon emissions.

For its second edition of CapitaLand Sustainability X Challenge (CSXC), CSXC 2022, one of the key themes is decarbonisation. The aim is to find solutions that reduce energy consumption intensity while ensuring thermal comfort for building occupants and increasing renewable energy adoption in CapitaLand’s portfolio. CSXC 2022 will see increased funding by up to SGD 650,000 for the top 10 projects to be piloted at the group’s global network of properties. CapitaLand provides the innovators with access to a range of real estate asset classes globally and typologies in varying climatic conditions, to implement their solutions. This gives them the opportunity to demonstrate conclusively how their systems will function under real-world conditions.

Launched in November 2020, the inaugural CSXC 2021 is said to be the first global sustainability-focused innovation challenge by a real estate company in Singapore, encouraging innovators and organisations to submit their ideas and solutions to transform the built environment. The first challenge saw over 270 entries from more than 25 countries. The two winners each received SGD 50,000 in funding to pilot their innovations at CapitaLand properties, which started in December 2021. Eight other promising solutions were also identified, with pilots being explored at various CLI properties around the world.

CapitaLand not only places sustainability at the core of what it does, it is also empowering its employees to be creative in deploying solutions to make a positive impact on the environment. Employees can tap on the five-year SGD 50 million CapitaLand Innovation Fund which further supports the test-bedding of sustainability and other high-tech innovations in the built environment.

CapitaLand is one of the first companies in Singapore to voluntarily publish its Global Sustainability Report, according to international standards, since FY 2009. The reports have been externally assured since FY 2010.

Net Zero Asset Managers initiative publishes initial targets for 43 signatories

A total of 43 asset managers have disclosed their initial targets for the proportion of assets managed in line with achieving net zero by 2050 or sooner, according to the latest Net Zero Asset Managers (NZAM) initiative target disclosure report. This follows the inaugural NZAM report published in November 2021.

The Net Zero Asset Managers initiative is an international group of asset managers committed to supporting the goal of net zero greenhouse gas emissions by 2050 or sooner.

The latest targets mean that, collectively, approximately USD 16 trillion – out of a possible USD 42 trillion managed by the asset managers who have set targets to-date – is now committed to be managed in line with achieving net zero by 2050 or sooner, and subject to targets consistent with a fair share of the 50% global emission reduction by 2030 identified as necessary, in the IPCC special report on global warming of 1.5° C.

This sum represents approximately 39% of those managers’ assets –

up from 35% when the first set of targets were published at COP26.

Ms Rebecca Mikula-Wright, CEO, Asia Investor Group on Climate Change (AIGCC) and Investor Group on Climate Change (IGCC), said, “This momentum must continue; climate is a risk that can’t be divested from, so investors will need to use their influence over capital flows, their influence on companies and their voice to policy-makers to speed up the transition to a net zero global economy”.



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Air-Conditioner





MUY-GN10VA



MXY-2G20VA2



MXY-3G28VA2



MXY-4G33VA2



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HIMA opens new Customer Solutions Centers in Germany and Singapore

HIMA, said to be the world's leading independent provider of safety-related automation solutions for the process and railway industries, recently celebrated the simultaneous opening of Customer Solutions Centers in Brühl, Germany and in Singapore.

In Brühl, near Mannheim, a completely new world was created for customers, partner companies and employees, in a newly rented building of 2,000 m². In Singapore, the existing space was doubled in order to set up an independent Customer Solutions Center for the strategically important Asia region.

Two hundred participants from 13 countries celebrated the opening of the Customer Solutions Center in Germany. The invited guests were able to gain an insight into how HIMA is strengthening its partnership with customers. In practical demonstrations, examples of solutions on topics such as digitalisation of the safety lifecycle, safe remote access, automated testing, digitisation of the field level with Ethernet APL and modular automation MTP, were presented. Keynote speeches by BASF, Bayer, Max Bögl and genua rounded off the programme.

On the same day, engineers and industry experts took part in a similar programme at the opening of the Customer Solutions Center in Singapore. Simultaneously, over 100 participants across Southeast Asia joined the event through an online live broadcast. Safety consulting for hydrogen production, safe signalling systems for the railway industry, digital twins for operator training, and innovative burner control methodologies, were all demonstrated, and keynote speeches were given by PETRONAS, PT Len Railway Systems and Mangan Software Solutions.

According to HIMA, the solution centres will create new opportunities to experience, test and further develop safety and security



Performing the ribbon cutting at the grand opening of HIMA Customer Solutions Center in Singapore are, from left to right, Dr Norbert Riedel, Ambassador of Germany to Singapore; Dr Tim Philippi, Executive Director, Singaporean-German Chamber of Industry & Commerce (SGC); Mr Friedhelm Best, Vice President of the Asia Pacific Region, HIMA; and Ms Rachel Ong, Vice-Chairperson of West Coast Town Council and Member of Parliament for West Coast GRC (Telok Blangah).

solutions, together with customers. Also, by locating experts in one place, discussions can be more illuminating and customers' questions can be answered and validated more effectively.

Five disciplines are combined in each Customer Solutions Center – Consulting, Applications, Academy, Security Lab and the Experience Room. Flexibly configurable rooms with advanced technology are set up to effectively facilitate each type of meeting.

In joint workshops on site, customers will be able to find better answers, together with the respective safety experts. The solutions that are developed can then be tested in the Experience Room, to enable direct validation using advanced hardware and software as well as innovative digital approaches for customer processes.

"As shareholders, we are convinced that the new Customer Solutions Centers are an investment in the future of our globally positioned family-owned company. We made this choice, as our customers' business partner, to actively drive customer partnerships and innovations forward, while providing an exceptional working environment as a modern employer", said Mr Steffen Philipp, Managing Partner of HIMA.

"The new Customer Solutions Cen-

ters in Europe and Asia are important milestones in the implementation of our strategy. We create innovative solutions there that can be experienced by our customers on site. This applies in particular to the cooperation with our strategic partners such as Mangan Software Solutions and genua", said Mr Jörg de la Motte, CEO of HIMA.

"For security, for open integration and for the digitalisation of the safety lifecycle, the Customer Solutions Center offers practical solutions that are developed together with the customer. In this way, real added value is generated for, by and with our customers", said Mr Sergej Arent, Director of HIMA's Process Applications Center and responsible for the Customer Solutions Center in Brühl.

Mr Friedhelm Best, Vice President of the Asia Pacific Region, HIMA, and responsible for the Customer Solutions Center in Singapore, sees the creation of the centre as an important milestone in strengthening the company's presence in the market of Asia.

"With the Customer Solutions Center in Singapore, we are building a base that enables us to intensify our cooperation with our customers and simultaneously demonstrate that there is a firm focus on the Asian market", he said.

EuroBLECH 2022 returns to ‘live event’ format

The 26th edition of the International Sheet Metal Working Technology Exhibition, EuroBLECH 2022, will take place from 25 to 28 October 2022 in Hanover, Germany.

Following the latest easing of COVID-19 restrictions, show organiser Mack-Brooks Exhibitions has confirmed that the world’s largest trade event for sheet metal processing will go ahead as planned.

Demand for stand space has surged, and the current exhibitor list stands at 1,257 companies from 39 nations, covering a total net exhibition space of over 88,000 m². For the first time, EuroBLECH will feature a ninth exhibition hall focusing on joining technology, one of the significant growth markets in the e-mobility and general industrial sectors.

EuroBLECH 2022 marks the long-awaited comeback of face-to-face marketing and personal business meetings. The show will also resume its usual biennial event cycle.

“There is a genuine sense of relief and excitement within the industry – it has been four years since our last live show, so EuroBLECH 2022 is widely perceived as a much-needed technological update for the entire sheet metal processing sector. EuroBLECH has always been the industry’s key marketplace where everything and everyone comes together, and this year’s edition provides a particularly important booster to kick-start or renew business growth”, said Ms Evelyn Warwick, Event Director of EuroBLECH, on behalf of Mack-Brooks Exhibitions.

Exhibits to promote technological excellence

Exhibits will cover the entire sheet metal working technology chain in the manufacturing of metal prototypes, industrial components and consumer parts. This includes machines, tools and IT solutions for cutting, punching and forming, joining, welding and fastening, surface



treatment and finishing, process control and quality assurance; machine elements and components; CAD/CAM/CIM systems; warehouse and factory equipment; material recycling solutions; and other solutions to process metal sheet, tubes, profiles, plastic hybrids and other structures.

EuroBLECH exhibitors come from around the globe and range from innovative start-ups and SMEs to big international companies. This year’s top exhibiting countries are Germany, Italy, Turkey, Switzerland, China, the Netherlands, Spain, Belgium, Poland and France.

Engaging live exhibits and world premieres

Visitors can expect to witness a number of live machine demonstrations and technological world premieres. There will also be opportunities to watch innovative machinery in action, allowing attendees to assess and discuss potential benefits for their own production processes.

Substantial need to invest in emerging technologies

Traditionally, EuroBLECH attracts a high percentage of visitors with decision-making and buying capacity. For 2022, technology budgets are expected to rise as companies begin to revive their plans to invest in emerging technology for a future-proof business.

“There is a substantial need for manufacturers to align themselves to the complex and fluctuating demands of modern markets. Many of our visitors will be looking for

automated, digital and scalable solutions to facilitate the cost-efficient and sustainable production of industrial components and consumer parts. At EuroBLECH, they enjoy direct access to a broad spectrum of technology suppliers. This will allow them to explore and invest in the best tools, machines and materials for all their sheet metal processing needs”, said Ms Warwick.

Attracting top industry professionals from all key industry sectors

The previous ‘live event’ in the series, EuroBLECH 2018, attracted a total of 56,301 international trade visitors, including buyers, design engineers, production and quality managers, researchers and other technical experts from all management levels and business types.

Visitors come from all key industry sectors, including sheet metal parts manufacturing, components and assemblies; ferrous and non-ferrous metal production and construction; automotive, aerospace and shipbuilding; mechanical engineering; building and construction; heating, ventilation and air conditioning; renewable energy engineering; consumer electronics; telecommunication; precision engineering, optics and medical equipment; food technology and packaging; and many more.

More information on EuroBLECH 2022 can be obtained from www.euroblech.com.



An exhibit at EuroBLECH 2018, the previous ‘live event’ in the series.

Engineering Singapore's transformation

Mr Dalson Chung was inaugurated as the 29th President of the Institution of Engineers, Singapore (IES), at the 56th IES Annual General Meeting (AGM) held on 28 May 2022. He will serve a two-year term.



Mr Dalson Chung

In an email interview with 'The Singapore Engineer', Mr Chung outlines the steps that IES will take, to strengthen the institution and the profession, and address some of the issues of the day.

The Singapore Engineer (TSE): What are some of the major challenges that Singapore is facing today that engineers can help overcome?

Mr Dalson Chung (DC): Climate change, renewable energy, food security and resilience against future pandemics are amongst the greatest challenges facing Singapore now. Many of these have been encapsulated in the Singapore Green Plan 2030, a whole-of-nation effort to move Singapore to a sustainable future.

All the five pillars of the plan – City in Nature, Energy Reset, Green Economy, Resilient Future and Sustainable Living – require practical, effective and innovative solutions from engineers. We need engineers to enhance our coastal defence, create alternative energy solutions, strengthen our food security, build more low-carbon buildings and contribute in many other areas as well.

TSE: How can IES, as the premier engineering institution in the country, help to address these challenges?

DC: The Government has taken decisive action to mitigate these challenges – but they will need to be supported by our engineers, just like how engineers had played an instrumental role in our earlier years of nation-building. The magnitude and complexity of the issues at hand require a concerted, multi-disciplinary response from engineers, both at the systems and localised levels.

As the national society of engineers



Mr Dalson Chung delivers the Inauguration Speech as the 29th President of IES.

in Singapore, IES is in a unique position to enable, empower and energise the engineering community to step forward and take action to build a sustainable Singapore for future generations. We will be doing this through the IES Green Plan to promote exchange of knowledge, inspire ideas and catalyse collaborations amongst our engineers.

As the voice of engineers in Singapore, IES also aims to use the IES Green Plan as a platform for engineers to voice their perspectives and ideas so that we are part of Singapore's sustainable development journey.

TSE: With the rapid technological advances taking place, what are the major changes in the scope of work of engineers?

DC: Technological advancements, fuelled by digitalisation, are re-shaping the way engineers

work. With the rise of the Internet of Things, automation and cloud technologies, engineers can now interact and solve problems within a much shorter period of time. The ability to access a vast amount of data and a plethora of technologies has also enabled engineers to be more collaborative and make faster decisions.

In this data- and technology-led landscape, it has become more critical than ever for engineers to strengthen their learnability – the attitude and ability to learn, unlearn and relearn, to be future-proof.

TSE: During your term as IES President, what would be among your major initiatives?

DC: I am anchoring our strategy for the next two years on five of Singapore's national imperatives: Sustainable Development, Workplace



Mr Chung (foreground, fifth from left) was the Co-Chair for the World Engineers Summit 2021. Major conferences like WES will continue to shape and facilitate discussions along the national imperatives of sustainable development, workplace health and safety, Industry 4.0, digitalisation, and cybersecurity.

Health and Safety, Industry 4.0, Digitalisation and Cybersecurity.

This is aimed at strengthening Singapore's resilience against future disruptions, as well as contributing to our economic development, creating professional job opportunities and providing good and sustainable infrastructure to enhance liveability for our citizens and our society.

Building upon these five anchors, we aim to develop initiatives such as the aforementioned IES Green Plan and a Systems Engineering Community of Practice; encourage technopreneurship in the sustainability space in support of Industry 4.0 and a Vision Zero work plan to internalise safety amongst our engineers and their engineering projects; as well as raise awareness of, and build capabilities of our engineers in, digitalisation and cybersecurity.

TSE: How do you see IES strengthening its role in the training and education of adequate numbers of engineers in various disciplines, and in continuous professional development?

DC: Over the years, IES has been a key hub for the training and up-

skilling of engineers. This is mainly delivered through the IES Academy which offers a comprehensive scope of quality training courses for engineering professionals from all disciplines.

Apart from technical courses, we have been running engineering leadership programmes, jointly with NTUC, to nurture young, senior and C-level engineers to lead Singapore's future growth.

Moving forward, we will continue to ride on the digitalisation wave and offer more of our courses and seminars online, to ensure that learning never stops even in the face of disruptions such as the COVID-19 pandemic.

Another crucial aspect of professional development is professional recognition. IES has made significant progress on this front through our accreditation programmes. There has been an increase of about 47% in our Chartered Engineer membership over the last two years while our Chartered Technologist and Chartered Technician programmes have helped enlarge the engineering eco-system since their launch in early 2021.

We will continue to build on this strong momentum to recognise engineers, engineering technologists and technicians for their professional competence and experience. This will be critical in forging a robust engineering ecosystem and retaining engineering talents.

TSE: Any other information that you wish to provide?

DC: I would do my best to inject greater verve and purpose into our institution, through the 'I.E.S.' framework. 'I' stands for 'Inclusive', 'E' stands for 'Empathy' and 'S' stands for 'Stability'.

The 'Inclusive' pillar focuses on promoting inclusivity for the benefit of engineering professionals in our ecosystem; the 'Empathy' pillar will look at strengthening our corporate social responsibility and sustainability agenda; and the 'Stability' pillar will involve bolstering our secretariat's capability and the IES brand.

All these plans will not bear much meaning and impact without the support of IES Members. I invite all our members to join me and our Council Members to engineer Singapore's transformation in the post-pandemic era.

IES Annual General Meeting 2022

Reporting on IES' key achievements in the past year and handing over the baton.

The IES 56th Annual General Meeting took place on 28 May 2022. With the easing of pandemic restrictions, it was conducted in hybrid format over Zoom and at Raffles Town Club.

Dr Richard Kwok, the 28th IES President, kicked off the AGM with his report on IES' key achievements in the past year.

In terms of advancing engineering here and overseas, there was strong growth in the Chartered Engineers, Technician and Technologist accreditation programmes since their inception. Various initiatives, such as the Transportation Standards Committee, were launched, and industry events like the World Engineers Summit 2021 were successfully conducted. More than half of IES courses were held online, to continue providing training and upskilling for engineers.

On driving the future of engineering, IES continued its efforts at enthusing the young with National

Engineers Day 2021, and reached out to the public on the circular economy with the Charles Rudd Distinguished Public Lectures 2022. A webinar was also jointly organised with NTU's Promotion of Women in Engineering, Research and Science (POWERS) on inspirational

women engineers who were heroes and innovators in the fight against COVID-19.

Dr Kwok also reported on the accolades IES and members received throughout the year, such as LTA's Best Collaboration Partner award,



Dr Richard Kwok (left) passes the baton over to Mr Dalson Chung, who officially took over as IES President during the AGM.



Front row (L-R): Er. David Ng, Dr Boh Jaw Woei, Er. Edwin Khew, Ms Jasmine Foo, Dr Richard Kwok, Mr Dalson Chung, Er. Chan Ewe Jin, Prof Yeoh Lean Weng, Er. Tan Seng Chuan, Er. Joseph Goh, Er. Chong Kee Sen

Middle row: Mr Danny Lee, Ms Wan Siew Ping, Er. Teo Tiong Yong, Dr Aaron Sham, Prof Er Meng Joo, Mr Dennis Tan, Er. A/Prof Lim Kok Hwa, Mr Kenneth Siew, Er. Simon Lee, Er. S Yogeewaran

Back row: Mr Jason Oh, Mr Chua Yi Bin, Er. Au Kow Liong, Mr Soh Tiam Chwee, Mr Syafiq Shahul, Er. Seow Kang Seng, Mr Mervyn Sirisena

and Er. Chong Kee Sen's FEIAP Engineer of the Year 2021.

In closing, he spoke about the areas in which he would continue to assist and provide guidance in the years ahead, such as attracting students to engineering and enabling IES and the engineering community to take on global challenges.

Dr Richard Kwok then passed the baton over to Mr Dalson Chung, who officially began his duties as the 29th IES President.

In his inauguration speech, Mr Chung unveiled the strategic plan

for IES for 2022 to 2024, with pillars identified to advance five of Singapore's national imperatives: sustainable development, workplace health and safety, Industry 4.0, digitalisation and cybersecurity.

"I am honoured and excited to serve as the President of IES at a time when Singapore is striving to emerge stronger from the pandemic.

"With the support of my team, I will lead IES to bolster Singapore's ability to enhance its future resilience and advance its sustainability agenda through engineering, with

strategies closely aligned with our national imperatives. In particular, we will develop and implement the IES Green Plan to drive greater action amongst engineers to realise the goals of the Singapore Green Plan 2030," said Mr Chung.

The new council (Session 2022/2023) looks forward to serving all members and the wider engineering community in the upcoming term. IES would also like to thank all outgoing council members – Mr Roger Lim, Mr Low Koon Huat, Er. Alfred Wong, and Dr Zhou Yi – for their service.

IES Council 2022/2023

President	Mr Dalson Chung	Council Member	Prof Er Meng Joo
Vice President	Er. Chan Ewe Jin	Council Member	Mr Lew Yii Der
Vice President	Ms Jasmine Foo	Council Member	Er. A/Prof Lim Kok Hwa
Vice President	Er. Joseph Goh	Council Member	Mr Jason Oh
Vice President	Mr Danny Lee	Council Member	Er. Seow Kang Seng
Vice President	Mr Mervyn Sirisena	Council Member	Dr Aaron Sham
Vice President	Er. S Yogeeswaran	Council Member	Dr Victor Sim
Immediate Past President	Dr Richard Kwok	Council Member	Mr Soh Tiam Chwee
Past President	Prof Yeoh Lean Weng	Council Member	Mr Syafiq Shahul
Past President	Er. Edwin Khew	Council Member	Mr Dennis Tan
Honorary Secretary	Er. David Ng	Council Member	Dr Teo Tee Hui
Honorary Treasurer	Er. Simon Lee	Council Member	Ms Wan Siew Ping
Assistant Honorary Secretary	Er. Teo Tiong Yong	Council Member	Mr Yee Boon Cheow
Assistant Honorary Treasurer	Mr Kenneth Siew	Associate Members' Representative	Mr Chua Yi Bin
Council Member	Er. Au Kow Liong	Honorary Council Member	Er. Chong Kee Sen
Council Member	Dr Boh Jaw Woei	Honorary Council Member	Er. Ho Siong Hin
Council Member	Er. Jacqueline Chan	Honorary Council Member	Er. Dr Lee Bee Wah
Council Member	Mr Chang Sau Sheong	Honorary Council Member	Er. Tan Seng Chuan

Advancing food innovation in the local industry

SIT, Enterprise SG and JTC jointly launch FoodPlant.

FoodPlant, Singapore's first shared facility for small-batch food production, that is licensed by the Singapore Food Agency (SFA), has been jointly launched by Singapore Institute of Technology (SIT), Enterprise Singapore (Enterprise SG) and JTC.

Located in JTC Food Hub @ Senoko, the facility was officially opened, on 22 April 2022, by Mr Heng Swee Keat, Deputy Prime Minister and Coordinating Minister for Economic Policies.

A key FoodInnovate initiative, FoodPlant provides affordable access to a wide range of pilot-scale equipment, research and development (R&D) consultancy services, and upskilling courses. These services aim to equip local companies with enhanced capabilities to develop new, innovative food products in response to evolving consumer preferences. FoodPlant is expected to benefit at least 200 food manufacturers and support the development of at least 400 new food products by 2026.

FoodInnovate was launched in 2018, by Enterprise Singapore; Agency for Science, Technology and Research; Economic Development Board; Innovation Partner for Impact; JTC; and the then-Agri-Food and Veterinary Authority. The initiative aims to provide resources to drive foodtech and innovations, particularly through access to shared infrastructure and industry knowledge.

The 1,107 m² facility boasts 12 rooms with specialised food production equipment, including:

- A Twin-Screw Extruder which employs a High Moisture Extrusion Technology (HMET) to texturise plant-based protein into viable meat alternatives.
- A Pulsed Electric Field (PEF)



The opening of FoodPlant, located in JTC Food Hub @ Senoko, was officiated by Mr Heng Swee Keat, Deputy Prime Minister and Coordinating Minister for Economic Policies.



Dr Lim Bee Gim, CEO of FoodPlant, addressing the guests.

system for microbial inactivation, improved extraction and drying acceleration, amongst other advantages.

- A Retort machine that provides commercial sterilisation of food, to extend the shelf life and storage life under ambient conditions, by packing and heating food within flexible retort pouches or glass jars.

- A Spray Dryer with an integrated fluidised bed, to enable the creation of products such as milk powder, instant beverages and nutrient-dense food, to address the needs of the elderly.

The equipment helps companies to expand their product portfolios and penetrate new consumer segments. For example, companies may use the Twin-Screw



Demonstration of the extrusion process.



The team at FoodPlant.

Extruder to produce plant-based meat analogues. Additionally, companies looking to expand abroad can make use of the Retort or the Spray Dryer machines to extend product shelf life or change product formats to meet various requirements.

Food products manufactured in the facility can be sold commercially as they are produced in an SFA-li-

censed facility. Companies will be able to trial new products in small batches and sell them to consumers to conduct market testing. This will allow them to take in feedback at an early stage, in order to sharpen their product development process.

FoodPlant will also provide skills training for food technologists to strengthen the industry's adop-

tion of advanced food processing technologies. The industry can look forward to specialised upskilling courses such as 'High Moisture Extrusion Technology (HMET) for Meat Analogues', 'Food and Feed Extrusion Technology' and 'Retort Processing'. The courses are led by local and foreign experts such as FoodPlant's Chief Executive Officer, Dr Lim Bee Gim, who is also an Associate Professor at SIT. Courses can also be tailored to companies' specific needs.

To boost collaborations among local food companies as well as cross-border partnerships, FoodPlant and SIT signed a Memorandum of Understanding with Foodbowl New Zealand on 20 April 2022. The parties will work with each other to develop capabilities in food innovation and manufacturing across shared facilities, through knowledge sharing and extension of industry networks.

Foodbowl is a government-supported, pilot-scale food processing facility, located in South Auckland,



Extrusion Room with twin-screw extruder.

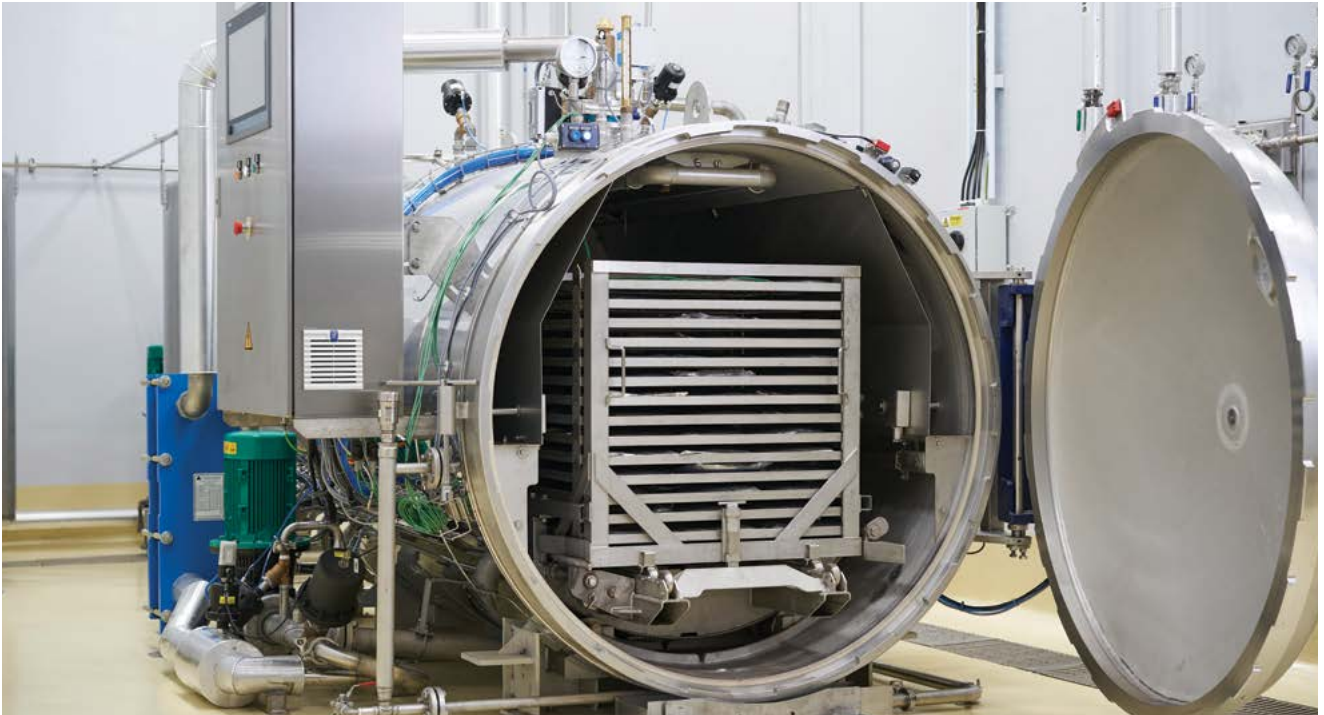
New Zealand. The facility provides food businesses with a platform to innovate, scale up and commercialise new products.

SIT President, Professor Chua Kee Chaing, shared, “FoodPlant is a key component in SIT’s sustainable food innovation programme which aims to help local companies grow and innovate through food technology. It is an enabling platform for companies to perform small-batch testing and production of innovative food products developed through R&D collaborations with SIT, other food R&D players or among themselves. Its affordable pay-per-use model lowers the barriers to market entry, such as high upfront costs in setting up a manufacturing plant or being charged for minimum order quantities when accessing commercial food processing equipment. Through FoodPlant, SIT hopes to contribute to Singapore’s transformation as a food innovation hub”.

Mr Jeffrey Siow, Managing Director & Chief Operating Officer, Enterprise SG, said, “Many of our companies are developing new products like plant-based meat alternatives or cell-cultured proteins, through FoodInnovate, to



Non-Thermal Processing Room with pulsed electric field system.



Retort Room with horizontal retort incorporating an agitation system.

meet growing consumer demand. FoodPlant provides these companies access to advanced food processing equipment, technologies and expertise which, in turn, enables faster innovation and time to market”.

Mr Alvin Tan, Industry Cluster Group, Assistant Chief Executive Officer, JTC, said, “The opening of FoodPlant is a significant milestone in strengthening Singapore’s food manufacturing ecosystem. FoodPlant will not only plug the gaps that food innovators face today but also provide a platform for partnerships and capability development. I look forward to seeing more collaborations amongst food innovators and exciting new products launched”.

Ahead of its launch, FoodPlant secured 17 membership sign-ups by companies and individuals who are keen to embark on, or further, their innovation journey. These companies include Agrocrop International, Dahmeh Pte Ltd and SGProtein.



Multi-stage spray dryer with pressure nozzle atomiser.

All images by Singapore Institute of Technology/FoodPlant

Greener and more sustainable homes in HDB towns

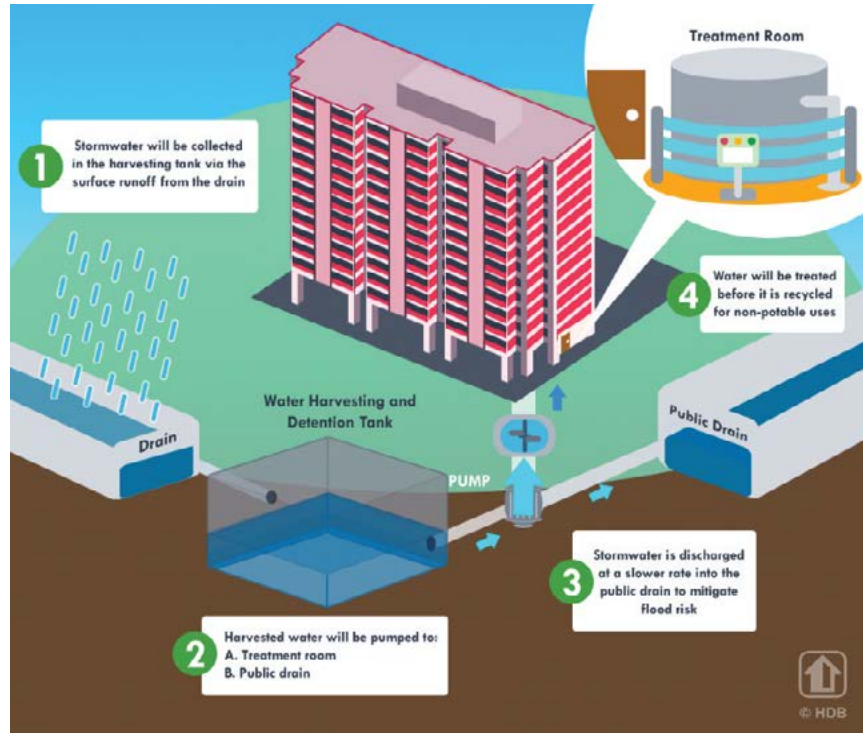
As part of efforts to improve the sustainability of HDB towns, HDB will be extending the UrbanWater Harvesting System (UWHS) to existing estates, for the first time, through a pilot project covering 89 blocks in two HDB towns. HDB called a tender recently for the installation of the UWHS to harvest rainwater for non-potable uses at the common areas of 89 blocks across Yishun and Jurong. It is estimated that about 15 UWHSs will be installed, potentially reaping water savings of about 17,500 m³ per year, or the average yearly consumption of potable water by over 85 units of 4-room HDB flats.

Separately, HDB has also awarded the sixth tender for the installation solar panels on about 1,200 HDB blocks under the SolarNova programme. These efforts, rolled out under the HDB Green Towns Programme, mark another step forward in HDB's move to make the towns more liveable, resource-efficient, and sustainable for residents.

First existing estates to be installed with the UrbanWater Harvesting System

First introduced in all suitable Build-to-Order (BTO) projects in 2018, the UWHS is designed to maximise the volume of rainwater collected by harvesting stormwater surface runoff from the ground area surrounding multiple residential blocks. The stormwater surface runoff that is discharged into an estate's surrounding drainage system will first be channelled into the UWHS' harvesting and detention tank.

The system's rainwater harvesting capability and water detention capacity allows for a single UWHS to harvest water from the ground areas surrounding as many as 12 residential blocks and dispense water to the blocks for non-potable uses. Some of these uses include the washing of common areas and watering of plants in HDB estates.



Schematic of how the UrbanWater Harvesting System works. Image: HDB.

The UWHS can save up to 50% of water usage for these purposes. In addition, the channelling of stormwater into the UWHS' harvesting and detention tank can mitigate potential flood risks in an estate, in the event of a heavy downpour, by slowing down the rate of discharge of stormwater into the drainage system downstream.

Unlike in new BTO projects, where the UWHS infrastructure can be planned and designed upfront to ensure it is located where the most amount of rainwater can be collected through the drain networks, retrofitting the UWHS into existing estates is more challenging, as it involves analysing the flow of the rainwater in the catchment area and identifying suitable locations to accommodate the system amidst other essential services infrastructure that are already in place underground.

Hence, the introduction of the UWHS to the 89 blocks in Yishun

and Jurong will be a pilot project, to assess the utility of the UWHS as applied to an existing HDB estate. The UWHS roll-out to existing estates, for the first time, will level up the sustainability provisions of existing estates to match that of newer HDB estates, and help HDB to assess the extent of potential scale-up in future.

The tender for the implementation of the UWHSs in Yishun and Jurong closed on 20 May 2022.

Construction of the systems is expected to commence in 2023 and be completed in 2027. HDB will study the cost-effectiveness of the system in reducing potable water consumption and mitigating flood risks in existing HDB estates, before deciding on the extent of future scale-up to other suitable estates.

HDB's Chief Executive Officer, Mr Tan Meng Dui, said, "As part of HDB's sustainability efforts under the Green Towns Programme,

we developed the UrbanWater Harvesting System which was first introduced in new BTO projects, in 2018. With the vast majority of our residents staying in existing HDB estates, we have taken a further step to pilot the system in existing HDB estates. While such brownfield developments will be more challenging to implement, compared to building the system as part of a new HDB development, the extension of the UWHS to existing estates will help to level up the sustainability provisions of our existing estates, and bring the benefits of green and sustainable living to more residents and towns”.

Sixth SolarNova tender awarded

In addition to launching the UWHS tender, HDB has awarded the sixth tender for the installation of solar photovoltaic (PV) systems at 1,198 HDB blocks and 57 government sites, under the SolarNova programme.

The tender, called in March 2021, attracted six bids from both local and foreign companies. HDB has awarded the tender to the joint-venture of Digo Corporation Pte Ltd and Terrenus Energy Pte Ltd. Installation of the solar PV systems is expected to begin in 3Q 2022 and be completed by 1Q 2025. This will create a solar PV capacity of 70 MWp.

To-date, HDB has called a total of seven solar leasing tenders under the SolarNova Programme. Including the last (seventh) tender which was called in February 2022, HDB has committed a total solar capacity of 380 MWp which can power 95,000 4-room flats with solar energy, thereby moving a step closer to realising the solar target of 540 MWp, by 2030.

Beyond the UWHS and SolarNova efforts

Further new initiatives under the HDB Green Towns Programme were also unveiled in the Committee of Supply 2022. More e-waste recycling bins will be introduced within HDB estates and the use of Light

Emitting Surfaces (LES) for block signages will be explored, to make towns more sustainable. To encourage green commute, more dual bicycle racks and Electric Vehicle (EV) charging points will be provided in HDB estates. HDB will continue to push the frontiers of sustainability, in both new and existing towns, to create a more resource-efficient, sustainable, and liveable environment for residents.

HDB Green Towns Programme

As the master planner of Singapore's public housing estates and the largest housing developer, HDB plays a key role in supporting Singapore's commitment to sustainable development.

The HDB Green Towns Programme is a 10-year plan to further this effort and bring sustainable living to all existing HDB towns, with large-scale implementation of green features to improve the quality of life of residents. It is a key initiative under the Singapore Green Plan which aims to build a more sustainable future for Singapore in the face of climate change.

Since 2005, HDB has been driving sustainability efforts to achieve a 10% reduction in annual energy consumption in HDB towns as of 2020. Through the Green Towns Programme, HDB aims to reduce energy consumption by a further 15% by 2030. The programme focuses on three areas of sustainability and liveability: (i) reduce energy consumption, (ii) recycle rainwater, and (iii) cool HDB towns. It brings together initiatives that have already been implemented or trialled successfully in some HDB towns/estates, as well as new initiatives that have the potential for scaling up.

SolarNova Programme

The SolarNova programme, led jointly by HDB and the Singapore Economic Development Board (EDB), accelerates the deployment of solar photovoltaic (PV) systems in Singapore and helps drive the growth of Singapore's solar industry. It is also an integral part of the HDB Green Towns Programme

which aims to make HDB towns more sustainable and liveable.

Being the largest driver for the installation of solar PV systems in Singapore, HDB aggregates public sector demand for the installation of solar panels across HDB blocks and government sites. This generates clean energy and helps to reduce carbon emissions, thereby mitigating the effects of climate change.

HDB raises funds through green bond issuance

The Housing & Development Board (HDB) has raised SGD 1 billion through the issuance of its inaugural green bond recently, marking HDB's first step into green finance transactions. The proceeds from the green bond will be used exclusively to finance HDB's green building projects, as guided by HDB's new Green Finance Framework. For the projects to be eligible for financing, the necessary provisions must be put in place right from the design stage, to ensure that they can be rated among the top green building performers in Singapore, with robust levels of energy- and water-efficiency, greenery provision and active mobility considerations, among others. The Green Finance Framework also sets out the structure for transparent reporting on the allocation of proceeds towards the eligible green projects.

The launch of HDB's Green Finance Framework and inaugural green bond will support the Whole-of-Government move to intensify sustainable development in Singapore, even as HDB seeks to reduce energy consumption and lower carbon emissions in its developments, under the Singapore Green Plan 2030's Energy Reset pillar.

Jet fans and their applications

by Er. Leong Cheng Wee, MASHRAE, MIES, P Eng

Enhancing the design of ventilation systems.

HISTORY OF JET FANS

Not much information is available on jet fans, as we know of them in today's context. Perhaps the initial concept of using jet fans for general ventilation originated from the applications of fans, without ducts, in tunnels, deep mines and underground shafts.

Jet fan technology was developed and commercialised in the US in the early 1960s. From the US, jet fan technology was later adopted and further developed by the Japanese fan manufacturers in the 1970s.

From Japan, jet fan technology spread to South Korea in 1986. Mr Lim Yun Cheol was the first Korean to refine and re-engineer Japanese and American jet fans. When Mr Lim first introduced his range and models of jet fans into the Korean market in 1987, the jet fans were very well accepted. The explosive popularity of jets fans led to many other different brands springing up overnight.

Some definitions of 'jet' are:

- An airplane that can rapidly travel long distances.
- A rapid stream of liquid or gas forced out of a small opening.
- A long, narrow current of high-speed winds (such as a jet stream).

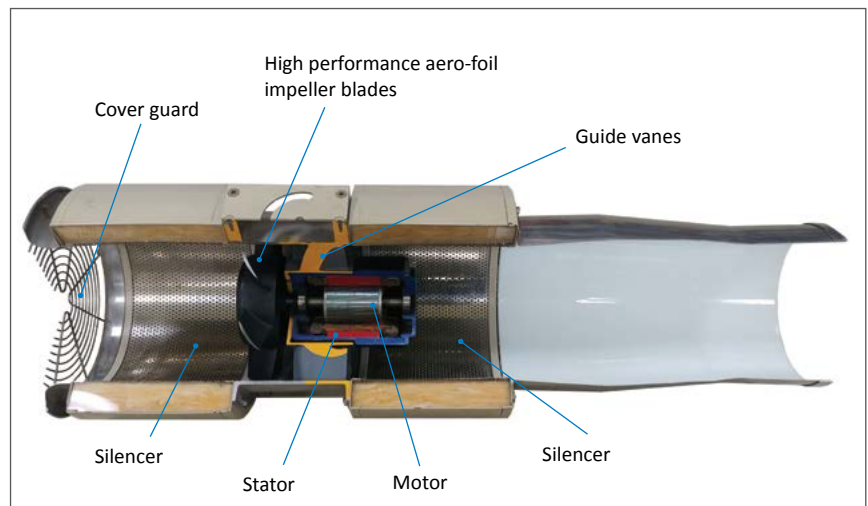
WHAT IS A JET FAN?

A jet fan is essentially a long cylindrical fan that generates a high-velocity jet of compressed air ejecting from the trailing edge of the blade, resulting in the forward movement of air, just like a jet plane being pushed forward by the high-velocity jet ejected from the rear of the jet engine.

A synonymous term that is commonly used for jet fans is 'duct-



External view of a jet fan. Image: MJ AirTech Co Ltd.



Cut-out section view of a jet fan. Image: MJ AirTech Co Ltd.

less fans'. Generally, jet fans do not need conventional ductwork from the louvres to the fans and to the diffusers/grilles for supply air, and ductwork in the reverse direction for ejecting exhaust air. The word 'ductless' does not always mean that no ducts are required. There may still be a requirement for a minimum amount of ductwork serving as the air plenum, where mechani-

cal fans (supply and exhaust fans) are located, usually at basement levels or where the openings provided are not large enough for efficient flows.

Generally, jet fans are divided into two categories:

- Impulse jet fans
- Induction jet fans

Impulse jet fans are axial fans, usu-

ally with die-cast aluminium blades, whereas induction jet fans use a centrifugal impeller with backward-curved metal blades.

This article will further describe the characteristics and applications of a vane axial impulse jet fan.

CONSTRUCTION OF A TYPICAL IMPULSE JET FAN

A typical impulse jet fan primarily consists of the following components:

- Nozzle
- Silencers
- Motor
- Stator
- Guide vanes
- Direct axial fan with high performance aero-foil impeller blades
- Electrical junction box
- Support brackets
- Cover guard

The construction of the jet fan is simple. It is made up of just a few parts. However, much research has been carried out to make good jet fans. A truly good jet fan produces air movement through laminar jet streams. The laminar jet streams should have as little swirl as possible; and should be able to travel as far as possible (have a long throw), with a good entrainment ratio and with as little electrical input as possible. Thus, although a jet fan may look simple and uncomplicated, various makes and brands of jet fans in the market display many differences in their construction, performance and efficiency.

Just as in the case of a conventional axial fan, the performance of a truly good and efficient jet fan depends very much on the following:

- Construction and surface finishing of the aero-foil fan impeller blades
- Optimal incidence angle of the inlet guide
- An efficient motor

CHARACTERISTICS OF A JET FAN

The common characteristics of a typical jet fan are the following:

- A high-velocity air stream leaving the nozzle.

- This induces or entrains the air surrounding jet streams, to generate a large volume of air flow.
- A long throw.
- Laminar flow with little, or ideally, no swirl.
- It is preferably used in a large, enclosed space with minimal number of columns or obstructions.

TYPICAL AIR FLOW PATTERNS USING JET FANS

There are generally four kinds of flow patterns that can be achieved using a jet fan:

- Mixing flow
- Turn-over flow
- Inducing/circulating flow
- Displacement flow

Mixing flow

A direct jet of air, from each fan mounted at a high level, is transferred quickly to the lower area near the finished floor, resulting in a number of main air flows spreading in a cone-shaped manner along the floor surface, and a return stream rising along the outer edge of the building or space between the main air flows.

The jet stream's speed can be adjusted accordingly, to control the strength of the manned wind speed at the lower part. To create a mixing flow pattern, the fans are mounted at a vertical angle on the ceiling of a high-rise space.

Mixing flow is used to reduce air flow and dust congestion, improve ventilation efficiency and reduce imbalance and stratification in terms of temperature and humidity.

Mixing flow can be applied to large spaces with very high floors, such as airports, indoor ice rinks, high-rise lobbies and logistics warehouses.

Turn-over flow

When a high angle, downward jet is sprayed on to the central or outer wall of the ceiling portion of the space, a 'cyclone' effect is created, that spreads downward to the shared area of each fan. A return flow is created, that rises along the empty space inside and outside the main air flow.

If the angle of the air discharge is changed from high angle to low angle, depending on the application, the main air flow can be directed to the outer part of the space. The return flow is then directed to the inner part. The turn-over flow air movement can be switched to the opposite direction (from inside to outside).

In turn-over flow, the jet fans are usually mounted at a downward angle of 45° or more, on the ceiling of a high-rise space, above 10 m high. They are used to reduce the deviation of the upper and lower humidity levels, improve heating efficiency, and prevent condensation and dust congestion. They can be installed in small spaces with high floors, such as museums, hotels, building lobbies, glass greenhouses, shopping malls etc.

Inducing (or circulating) flow

When the downward air jet is sprayed from the fans, the upper layer of air is attracted to each jet fan's air flow and is transferred to the lower space. The jet fan's feed (supply) air layers are overlapped with each other, creating a manned air flow that moves smoothly in the forward direction, while the upper side air layer is induced to flow in the opposite direction to the main air flow.

In addition, reducing the overlay placement spacing of fans increases the strength of the rotating inducing flow. To create inducing flow, the jet fans are installed at a downward angle (within 30°) on the lower area and wall near the ceiling of the high space.

Inducing air flow is used to improve heating and cooling efficiency, reduce temperature and humidity deviation by area, and reduce air congestion.

Inducing air flow can be applied to large spaces with slightly higher floors, such as exhibition halls, warehouses, factories, and gymnasiums.

Displacement (or push-pull) flow

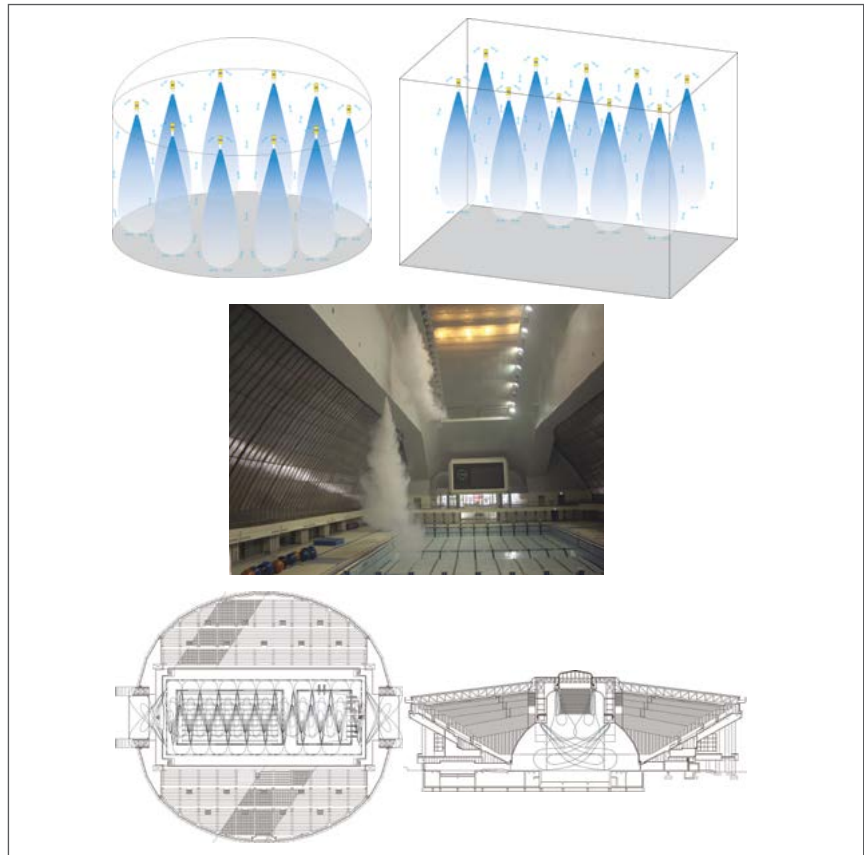
In displacement flow, a main air flow is created, that transfers air within each fan sharing the area horizontally, in a jet-oriented

direction; and a returning air flow is created that promotes inflow of air into the surrounding area.

Overlapping a large number of fans in the same direction also synthesises the main air flows, allowing rapid transport of air over long distances, and mixing the directions of each group to create a large number of circulating air flows in the same space. In displacement flow, where the ceiling of the low-rise space is about 4 m high or lower, the jet fans should be installed at a horizontal or downward angle within 20°.

Displacement flow is used to improve the efficiency of air supply and ventilation, induce the exhaust of contaminated air, and create breezes that improve comfort through their effect on the skin.

Displacement flow can be applied to large spaces with low floor heights such as underground parking lots, shopping malls, restaurants and greenhouses.



Mixing flow

JET FAN SYSTEM FOR CAR PARK MECHANICAL VENTILATION

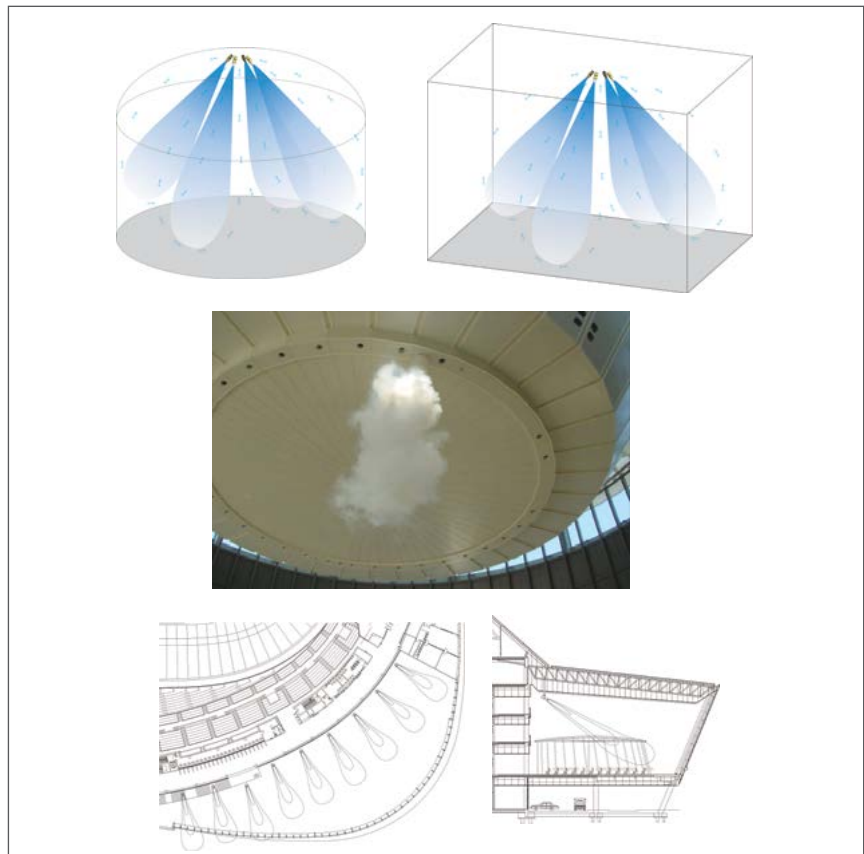
Currently, most of the projects in Singapore for car park mechanical ventilation systems, involving jet fans, are adopting the displacement flow design. Jet fans could also be used in many other situations, especially for large enclosed spaces with high headroom, where conventional ductwork would be cumbersome and humongous.

The main objectives of the mechanical ventilation (MV) system for a car park are:

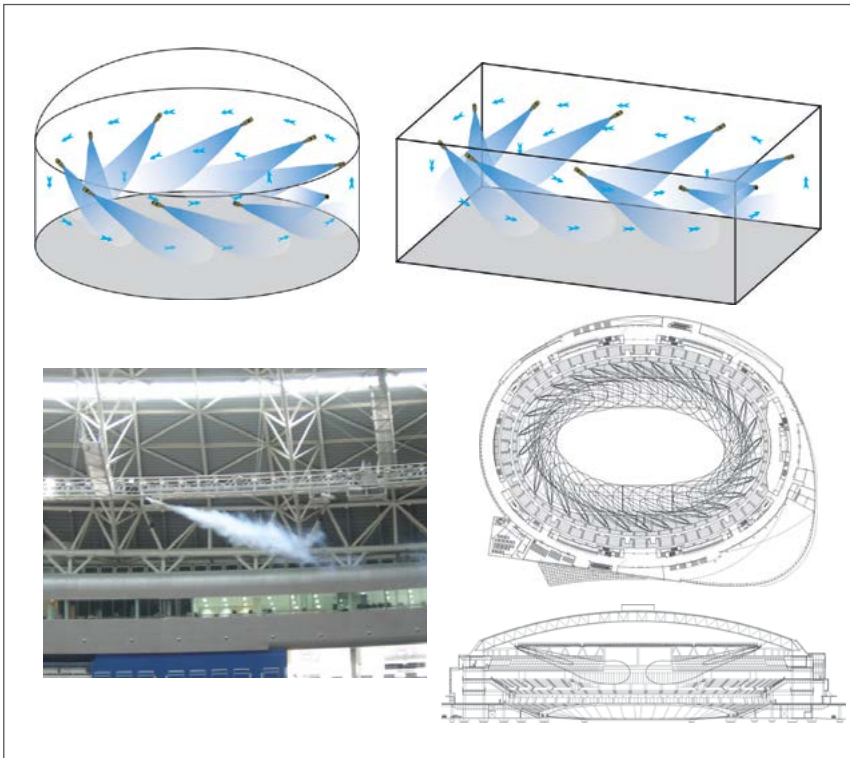
- To remove toxic gases (such as CO, NOx etc) during normal (non-fire emergency) mode of operation. The dilution of the CO level via ventilation rates is usually adequate to control the levels of the other contaminants.
- To control and remove smoke and hot gases in the event of a fire occurrence.

The movement of air within the car park accomplishes several functions:

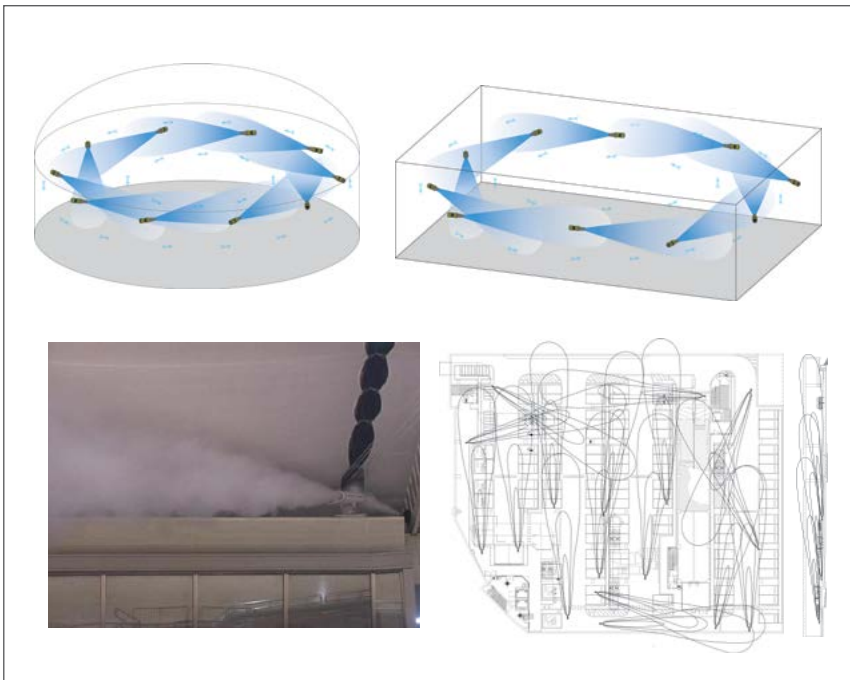
- Provision of fresh air for the people in transition within the car park.



Turn-over flow



Inducing (or circulating) flow



Displacement (or push-pull) flow

- Removal of contaminants that become airborne, such as those produced by combustion of fuel within the vehicle's engine.
- Removal of smoke produced during a fire scenario.
- Provision of some degree of cool-

ing to the interior of the car park. Therefore, it is important to ensure that the correct number of air changes per hour (in accordance with relevant local codes and regulations of the authorities) are provided during normal and

emergency modes of operation, to successfully perform the above functions.

The main advantage of using jet fans is the elimination of the extensive amount of ductwork involved in conventional mechanical ventilation systems, thereby allowing easier coordination and lower head rooms. By using jet fans to move the air, there is no need for ducts that under-cross beams. The jet fans could be located within the spaces in-between beams.

A general misconception is that, by using jet fans, the main supply and exhaust fans could be omitted or their capacities reduced. This is not true for basement floors, as the main supply and exhaust fans transport the overall volume of air and are among the important design considerations. For above-ground floors, in certain configurations, the omission of the main fans could be considered.

The advantages of using jet fans, instead of a conventional ducted system, are:

- Less ductwork to install, making coordination of services easier and with no obstruction to other services.
- Lower headroom required, resulting in savings in the construction cost (especially for basement floors).
- Lower emergency power required, thus a smaller emergency generator set is required.
- Lower running energy cost, due to lower static heads required for the main fans (thus contributing to sustainability).
- Lower operating cost.
- The ability to identify the origin of fires.
- Better air movement.
- Ease of operation (zone control is possible).
- Generation of lower noise levels.
- More pleasing aesthetics.
- Absence of low-level ducts, thus there is no possibility of impact damage by vehicles.
- Less cleaning of ducts.

Other advantages include:

- Better air distribution through greater air movement within car parks. Computational Fluid Dynamics (CFD) simulations can be carried out for smoke and carbon monoxide removal.
- Reduced redundancy of main fans, resulting in greater reliability (for designs with more than a single zone).
- Better resilience, as single circuit failure is simulated in CFD and a smoke test is conducted for every project with a jet fan system, and inspected and witnessed by an appointed Registered Inspector (M&E).

DESIGN CONSIDERATIONS FOR A CAR PARK MECHANICAL VENTILATION SYSTEM USING JET FANS

The implementation of numerous projects and past experiences have highlighted important considerations in the design of jet fan systems. Some of them are, as follows:

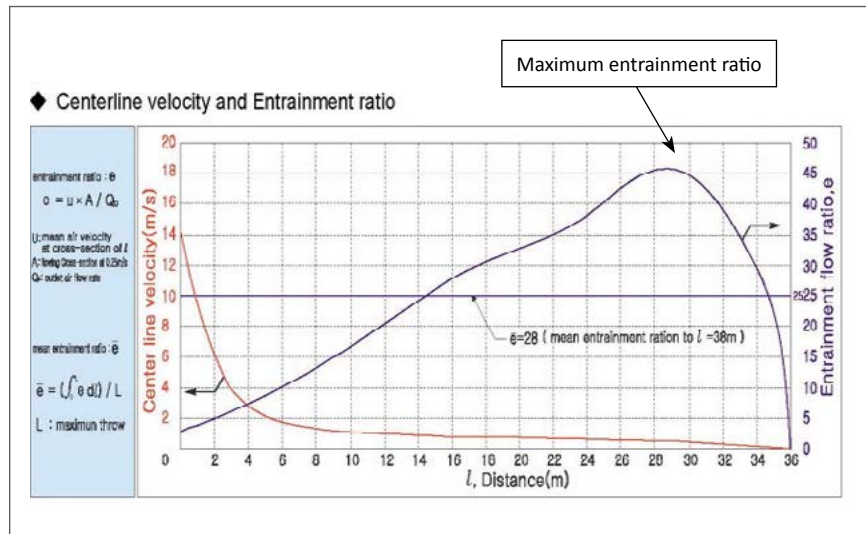
Proposed zoning of the car park space

Careful planning and consideration of the zoning configuration is important to ensure the efficient and smooth flow of air from the supply (intake) point to the exhaust locations. The jet fan zone should preferably be rectangular rather than circular or elliptical. The jet fan’s optimal performance should be taken into consideration when determining its location as well as the fresh air intake and exhaust locations.

Coverage of each jet fan and the air flows within each zone

As the performance of products from the many jet fan manufacturers varies, it is important to understand each brand of jet fan, in detail. For the design of a jet fan system, one would need to know the following characteristics:

- Jet fan air flow capacity
- Entrainment ratio
- Throw distance
- Optimal distance between jet fans



Entrainment ratio profile of a typical jet fan.

- Coverage
- Dimensions
- Weight
- Electrical power input
- Sound power level

Air, like water, does not flow smoothly along sharp or abrupt turns. A smooth transition would ensure that the movement of air is not constricted. It is good practice to ensure a full flow, in the design of jet fan system. When air flows from one location to another, make-up air must be available to fill the volume of air displaced.

The jet fan’s width profile should slightly overlap that of the next jet fan, with the two fans at an optimal distance from each other. This would ensure that there will be no stagnation of air within the space and the maximum amount of air is being conveyed from one jet fan to the other.

The continuity of air volume must be carefully visualised and planned for, in the design, to avoid stagnation or re-circulation of air.

Importance of main fans

For basement car parks or floors, main fans are usually required to provide supply air to, and extract the exhaust air from, these spaces. The capacities and static head of the fans are key factors for effective air exchange and for providing the required number of air changes

per hour. The jet fans move the air within the basement floors, from the supply locations to the exhaust points. The main fans provide the overall effective air changes per hour in car parks, for effective fume removal during the normal mode of operation and smoke extraction during the fire mode. Thus, the performance of the main fans should not be overlooked.

Beams and columns

Deep beams and big columns affect and impede the movement of air. Beams are required to be modelled in the CFD simulations, if they are deeper than 10% of the floor height.

Obstruction of air flow

All obstructions (by trellises, signage, architectural artefacts, building services etc) that would affect the performance of the jet fan system must be evaluated, to ensure that the design of the overall system is effective and it performs, as designed, to meet the mandatory criteria stipulated in the Fire Code, Approved Documents and relevant Codes of Practice.

Effectiveness and efficiencies of external louvres

The performance of the external louvres must be reviewed, to ensure that the air flow velocity across them does not produce an unduly high pressure drop, resulting in unwanted noise.

Angle of tilt

Axial jet fans are usually installed with a tilt, to ensure that the system fulfils the requirements for smoke and CO removal. The tilt angle also affects the throw distance and width of coverage.

High headroom

The height of the jet fan installations affects the tilt angle. For compliance with the required headroom of the car park, a suitable installation height and suitable supporting brackets must be selected.

Design of the fire size

The design of the fire size, to be used in CFD simulations, will depend on the types of vehicles expected to be found in the car park. The different fire size values can be

found in SCDF's Code of Practice for Fire Precautions in Buildings.

Other more specific requirements for jet fan systems, relating to the requirements of authorities, can be found in the relevant sections of SCDF's Code of Practice for Fire Precautions in Buildings and BCA's Approved Document.

CONCLUSION

The jet fan system is a new-technology ventilation system that enhances ventilation and energy efficiency for large-scale, enclosed working spaces.

The advantages of using jet fan systems have been described and demonstrated in many projects. The overall lower capital and running costs further add to their

increasing popularity.

In wide spaces with high ceilings, requiring heating or cooling, jet fans can perform effectively, to enable optimum air movement and a uniform temperature within the space.

Jet fans are particularly effective in removing air stratification within the spaces, as it is able to bring in a large amount of air from the surroundings and dilute the main airstream, simultaneously.

ACKNOWLEDGEMENT

I would like to express my appreciation of, and gratitude to, Mr Lim Yun Cheol, Managing Director of MJ AirTech Co Ltd (Korea), for his years of dedicated guidance, advice as well as sharing of knowledge and experiences on jet fans.

Jet Fans Market Research Report 2022 offers valuable information

The global Jet Fans Market Research Report 2022-2028, from Industry Research Biz, features an intrinsic analysis of the current growth status of the market and provides detailed insights into the market size, drivers, opportunities, trends, competitive landscapes, and strategies of players. The report analyses the latest market advancements, mergers, acquisitions, product launches, concentration, and scope of development across the region. The key factors, such as market size, share, geographical expansion, market demand, sales, value, and quantity, are explained. Moreover, the document presents information on the latest developments, regional production, industry drivers, revenue, upcoming technologies, and manufacturer information compiled by researchers.

Global Players can use the accurate market facts and figures and statistical studies, provided in the report, to understand the current and future growth of the Jet Fans market.

This report focuses on global and US Jet Fans markets, and also covers the segmentation data

of other regions at the regional level and county level.

The competitive landscape analysis of the Jet Fans market uncovers detailed company profiles, revenue shares, portfolio of innovations, regional product footprint, key developmental strategies, pricing structure, and future plans of market leaders. This entire section helps readers gain the essence of what is driving competition and what would help them stand out to win new target markets. Assessment of Jet Fans demand across a variety of application areas also discovers the potential applicability that would push market growth at a considerable rate.

Industry Research Biz provides an analysis of the key trends in each sub-segment of the global Jet Fans market, along with forecasts, at the global, regional, and country-level, from 2022 to 2028. The report has categorised the market based on type, offering, technology, system, and end-use industry. The biggest highlight of the report is that it provides companies in the industry with a strategic analysis of the impact

of COVID-19. The research report includes specific segments by region (country), manufacturer, type and application.

On the basis of product type, this report displays the production, revenue, price, market share, and growth rate of each type, primarily split into:

- One-way Jet Fans
- Two-way Jet Fans

On the basis of the end users/applications, this report focuses on the status and outlook for major applications/end users, consumption (sales), market share, and growth rate for each application, including:

- Tunnel
- Metro

With accuracy in analysis and data integrity, the report makes an attempt to unveil key opportunities available in the global Jet Fans market, to help players in achieving a strong market position. Buyers of the report can access verified and reliable market forecasts, including those for the overall size of the global Jet Fans market, in terms of revenue.

Optimal cleaning processes for quality products

They are critical in the manufacturing industries.

Today, component cleanliness is just as much a quality criterion as dimensional accuracy. It is defined by given particulate and, increasingly, also thin-film cleanliness specifications. Meeting these reliably can be quite a task. For operations to be cost-effective, it is becoming ever-more important to design cleaning processes in line with user requirements and for reproducible cleaning results.

Regardless of the industry sector, parts cleaning today has become one of the critical processes in manufacturing. For one, parts must be sufficiently clean for subsequent processing steps like coating, printing, heat treatment and assembly. For another, product quality and functionality are crucially dependent on clean components.

In recent years, the focus has been on removing particulate contamination, including chips produced in machining and forming processes, but also burrs and particles generated from abrasion. Meanwhile, thin-film contamination has become a more serious issue. This is because the tiniest residues can impair the quality of the joints in joining processes such as laser welding, soldering and bonding. These residues are produced by machining oils and emulsions; cleaning media; and drawing, forming and release agents etc. When it comes to thin-film contamination, cleanliness specifications are often defined in terms of surface energy or surface tension (mN/m = milli-newtons per metre). Compliance can be checked comparatively, with ease, using test inks and by measuring contact angles.

Tailoring wet chemical cleaning processes to the task

For the vast majority of parts, specifications regarding particulate



Component cleanliness is a quality criterion that contributes to customer satisfaction and thus to a high level of competitiveness.

and/or filmic cleanliness can be met using wet chemical cleaning processes. The parts are generally cleaned in batches, either in bulk or arranged in part carriers. However, stable and reproducible process quality and consistently good results can be obtained only if the cleaning chemicals as well as the system engineering and process technology are optimally tailored to the cleaning task.

Choosing the right cleaning medium for the contamination

When selecting the cleaning medium, the chemical principle of 'like solves like' can serve as a guideline. This means that polar contaminants, such as cooling emulsions, polishing pastes, salts, particles from abrasion and other solids, are normally removed using water as a polar cleaning medium in conjunction with pH-neutral, acidic or alkaline cleaners. For mineral oil-based (organic, non-polar) contaminants, such as machining oils, greases and

waxes, solvents like non-halogenated hydrocarbons or chlorinated hydrocarbons are generally used. Modified alcohols (3-butoxy-2-propanols) have lipophilic and hydrophilic properties, and are therefore capable of removing both non-polar and polar contaminants to a certain extent.

To determine exactly which cleaning medium is best for effectively removing the contaminants adhering to the respective parts, cleaning trials with original contaminated parts are recommended. In its technology centres around the world, Ecoclean GmbH has provided a variety of cleaning systems for all types of media. They are used to conduct tests on parts made of metallic materials, plastics, ceramic materials, glass and combinations thereof. In addition to the achievable cleaning result, the company also checks that the materials of the components to be cleaned are compatible with the cleaning media used.

Minimising cleaning costs with suitable process technology

The faster and more effectively the predefined cleanliness specifications are met in the cleaning process, lower is the proportion of costs that are incurred for each cleaned part. The cleaning effect of the medium is therefore enhanced by various physical process technologies such as spraying, vapour degreasing, dipping, ultrasonics and injection flood washing, as well as high-pressure cleaning which is used to deburr the parts at the same time.

During spray cleaning, the kinetic energy of the jet boosts the effect of the cleaning chemicals used and removes impurities from the component surface.

Pressures between 2 bars and 20 bars are applied to all or specific areas, for example boreholes and blind holes. Especially with pinpointed spray cleaning, the cleaning result depends on how the nozzles are directed at the surface to be cleaned. The result can be improved if the part is moved relative to the spray nozzle or vice versa. Where particulate cleanliness requirements are high, spray cleaning can also be used as a final cleaning step to remove any small particles still adhering to the surface.

During vapour degreasing, which is carried out in the closed working chamber of a solvent cleaning system, the cleaning medium is heated to boiling point and the resulting solvent vapours are directed at the components to be cleaned. The temperature difference between the hot vapours and the cooler component causes the solvent to condense on the surface of the workpiece so that the solvent condensate has a rinsing effect. Steam degreasing is used to remove contaminants such as oils, greases and emulsions from lightly soiled parts.

In immersion cleaning, which can be carried out with water-based media and solvents, contaminants are primarily removed by the chemical action of the medium. This effect can be enhanced by



Modern solvent cleaning systems do more than just efficiently remove organic contamination, to achieve the required level of cleanliness. They also meet high environmental standards and significantly prolong the service life of solvents, thanks to integrated media treatment.

swivelling and rotating the parts. The process is mostly used for parts with complex geometries, such as blind holes or undercuts, and is frequently combined with injection flood washing and/or ultrasonic cleaning.

Injection flood washing is used in almost all cleaning processes involving components that are heavily contaminated with chips and oil or emulsion. The parts are subjected to pressures between 3 bars and 15 bars in an immersion bath. Since this is done below the level of the liquid, high volume flows are generated which can easily penetrate the cavities even of very complex workpieces.

The cleaning effect of ultrasonic units is based on cavitation. The electrical signals generated at a specific frequency by an ultrasonic generator are transmitted by a transducer, as sound waves to the cleaning liquid. This results in an interplay of negative and positive pressure, with microscopic cavities forming in the negative pressure phases which collapse (implode) in the ensuing positive pressure phase. This creates microcurrents in the liquid, which virtually 'blast' and wash away any particulate and thin-film contamination adhering to the parts. For the cleaning effect,

lower the frequency, larger are the cavitation bubbles and higher is the energy released.

Deburring and cleaning in a single step

The use of water jets at high pressure, usually in the range of 300 bars to 1,000 bars, and sometimes higher or lower, depending on the application, makes it possible to reliably remove machining-generated feather burrs from parts and clean them at the same time. High-pressure cleaning is also used to remove sand residues from castings and stubborn soils from part surfaces, including welding residues and scale. The pressures used depend on the type and level of contamination as well as on the test results obtained, for example, in Ecoclean's technology centres.

In addition to the cleaning medium and the system technology, the personnel operating the cleaning system influence the quality of the process. Knowledge of the interrelationships and processes of the parts-cleaning step in manufacturing is therefore crucial, in order to meet cleanliness requirements reproducibly and cost-effectively.

Images by Ecoclean GmbH.

OT at risk: Is industry striking the right balance between operations and security?

by Matt Hubbard, Director, Market Intelligence, Armis

Protecting Industrial Control Systems adequately has become a challenge.



Mr Matt Hubbard

As ransomware attacks on manufacturers and critical infrastructure increase, it is time to revisit the question of whether compliance with common standards is enough to protect operations. At Armis, we believe that compliance with security guidelines like the NIST Cybersecurity Framework is an important part of an organisation's security foundation, but it is not the entire security structure.

Too often, operations managers focus their concerns on physical risks to equipment and sites. And for good reason – equipment malfunctions, terrorist attacks, and insider sabotage all have the potential to harm employees, damage operations, and even put the public at risk.

Physical threats to industrial control systems now have cyber components. For example, when digital intruders gain remote access to a power grid or a water treatment plant's operational controls, they can cause physical harm. Preventing these attacks requires a commitment to cybersecurity, that goes beyond punch-list compliance, to embrace a digital security mindset, new practices and security technology, across the organisation.

Modernising OT systems poses challenges

As more manufacturers and critical infrastructure providers modernise their Industrial Control Systems (ICS) equipment and operations, they are storing more device data in the cloud for faster, more accessible analytics and reporting; increased productivity; and better data security. However, nearly 60% of IT leaders say the biggest cloud migration challenge they face is

maintaining security and compliance, according to a Lemongrass/Upwave survey.

Convergence of IT (Information Technology) and OT (Operational Technology) also expands compliance requirements. For example, most global organisations must comply with GDPR standards for protecting customer data as well as ISA standards for data acquisition, tracking and reporting. US government contractors must also meet and maintain FISMA standards for cybersecurity. Compliance with all of these standards requires comprehensive cybersecurity that covers also the functioning of all devices in the organisation's environment – including OT devices that legacy IT security solutions cannot see or support.

Cybersecurity is no longer just for IT and corporate networks

Why is OT out of the cybersecurity loop? For decades, ICS cybersecurity simply did not exist because it did not need to.

OT and IT were separate domains, with separate systems that did not connect to each other, and legacy industrial devices did not connect independently to the internet or to each other. This disconnection – the so-called 'air gap' – was thought to be all the security that OT systems needed, aside from physical access control.

Now, though, IT/OT integration is becoming the norm. Connected devices stream data, monitor equipment and processes, and support line automation and other Industry 4.0 functions, so the air gap is no longer a reliable method of OT security. As OT and IT continue to

merge, cybersecurity requirements now apply to ICS just as much as to corporate networks, but many organisations struggle to find the right approach to protect their OT.

For example, many operations managers are concerned about downtime and the impact of implementing more security for their OT, IIoT, and other ICS devices. That is understandable because legacy solutions that are built to scan IT networks can knock these devices offline or cause them to malfunction – if the scan can detect them at all.

Facilities that cannot operate securely are at risk of going offline at any moment. A ransomware attack on an ICS facility can halt operations and leak operational and corporate data to the dark web – or destroy that data altogether.

Just consider how lucky shipping giant Maersk was when NotPetya malware rampaged through the company's systems. If it was not for a random power outage that kept a domain controller backup offline, Maersk would have been unable to recover their server backup data.

ICS cyberattacks change the risk/benefit calculation

ICS cybersecurity incidents can cause immediate problems such as operational disruption, financial losses, and risks to personnel and equipment, as well as longer-term problems like customer churn, remediation expenses, and regulatory penalties.

Recommended cybersecurity practices for Industrial Control Systems

Conversely, when organisations adopt security solutions that let them see, assess, and monitor all their devices, the security improvements deliver other benefits, including:

- Savings on unplanned downtime and shutdowns: McKinsey reports that in the materials and energy sectors, ‘outages typically consume between a third and half of the overall maintenance budget and can reduce annual production volume by 5 to 10 percent’.
- Continued access to cybersecurity insurance: As ransomware attacks and other incidents push insurers’ losses higher each year, they are hiking premiums, reducing coverage limits and implementing stricter underwriting standards for organisations seeking cybersecurity coverage. The result is that ‘organisations will need a robust system of cybersecurity to even qualify for insurance’, according to an S&P Market Intelligence article from June 2021.

Proper ICS security also frees organisations to optimise their operations by protecting the data they collect from their equipment and process monitoring devices, so they can improve their service and products, and drive growth.

Updating ICS protection is also the key to remaining competitive in a world where ICS is a major target for cyberattacks that can cause opera-

tional disruptions, data loss, compliance penalties, damage to vendor and customer relationships, and expensive remediation programmes.

SHORT-TERM IMPACTS	LONG-TERM IMPACTS
<ul style="list-style-type: none"> • Operational shutdowns • Loss of visibility over production and safety systems • Financial loss due to outages and downtime • Intellectual property theft • Health and personal safety risks • Damage and destruction of property and equipment • Loss of availability • Loss of control • Denial of service 	<ul style="list-style-type: none"> • Significant unplanned labour, overtime and idle equipment costs • Increased or denied insurance • Degraded equipment performance and quality • Fees and lawsuits due to negligence or non-compliance • Loss of customers • Redirection of organisational expenditure towards recovery efforts

Cybersecurity event impacts



As OT and IT continue to merge, cybersecurity requirements now apply to ICS just as much as to corporate networks.

Keysight launches M9484C VXG Microwave Signal Generator in Southeast Asia

Mr Joe Rickert, Vice President of Radio Frequency Product Management and R&D, Keysight, introduces the company's new microwave signal generator and explains how it helps developers address demanding new wireless industry applications.



Mr Joe Rickert

Introduction

New 5G mobile communications, 6G research, satellite communications and radar applications increasingly utilise a wide range of frequencies, up to and including the millimetre wave (mmWave) spectrum. Testing these wireless applications requires signal generation equipment capable of creating millimetre-wave signals at extremely high bandwidth.

These new applications also adopt multi-antenna techniques, such as spatial diversity, spatial multiplexing and beamforming to achieve diversity, multiplexing and antenna gains for high-throughput and robust communications. These demands in the RF layer bring new design and test challenges to the next-generation wireless devices.

In addition, companies that produce or consume RF components for manufacturing electronic equipment have unique requirements for signal fidelity to accurately characterise their components or sub-systems.

What is Keysight announcing?

The demand for ubiquitous wireless communications challenges receiver designs and tests. When wireless systems operate in a crowded wireless environment on the same frequency bands, interference between the systems can occur. Designing receivers for robust links is challenging because wireless devices must handle various input signal conditions which are typically difficult to predict. This makes the process of designing, testing and

isolating system problems more complex, and RF engineers must emulate sophisticated test scenarios to characterise the receiver's performance.

To meet these requirements, Keysight is introducing the M9484C VXG microwave signal generator. This new VXG expands Keysight's signal generator portfolio with real-time capabilities.

In more detail, the M9484C VXG signal generator is a four-channel vector signal generator, with frequency up to 54 GHz that offers up to 5 GHz of radio frequency (RF) bandwidth and low phase noise in a single instrument. With a V3080A vector signal generator frequency extender, the frequency range of the VXG extends up to 110 GHz to address the needs of the latest and evolving standard.

How will this product introduction benefit customers?

The scalable architecture of the M9484C VXG enables the most demanding wideband and multichannel test signals with frequencies up to 110 GHz. This product will help customers reduce their test system setup complexity and achieve accurate and repeatable multi-channel measurements, delivering three key benefits in a single instrument, as follows:

The signal generator generates demanding test signals with an RF bandwidth up to 5 GHz; covers frequency ranges from 9 kHz to 54 GHz and up to 110 GHz with a V3080A vector signal generator frequency extender; and enables multi-antenna test applications such as MIMO and beamforming

with precise phase coherence and timing synchronisation.

The fully integrated, calibrated and synchronised signal generation solution delivers low phase noise and minimises measurement uncertainty by overcoming the excessive path loss experienced at mmW frequencies with low error vector magnitude (EVM) and distortion at high output power; delivering advanced RF performance with direct digital synthesis (DDS) technology for accurately characterising device under tests (DUTs); and enabling precise multi-channel / multi-instrument synchronisation and triggering test applications.

Sophisticated real-time signal processing and comprehensive signal creation tools enable complex test scenarios and simplify test complexity for receiver and performance tests. It supports MIMO real-time fading for all 3GPP 5G new radio (NR) required base station conformance tests with PathWave Signal Generation software; streamlines complex receiver test scenarios with the world's first 8-virtual-signal emulation per RF channel, up to 32 signals in one instrument; and it simplifies test workflow with pre-defined compliance test setups, auto-configuring signal analysis and graphic user interface.

These capabilities help designers generate high frequency, wide channel bandwidth signals in multiple coherent channels. Combined with spectral purity and real-time signal processing, they make addressing multichannel test requirements, for MIMO, beam-

forming, selectivity and blocking tests, simple and fast.

Engineers are able to optimise measurement integrity and minimise measurement uncertainty by generating signals with a fully integrated, calibrated and synchronised multichannel signal generation solution. They can innovate designs that enable higher frequencies, wider bandwidths and multichannel applications, and ensure they meet the latest and evolving standard test requirements. And they can simplify measurement setup and complex calibration routines associated with multi-box solutions, with a one-box approach. This saves time and reduces measurement errors related to changing equipment configuration and cabling. In addition, the M9484C VXG eliminates signal impairments, caused by traditional analog I/Q modulators, with a new DDS (Data Distribution Service) architecture, and delivers advanced signal fidelity for wideband signal generation.

Are there any engineering breakthroughs in this new signal generation solution?

Keysight Labs, the research laboratory of Keysight Technologies, has been working for years on the underlying semiconductor, ASIC and MMIC technology, designed to deliver industry-leading performance and purposely built for test and measurement equipment. The new ASIC in the M9484C VXG provides powerful digital signal processing for digital upconversion and generates IF/RF signals up to 8.5 GHz direct from a high-sampling-rate, 14-bit digital-to-analog converter (DAC), without signal impairments found in traditional vector signal generator architectures.

The DDS eliminates signal impairments caused by a traditional analog I/Q modulator, such as gain imbalance, timing skew, quadrature skew, DC offset and phase noise. This new architecture improves a signal's dynamic range and offers advanced signal fidelity, especially for wideband signal generation. The performance of the VXG enables

accurate characterisation of components and receivers.

Another key DSP ASIC can emulate up to 8 baseband signals and aggregate them into one wideband signal in real time. It provides flexible, real-time manipulation of baseband signals, where each baseband signal can be independently controlled, filtered, faded and placed anywhere within a 2.5 GHz bandwidth in real time.

The combination of these two ASICs allows customers to generate 8 RF signals in one RF channel without generating intermodulation distortion and carrier feedthrough. This solution simplifies the receiver test setups, that conventionally require several signal generators for simulating wanted and interfering signals, with improved signal fidelity, simple test setup and cost-effectiveness.

How does Keysight help customers shorten the development cycle?

Designing wireless receivers is challenging because the wireless device is required to handle a wide variety of input signal conditions. This makes the process of designing, testing and isolating system problems more complex.

The sophisticated real-time signal processing of the VXG enables complex test scenarios for receiver and performance tests. The VXG's built-in DSP ASIC allows engineers to emulate MIMO fading, with additive white Gaussian noise (AWGN), for 5G base station performance conformance testing.

Keysight PathWave Signal Generation software is a flexible suite of signal-creation tools that will reduce the time engineers spend on signal simulation. The software's performance-optimised reference signals – validated by Keysight – enhance the characterisation and verification of wireless devices. The software supports a wide range of general-purpose or standard-based signals and ensures wireless designs meet the latest standards and test requirements.

Keysight signs MoU with QEP

Keysight Technologies Inc and Singapore's Quantum Engineering Programme (QEP) have signed a Memorandum of Understanding (MoU) to collaborate in accelerating research, development and education in quantum technologies.

QEP was launched in 2018 by Singapore's National Research Foundation (NRF) and is hosted at the National University of Singapore (NUS). Its aim is to support quantum technologies research and ecosystem building. The programme funds projects in quantum computing, quantum communication and security, quantum sensing, as well as a quantum foundry, that are expected to lead to practical uses.

Keysight is well-positioned to provide modular and scalable quantum control systems, by leveraging the company's expertise in advanced measurement equipment, qubit control solutions and precise measurement instrumentation, which enable researchers to engineer and perhaps scale next-generation systems to harness the power of quantum computing and other quantum devices.

Under the MoU, QEP and Keysight will closely cooperate in the development of quantum instrument packages, as well as in the technologies that enable quantum systems to be scalable and deployable. In addition, they will establish a programme named 'Quantum Joint Innovation Accelerator' that makes it easy for researchers participating in QEP to access several of Keysight's software design tools and advanced test and measurement equipment.

Keysight Technologies delivers high performance vector signal generator

Keysight Technologies Inc, a leading technology company that delivers advanced design and validation solutions, recently launched a new four-channel vector signal generator, with frequency up to 54 GHz that offers up to 5 GHz of radio frequency (RF) bandwidth and low phase noise in a single instrument.

Keysight's new M9484C VXG vector signal generator expands the company's VXG series portfolio with real-time capabilities to support demanding wireless industry applications. The M9484C VXG signal generator, with a V3080A vector signal generator frequency extender, expands the frequency range up to 110 GHz to address the needs for the latest and evolving standards.

New 5G mobile communications, 6G research, satellite communications and radar applications use a wide range of frequencies, up to and including millimetre wave (mmWave) spectrum. Testing these applications requires signal generation equipment capable of creating millimetre-wave signals at high bandwidth. The new applications also adopt multi-antenna techniques, such as spatial diversity, spatial multiplexing and beamforming to achieve diversity, multiplexing and antenna gains for high-throughput and robust communications.

Keysight's new M9484C VXG signal generator enables customers to reduce test system setup complexity and achieve accurate and repeatable multi-channel measurements in a single instrument. Key customer benefits include:

- A scalable architecture that enables demanding wideband and multichannel test signals with frequencies up to 110 GHz.
 - Generates test signals with a radio frequency (RF) bandwidth up to 5 GHz.
 - Covers frequency ranges from 9 kHz to 54 GHz and up to 110 GHz with a V3080A vector signal



The M9484C VXG signal generator enables wide RF bandwidth in one instrument. Image: Keysight Technologies Inc.

generator frequency extender.

- Enables multi-antenna test applications such as MIMO and beamforming with precise phase coherence and timing synchronisation.
- A fully integrated, calibrated and synchronised signal generator that delivers low phase noise and minimises measurement uncertainty.
 - Overcomes the excessive path loss experienced at mmW frequencies with low error vector magnitude (EVM) and distortion at high output power.
 - Delivers advanced RF performance with direct digital synthesis (DDS) technology for accurately characterizing device under tests (DUTs).
 - Enables precise multi-channel / multi-instrument synchronisation and triggering test applications.
- Real-time signal processing and comprehensive signal creation that enables complex test scenarios and simplifies test complexity for receiver and performance tests.
 - Supports MIMO real-time fading for all 3GPP 5G new radio (NR) required base station conformance tests with PathWave Signal Generation software.
 - Streamlines complex receiver test scenarios with 8-virtual-signal emulation per RF channel, up to 32 signals in one instrument.
 - Simplifies test workflow with pre-defined compliance test set-



The vector signal generator provides four coherent channels in one instrument. Image: Keysight Technologies Inc.

ups, auto-configuring signal analysis and graphic user interface.

Keysight's new M9484C VXG signal generator generates high frequency, wide channel bandwidth signals in multiple coherent channels. These capabilities enable engineers to:

- Innovate designs that enable higher frequencies, wider bandwidths and multichannel applications, and ensure they meet the latest and evolving standard test requirements.
- Simplify measurement setup and complex calibration routines associated with multi-box solutions with a one-box approach, saving time and reducing measurement errors related to changing equipment configuration and cabling.
- Eliminate signal impairments caused by traditional analog I/Q modulators with a new DDS architecture and deliver advanced signal fidelity for wideband signal generation.

Universal Robots adds new 20 kg industrial cobot to its portfolio

Universal Robots, the Danish manufacturer of collaborative robots (cobots), has announced that it will add a new 20 kg cobot to its product range.

Called the UR20, the cobot boasts an all-new design based on Universal Robots' experience in highly refined engineering.

Demonstrating Universal Robots' innovation capability in the cobot space, the UR20 features an entirely new joint design that will allow for even faster cycle times. The new cobot also has the ability to handle heavier loads. Its 1750 mm reach has been designed to correspond to the full height of the standard Euro-pallet, while its small footprint will allow companies to achieve more within their existing production space.

Universal Robots expects the UR20 to be used for welding, material handling, machine loading and machine tending, in addition to palletising, as well as for innovative solutions created by its extensive partner ecosystem.

"The UR20 is the most innovative cobot we have produced and the latest evolution in 17 years of technical experience in the robotics industry. Our expert engineers have completely re-engineered the arm while retaining the same intuitive user interface we have long been celebrated for. The benefits of the UR20 are significant, from faster cycle times and the ability to handle heavier loads, to greater reach with a small footprint. We have also incorporated advanced software enhancements, giving users unprecedented motion control capabilities", said Mr Kim Povlsen, President, Universal Robots.

"The UR20 is just the beginning. We are launching our next generation with this high-payload model first to market because it will make end-to-end automation a reality for

our customers, allowing them to use cobot automation to cover new tasks. The next step in redefining automation will be to bring the same innovative features to a new family of cobots", he added.

Universal Robots launched the world's first commercially viable cobot in 2008 and has since built an ecosystem of more than 1,100 integrators, distributors and inde-

pendent partners creating components, kits and applications for its cobots. The company has sold more than 50,000 cobots and has drawn on the knowledge gained through its established customer base in the design of this latest product.

The UR20 signals the start of a new series of innovative, next-generation cobots, which will complement the company's successful e-Series.



The UR20 is the latest addition to Universal Robots' portfolio of cobots.



Production of cobots in progress.

Practical solutions to everyday problems

With the help of their lecturers and industry partners, students from Ngee Ann Polytechnic’s School of Engineering applied their technical skills in final year projects, such as the following:

Wheelchair Drive Controller for Children with Cerebral Palsy

Children with cerebral palsy find it difficult to operate a conventional powered wheelchair as they lack fine motor skills to move a joystick. In collaboration with Engineering Good, students from the School of Engineering worked closely with Allied Health Professionals, who have rich experience in providing health services to children with cerebral palsy, to understand their needs.

To make it easier for the children to use the wheelchair, the students designed an alternative controller with four large, customised push-buttons in red and green. These four buttons enable the wheelchair to move in four directions – left, right, forward and backwards. They are able to mimic a joystick through the use of Arduino programming and interface circuitry.

The wheelchair controller is currently under trial and the team will further refine the design after gathering results from user testing. In future, the wheelchair can be deployed to training and care centres for children with cerebral palsy.

Safe Paths for All

With more pedestrians, cyclists and Personal Mobility Device (PMD) riders sharing paths, it is crucial for all users to travel along the paths graciously and keep a lookout for one another. Students from Ngee Ann Polytechnic’s School of Engineering worked with Municipal Services Office (MSO) and Land Transport Authority (LTA) under MSO’s Project Code R.E.D. (Research, Engage, Deploy), to design an alerting system to prevent collisions and enhance the safety of all users sharing paths.

Project Code R.E.D. is MSO’s collaboration with Institutes of Higher Learning to provide support for students to develop solutions that address municipal issues, through coursework and programmes such as their Final Year Projects. MSO and its partner agency, LTA, have been supporting the team from Ngee Ann Polytechnic’s School of Engineering, on this project.

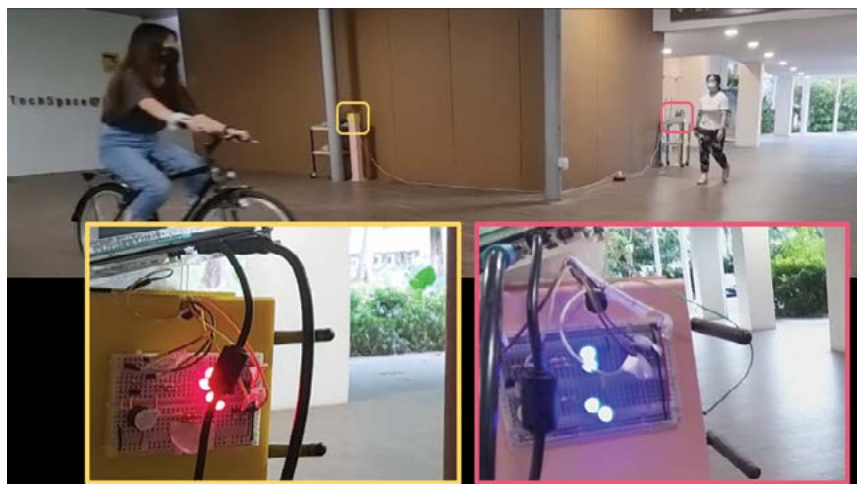
‘Safe Paths for All’ is a detection and

warning system that leverages computer vision, artificial intelligence and wireless technologies. The system detects potential collision at blind corners and provides alerts to road users. Warning lights and sounds are activated on both sides of a blind corner when the system detects path users, on either side, moving towards the corner.

The prototype is currently ready for field testing.



Wheelchair Drive Controller for Children with Cerebral Palsy.



‘Safe Paths for All’ detection and warning system.

Aerotech launches second generation of nanopositioning stages

Aerotech Inc, a global leader in precision motion control and automation, has released the second generation of its popular ANT nanopositioning stages.

The second-generation ANT nanopositioning stages are ideal for single- and multi-axis applications. They include photonics assembly and inspection; fibre alignment and optimisation; optics manufacturing, testing and inspection; sensor testing and qualification; semiconductor processing and inspection; and research and laboratory applications.



The ANT 95 and 130 Family of nanopositioning stages.

Features of enhanced and new products

- ANT95L & ANT130L Single-Axis Linear Nanopositioning Stages are available in a variety of configurations and combine resolution, accuracy, repeatability, size and reliability.

- ANT95XY & ANT130XY Two-Axis XY Nanopositioning Stages deliver superior planar performance with good geometric characteristics and can be further enhanced with high accuracy 2D error mapping.
- ANT95LZ & ANT130LZ Single-Axis Z Nanopositioning Stages are

specifically engineered to provide nanometer-level motion and positioning performance in the vertical orientation.

- ANT95LZS & ANT130LZS Low-Profile Z Nanopositioning Stages deliver superior quality vertical motion with a compact form factor.

Vertiv introduces new line of rack transfer switches

Vertiv, a global provider of critical digital infrastructure and continuity solutions, recently introduced the Vertiv Geist Rack Transfer Switch (RTS), a new line of transfer switches that provides redundant power to single-corded devices. Available now throughout Asia, including South Korea and Japan, as well as in Australia and New Zealand, and in North America and Latin America, the Geist Rack Transfer Switch enables reliable switching to an alternative power source, when the primary source fails or is unavailable. The space-saving device is ideal for use in distributed IT networks and edge locations.

The Vertiv Geist RTS instantly detects loss of power and automatically switches the load to an alternative source in less than 4 to 8 milliseconds, allowing the

supported servers and other critical devices to continue to operate through a planned or unplanned outage. It is currently available in basic upgradeable and enhanced intelligence models, with switched and outlet-level monitored models launching later in 2022. Basic upgradeable models include the intelligence needed today, with the option to upgrade technology as needs evolve. Enhanced intelligence models provide a comprehensive view of critical IT equipment power usage, available either at the rack or via remote access.

The Geist RTS is available in 1U and 2U rack mount designs, enabling users to easily mount rack power distribution units (rPDUs) within the U-space of any standard rack or cabinet. Select models are available with

Combination Outlet C13/C-19, simplifying the selection and purchasing process, and providing flexibility for customer applications.

In addition to providing redundant power, the Vertiv Geist RTS also proactively monitors the IT environment, including temperature, humidity, and airflow. Users also have the option to enhance device monitoring features, with remote monitoring of IT power usage. The Vertiv Geist RTS can support up to 24 outlets for higher-density rack configurations.

The Vertiv Geist RTS is ideal for banking, healthcare, financial services, education, energy, government and transportation industries that operate micro data centres, distributed IT networks or edge data centres.

IES MEMBERSHIP RELATIONS GROUP HELPS ENGINEERS TO UNDERSTAND RISK

The second Thought Leadership webinar on Risk Exposure and Risk Management took place on 19 April 2022 over Zoom. Organised by the IES Membership Relations Group and insurance brokerage firm Lockton Singapore, the aim of the webinar series is to broaden the horizons of members with relevant knowledge from non-engineering fields, and to engage the community.

More than 330 registrations were received from participants across 13 countries, including Singapore, with almost 40 per cent coming from young engineers.

Mr Frederic Boles, CEO of Lockton Singapore, began the webinar with an overview of the risks to engineering businesses for 2022. These include cyber risks, human factor risks, risks in the political landscape, and acts of God. With COVID-19 transforming the way we work and increasing our reliance on IT and digital infrastructure, all businesses face elevated cyber risks, he opined.

Deep-diving further into cyber risks was Mr Donald Yeo, senior vice president and deputy head of Lockton’s professional and financial risks unit. Noting that there was an increase in the weekly cyberattack rate globally over the past two years, he pointed out that engineering companies were at risk as well.

The risks, and hence, cybersecurity challenges, arise from various

factors such as phishing, malicious software (worms), data deletion, advanced persistent threats, and ransomware. According to research conducted by Stanford University and security firm Tessian, 88 per cent of data breaches were caused by employees who clicked on fraudulent or phishing emails, thinking that they originated from a legitimate source.

As such, companies need to be aware of their risks and how they can be insured and protected, which was where Mr Yeo intro-

duced Lockton’s services in this area and how it could help.

Rounding off the presentations was Ms Shermayn Ting, the senior vice president and head of employee benefits, also from Lockton Singapore. She touched on how employees could be engaged on wellness in a post-COVID workplace, and how this was important to prevent burnout and social disengagement, which could lead to increased human error (and thus, cyber risks), and employee attrition.



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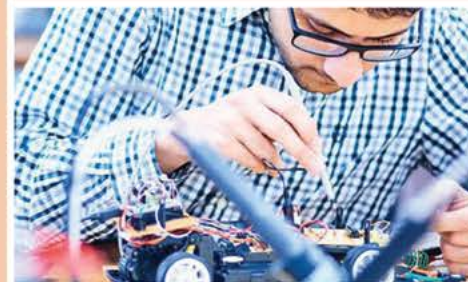


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