Asia Pacific Urban Energy Association

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APUEA

Magazine

SUSTAINABLE URBAN ENERGY TECHNOLOGY

APUEA
Asia Pacific Urban Energy Association

Promoting Sustainable Urban Energy in Asia Pacific

Content

Editorial

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COP28 has come to an end, and the draft agreement suggests that the days of fossil fuels are numbered. The summit will be remembered by the Republic of the Marshall Islands negotiator John Silk's statement, "(we) did not come here to sign our death warrant". The statement was made as the agreement was about to be stripped of important content on fossil fuel phase-down, hours before the summit's closure.

While applauding the efforts of progressive nations during COP28, despite pushbacks from oil-rich nations, one could wonder why the world is still divided on this topic. We often see polarized debates where different fuels, carriers, and technologies are put against each other. In fact, many fuels, carriers, and technologies have their natural place in future integrated energy systems. We often also forget about transitional concepts and technologies, which could serve well during a transition period.

Examples of transitional concepts and technologies include Waste-to-Energy (incl. Waste-to-Cooling). Of course, we would like to take a leap in the waste hierarchy, but Waste-to-Energy could help get waste management in place and facilitate such a leap while providing a clean and energy-efficient energy supply in a transition period. Both steam and electricity from a Waste-to-Energy plant could provide cooling from a combination of electrical compressor chillers and absorption chillers.

District Cooling shall also be seen as something more than only a cooling supply technology, competing with individual solutions on electricity consumption and efficiency gains. While off-loading the electricity grid with electricity demands derived from individual chillers, the cooling in District Cooling systems can be produced during low-load periods. This could significantly reduce the investment needs in electricity infrastructure. Furthermore, District Cooling provides unique opportunities for grid flexibility, providing balancing services to the electricity grid and increasing the integration of more variable renewable energy. In addition, District Cooling is a not-in-kind solution for HFC phase-down. These aspects must be highlighted more to accelerate the development of District Cooling.

During our events throughout the year, we have disseminated insights on integrated urban energy systems and related concepts, including transitional concepts and technologies, as well as District Energy (District Cooling and District Heating). Two events that I want to highlight:

The region's front-runners in integrated municipal and industrial multi-utilities were gathering to discuss Systemic Efficiency, Decarbonization, and Sustainable Urbanization in the world's fastest-growing region during the Asia Urban Energy Assembly 31st August – 1st September at Queen Sirikit National Convention Center in Bangkok. The Asia Urban Energy Assembly was held in conjunction with the ASEAN Sustainable Energy Week. The Assembly was hosted by APUEA in collaboration with Informa Markets, sponsored by Danfoss and Qatar Cool, and supported by Euroheat & Power, DBDH, and GIZ India.

The District Cooling International Conference, part of Energise 2023, was hosted in Goa from 31st October to 1st November. The conference was supported by APUEA, and hosted by AEEE, GIZ, KPMG and UNEP. The conference played an important role as District Cooling shall play an essential role in India's future energy system.

In this issue of the APUEA Magazine, you can read the following articles: Innovations for a greener built environment, Megajana, a beacon of excellence in Malaysia's District Cooling market, Cooling as a catalyst for urban transformation in India, and Sustainable Urban Energy Technology: Forging a greener future. The Magazine also includes the articles ENERtec Asia 2024: Accelerating sustainable energy transition in Southeast Asia, Turning waste into a resource: Waste heat recovery, True software support for improving ESG, and the latest APUEA activities. We want to thank Keppel, ENGIE, Tabreed, Qatar Cool, Informa Markets, BECIS, and Bluebee Technologies for contributing to this issue of APUEA Magazine.

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ASIA PACIFIC URBAN ENERGY ASSOCIATION

The Asia Pacific Urban Energy Association (APUEA) was launched in 2017 to promote the development of sustainable Urban Energy Systems in the Asia Pacific region. The APUEA platform promotes public and private sector collaboration to develop sustainable urban energy systems that support livable cities across the Asia Pacific region. Our membership and activities serve as an information hub to support city policymakers, program managers, and other stakeholders in the design, development, and implementation of sustainable urban energy systems. Through our activities, including APUEA events, conferences, and continuous outreach to our members, we share international and regional best practices for planning and implementing sustainable urban energy systems–including policies and regulations, business models, and technologies for implementing district heating and cooling, smart grids, energy efficiency improvements, and renewable energy systems.

The APUEA membership provides a unique opportunity to liaise with governmental agencies and important stakeholders and get access to valuable information and intelligence on urban energy developments, business opportunities, trends, and financing in one of the fastest growing energy and infrastructure markets in the world. Membership benefits include a marketing platform, newsletters, APUEA Magazine, Annual Publications, Annual General Meeting including Trade Exhibition and Direct Assistance.

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For more information about APUEA and how to become a member, contact info@apuea.org

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ASIA PACIFIC URBAN ENERGY ASSOCIATION

The Asia Pacific Urban Energy Association (APUEA) is a platform to collect and disseminate knowledge, best practices, and tools related to the development of sustainable urban energy systems, and thereby support the development of livable cities in the Asia Pacific region.

APUEA serves a broad range of members including but not limited to utilities, manufacturers, investors, engineering companies, donor agencies and sector associations that are active in the urban energy sector. Members can choose among several membership categories, depending on their sector and level of engagement in APUEA.

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Premium membership includes an active role in the governance of the association through the APUEA Executive Committee and during the APUEA Annual General Meeting.

Premium membership also includes special recognition in APUEA publications and marketing channels, and free participation at APUEA events.

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Individual or agency invited by the Association to participate as an individual member; and entities such as regional NGOs, development agencies, and utility organisations. An Affiliate Member benefits from the Association but does not take an active role in the Association in terms of its governance and operation.

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	< 1,000	1,000 - 10,000	> 10,000
PREMIUM MEMBER	USD 10,000	USD 10,000	USD 10,000
CORPORATE MEMBER	USD 3,500	USD 5,000	USD 6,500
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DISTRICT COOLING | DISTRICT HEATING | MULTI ENERGY SYSTEMS (MES) | SMART ENERGY CITY (SEC)

INNOVATIONS FOR
A GREENER BUILT ENVIRONMENT

By Keppel

KEPPEL'S ENERGY-AS-A-SERVICE OFFERING SERVES A WIDE RANGE OF ASSETS INCLUDING DATA CENTRES, COMMERCIAL AND INDUSTRIAL BUILDINGS, HOTELS AND MORE, HELPING THEM REDUCE BOTH COSTS AND CARBON EMISSIONS. WITH A BURGEONING PORTFOLIO OF OVER 80 BUILDINGS AND OVER 200,000 RT OF DESIGNED COOLING CAPACITY ACROSS SINGAPORE, CHINA, THAILAND AND VIETNAM, WE ARE RAPIDLY EXPANDING TO SERVE CUSTOMERS IN NEW MARKETS SUCH AS INDIA AND THE MIDDLE EAST.

Keppel EaaS

The world is facing a climate crisis, with the built environment (including the construction and operation of buildings) accounting for approximately 40 per cent of energy and industrial-related carbon emissions globally. It is thus imperative that we focus our efforts on decarbonising this sector as its emissions are only expected to grow, driven by global megatrends in urbanisation.

An often overlooked piece of the puzzle is energy efficiency, which can be pivotal to help reduce carbon emissions for older buildings. Building owners can adopt greener solutions to meet the needs of their tenants while improving the building's sustainability performance.

Figure 1 Keppel's state-of-the-art Operations Nerve Centre (ONC)

1 UNLOCKING THE POTENTIAL FOR A SUSTAINABLE BUILT ENVIRONMENT

To reduce the energy consumption and carbon footprint of in-building solutions, building owners can adopt digital tools and innovative technologies. Retrofitting buildings with smart energy management systems with highly efficient cooling systems (either at district- or individual-building levels) to deliver space cooling with a lower carbon footprint. These measures can be augmented with the deployment of solar photovoltaics (PVs) and smart electric vehicle (EV) charging infrastructure to supplement existing in-building solutions to reduce emissions.

1.1 Adopting digital tools for optimisation and security

With advancements in digital technology and technical capabilities, smart monitoring and optimisation systems are key to overcoming the challenges of integrating disparate systems. At Keppel, our Operations Nerve Centre (ONC) harnesses digital technology, artificial intelligence and Internet of Things (IoT) for remote operations, predictive maintenance and performance optimisation to enhance the efficiency and reliability of Keppel's district cooling plants across Singapore.
Systems similar to Keppel's ONC allow operators to remotely monitor equipment performance as well as turn systems on or off without physically visit client sites. Beyond simple command and control, advanced machine learning algorithms and AI-optimisation techniques can optimise energy consumption level in key equipment, such as chiller plants, within a building or at a district level.

Being a digital-based platform, the ONC is flexible and scalable. The ONC's scope is currently being expanded to include other operating assets such solar panels and EV charging infrastructure. Keppel's overseas assets in Vietnam are currently onboarded and monitored from Singapore, with future expansions to include markets such as Thailand, India and the Middle East. It is envisaged that all overseas assets will eventually be monitored and optimised via Keppel's ONC.

With digital systems increasingly being utilised to control and monitor assets, it is crucial to protect our assets from attacks and threats. Cybersecurity defense and protection is of paramount importance to critical assets, as any successful cyberattacks could impact the safety and reliability of the critical infrastructure operation and disrupt essential services.

Keppel deploys the Infrastructure Cyber Fusion Center (iCFC) to protect our critical assets. The iCFC oversees the key assets' operations, maintenance and cybersecurity defense operations to effectively detect, prioritise, and respond to potential cybersecurity threats. The iCFC is built with advanced security capabilities such as 24/7 security monitoring, threat intelligence, security automation, vulnerability management, and incident response. These features improve on traditional security monitoring and defense systems with strategic, tactical and operational dimensions.

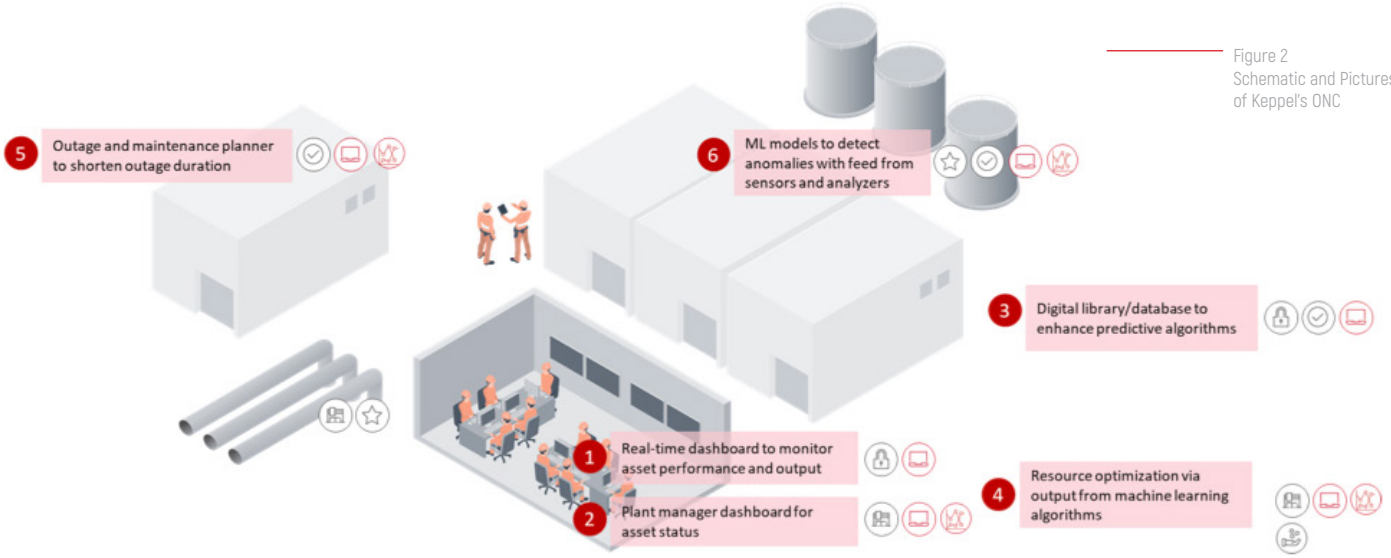

Figure 2
Schematic and Pictures of Keppel's ONC

1.2 Ensuring energy reliability

Due to the intermittency associated with increasing the amount renewables in our energy mix, batteries will be a prominent fixture to ensure grid stability and a stable supply of energy. Innovations such as Phase Change Material Thermal Energy Storage technology (PCM-TES) can push the envelope for the efficiency and reliability of energy storage.

PCM-TES acts as a cost-efficient energy battery that can enhance the energy performance for district cooling systems (DCS) plant operations. The use of PCM-TES can triple energy storage capacity as compared to traditional water-based thermal storage systems. The adoption of PCM-TES can translate into significant space savings by reducing the number of thermal storage systems that are needed for operations, and it can also avoid the energy inefficiencies associated with ice-based thermal storage systems.

2 ADVANCING INNOVATIONS FOR A SUSTAINABLE FUTURE

While core technologies such as the ONC, iCFC and PCM-TES are actively deployed in Keppel for energy efficiency and resource management, we are also investing in solutions to accelerate decarbonisation in the built environment.

For example, Keppel is innovating on the integration of batteries with solar PVs and EV charging to enable vehicle electrification at sites with insufficient power. Scaling such energy management systems to operate at a building- or district-level can unlock new energy savings and efficiency gains.

Keppel is also exploring solutions related to hydrogen and ammonia to provide low-carbon electricity. Hydrogen and ammonia have the potential to deliver energy with lower carbon emissions at a large scale. In greening the electrons supplied by the grid to buildings, an integrated pathway to a carbon neutral built environment sector can be established.

3 ENERGY EFFICIENCY IS THE FUTURE OF THE BUILT ENVIRONMENT

Many businesses are taking active steps to embark on their sustainability journey and have tied up with solutions providers, such as Keppel, to reduce their energy consumption and consequently carbon emissions.

Keppel's Energy-as-a-Service offering serves a wide range of assets including data centres, commercial and industrial buildings, hotels and more, helping them reduce both costs and carbon emissions. With a burgeoning portfolio of over 80 buildings and over 200,000 RT of designed cooling capacity across Singapore, China, Thailand and Vietnam, we are rapidly expanding to serve customers in new markets such as India and the Middle East.

These businesses have recognised that being green is not only good for the environment, but also good for their bottom line, valuations and access to green financing – many more are expected to follow.

Keppel is a global asset manager and operator with strong expertise in sustainability-related solutions spanning the areas of infrastructure, real estate and connectivity. Headquartered in Singapore, Keppel operates in more than 20 countries worldwide, providing critical infrastructure and services for renewables, clean energy, decarbonisation, sustainable urban renewal and digital connectivity.

Keppel's Infrastructure Division drives the Company's strategy to invest in, own and operate competitive assets in Power and Renewables, Environment and Energy-as-a-Service (EaaS) – a one-stop sustainability offering that covers smart and energy-efficient cooling, rooftop solar panel installations and EV charging solutions.

Keppel EaaS

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Accelerating your Decarbonisation Journey

with Keppel Energy-as-a-Service

Keppel EaaS offers asset owners a suite of smart and connected energy supply and management solutions, such as energy-efficient cooling, solar PV and EV charging infrastructure, which can help to decarbonise operations with minimal upfront costs.

Move closer to achieving your net zero targets with Keppel EaaS today.

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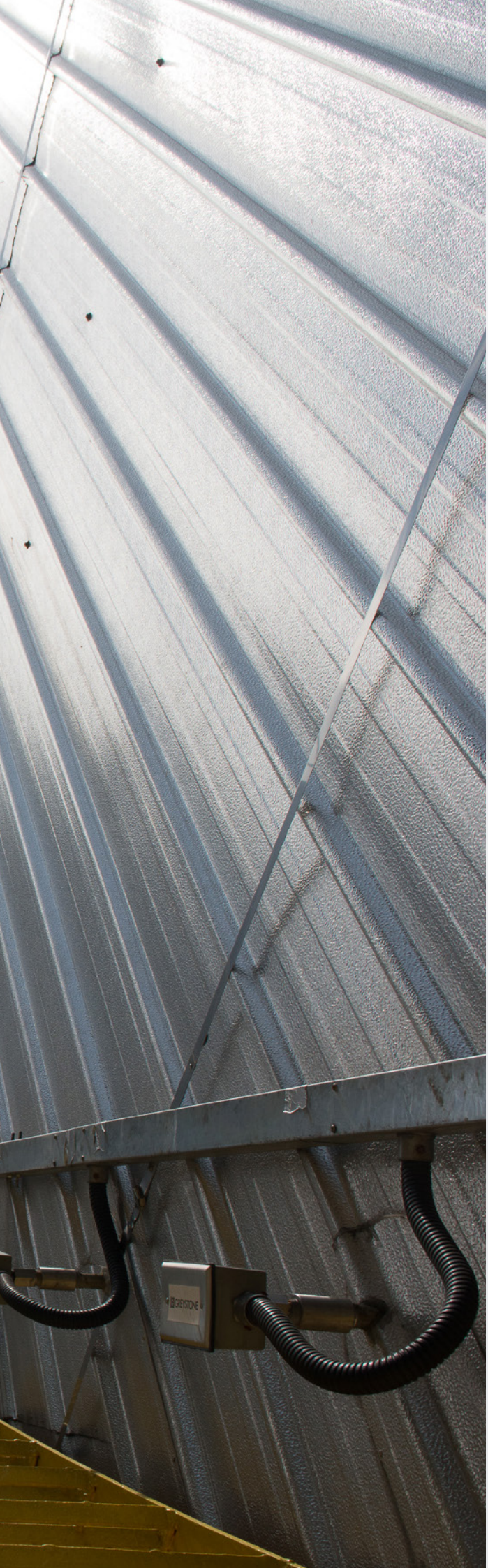
Keppel EaaS

MEGAJANA GAINED A SIGNIFICANT BOOST WHEN THE GOVERNMENT CONNECTED ITS BUILDINGS IN THE VICINITY. THIS ACT MITIGATED THE RISK OF LOW BUILDING PARTICIPATION – A CRITICAL FACTOR IN THE SUCCESS OF DISTRICT COOLING PROJECTS – TRIGGERING A DOMINO EFFECT, THAT DREW IN CUSTOMERS AND INVESTORS ALIKE.



MEGAJANA, A BEACON OF EXCELLENCE IN MALAYSIA'S BURGEONING DISTRICT COOLING MARKET

330,000 refrigeration ton (RT), this is the impressive combined installed capacity of district cooling plants in the Malaysian market. To put it in perspective, that is enough capacity to sustainably cool over 13 million square metres (sqm) of Malaysian office space, and according to a 2013 report from the Asian Development Bank, the market demand even ten years ago for sustainable cooling in Malaysia could have easily supported nearly double this figure. Capitalising on this growth potential for low-carbon cooling could deliver a range of advantages for the environment and the broader energy ecosystem, all aligned with Malaysia's target of achieving carbon neutrality by 2050.

Despite the absence of comprehensive regulations in the district cooling sector, various indirect policies have supported the Malaysian market's development. These include specialised power tariffs for thermal energy storage (TES), additional certification ratings for buildings, and government-supported demonstration projects such as Cyberjaya, situated 30km from Kuala Lumpur, home to innovative pioneer in district cooling systems, Megajana.

The Megajana District Cooling System

In 1998, the Malaysian government tendered and commissioned a local energy services company, Pendinginan Megajana Sdn, to design, build, own, and operate the Megajana district cooling system (DCS) in Cyberjaya. Though this pioneering venture started humbly, with only five buildings connected to a rather small 2,300 RT capacity system, it was charged with the hefty goals of reducing operational costs for cooling, promoting environmental sustainability, and showcasing the viability of centralised cooling systems for Malaysia.

Megajana gained a significant boost when the government connected its buildings in the vicinity. This act mitigated the risk of low building participation – a critical factor in the success of district cooling projects – triggering a domino effect, that drew in customers and investors alike. With the government's vote of support, the project and the public's awareness of the benefits of district cooling grew.

A Transformative Partnership

Transitioning in 2013 to a joint venture between ENGIE and Cyberview marked a pivotal moment for Megajana. With their 49% stake, ENGIE infused substantial international expertise and investment into the system, significantly enhancing operational efficiency. This collaboration led to an initial 5% energy efficiency gain for Megajana's system in 2017 and a 2.3 GWh of electricity decrease in power consumption, following the expansion of its chilled water capacity servicing Cyberjaya. This energy efficiency improvement produced considerable carbon savings, allowing the system to avoid the equivalent of 1,160 tonnes of CO2 per year, roughly comparable to planting over 19,000 trees per year.

How was this system improvement achieved in 2017? Through the installation of a new 2,000 RT electrical chiller and 20,000 RT per hour (RTh) TES in Megajana. These upgrades raised Megajana's existing two district cooling plants to a total installed capacity of 14,000 RT of chillers and 95,500 RTh of thermal energy storage. As a result, the 46 connected buildings in Cyberjaya benefited from a monthly distribution of over 3.8 million RTh of chilled water, which provided energy-efficient, environmentally friendly, low-carbon cooling through a 12km network of discreet underground pipes. Building upon their pioneering work advancing district cooling in Malaysia, Megajana completed further enhancement initiatives in the third quarter of 2023. These works were comprised of a couple of major projects for one of Megajana's two district cooling plants. The first project saw the revamping of the district cooling plant's old ice storage (circa 2002) – of approximately 9,000 RTh operational capacity – into a chilled water TES system – of 17,000 RTh operational capacity – improving the plant's ability to charge cooling energy at night, which is when 70% of its electricity consumption now occurs.

The result was a reduction of peak electricity demand and a notable 4% year-on-year improvement in the plant's electrical efficiency compared to August of 2022. The second project, renovating and expanding the plant's office, incorporated implementing an advanced control command centre to monitor and operate both of Megajana's district cooling plants. This centre allows remote monitoring and control of the connected customers' energy transfer stations (ETS), enhancing the real-time monitoring and operating of both of the cooling plants and the connected chilled water network.

> THE SUCCESSFUL EXECUTION OF THESE LATEST PROJECTS HAS DELIVERED A FURTHER ENERGY EFFICIENCY GAIN AND CARBON FOOTPRINT REDUCTION FOR MEGAJANA, DEMONSTRATING THE TANGIBLE BENEFITS OF ITS COMMITMENT TO CONTINUOUS IMPROVEMENT.

The successful execution of these latest projects has delivered a further energy efficiency gain and carbon footprint reduction for Megajana, demonstrating the tangible benefits of its commitment to continuous improvement. In fact, a cumulative improvement in electrical efficiency of 28.7% has now been achieved, as compared to before partnering with ENGIE in 2013.

A High Bar for Safety

In addition to raising energy efficiency and digitalisation standards for district cooling in Malaysia, Megajana's recent enhancements have led by example in putting safety first. Over the course of the TES project, which ran from March of 2022 to August of 2023, over 47,000 total safety manhours were achieved. This exemplary safety record was accomplished despite having 15 workers on site per month, working 11-hour days on average, in a confined space from the start of groundworks in June of 2022, through to project completion. Overall, the TES project saw zero loss time incidents, or LTI, an impressive feat not easily achieved.

As Megajana continues to lead the way in Malaysia, leveraging digital solutions and pushing continuous improvement to drive excellence in sustainable cooling, it sets a model for Malaysia and much of Southeast Asia to follow. Cooling the region is projected to require up to 30% of its peak electricity demand by 2040, an unsustainable energy volume that could jeopardise existing grids, economic development, and the broader energy transition. However, by embracing, scaling, and optimising district cooling systems, as we are seeing modelled at the micro-level in Cyberjaya , Malaysia with Megajana, countries across ASEAN stand the best chance of meeting their escalating cooling needs sustainably.

ENGIE is a global reference in low-carbon energy and services. With its 96,000 employees, its customers, partners and stakeholders, the Group is committed to accelerate the transition towards a carbon-neutral world, through reduced energy consumption and more environmentally-friendly solutions. Inspired by its purpose ("raison d'être"), ENGIE reconciles economic performance with a positive impact on people and the planet, building on its key businesses (gas, renewable energy, services) to offer competitive solutions to its customers.

Turnover in 2022: 93.9 billion Euros. The Group is listed on the Paris and Brussels stock exchanges (ENGI) and is represented in the main financial indices (CAC 40, Euronext 100, FTSE Euro 100, MSCI Europe) and non-financial indices (DJSI World, Euronext Vigeo Eiris - Europe 120 / France 20, MSCI EMU ESG screened, MSCI EUROPE ESG Universal Select, Stoxx Europe 600 ESG-X).

COOLING IS AN IMPORTANT PART OF THE ENERGY DEMAND AND IS ESTIMATED TO ACCOUNT FOR 45% OF THE COUNTRY'S PEAK ENERGY DEMAND BY 2050. WE SEE AN OPPORTUNITY HERE, FOR EMERGING COOLING TECHNOLOGY TO BE A CATALYST FOR MORE INTEGRATED URBAN RESOURCE USE SOLUTIONS THAT CAN HELP ACHIEVE THE CLIMATE TARGETS, AND MEET THE GROWING THERMAL NEEDS OF INDIA'S POPULATION.

COOLING AS A CATALYST FOR URBAN TRANSFORMATION IN INDIA

By Sudheer Perla
Managing Director,
Tabreed Asia & Country
Manager, Tabreed India

Urban India faces a complex predicament. Increasing populations combined with unpredictable climatic conditions are impacting health and livelihoods. This has to find balance in a growing economy where basic infrastructure and facilities are yet being developed at a country wide scale. Achieving better energy efficiency, reducing emissions, and moving towards renewables is an important part of India's climate change mitigation efforts. In August 2022 India updated its NDC targets to 45% reduction of emission intensity (from 2005 levels), and 50 % cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. Cooling is an important part of the energy demand and is estimated to account for 45% of the country's peak energy demand by 2050. We see an opportunity here, for emerging cooling technology to be a catalyst for more integrated urban resource use solutions that can help achieve the climate targets, and meet the growing thermal needs of India's population.

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There are two aspects to the cooling needs in urban India. Cooling needs in residential and commercial buildings, cold-chain, refrigeration, transport and industries are expected to grow with the growing economy. On the other hand, a large section of the population lives and work in conditions where cooling is not even a consideration, although, it should be a priority. Access to cooling at the household level as well as working conditions (think markets) where feasible would make all of the difference. Cooling is therefore no longer a luxury, but a necessity for India. Practices such as 'integrated building design" and technologies such as District Cooling and CaaS can truly be gamechangers in making cooling accessible and affordable to all Indian citizens.

First line of defence: Cooling through Integrated Building Design

Integrated building design involves looking at the building as a whole ecosystem and taking a collaborative approach that brings efficiency to it various needs. Here, passive cooling is looked at as a first line of defence, where features suited to geography and climate are inbuilt into design. These measures could include, for example, angling windows to receive lesser sunlight in the summer, using materials suitable to a particular climatic condition, radiant cooling systems to reduce the mechanical requirement for cooling. Passive cooling measures can reduce the need for mechanical cooling drastically to where only 1 ton of cooling is required to cool an area equal to as much as 500-700 sq feet, as opposed to industry benchmarks of 250-400 sq feet. Infosys, a leading multinational information technology company headquartered in India, has demonstrated the benefits of passive cooling through its campuses across the country.

For Infosys a first order of priority is considering building envelope design to increase energy efficiency. In its Mysuru campus, for example, with integrative design features, the initial requirement of cooling capacity of 622 RT was right-sized to 400 RT resulting in >40% savings in electrical load to 400 kW and 45% reduction in power consumed to 1.7 GWh, annually. Overall, although Infosys workforce grew by 166% (FY2008-2020), its electricity consumption grew only by 20%.

Second Line of Defence: Campus cooling or District Cooling and Cooling as a Service

District Cooling (DC) and Cooling as a Service (CaaS) models can solve for both demand and supply side aspects of cooling. To achieve net zero targets, developers in India resort to heavy capital investment in HVAC systems, while alternate avenues could be explored. In Gurugram, Tabreed and TATA Realty have formed a strategic partnership for TATA Realty's Intellion Park development. The building design is integrated with several passive cooling features including insulated building envelope, minimum glazing on façade, radiant cooling for lift lobbies and common areas. The remaining, significantly reduced, cooling requirements are then aggregated and met through a campus-wide cooling system -designed, built, financed, owned and operated by Tabreed through a Cooling as a Service (CAAS) model.

The cooling system is highly efficient, comprising of specifications including chillers selected for a minimum Coefficient Of Performance of 6.9, higher chilled water supply temperature, Dedicated Outside Air System (DOAS) installed to handle outside air and latent load, Electronically Commutated (EC) fans for Air Handling Units (AHUs), IE-3/4 motors, Variable Frequency Drive (VFD) for cooling tower fans, demand controlled ventilation systems. As opposed to standalone system for each building in the campus, this campus wide system in conjunction with integrative design practices is able to serve 700 sft of cooling per ton and achieve an building energy performance index (EPI) of 70-90 kWh/m2/year. Further, being a zero-discharge campus, the cooling system uses treated waste water from a centralized STP, thus reducing reliance on fresh water use.

Additional Benefits: Wider societal benefits and promoting a circular economy

Passive cooling solutions and district cooling open a sea of opportunity for a country like India that is looking to be future climate ready, while also solving for high levels of poverty. What we seek to achieve with TATA Realty for its green field development for instance, can also be retrofitted for brown field developments. In most Indian cities, new and upcoming real estate developments are surrounded by low-income housing/slums, or adjacent to rural, agrarian societies. The installation of a cooling facility, even if located in new developments, could potentially provide subsidised cooling facilities through CaaS to the nearby low-income areas.

DISTRICT COOLING (DC) AND COOLING AS A SERVICE (CAAS) MODELS CAN SOLVE FOR BOTH DEMAND AND SUPPLY SIDE ASPECTS OF COOLING. TO ACHIEVE NET ZERO TARGETS, DEVELOPERS IN INDIA RESORT TO HEAVY CAPITAL INVESTMENT IN HVAC SYSTEMS, WHILE ALTERNATE AVENUES COULD BE EXPLORED.

Further, other circular economy technologies are made more commercially viable in the adoption of district cooling technologies. For example, the use of sewage treatment plants (STPs) – Indian urban areas have only 920 sewage treatment plants (STPs) with the capacity to treat only 37 % of domestic sewage, several existing STPs remain underutilised, and much of the treated water ends up in local water bodies. DC Systems can use the Treated Sewage Effluents (TSE) for cooling, thereby reducing the need for freshwater.

District cooling plants can increase the financial viability and adoption of Waste to Energy (W2E) plants and City Gas Distribution (CGD) networks in India, by providing anchor demand through use of waste heat for cooling, thereby promoting integrated resource use in cities for greater circularity. Furthermore, in addition to waste heat utilization, the power produced from CGD networks and W2E plants can be used to power cooling systems, reducing grid power requirements.

Integration with W2E and CGD builds redundancy (power back-up) to replace the highly polluting Diesel Generator (DG) sets in case of grid failures, reducing fossil fuel consumption (Fossil fuels accounted for 76% of India's electric generation in 2021). At the same time, the DC facilities can provide the cooling requirements of W2E plants, thus closing the energy loop. A central cooling plant as opposed to standalone HVAC systems with respective cooling equipment accommodated on rooftops and basements, frees up space to install more solar panels, thereby increasing solar generation potential and creating monetizing opportunities.

Combating the emerging multidimensional risks to the urban ecosystem will require a rethink on how we plan our urban infrastructure development. Energy source/supply/production, while an important aspect, is a small part of a very large puzzle. We must look at the puzzle in its entirety to be able to solve it, and how we approach cooling can be an important lever for change. The change that we envision is not a short-term fix, but a long-term solution that will enable the Indian economy to achieve its growth targets, its emission reduction targets, while also meeting the needs of its growing population.

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National Central Cooling Company PJSC (DFM: Tabreed)

is a leading international district cooling utility headquartered in the UAE that provides energy-efficient, cost-effective, and environmentally friendly year-round cooling solutions in 6 countries, including Indian markets, through its 89 plants, delivering 1.35 million refrigeration tons (RT) of cooling services to major residential, commercial, government and private developments, eliminating over 1.4 million tons of CO_2 emissions annually through its sustainable approach to cooling.

Tabreed India Private Limited is a wholly owned subsidiary of Tabreed Asia Central Cooling Company a 75-25 joint venture between Tabreed UAE and World Bank's International Finance Corporation (IFC). Tabreed India is actively engaged with several leading real estate developers and institutional investors across the country, for implementing and operating district cooling or stand-alone central cooling plants.

AS CITIES CONTINUE TO GROW AND EVOLVE, THE ADOPTION OF SUSTAINABLE URBAN ENERGY TECHNOLOGY, ESPECIALLY INNOVATIONS LIKE DISTRICT COOLING, EMERGES AS A BEACON OF HOPE. THE INTEGRATION OF THESE TECHNOLOGIES IS NOT JUST A CHOICE BUT AN IMPERATIVE. WITH THE POTENTIAL TO REDUCE ENERGY CONSUMPTION, LOWER CARBON EMISSIONS, AND MITIGATE THE URBAN HEAT ISLAND EFFECT, THEY ARE INSTRUMENTAL IN RESHAPING THE URBAN LANDSCAPE TOWARDS A GREENER, MORE SUSTAINABLE FUTURE.

SUSTAINABLE URBAN ENERGY TECHNOLOGY: FORGING A GREENER FUTURE

The global urban landscape is evolving at an unprecedented rate, with more than half of the world's population residing in urban areas. As cities continue to expand, the sustainability of urban energy technology becomes a paramount concern. The need to cater to the energy demands of urbanization while reducing the associated environmental impacts is at the core of this challenge. Sustainable urban energy technology offers a glimmer of hope, providing cities with the tools to transform their energy ecosystems and transition to more eco-friendly, efficient, and resilient systems.

By Aysha AlShriem
Chief A&SS Officer, Sustainability Lead

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QATAR COOL

In the pursuit of sustainable urban energy technology, innovation is the driving force. Cities are exploring diverse sources of energy, such as solar, wind, and hydropower, to diversify their energy mix and reduce reliance on fossil fuels. These renewable energy sources reduce carbon emissions and the environmental impact of energy production. Furthermore, advancements in energy storage and distribution systems ensure that energy is used more efficiently, reducing waste and loss during transmission.

Central to this pursuit of sustainability is district cooling, a remarkable innovation that extends its impact far beyond just cooling. At the heart of district cooling systems is the drive to revolutionize cooling technologies and make them environmentally friendly. Its potential to address urban heat islands and reduce greenhouse gas emissions highlights its significance.

The cornerstone of district cooling's sustainability is its exceptional energy efficiency. By centralizing cooling services, energy consumption is significantly reduced, resulting in a notable decrease in carbon emissions. Central plants, engineered for peak performance and equipped with high-efficiency chillers, make optimal use of resources, thereby minimizing waste and environmental impact.

Urban heat islands are increasingly prevalent in today's cities due to the cumulative heat generated by numerous individual air conditioning units. District cooling confronts this issue head-on. By centralizing cooling services, it not only reduces urban heat but also enhances the overall quality of life in urban areas. It keeps cities cooler, more comfortable, and more sustainable.

Sustainability is a multifaceted concept that transcends environmental goals. It's about striking a harmonious balance between economic viability and ecological preservation. The economic rationale behind district cooling is compelling. While there may be initial investments in infrastructure and technology, the long-term benefits, both in terms of economic savings and environmental preservation, are undeniable. Lower maintenance costs, reduced energy expenditures, and prolonged equipment lifecycles collectively contribute to the economic sustainability of district cooling systems.

As cities continue to grow and evolve, the adoption of sustainable urban energy technology, especially innovations like district cooling, emerges as a beacon of hope. The integration of these technologies is not just a choice but an imperative. With the potential to reduce energy consumption, lower carbon emissions, and mitigate the urban heat island effect, they are instrumental in reshaping the urban landscape towards a greener, more sustainable future. The path forward is illuminated with possibilities, as cities worldwide explore these innovations to create cooler, more eco-friendly urban environments.

Qatar Cool is the leading district cooling company's in Qatar. Since its inception, Qatar Cool has aimed for operational excellence in every aspect of its business. Over the past 20 years, the company has developed solid technical and operational experience and has refined its approach on both business-to-business (B2B) and business-to-consumer (B2C) fronts. Currently, Qatar Cool is the leading commercial provider of district cooling services in Qatar.

Qatar Cool currently owns and operates five cooling plants covering the West Bay and The Pearl-Qatar districts with the combined capacity of 237,000 tons of refrigeration.

قطركول
QATAR COOL

All issues of the APUEA Magazine can be found on www.apuea.org

APUEA
Asia Pacific Urban Energy Association

WITH OVER 400 EXHIBITORS, INCLUDING MAJOR BRANDS AND 5 COUNTRY PAVILIONS, AS WELL AS AN ANTICIPATED ATTENDANCE OF OVER 10,000 VISITORS, ENERTEC ASIA 2024 WILL BRING TOGETHER A DIVERSE RANGE OF GLOBAL SOLUTION PROVIDERS, POLICYMAKERS, MECHANICAL AND ELECTRICAL INDUSTRY PROFESSIONALS, AND ENERGY EXPERTS, PROVIDING THEM WITH A UNIQUE PLATFORM TO COLLABORATE AND INNOVATE UNDER ONE ROOF.

ENERTEC ASIA 2024:

ACCELERATING SUSTAINABLE ENERGY TRANSITION IN SOUTHEAST ASIA

Energy transition needs have been accelerating, driven by the global shift towards low emission energy sources, heightened emphasis on energy efficiency, and a concerted effort to electrify sectors such as transportation, industry, and buildings. In the urgent race against time to curb global temperature increases to 1.5°C, there is a growing chorus from both households and businesses for innovative solutions to facilitate a sustainable energy transition.

informa markets

RANKED 35TH IN THE WORLD ENERGY TRANSITION INDEX (ETI) AND NO.1 IN ASEAN, MALAYSIA IS SPEARHEADING THE REGION'S ENERGY TRANSITION.

Recognising this imperative, Informa Markets, the world's leading exhibitions organiser, has re-branded its iconic ASEAN M&E trade show into ENERtec Asia to embrace the evolution of business sustainability in the energy landscape. This is also a testament to Informa Markets' commitment to drive sustainability beyond its customer and partner markets. By providing dedicated platforms, the company aims to catalyse the acceleration of sustainability across entire industries within the diverse sectors it serves.

Amidst ongoing climate change and geopolitical conflicts, the energy landscape is undergoing a profound transformation. Exorbitant energy costs have prompted countries to seek alternative energy solutions, while businesses face pressure to operate sustainably and profitably. The growing demand for environmental, social, and governance (ESG) compliance has added an additional layer of urgency. As international investors increasingly prioritise entities with robust ESG credentials, businesses are now in a race to enhance the environmental impact of their operations.

Scheduled to take place from 26th to 28th June 2024, at the prestigious Kuala Lumpur Convention Centre (KLCC), Malaysia, ENERtec Asia 2024, is set to revolutionise the industry by providing sustainable solutions and opportunities to global businesses. With over 400 exhibitors, including major brands and 5 country pavilions, as well as an anticipated attendance of over 10,000 visitors, ENERtec Asia 2024 will bring together a diverse range of global solution providers, policymakers, mechanical and electrical industry professionals, and energy experts, providing them with a unique platform to collaborate and innovate under one roof.

ENERtec Asia will feature three distinctive segments - TENAGA (Renewable Energy & Cleantech), REVAC (Energy Efficiency & Decarbonisation), and an exciting new addition - BATTERY & EV Tech (Energy Storage & EV Technology and Solutions). This innovative trade show will lead the way in the energy transition journey within the Southeast Asia region, showcasing revolutionary technologies ranging from renewable power generation and smart energy management to battery and energy storage solutions, as well as HVACR and District Cooling solutions focused on decarbonization and energy efficiency. Additionally, it will spotlight innovations related to electric vehicles, creating a comprehensive platform for exploring the future of sustainable energy and transportation.

This rebranding reflects Malaysia's growing leadership in the energy transition within ASEAN. Ranked 35th in the World Energy Transition Index (ETI) and No.1 in ASEAN, Malaysia is spearheading the region's energy transition.

The National Energy Transition Roadmap. (NETR) and the National Industry Master Plan (NIMP2030) outline Malaysia's commitment to becoming a High-Income Nation through a Net Zero Carbon Neutral target.

Malaysia's energy transition strategy encompasses ten flagship projects under NETR, focusing on Renewable Energy, Energy Efficiency, and Green Industrial Development. The Industrial Environmental Sustainability Guidelines (iESG) introduced by the Ministry of International Trade and Industry (MITI) extend the goals of NIMP2030, emphasizing green transitions in industrial sectors.

This multifaceted strategy places a special emphasison promoting Renewable Energy and Energy Efficiency across diverse sectors, including urban areas, industrial parks, technology parks, and agriculture. The forthcoming Energy Efficiency and Conservation Act (EECA), currently undergoing parliamentary processes, is poised to play a pivotal role as the cornerstone of Malaysia's journey towards energy efficiency. This legislative framework is integral to shaping the nation's sustainable future, contributing significantly to Malaysia's evolving energy landscape.

In a significant move towards sustainability, all Bursa Malaysia-listed companies are mandated to obtain their ESG certificates by 2024. This

initiative underscores Malaysia's commitment to environmental, social, and governance standards, ensuring sustainable practices across industries.

Malaysia is actively driving electric vehicle (EV) adoption, aiming to establish 10,000 EV charging stations by 2025, aligning with the Low Carbon Mobility Blueprint 2021-2030. This initiative promotes eco-friendly transportation solutions and supports the growing demand for electric vehicles, providing a strategic advantage to automakers and investors. As a major electrical and electronics manufacturing hub in Southeast Asia, Malaysia offers a strategic advantage to automakers and investors. The components sub-sector, including semiconductors, sensors, batteries, and vehicle assembly, provides a robust supply chain for Next-Generation Vehicles (NxGVs).

ENERtec Asia has forged strategic collaborations with prominent industry stakeholders, including EiC (Energy Industries Council), TEEAM (Electrical and Electronics Association of Malaysia), APUEA (Asia Pacific Urban Energy Association), Megajana, MDCA (Persatuan Penyejuk Dae rah Malaysia), ASH RAE (American Society of Heating, Refrigerating and AirConditioning Engineers), FMM (Federation of Malaysian Manufacturers), Malaysia Green Building Council, and Malaysia Shopping Mall Associations. Their expertise and support will enhance the event's impact and relevance.

ENERtec Asia is the leading platform bringing together industry leaders, innovators, and policymakers to explore sustainable practices, cutting-edge technologies, and collaborative initiatives driving the region's energy transition towards a low-carbon future. The event provides opportunities for businesses to showcase their latest products and services, build partnerships, and spearhead the development of a progressive energy landscape. In addition to its prominent exhibition, ENERtec Asia boasts a comprehensive conference programme where industry experts share invaluable insights on a diverse range of topics pertaining to ESG and the energy transition.

For more information, please visit:
www.enertecasia.com

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DON'T MISS THE OPPORTUNITY TO BE PART OF ENERTEC ASIA 2024, A MUST-ATTEND EVENT FOR ANYONE SEEKING TO EXPLORE AND CONTRIBUTE TO THE FUTURE OF ENERGY IN SOUTHEAST ASIA.

This event is powered by **Renewable Electricity**

ENERtec ASIA 2024

Empowering Energy Transition & Technology

26-28 JUNE 2024

KUALA LUMPUR CONVENTION CENTRE (KLCC), MALAYSIA

POWER UP for Something Electrifying and Exciting

After 2 decades of overwhelming success, the ASEAN M&E trade show has been transformed with a renewed and dynamic identity. Rebranded as **ENERtec Asia**, it will cover 3 comprehensive segments namely, ***TENAGA (Renewable Energy & Cleantech), REVAC (Energy Efficiency & Decarbonisation) and an exciting NEW segment - BATTERY & EV TECH (Energy Storage & EV Technology and Solutions).*** The energy empowered **ENERtec Asia**, introduced exclusively by Informa Markets, will be held from **26th to 28th June, 2024** at **the Kuala Lumpur Convention Centre, Malaysia.**

Charging Forward for Greater Possibilities at ENERtec Asia 2024

400+ exhibitors

5 international pavilions

10,000 visitors

50+ speakers

www.enertecasia.com

Organised By informa markets | Endoresed By MATRADE | Co-Host TEEAM | Conference Partner EIC

BECIS Waste Heat Recovery

Reduce the GHG emissions and bring energy cost-savings to your plant. Waste heat recovery system helps save the cost of cooling tower and reduces steam consumption.

BECIS

BECIS WASTE HEAT RECOVERY SOLUTIONS

Well-designed

The design of waste heat recovery project is based on the analysis of customer's unique energy consumption and facility characteristics; this is achieved through well-designed energy systems, properly sized piping and well-planned process flows.

Multiple Savings

The waste heat recovery system will reduce the energy dissipated by cooling towers into the atmosphere and enable energy savings by utilizing the dissipation as a source for the heat pumps. This will also reduce the utilization of steam to produce hot water and realize further energy and cost savings.

CO2

Significantly lowered emissions by utilizing waste heat as reheating source, can be a substitute for a percentage of the steam demand and save electricity consumption from cooling towers.

Sustainable

The recovered heat is collected from daily production in a sustainable way.

FACT

Waste heat recovery systems can help industries achieve CO2 emission reductions of up to 15-30% or more, making them a powerful tool in the fight against climate change.

INDUSTRIES BENEFITING FROM WASTE HEAT RECOVERY SYSTEMS

- Power Generation
- Manufacturing
- Chemical Industry
- Oil and Gas Industry
- Food and Beverage Industry
- Pulp and Paper Industry
- Data Centers
- District Heating/ Cooling Systems
- Automotive Industry

www.be-cis.com

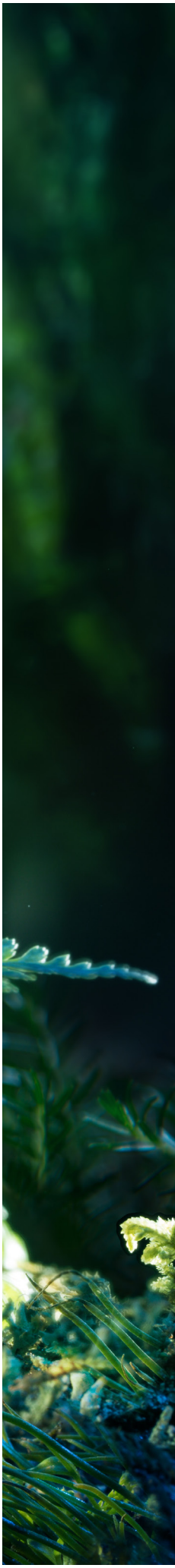
WASTE HEAT RECOVERY PRESENTS AN INNOVATIVE MODEL IN WHICH SERVICE PROVIDERS CAPTURE, CONVERT, AND DISTRIBUTE THIS UNDERUTILIZED HEAT, OFFERING BOTH ENVIRONMENTAL AND ECONOMIC BENEFITS.

TURNING WASTE INTO A RESOURCE: WASTE HEAT RECOVERY

Waste Heat Recovery (WHR) is redefining the way we view industrial processes, transforming what was once considered waste into a valuable resource. We'll embark on a fascinating journey into the realm of WHR, exploring its groundbreaking potential to revolutionize various industries. Get ready to delve into the world of sustainability, innovation, and efficiency, as we shine a spotlight on the transformative power of WHR and the trailblazing experts leading the way in this exciting field.

BECIS
Commercial Industrial Solutions

*Deloitte. Shifting Sands: Are Consumers Still Embracing Sustainability? London, United Kingdom: Deloitte, 2021.



WASTE HEAT RECOVERY, A WIDELY UNDERUTILIZED RESOURCE

Waste heat is a byproduct of countless industrial activities, from manufacturing and power generation to data centers and chemical processes. Waste heat is often vented into the atmosphere, contributing to energy wastage and environmental harm.
The failure to capture and reuse waste heat results in both energy inefficiency and environmental concerns. Waste heat is a valuable resource that can be harnessed to meet energy demands more sustainably. Waste Heat Recovery presents an innovative model in which service providers capture, convert, and distribute this underutilized heat, offering both environmental and economic benefits.

HARNESSING WASTE HEAT

Cooling towers are an unambiguous sign of available waste heat potential and are a common sight in compressed air plants or chiller farms. Rather than wasting this valuable resource which comes at low temperatures, it can be utilized by feeding the waste heat to a heat pump raising it to higher temperature levels to provide hot water to industrial processes. The waste heat allows the heat pump to reach higher and thus more valuable temperature levels with less energy consumption due to its high coefficient of performance. Utilizing the waste heat in such a way not only reduces energy consumption but also saves costs for cooling towers and the extensive maintenance for such in the first place. Other potential sources of waste heat are for example flue gases, furnace exhausts, steam condensates, or flash vapors, which come at higher temperature levels and can be harnessed directly by Vapor Absorption Chillers to produce chilled water for ambient or process cooling.

WASTE HEAT RECOVERY AS PART OF ENERGY AS A SERVICE OFFERINGS

As part of our EaaS offering, BECIS provides all required services, including engineering design, installation, and the integration of Waste Heat Recovery as a resource that will reduce primary energy consumption and reduce carbon emissions.

This transformation involves a holistic and integrated approach to planning and design taking into account all potential energy resources, total demand, and discovery of synergies and energy efficiency potential. It requires a detailed understanding of all energy flows, conducting measurements where necessary, use of state-of-the-art control and monitoring systems, and implementing rigorous operation and maintenance practices. Our goal is to optimize performance and maximize overall energy savings. EaaS means that we handle the entire capital expenditure investment when transforming our clients' energy systems, conduct all operations and maintenance, and provide a performance guarantee throughout the full contract period.

UNLOCKING COOLNESS AND HARNESSING WASTE HEAT MAGIC

Energy as a Service introduces an intriguing world of cooling potential, primarily driven by two methods: electrical cooling and waste heat utilization. Electrical cooling energizes businesses with its efficiency and scalability, while waste heat utilization works its magic by turning previously wasted energy into cooling delight through the use of absorption chillers. Together, these two approaches offer businesses versatile and customized solutions, significantly reducing their carbon footprint. Depending on the abundance of waste heat available, both methods can be seamlessly integrated to maximize savings and complement each other perfectly.

OVERCOMING WASTE HEAT HURDLES: INSIGHTS FROM AN ELECTRONICS MANUFACTURER

Now, let's dive deeper into the transformative power of Waste Heat Recovery with an inspiring example from an Electronics industry giant. A renowned multinational in this sector was purchasing steam from an external utility and converting part of it in a heat exchanger at a very low efficiency into hot water for their process. On the other hand, waste heat from their compressed air plant was released into the atmosphere with a cooling tower. Turning to BECIS for a sustainable solution, the company discovered that utilizing the waste heat from their compressed air plant was sufficient to produce the hot water they needed for their process through a heat pump. BECIS designed a cutting-edge system that not only eliminated the need to buy steam from an external supplier but also made their cooling towers redundant resulting in total operational savings of 42%. All this came at zero investment and BECIS provided operation and maintenance together with performance guarantees for the waste heat recovery and hot water supply.

RENEWABLE INTEGRATION

Waste heat recovery can complement renewable energy sources, offering consistent, round-the-clock energy availability, which can be especially useful in grid stability and reliability. The solution to integrate waste heat with renewable energy is Thermal Energy Storage (TES). TES systems store excess heat for later use, allowing for better matching of supply and demand. TES systems can be charged with waste heat or with intermittent electricity supply from renewable energy sources like photovoltaics and release the stored heat in the form of steam or hot water. This can be beneficial in industries with varying heat loads that need to be matched with an intermittent energy supply.

ENERGY DEPENDENCY

Waste heat recovery contributes to energy security by reducing reliance on external energy sources. This is particularly significant for industries and regions with energy supply challenges.

BY PARTNERING WITH BECIS AND THEIR EAAS OFFERINGS, COMPANIES CAN LEVERAGE WASTE HEAT RECOVERY TO REDUCE COSTS AND MINIMIZE THEIR CARBON FOOTPRINT.

CONCLUSION

Waste Heat Recovery is a sustainable solution with the potential to turn waste into a valuable resource. By capturing and repurposing waste heat, businesses can simultaneously reduce energy costs and environmental impact. As technology advances and environmental regulations tighten, waste heat recovery is poised for significant growth. By partnering with BECIS and their EaaS offerings, companies can leverage Waste Heat Recovery to reduce costs and minimize their carbon footprint. Through advanced digitization, monitoring, and a holistic approach to utilizing energy, BECIS empowers businesses to meet their sustainability goals while benefiting from optimized performance and reliability. With Waste Heat recovery, companies can embrace low-carbon technologies, utilize free energy sources, and pave the way for a greener and more sustainable future.

BECIS
Commercial Industrial Solutions

BECIS is a leading Energy as a Service (EaaS) provider to high-quality commercial and industrial customers. With the EaaS model, BECIS develops, constructs, operates, and owns distributed energy solutions. This reduces the risk and complexity for our customers whilst achieving their key objectives of sustainability, increased cost efficiency, and resilience of their energy infrastructure, all with no requirement for capital investment.

Expertise & Capabilities
· Investment
BECIS finances projects to minimize or eliminate customer CAPEX spend.
· Design & Engineering
Our solutions are engineered to high safety and reliability standards.
· Sustainability & Decarbonisation
BECIS continues to expand its solutions offerings which enable our customers to achieve ambitious targets.
· Construction
We safely manage and deliver projects – reducing complexity and risk for our customers.
· Asset Performance
Our assets are monitored and maintained over their life to ensure reliable delivery of energy & service.

TRUE SOFTWARE SUPPORT FOR IMPROVING ESG

By Bruno Lhopiteau, CEO of Bluebee Technologies

Many utility companies feel that "ESG solutions" available in the market are just glorified IoT. Most observers have noticed how IoT vendors went from promising predictive maintenance magic to only delivering automated energy meter readings...

Multiply energy consumption by the corresponding energy carbon content (kgCO2eq/kWh) and voila! You got an ESG software... Another type of ESG solution consists in administrative systems to gather and consolidate manual inputs of ESG indicators from sites to group. Nice for replacing paperwork and Excel, but no real impact on improving ESG.

ESG (Environmental, Social, and Governance) is a framework that helps stakeholders understand how a company is managing risks and opportunities related to environmental, social, and governance criteria. Looking at ESG from an industrial perspective:

- Environmental includes energy, water and waste.
- Social covers safety, first and foremost.
- Governance consists in complying with regulations and best practices, as well as communicating with stakeholders.

ESG, Risk and Asset Management

Long before ESG became popular, Bluebee Technologies started developing innovative software for sustainability in its Asian R&D center. The winner of an ESG award in 2023, bluebee® goes further than just monitoring energy consumption and providing beautiful KPIs. The solution helps analyze incidents, define improvement plans, track their implementation, manage audits, capture data from the multiple source: systems, sensors and... people!

People (technicians and managers) are too often forgotten in IT system design, and they usually end up being blamed for project failures. By involving people and covering all the technical activities that contribute to ESG improvement, bluebee® enables ESG by making use of its in-depth Risk Management and Asset Management functionalities.

Risk Management? bluebee® provides a Risk Management platform in line with ISO 31000. Categorize risks, define control points, manage incidents, plan and execute audits, trace corrective and preventive actions, based on true data from mobile users and external systems. Large touchscreen displays support complex decisions and proactive communication with all stakeholders.

Asset Management? bluebee® is designed to facilitate the implementation of the ISO 55000 Asset Management framework and to demonstrate compliance to the various stakeholders (owners, clients, regulators). bluebee supports the entire asset lifecycle, from construction to operation, for owners and operators, closing the ISO 55000 loop between strategy and execution.

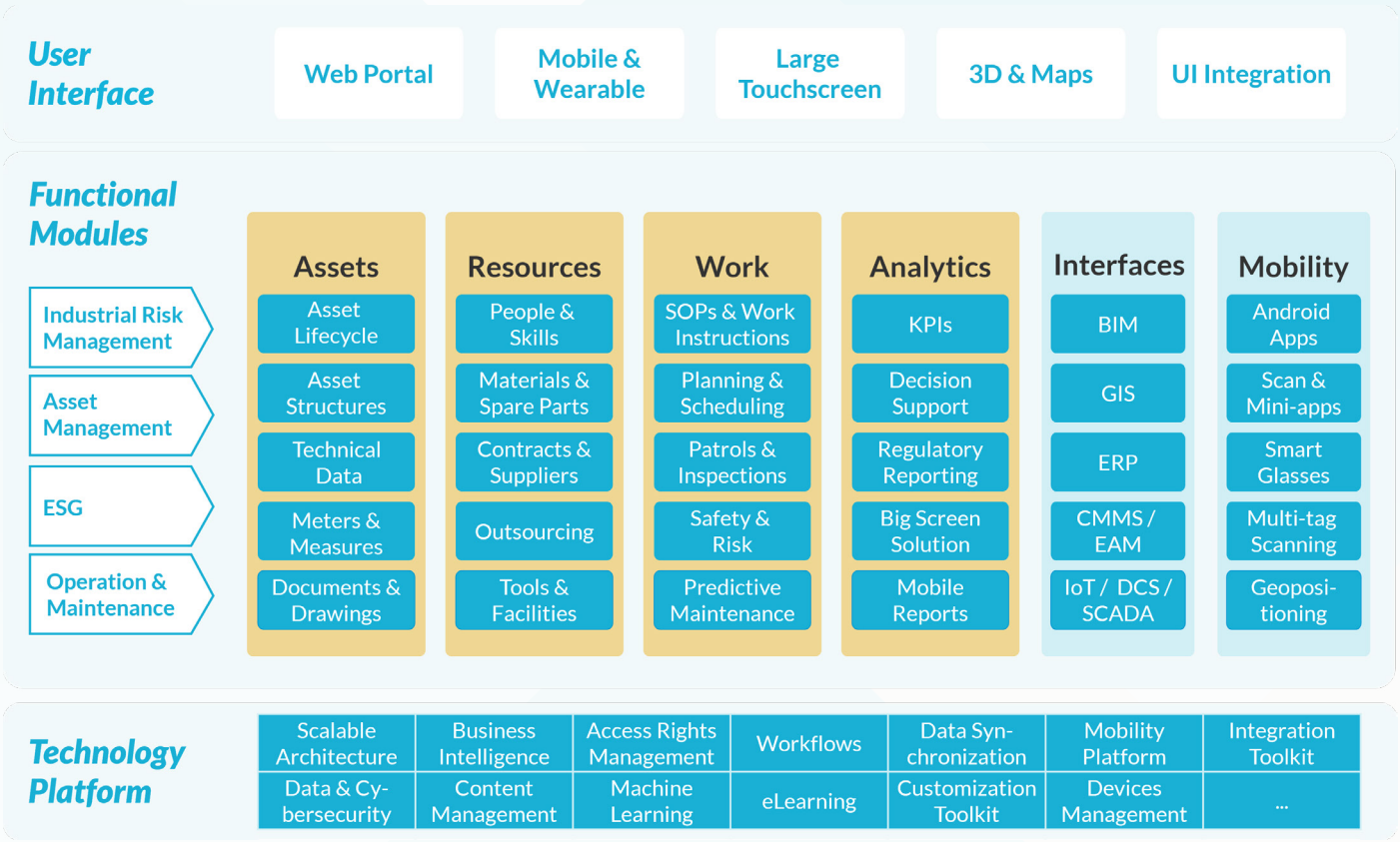
How about day-to-day Operation & Maintenance? Real technical work on the shop floor is at the core of ESG. The Smart O&M solution offered by bluebee®, either stand-alone or integrated with an existing CMMS (Computerized Maintenance Management System) or EAM (Entreprise Asset Management) software, is designed to enforce O&M best practices from top managers (decision support with touchscreen dashboards) to field workers (mobile app "for the worker of tomorrow" and smart glasses plugin). A true, practical, Digital Twin for O&M, bluebee® visually integrates 3D BIM models, GIS maps, with data from IoT and legacy systems.

bluebee®

THE WINNER OF AN ESG AWARD IN 2023, BLUEBEE® GOES FURTHER THAN JUST MONITORING ENERGY CONSUMPTION AND PROVIDING BEAUTIFUL KPIS. THE SOLUTION HELPS ANALYZE INCIDENTS, DEFINE IMPROVEMENT PLANS, TRACK THEIR IMPLEMENTATION, MANAGE AUDITS, CAPTURE DATA FROM THE MULTIPLE SOURCE: SYSTEMS, SENSORS AND... PEOPLE!

A modular, scalable solution

The bluebee® suite is made of functional and technical components. Users interact through the Web Portal, Mobile & Wearable devices, Large Touchscreen, with embedded 3D models and maps. User Interface (UI) integration allows seamless integration with the HMI of other systems such as the SCADA.



The choice of components to be implemented for each client depend on actual needs, priorities, existing IT systems, etc. In any case, the system is designed to be both modular and scalable. Modular, to allow future extensions by adding functional components, new interfaces, etc. Scalable, so that when the company grows or extends the coverage of the solution, new users and sites can be added. The system can run on premises or in a secured cloud.

The main ESG dashboard

All stakeholders (which may include clients, government authorities, company management) may be given access in the form of dedicated screens, graphical dashboards and reports offering them unprecedented visibility into the operation of the facility. The level of access is defined according to each organization and user's role with granular and strict access control.

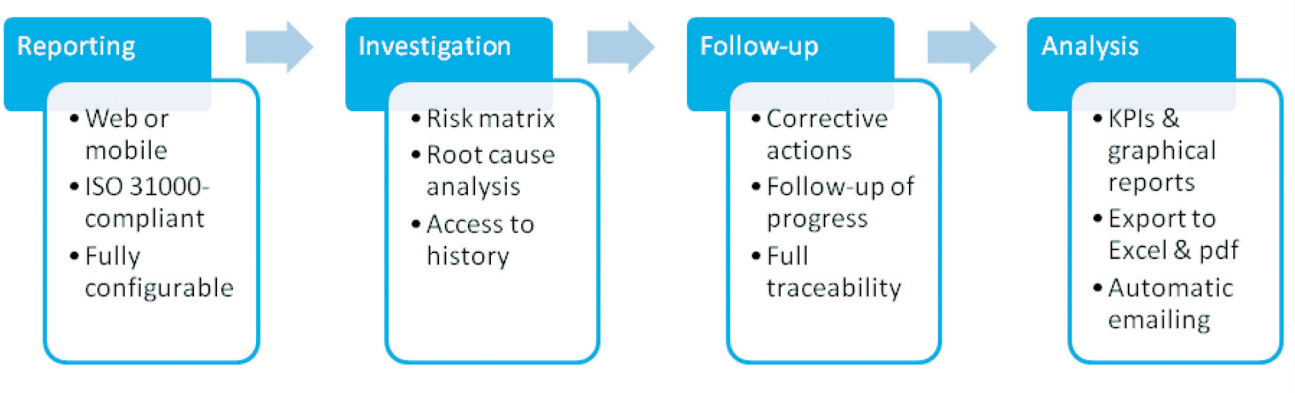
The main ESG dashboard displays all KPIs relevant to E, S and G including CO2 emissions, energy and water consumption, incidents, downtime of critical systems, status of improvement actions, based on true data from sensors and from people using the mobile app.

Environmental compliance

Users can navigate into specific areas such as Energy, Emissions, Water & Waste or Safety to know the actual consumption, costs, emissions, etc. and all actuals versus plans through data visualization and reports. Leveraging the structured asset database and work management system, bluebee® manages all environmental-related incidents, the resulting corrective and preventive actions and their execution, in order to support energy savings, emission reduction and regulatory compliance action plans.

Safety first

The S (Social) of ESG covers safety, first and foremost. Most of the time, safety management is outside of any IT system. bluebee® helps analyze incidents, their root causes, define improvement plans and track their implementation. Safety audits, in-house and by third-party, are managed. Historical safety data is available to assist users to analyze in the investigation process. As a result, corrective actions and preventive measures are created and their execution followed.



The solution is conceived to help implement ISO 31000 Risk management and OHSAS 18000 Occupational Health & Safety (and similar framework) through the IT system.

Traceability of actions

The system is aimed at promoting continuous improvement: all technical activities pertaining to energy efficiency, emissions reduction, better safety can be managed, and their impact analyzed.

All work orders, planned and unplanned, are displayed on the dashboard of the manager in charge, providing an intuitive planning tool. Work is assigned automatically to the mobile phones of engineers and operators. Mobile users perform their tasks under the guidance of predefined work instructions. All mobile records are automatically synced to the central system, to assist in decision-making, thus completing the closed loop.

Real-time governance

Governance consists in complying with regulations and best practices, as well as communicating with stakeholders. All reports in the system are based on true, proven, data from sensors and mobile users. The big screen display gives high visibility to O&M activities, creating fruitful interactions between teams, providing a training tool and helping ensure compliance. A major management challenge today is that the work of technical teams is not visible outside of the O&M department, except when problems occur. "You can't manage what you don't measure" according to Peter Drucker (or was it Aristotle?). When was last time the plant manager could monitor the execution of the inspection plan? Do KPIs come from actual records? With bluebee®, all information is real time and visible to all, from shop floor to board room. This is true governance.

bluebee® for ESG is the brainchild of Bluebee Technologies (www.bluebeecloud.com). bluebee® has been marketed and delivered by certified partners since 2013, with a large customer base in China and Southeast Asia. Clients include AstraZeneca, Daramic, Goglio, Keppel Infrastructures, Suez, Tayo Nippon Sanso, Veolia, Zhongshan Water, etc. Bluebee Technologies has offices in Singapore, Bangkok, Hongkong and Shanghai, and is currently expanding its partner ecosystem in the region. Bruno Lhopiteau is the CEO of Bluebee Technologies.

bluebee®

Welcome to Smart O&M

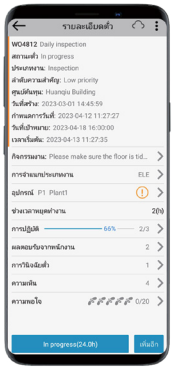
Over 1,000 client sites use bluebee® in Environment, Energy, Manufacturing, Infrastructures and Facilities. Major clients in Asia include AstraZeneca, Arkema, Hyundai Engineering, Keppel Infrastructures, Suez, Taiyo Nippon Sanso, Ranhill Power, SP Group, PUB Singapore, etc. In Thailand: Chonburi Clean Energy, Veolia, Daramic, Essilor, Center One Shopping Plaza etc.

Bluebee Tech

Control your industrial risks with Smart O&M solutions!

Bluebee Technologies design innovative yet practical Digital Twin for O&M solutions known as bluebee®.

bluebee® supports **Industrial Risk Management**, **Asset Management** and **Environmental, Social and Governance (ESG)**, **Operation & Maintenance** by enabling industrial decisions based on true data from mobile workers, connected objects and external systems.



Talk to our Bangkok team for your requirements on:

- ✓ CMMS / EAM / Maintenance 4.0
- ✓ Mobile solutions for O&M
- ✓ BIM for Asset Management
- ✓ Partnering with us

French-invested Bluebee Technologies was founded in 2013. It is headquartered in Hong Kong, with R&D center in Shanghai, offices in Singapore and Bangkok, value-added partners all over Asia. Through our partnership with Chulalongkorn University's School of Integrated Innovation, Bluebee Tech benefits from a strong Thai ecosystem.

To see bluebee® in action (movie testimonial) and learn more in English and Thai, scan the QR code, visit www.bluebeecloud.com or mail info@bluebeecloud.com

RECENT APUEA ACTIVITIES

ASIA URBAN ENERGY ASSEMBLY

ASIA URBAN ENERGY ASSEMBLY – ASEAN SUSTAINABLE ENERGY WEEK

The 2nd edition of the Asia Urban Energy Assembly was held as a 2-day international conference between 31 August and 1 September at Queen Sirikit National Convention Center in Bangkok, Thailand. The event was co-located with ASEAN Sustainable Energy Week, one of ASEAN's largest and most comprehensive international Exhibition and Conferences on Renewable Energy, Energy Efficiency, and Environmental Technology.

Most major economies in the Asia-Pacific region have set net-zero GHG targets by mid-century, and national governments are working on updating energy and climate policies to achieve this. This year's edition of the Asia Urban Energy Assembly was themed "Supporting the Energy Transition in the Asia-Pacific" and aimed to present, discuss, and explore solutions that can help speed up the energy transition and help countries reach their climate targets.

The 2nd edition of the Asia Urban Energy Assembly also focused on how the public and private sectors can contribute to the Energy Transition by applying today's technology and solutions to increase energy efficiency and integrate more renewable energy into our society. The event explored how more Renewable energy can be integrated into our cities and how district energy systems can be one tool in the toolbox to reach climate targets in the Asia Pacific region.

The event gathered more than 30 speakers and 180 attendees from India, Southeast Asia, and Europe to meet and discuss throughout six different sessions on the theme" Supporting the Energy Transition in the Asia-Pacific":

Session topics:
1. Plenary Session: Supporting the Energy Transition in the Asia-Pacific
   1a. Asia Energy Transition Outlook
   1b. Sustainable Real Estate Developments
2. Supporting the Integration of Renewable Energy in Cities
3. International District Energy Outlook
4. Accelerating District Energy in APAC
5. District Cooling India
6. Managing Multi Utilities

We are also happy to report that this year's edition of the ASEAN Sustainable Energy Week was a huge success, with more than 28000 visitors, including 6000 conference attendees.

We thank our **Gold Sponsors, Qatar Cool** and **Danfoss**, for supporting the event. We also want to thank our co-host, **Informa Markets** Thailand, for creating the event with us.

ELECTRIC POWER INDONESIA - ACCELERATING THE ENERGY TRANSITION IN INDONESIA WITH SUSTAINABLE URBAN ENERGY

On 14 September, APUEA hosted the workshop Accelerating the Energy Transition in Indonesia with Sustainable Urban Energy together with Informa Markets during the Electric Power Indonesia Show in Jakarta.

This workshop, presented, shared, and discussed how to accelerate the energy transition in Indonesia by applying technology and solutions that exist today to increase energy efficiency and integrate more renewable energy into the energy system.

The event included presentations on the following topics:
- Indonesia Energy Transition Outlook
- The Importance of Energy Efficiency in the Energy Transition
- Maximizing Energy Efficiency with District Cooling
- Technology to support RE integration
- District Cooling developments in the new capital city, Nusantara

We want to thank our speakers for contributing with great presentations and discussion of how the Energy Transition in Indonesia can be supported:

- Devi Laksmi Zafilus, Deputy Director of Energy Conservation for Energy Efficiency, Business Development, Ministry of Energy and Mineral Resources
- CK Tan, EVP Motion Business PT. ABB Sakti Industri
- Peter Tan, Business Development Manager, Keppel Energy-as-a-Service (EaaS)
- Kuntoro Kuntoro, Head of Digital Solution & Senior System Consultant, Yokogawa Indonesia
- Rana Yusuf Nasir, Vice Chairman Board of Expert, Indonesian Society for Energy Conservation & Efficiency (MASKEEI)
- Peter Lundberg, Executive Director, APUEA (Moderator)

We also want to thank our co-host, Informa Markets, for creating this workshop with us.

DISTRICT COOLING INTERNATIONAL CONFERENCE (DCIC)

Between 31 October and 1 November 2023, APUEA participated as an International Partner at the District Cooling International Conference (DCIC) in Goa, India.

The 2-day international conference discussed District Cooling technology and how to support project development and collaboration between public and private sectors. The conference focused on three critical themes: **(1) Urban Integration and Governance, (2) Economic and Financial Viability, and (3) Resource Circularity and Energy Transition.** The conference included participation from government bodies, policymakers, private sector organizations, industry experts, civil society, academia, researchers, and more. The event was organized by the Alliance for an Energy Efficient Economy (AEEE), KPMG India, UN Environment Programme, and supported by the Asia Pacific Urban Energy Association (APUEA), Bureau of Energy), GIZ India, Federal Ministry for Economics and Climate Action, International Climate Initiative.

During the event APUEA hosted and moderated the panel discussion titled 'Securing Investments for a Sustainable Tomorrow: Exploring Business and Financial Frameworks for District Cooling Initiatives,'. The session delved into the business case for district cooling systems and included the following panelists:

- Eric Lindström, DEVCCO
- Zhuolun Chen, UN Environment Programme
- Tarun Garg, RMI
- Sudheer Perla, Tabreed India
- Neha Nagpal, IFC – International Finance Corporation
- Abhishek Gupta, Energy Efficiency Services Limited
- Sohini Ghosh Mukherjee and Siddharth jain, KPMG India
- Mikael Jakobsson, APUEA (Moderator)

We want to thank AEEE for collaborating with us to promote District Cooling in India. We also want to thank Danish Board of District Heating (DBDH), and participating APUEA - DBDH Members (below) for supporting and participating in the event. Thank you also to the Embassy of Denmark for supporting the event.

Participating APUEA – DBDH Members:

- Tabreed
- DEVCCO
- Kamstrup
- Grundfos
- Frese
- Iron Pump A/S

WEBINAR – DISTRICT COOLING FOR MODERN DEVELOPMENTS

On 2 October, APUEA co-hosted the District Cooling for Modern Developments webinar with the International Real Estate Federation (FIABCI). The webinar focused on how District Cooling can add benefits and value to buildings and real estate developments.

Webinar title: District Cooling for Modern Developments together
Hosted by: FIABCI, APUEA
Host: Dr. Sopon Pornchokchai, FIABCI Thailand
Speakers: Peter Lundberg, APUEA and Mr. Zhenglin Wang, Keppel Energy as a Service (EaaS)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EVENT CALENDAR

APUEA EVENTS

ASIA URBAN ENERGY ASSEMBLY 2024

4-5 JULY 2024

Bangkok, Thailand

29-30 JANUARY

APUEA - FIABCI THAI STUDY VISIT TO SINGAPORE
Singapore

29-30 JANUARY 2024

12-16 MARCH

INDIA SMART UTILITY WEEK
New Delhi, Delhi, India

12-16 MARCH 2024

20-22 MARCH

PHILENERGY 2024
Manila, Philippines

20-22 MARCH 2024

3-7 JUNE

ASIA CLEAN ENERGY FORUM (ACEF)
Manila, Philippines

3-7 JUNE 2024

3-5 JUNE

EUROHEAT & POWER CONGRESS 2024
Rotterdam, Netherlands

3-5 JUNE 2024

26-28 JUNE

ENERTEC ASIA 2024
Kuala Lumpur, Malaysia

26-28 JUNE 2024

3-5 JULY

ASEAN SUSTAINABLE ENERGY WEEK
Bangkok, Thailand

3-5 JULY 2024

4-5 JULY

ASIA URBAN ENERGY ASSEMBLY 2024
Bangkok, Thailand

4-5 JULY 2024

28-31 AUGUST

ELECTRIC & POWER INDONESIA
Jakarta, Indonesia

28-31 AUGUST 2024

4-6 SEPTEMBER

HVACR VIETNAM / ELECTRIC & POWER VIETNAM
Ho Chí Minh, Vietnam

4-6 SEPTEMBER 2024

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IVL Swedish Environmental Research Institute

District Energy in Cities Initiative

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Thai ESCO Association

Overseas Environmental Cooperation Center (OECC)

Institute for Sustainable Energy Policies

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Corporate Member		◯	◯	◯
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APUEA Magazine

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