

Digitalising the Smart City

Innovation towards engineering

Excellence in the Built Environment



Preface

Riding on the success of CIBSE Building Performance Awards (BPA) in UK, the new CIBSE Hong Kong Awards programme on Building Services Engineering initiated by the CIBSE Hong Kong Region (HKR), was first launched in 2019.

This Award aims to recognize demonstrated engineering excellence in the built environment and provide a platform for encouraging projects in the building construction and facility management industries. Importantly, it drives organizations and engineering professionals to collaborate, deliver the most appropriate and cost-effective solutions from design to installation. The common goals are to improve efficiency, quality, safety, and reduce operating costs through more effective building services installation for the benefit of businesses and society.

The third CIBSE Hong Kong Awards, launched in January 2023, is the only industry award that focuses on actual measured performance outcomes in the built environment, rather than just design intent or performance specifications. The awards are open to any organization within Hong Kong that is responsible for the design, construction, installation, commissioning, and operation of low-energy buildings with a high-quality built environment. The awards remain true to our professional mission by being free to enter and by minimizing the burden of filling out forms. We look forward to learning and sharing the success stories of the winners. Furthermore, we sincerely anticipate that the winners of the awards will showcase their achievements by submitting qualified entries to participate in the upcoming CIBSE Building Performance Awards in the UK.

Award

a) Project of the Year Award – Commercial / Industrial Building, Public Use Building and Retrofit Building

- Project of the Year Award (for winner)
- Merit Award (for Shortlisted)

b) Facilities Management Team Award

- Facilities Management Team Award (for winner)
- Merit Award (for Shortlisted)

c) Best Digital Innovation Award

- Best Digital Innovation Award (for winner)
- Merit Award (for Shortlisted)

Categories for Entry

a) Project of the Year Award

- Commercial/Industrial Building
- Public Use Building
- Retrofit Building

The Awards recognise the building project (new or refurbished) that most effectively demonstrates achievement of high levels of user satisfaction and comfort and outstanding measured building performance, energy efficiency and reduced carbon emissions. Subcategories in specific building usage are given in table below:

Categories (Sector based)	Building Usage	Example (building owner / building name)
Commercial / Industrial Projects	Building that is mainly (a) used for offices, shops, entertainment facilities; and etc (b) used for the purpose of any trade, business or profession (including industrial use)	Building Developers, Data Centre, Commercial Office Block, Private Club Houses, Hotel, Commercial Complex, Club House, Convention and Exhibition Centre, Theme Parks and etc.
Public Use Projects	Building that is mainly used for general public purposes and includes functions managed by government / non-government organisation, public utilities, public organisation, quasi-government Corporation / Public Institutions.	Airport Authority, University, Hospital Authority, Government Offices, Vocational Training Council, Health Centre, MTR, West Kowloon Cultural District Authority and etc.
Retrofit Projects	Retrofit project of whole building or of any substantial or significant part of a building only.	Open to all types of buildings.

b) Facilities Management Team Award

Most facilities management teams work in a range of areas, combining resources and activities to deliver a safe, healthy and efficient work environment. This award recognises and celebrates the achievements of the facilities management (FM) team, whether inhouse or outsourced, who delivers outstanding operational performance from an individual building, a site with several buildings, business premises including supporting facilities or a portfolio of assets. This includes delivering the comfort levels and working conditions required by the users while demonstrating substantially reduced carbon emissions, energy, water consumption and effective waste management.

c) Best Digital Innovation Award

Introducing in 2023 (CIBSE UK) to recognise an innovation that has made a significant contribution to digital engineering. The two elements (digital & innovation) are important in BSE in order to stay competitive and include changes in next generation.

This Award recognises and celebrates an innovation that has made a significant contribution to digital engineering in Hong Kong. This may be a piece of software, a project process or other innovation that shows ground-breaking thought.

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Message from CIBSE Chief Executive



Riding on the success of CIBSE Building Performance Awards in UK, the CIBSE Hong Kong Awards was launched in 2019 to drive organisations and engineering professionals to collaborate and deliver the most appropriate, cost-effective solutions from design, through to installation and beyond. The Hong Kong Awards celebrate the role of building services engineering in delivering efficiency, quality, safety and reducing operating costs, for the benefit of business and society.

The world class knowledge, best practice resources and route to Chartership is what CIBSE stands for globally. CIBSE Hong Kong has played a pivotal role in this world-wide leadership, being our first non-UK region and our largest region outside of the UK – representing 59% of our non-UK membership and 15% of total membership.

CIBSE's knowledge and expertise has been acknowledged by wider industry, not least with our technical contribution to critical developments in setting standards for achieving greater building performance, and our ongoing activities on net zero carbon for a more sustainable future. These include:

- A leading voice in the creation of the UK Net Zero Carbon Building Standard
- Contributed to Mission Retrofit, co-authored by Chris Skidmore and Simon McWhirter
- Refreshed climate action plan
- Input into the Building Safety Act.

CIBSE Hong Kong have been instrumental in developing the role of building services engineers in the region. This ongoing partnerships with CIBSE Hong Kong, the Hong Kong Institution of Engineers (HKIE), ASHRAE HK and Hong Kong Polytechnic University through the joint symposium plays a key role in bringing building efficiency, performance and excellence in building services engineering to the forefront of industry and exemplifies the ongoing role CIBSE takes and will continue to take.

The Hong Kong Awards are an event in recognition of engineering excellence in the built environment and I take great joy knowing that the learnings and shared success stories of the winners will inspire future professionals to enter the world of building services engineering.

My congratulations to the winners of the CIBSE Hong Kong Awards 2023 in your accomplishments and the very best of luck in your future endeavours.

A final thank you to our sponsors, the judges and CIBSE Hong Kong Region for building on the success of the Awards and enabling CIBSE to showcase the positive impact of our profession on our future everyday lives.

Ms. Ruth CARTER
CIBSE, Chief Executive

Message from CIBSE President



The CIBSE Hong Kong Awards 2023 recognise demonstrated performance in the built environment.

They provide an ideal opportunity for us to showcase engineering excellence in the built environment and celebrate outstanding projects in construction and facilities management. Most importantly though, they drive organisations and engineering professionals to collaborate and deliver the very best, cost-effective solutions from initial design intent, through their installation and commissioning, right into building use and post occupancy evaluation.

This 3rd CIBSE Hong Kong Awards is the only industry awards event that focuses on actual and measured performance outcomes, rather than any aspirational targets or design intent. This will be central if we are to adapt to climate change and deliver on our net zero carbon agenda.

I am excited to support the Hong Kong Region Awards and am looking forward to hearing about some of the fantastic projects submitted. Whether, they are for Project of the Year, which recognises building services excellence in new or refurbished buildings, or the Facilities Management Team Award, which celebrates the achievements of in-house or outsourced facilities management teams, or indeed the Best Digital Innovation Project of the Year, that has made a significant contribution digital engineering. Each of these, has a wonderful story to tell about engineering excellence and operational best practice.

I would encourage all of you to actively participate in CIBSE activities, seminars, CPD courses, and the excellent conferences the Hong Kong Region organises each year.

Finally, I would like to congratulate the CIBSE Hong Kong Region for another superb event, and all the Awards Winners for their success. Your hard work and dedication are acknowledged and appreciated. Many thanks also to the Steering and Organising Committees, the Honorary Advisors, the Judging Panel, and all our sponsors for their support in making the Awards such a tremendous success.

Mr. Adrian CATCHPOLE
CIBSE, President (2023/24)

Message from CIBSE Hong Kong Region Chair



Congratulation to the successful completion of the third CIBSE Hong Kong Awards 2023. CIBSE Hong Kong Awards is providing a common platform in building services engineering to showcase the industry achievement, exchange of experience, Innovative ideas, consideration to climate changes & sustainability.

This award is also a testament to the hard work and commitment, to push the boundaries of building services excellence. Keep up the amazing work and the exceptional talent.

Each CIBSE Hong Kong Awards receives support from the industries of Building Services, with more and more participants. Especially this year, there are participants from additional sectors such as the Data Centre group. The participants show their professionalism and creativities. Once again congratulations to the winners, thanks for their participation. This is the first-year return to normal after the COVID-19, under limited time and tight schedule the committee really work hard to organise the CIBSE Hong Kong Awards. I would like to extend my gratitude to the organizing committee for the effort they paid.

Mr. TC CHAN

Chair, CIBSE Hong Kong Region (2022/23)

Message from CIBSE Hong Kong Region Chair



On behalf of the CIBSE Hong Kong Region, I extend my heartfelt congratulations to all the participants and winners of the third CIBSE Hong Kong. This momentous occasion marks another milestone in our journey to recognize and celebrate Building Services Engineering excellence in the built environment.

Ever since its inception in 2019, the CIBSE Hong Kong Awards have been a platform to honor projects that exemplify the highest standards of Building Services Engineering ingenuity. Our awards ceremony has become a beacon of inspiration for the industry, motivating professionals to push boundaries and redefine what is possible in the field.

I applaud all the participants who submitted their outstanding projects for consideration. Your dedication to excellence and commitment to innovation are the driving forces behind the advancements we witness in our industry. The projects showcased in this year's awards demonstrate the remarkable achievements made by organizations responsible for the design, construction, installation, commissioning, and operation of low-energy buildings with high-performance of built environments. Your contributions are shaping the future of our profession and leaving a lasting positive impact on society.

I would also like to express my deepest gratitude to the organizers, judges, and sponsors who have tirelessly worked behind the scenes to make this event a resounding success. Your unwavering support and dedication to promoting excellence in building services engineering are highly commendable. Without your contributions, this celebration of achievement would not have been possible.

Once again, my warmest congratulations to all the participants and winners of the third CIBSE Hong Kong Awards. Your achievements are a testament to the immense talent and unwavering dedication within our industry. I eagerly anticipate witnessing even greater accomplishments as we continue our journey together.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Gary Chiang', written in a cursive style.

Mr. Gary CHIANG
Chair, CIBSE Hong Kong Region [2023/24]

The Awards Committee

Steering Committee

Prof. Thomas CHAN

Chair of Steering Committee, Council of Management Member, CIBSE HKR

Mr. Thomas SOON

Deputy Chair of Steering Committee, Council of Management Member, CIBSE HKR

Mr. Ronald CHIN

Past Chair of CIBSE HKR

Mr. KL CHAN

Past Chair of CIBSE HKR

Mr. Keith MA

Past Chair of CIBSE HKR

Mr. Vincent MA

Past Chair of CIBSE HKR

Mr. TC CHAN

Chair of CIBSE HKR (2022/2023)

Organising Committee

Prof. Horace MUI (Chair)

Mr. Gary CHIANG

Mr. TC CHAN

Mr. Vincent MA

Mr. Alvin LO

Mr. Sam NG

Mr. Derek CHAN

Mr. Elmen CHU

Mr. Kwan-Ho SHING

Judging Panel Members



Prof. Thomas CHAN
Chair of Judging Panel,
CIBSE Hong Kong Awards 2023



Prof. Horace MUI
Chair of Organising Committee,
CIBSE Hong Kong Awards 2023



Mr. Thomas SOON
Deputy Chair of Steering Committee,
Council of Management Member,
CIBSE HKR



Mr. TSE Cheong Wo,
Edward, BBS, JP
Director of Architectural Services,
HKSAR Government



Mr. PANG Yiu Hung,
Eric, JP
Director of Electrical & Mechanical Services,
HKSAR Government



Mr. Eric MA,
GBS JP
Senior Vice President,
The Hong Kong Institution
of Engineers



Mr. Rocky POON
President,
The Hong Kong Federation of
Electrical and Mechanical Contractors



Dr. LT WONG
Associate Head (Partnership)
and Associate Professor,
Department of Building Environment
and Energy Engineering (BEEE)
The Hong Kong Polytechnic University

CIBSE Hong Kong Awards 2023

Judging Panel Presentation



Finalists of the CIBSE Hong Kong Awards 2023

PROJECT OF THE YEAR AWARD – COMMERCIAL / INDUSTRIAL BUILDING

- > International Commerce Centre (ICC)
- > Marina 8
- > Nina Mall 2

PROJECT OF THE YEAR AWARD – PUBLIC USE BUILDING

- > Kowloon East Regional Headquarters and Operational Base cum Ngau Tau Kok Divisional Police Station
- > Shaw Auditorium
- > Tai Po Tung Cheong Street Leisure Building

PROJECT OF THE YEAR AWARD – RETROFIT BUILDING

- > Renovation Works of Provident Square, North Point
- > TKO Plaza

FACILITIES MANAGEMENT TEAM AWARD

- > Design-Build-Operate a District Cooling System (Phase II Works) at Kai Tak Development and Operation and Maintenance Services of DCS in West Kowloon Culture District
- > Hong Kong Palace Museum
- > Manulife Tower
- > Park Central Shopping Arcade
- > Retro-commissioning for Sha Tin Racecourse Grandstand following Air Conditioning Infrastructure Upgrades

BEST DIGITAL INNOVATION AWARD

- > A novel artificial intelligence algorithm for energy optimization in the smart building
- > Energy Management System with A.I. Optimization
- > Integrated Smart Management System
- > New World Energy Centre - Ecoworld
- > The Cloud-based A.I. Solution for Energy Efficiency at 2IFC

Winners of the CIBSE Hong Kong Awards 2023

PROJECT OF THE YEAR AWARD – COMMERCIAL / INDUSTRIAL BUILDING

> International Commerce Centre (ICC)

PROJECT OF THE YEAR AWARD – PUBLIC USE BUILDING

> Kowloon East Regional Headquarters and Operational Base cum Ngau Tau Kok Divisional Police Station

PROJECT OF THE YEAR AWARD – RETROFIT BUILDING

> TKO Plaza

FACILITIES MANAGEMENT TEAM AWARD

> Design-Build-Operate a District Cooling System (Phase II Works) at Kai Tak Development and Operation and Maintenance Services of DCS in West Kowloon Culture District

BEST DIGITAL INNOVATION AWARD

> Integrated Smart Management System

Project of the Year Award – Commercial/Industrial Building

Winner:

INTERNATIONAL COMMERCE CENTRE (ICC)

Kai Shing Management Services Limited

 啟勝管理服務有限公司
KAI SHING MANAGEMENT SERVICES LIMITED
PMI Licence Number: G48910

 環球貿易廣場
INTERNATIONAL
COMMERCE CENTRE



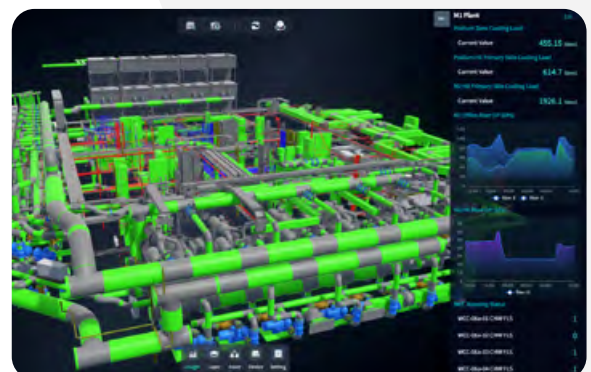
ICC is Hong Kong's tallest building, stands as a 118-storey commercial tower providing approximately 3 million sq. ft. of space encompassing offices, an observation deck, restaurants, and a premium hotel. Positioned strategically at a transportation hub, ICC establishes synergies with neighboring developments like the West Kowloon Cultural District and high-speed railway West Kowloon, contributing to the vision of a One-hour living circle across the Greater Bay Area (GBA).

As one of the landmark properties in Hong Kong, ICC commits to sustainable development and employs advanced technologies to enhance energy efficiency and sustainability. ICC fully supports the group, Sun Hung Kai Properties' 10-year energy reduction target, to reduce the electricity consumption intensity by 13% between 2019/2020 and 2029/2030.

ICC determines to work towards as the highest green building in Hong Kong through the participations in various international and local certifications like the BREEAM [the first building in Hong Kong certified], BEAM Plus EB V2.0 [the first building certified], LEED V4.1 O&M: EB [the highest score

in Hong Kong] and the implementation of sustainability related management standards such as ISO 50001:2018 EnMS and ISO 41001:2018 FMS to enable the continual improvement of energy and building performance. Meanwhile, with the company motto "We serve you best", ICC offers "Excellent" Indoor Air Quality, cover the whole building includes both common and tenancy areas, which allows the healthy and comfort working environment to tenants and guests.

Embracing the **SMART I-C-C** framework, which integrates Sustainability, Machine Learning, Artificial Intelligence (AI), Research & Development and Training with Intelligence, Collaboration & Continuity. Apart from green, ICC also dedicates to becoming Hong Kong's tallest smart building by integrating innovative technologies into daily management and implementing energy optimization strategies. For instances, ICC developed a BIM model on existing building basis for building management and then the digital twins to improve facilities operation and monitoring. Moreover, ICC collaborates with the Hong Kong Polytechnic University (PolyU) to implement "Life cycle retro-commissioning" for the continuous commissioning and control optimization of building systems. The exercise



involves periodic monitoring of the building's performance using AI machine learning and big data analysis to identify opportunities for energy and operational improvements. Over the past decade, ICC achieved a remarkable energy saving result, with a reduction of over 20 million kWh in electricity consumption from 2012 to 2022. Below are the initiatives to enhance the energy efficiency, building operations and management of ICC:



1. Innovative chilled water battery by leveraging the inherent heat storage capabilities of chilled water system with the use of artificial intelligence models to analyze and predict cooling demands. This optimization strategy improves the efficiency of the air conditioning system, resulting in energy savings of up to 7%.
2. AHU supply air static pressure (fault-tolerant) control strategy by utilizing statistical models to optimize the supply air static pressure of air conditioning system, dynamically optimizing energy consumption based on actual demand. This approach leads to significant savings of over 30% in fan power consumption.
3. Technologies applications like video analytic for security monitoring – automatic tailgating system to oversee the turnstile access control at main lift lobbies. Another example is façade inspection – adopt drone with AI technology. Both methodologies can optimize manpower resources, time and cost.

4. Augmented Reality Maintenance Management (ARMM) – this is another technology by utilizing 3D scanning technology to render a high accuracy 3D model with internal and external structures, which allows remote monitoring and operate facilities virtually via an ARMM interface, enhancing management efficiency and enabling quick responses to unforeseen incidents.

Lastly, ICC collaborates with tenants, industrial partners, academic and professional institutions, NGOs and government bodies via visits, events, best practices sharing, etc. to engage with stakeholders in pursuing sustainable development and fully supports national and Hong Kong's carbon neutrality goals.

ORGANISATION:

Kai Shing Management Services Limited

PROJECT ADDRESS:

No.1 Austin Road West, Kowloon, Hong Kong

PROJECT TEAM:

Building Services Engineer: J. Roger Preston Ltd

Building Developer / Owner: Sun Hung Kai Properties Ltd

Project Manager: The Harbour Vantage Management Ltd

Quantity Surveyor: WT Partnership (HK) Ltd

Brief Consultant: Wong & Ouyang (HK) Ltd

Architect: Wong & Ouyang (HK) Ltd

Façade Consultant: Meinhardt Group International Limited

Lighting Designer: Lighting Planners Associates

Interior Designer: Kohn Pedersen Fox Associates

MVAC, Electrical, BMS, ELV / ICT, Fire Services and P&D Contractor: Sanfield Building Contractors Ltd

Main Contractor: Sanfield Building Contractors Ltd

Facilities Manager: Kai Shing Management Services Ltd

Project of the Year Award – Commercial/Industrial Building

Merit:

MARINA 8

Hong Yip Service Company Ltd. – Marina 8



MARINA 8, developed by Sun Hung Kai Properties, is a commercial building located in Wong Chuk Hang, Hong Kong. The building is managed by Hong Yip Service Co. Ltd. It is situated in close proximity to Ocean Park and Aberdeen Marina Club, offering scenic views and convenient access to recreational facilities. The building is strategically positioned next to a large-scale residential project on top of the Wong Chuk Hang MTR station.

With a total gross area of 13,655.9 square meters, MARINA 8 is a 25-storey development that combines office, retail, and dining spaces. The building consists of two floors dedicated to restaurants, 22 floors for office space, two floors for shops, and two basement floors for car parking.

As a sustainable and energy-efficient complex, MARINA 8 incorporates various green building strategies. The office units feature Low-E double glazing windows, which serve as a curtain wall to reduce heat transmission and minimize the need for air conditioning, thus reducing energy consumption. The design also includes openable windows on the building facade to encourage natural ventilation by convection, further decreasing reliance on air conditioning.

In line with promoting sustainable transportation, the basement car park at MARINA 8 is equipped with a double-deck system to provide ample parking space. Additionally, parking spaces are equipped with electric vehicle (EV) chargers, encouraging the use of electric vehicles and supporting a low-carbon lifestyle.

MARINA 8 has undergone assessments to validate its sustainability and environmental performance. It has obtained the Final Silver rating in the Building Environmental Assessment Method (BEAM Plus), a comprehensive green building certification scheme in Hong Kong. The final assessment report was released in 2023, confirming MARINA 8's compliance with the green building standards.

Furthermore, MARINA 8 has participated in the WELL AP rating, which evaluates buildings based on their impact on human health and well-being. The building has obtained the relevant certificate, indicating its commitment to promoting a healthy and productive indoor environment for its occupants.

Overall, MARINA 8 stands as an excellent Grade A complex, combining office and retail spaces, with a strong emphasis on sustainability, energy efficiency, and occupant well-being.



ORGANISATION:

Hong Yip Service Company Ltd. – Marina 8

PROJECT ADDRESS:

Marina 8, 8 Heung Yip Road, Wong Chuk Hang, Hong Kong

PROJECT TEAM:

Building Services Engineer: Sun Hung Kai Architects and Engineers Ltd.

Building Developer / Owner: Santa Property Investment Ltd.

Project Manager: Sun Hung Kai Architects and Engineers Ltd.

Quantity Surveyor: Sun Hung Kai Architects and Engineers Ltd.

Structural Engineer: Sun Hung Kai Architects and Engineers Ltd.

Architect: Sun Hung Kai Architects and Engineers Ltd.

Sustainable Design Consultant: Allied Environmental Consultants Ltd.

MVAC Contractor: Shun Hing E & M Engineering Ltd.

Electrical Contractor: Everfield Engineering Co. Ltd.

Fire Services Contractor: Pyrofoe Engineers Ltd.

P&D Contractor: Aires Engineering Co. Ltd.

Main Contractor: Yee Fai Construction Co. Ltd.

Facilities Manager: Hong Yip Service Co. Ltd.

O&M Agent: Yee Fai Construction Co. Ltd.

Project of the Year Award – Commercial/Industrial Building

Merit:

NINA MALL 2

Chinachem Group



CHINACHEM GROUP
華懋集團



Located in the heart of Tsuen Wan West, Nina Mall 2 serves as a gateway and connects all the nearby developments to the Tsuen Wan West MTR station. With a total GFA of around 11,000 m² for the retail portion, Nina Mall 2 is consisted of a 3 storey retail block and a 2 storey carpark and has been a local hotspot since May 2019.

To align with the triple bottom line of Chinachem: People, Prosperity, and Planet, Nina Mall 2 is equipped with many innovative features to minimize energy consumption and enhance indoor environmental quality within the premises. For starters, on-site renewable energy such as photovoltaic panels are adopted. To minimize water consumption, rainwater harvesting system, bleed-off water recycling system for flushing water, and water efficient fitments are installed. Furthermore, for energy use reduction, LED luminaires with lighting control systems such as occupancy sensors and daylight sensors, VSD for water pumps, energy saving mode for lift cars, demand control for HVAC system, and energy-efficient HVAC equipment and filters are deployed. Active monitoring of the development's energy use is also enabled by the provision of smart metering system, connecting to the BMS of the development.

In terms of indoor environmental quality, the façade of the development is specifically designed with vast majority of glass wall and green wall to both enable penetration of natural lighting and improve indoor thermal comfort, keeping an indoor temperature of around 24°C to 26°C. Furthermore, in view of the recent pandemic, Nina Mall 2 has deployed disinfection stations around the development for the occupants' use. Touchless lift car buttons are installed to minimize close contact among the shoppers.



Finally, to promote sustainability lifestyles, Nina Mall 2 is designed with designated public bicycle parking and electric vehicle charging facilities to encourage green transportations. Equipment that uses only renewable energy, such as solar wall lamps and solar mosquito trap, are also easy to find in the landscape area of the development. To encourage contribution from the public toward sustainability, the development also participates in many campaigns related to energy saving, such as the Earth Hour, every year.

Overall, Nina Mall 2 is proud to be at service for the community while caring for the neighbour hood, cherishing the planet's resources, and setting examples in sustainable retail operation.



ORGANISATION:

Chinachem Group

PROJECT ADDRESS:

Nina Mall 2 at west rail Tsuen Wan West Station
TW5 Cityside, TWTL 417

PROJECT TEAM:

Building Services Engineer: WSP (Asia) Limited

Building Developer / Owner: Chinachem Group & MTRC

Project Manager: Chinachem Group

Quantity Surveyor: RLB Asia Limited

Structural Engineer: Arup Group

Architect: Wong & Ouyang (HK) Ltd

Sustainable Design Consultant: Arup Group

MVAC Contractor: Alliance Contracting Company Limited

Electrical Contractor: Huns Engineering Company Limited

Fire Services Contractor: Shun Cheong Engineering Company Limited

P&D Contractor: Southa Technical Limited

Main Contractor: Gammon Engineering & Construction Company Limited

Facilities Manager: Chinachem Group

O&M Agent: Wylie Maintenance and Services Ltd.

Project of the Year Award – Public Use Building

Winner:

KOWLOON EAST REGIONAL HEADQUARTERS AND OPERATIONAL BASE CUM NGAU TAU KOK DIVISIONAL POLICE STATION

a. Architectural Services Department (ArchSD)

b. Electrical and Mechanical Services Department (EMSD)

 建築署
Architectural Services Department

機電工程署  EMSD



Kowloon East Police Regional Headquarters and Operational Base cum Ngau Tau Kok Divisional Police Station (KERHQ) is a re-provisioning project of various police offices and facilities among Kowloon East District. It is an integrated complex consists of 16-storey of Police facilities with car parks providing enhanced services to the new Kai Tak community. To foster the green community culture in Kowloon East, the design of this building complex emphasizes on energy efficiency and sustainability with innovative building services systems endeavor to achieve the goal of low carbon emission and energy consumption.

KERHQ is designed to outperform the statutory energy efficiency taking into account of passive and active sustainable building design features in achieving the goal. It is designed not only to meet the building occupants' needs in terms of comfort, security, safety and operational efficiency, but also to equip a number of sustainable design features to reduce its carbon emission and environmental impact as well as achieving eco-friendliness of built environment, following the green building assessment guidelines set out in the Building Energy Assessment Method (BEAM) Plus (New Building) Version 1.2.

To achieve a green government building with emphasis on building energy efficiency and sustainability, this project has adopted various forms of sustainable elements including energy efficient features and renewable energy technologies. The sustainable design of KERHQ adopted a holistic design approach with the overall consideration of building envelope, application of renewable energy and energy efficiency features beyond statutory requirements and general practices.





The energy efficient features and renewable energy technologies adopted in this sustainable building design include:

- Adoption of District Cooling System (DCS);
- Photovoltaic system and solar hot water system as renewable energy sources;
- Demand control ventilation, air-side heat recovery wheel and free cooling for primary air handling units;
- CO/NO₂-based demand control ventilation to reduce energy consumption on carpark ventilation;
- Energy reclaim of lift regenerating power;
- Use of rainwater harvesting and condensate water recycling system for landscape irrigation;
- Power Quality Management System (PQMS) and Building Energy Management System (BEMS) for instant energy monitoring and future auditing;
- Podium free design to echo the design concept in Kai Tak Development Area and to enhance ventilation in the area;
- Maximization of greenery coverage of about 30% of the total building area;
- Energy efficient building envelope with low-E glazed curtain wall.

The analysis of energy data indicated that various energy efficient features and renewable energy technologies adopted in KERHQ were effective for the purpose of energy conservation and reduction of building operation cost. The annual electricity consumption of KERHQ in 2021 was about 20% less than the estimated electricity consumption of the building simulation model under BEAM Plus.

In addition to the energy saving achievement benefits from the sustainable building design features, KERHQ adopted DCS water source for heat rejection, and the building owner was no longer required to install, operate, maintain and replace their own chillers, resulting in simplified system operation and maintenance. Hence, the up-front capital cost and subsequent maintenance cost for the air-conditioning plant were reduced. Also, the

reliability and flexibility of the air-conditioning system have been improved from maintenance and operation point of view. The KERHQ cooling plant receives its chilled water supply from a centralized district cooling plant located at the Kai Tak district, which distributes chilled water to KERHQ through a network of thermally insulated underground chilled water pipes for space cooling. In normal operation, the DCS plant would be the primary chilled water source, and variable chilled water pumps distribute the chilled water for air-conditioning loads.

Apart from the sustainable design consideration, to promote the adoption of innovative technology in the construction industry, KERHQ took the initiative in implementing Modular Integrated Construction/ MultiTrade Integrated Mechanical, Electrical and Plumbing (MiC/MiMEP) to meet the tight construction programme, which included the modular acoustic enclosure for total energy heat pumps (TEHP) at roof level, pre-fabricated heating plant unit and air duct system. The adoption of this approach had showcased the quality improvement, productivity and construction site safety enhancement. Building Information Model (BIM) application was also adopted to facilitate smooth coordination particularly for the plant room layouts and installations.

ORGANISATION:

Architectural Services Department (ArchSD) & Electrical and Mechanical Services Department (EMSD)

PROJECT ADDRESS:

105 Concorde Road, Kai Tak, Kowloon

PROJECT TEAM:

Building Services Engineer: WSP Hong Kong Limited

Building Developer / Owner: Hong Kong Police Force (HKPF)

Project Manager: Architectural Services Department (ArchSD)

Quantity Surveyor: C.S. Toh & Sons & Associates Limited

Structural Engineer: WSP Hong Kong Limited

Architect: TFP Farrells Ltd.

Sustainable Design Consultant: Urban Green Consultants Limited

MVAC, Electrical, Fire Services and P&D Contractor: Hsin Chong Aster Building Services Limited

Main Contractor: Hsin Chong – Build King Joint Venture

Facilities Manager: Hong Kong Police Force (HKPF)

O&M Agent: Electrical and Mechanical Services Department (EMSD)

Project of the Year Award – Public Use Building

Merit:

SHAW AUDITORIUM

HKUST



The HKUST Shaw Auditorium at the Hong Kong University of Science and Technology is a world-class performing arts venue featuring a highly flexible, acoustically sophisticated main hall and generous social spaces for the campus community. The sustainable architectural design is an inventive response to the local sub-tropical climate and the site's prominent location as the new nodal point connecting the University's southern and northern campuses. Its iconic, ring-shaped façade signals its artistic and cultural programming, while its elliptical floorplan with multiple entrances makes it a welcoming landmark. Designed to be full of life day and night, the Auditorium's pleasant classrooms, social areas and circulation spaces encourage students to meet, study and relax. The Grand Foyer's stepped seating also functions as a small-scale performance space. Therefore, the Shaw Auditorium is not only a destination for major events, but also a part of the campus's daily social fabric. The reconfigurable main hall has several modes that accommodate a wide range of events, including performing arts productions, lectures, and other large-scale events. The retractable raked seating can fit either 840 or 1,300 seats or be stored away to provide an open surface for conferences, open days, and exhibitions. The curved wall can also function as a 360-degree projection screen. With its varied requirements, performing arts venues seldom can

be sustainable, but the Auditorium achieved an impressive BEAM Plus Platinum rating.

Passive design using the extensive overhang structural design supporting the balcony provides significant reduction of solar irradiation to the building façades with over 70% of total solar heat blocked during cooling seasons. Daylight penetration into the atrium via skylights provides a good balance of daylight access and reflective interior surfaces around the atrium provide a well-lit environment that does not solely rely on artificial lighting. The high-performance building facade reduces solar heat gains further and demand controlled all air systems greatly reduce the building energy consumptions by more than 20% as compared to the baseline in EMSD Building Energy Code.

With more than 50% of total roof area installed with grid connected photovoltaic system for onsite power generation, the total building energy consumption is further offset by more than 2.5%.

HKUST and the project team considered using the existing HKUST main campus water-cooled district cooling system to serve this new building instead of installing new on-site chillers. This approach not only saved valuable plant space, but also addressed concerns related to noise and vibration controls as the Shaw Auditorium was designed to achieve stringent acoustics performance suitable for a variety of performances.



All air handling units were equipped with EC plug fans array for achieving lower fan power, better acoustics performance while providing enhanced system resilience. High performance filters are installed after flush-out and prior to occupancy to ensure the indoor air quality meets the Hong Kong Indoor Air Quality (HKIAQ) Certification Scheme "Excellent" Class with respect to various indoor and outdoor pollutants.

Smart demand control ventilation continuously monitors the indoor air quality via constant sampling of the air via air quality sensors and adjusts the fresh air provisions to the spaces while achieving energy savings.

Centralized Control and Monitoring System (CCMS) assisted HKUST Campus Management Office for monitoring the space temperature, air quality and energy consumption. Significant energy saving was achieved through set back of internal ambient condition, and daylight, motion, and time control of lighting. The annual energy consumption was 225MJ/m²/annum, which was at the top 10th percentile of the same building group in accordance with energy consumption benchmarking tools by EMSD.

Remarkable acoustics performance was achieved for this auditorium with designed NR20 spaces. All air terminal devices and ductwork were carefully sized to achieve low induct velocities complying with the NR20 requirements. Silencers and external cladding of air ducts on the main roof were provided to prevent noise impact from the external environment.

Theatrical system installations, audio visual systems, special effects from the indoor cyclorama around the auditorium were designed with precision for seamless coordination with the overall architectural, structural, MEP and the theatrical installations. A platform lift at the heart of the auditorium was a key feature allowing seating stored under floor to be lifted when required and hidden from view during a flat floor mode setting.

The HKUST Shaw Auditorium is fully covered with 5G network, high speed Wi-Fi and "Future Ready" LoRaWan infrastructure for working seamlessly with wireless smart sensors that could be implemented in future. For the external landscape areas, smart multipurpose lamp poles with built-in Wi-Fi would allow continuous uninterrupted connectivity of high-speed Wi-Fi even in the outdoor landscape areas.



Lastly, separate energy sub-meters for different individual building services systems greatly assisted the end users to understand their energy consumption. All the data and energy use patterns could be easily obtained and visualized via the CCMS for monitoring and targeting. It is anticipated that more energy savings will be achieved in future, which will be part of the HKUST strong commitment towards a net-zero carbon campus.

ORGANISATION:
HKUST

PROJECT ADDRESS:
Shaw Auditorium, HKUST, Clear Water Bay, Hong Kong

PROJECT TEAM:
Building Services Engineer: WSP Hong Kong Limited
Building Developer / Owner: The Hong Kong University of Science and Technology
Project Manager: Campus Development Office, The Hong Kong University of Science and Technology
Quantity Surveyor: Rider Levett Bucknall Limited
Structural Engineer: WSP Hong Kong Limited
Architect: Henning Larsen Architects Hong Kong Limited
Sustainable Design Consultant: WSP Hong Kong Limited
MVAC Contractor: Meco Engineering Limited
Electrical Contractor: Alliance Contracting Co. Ltd.
Fire Services Contractor: Webster Engineers Limited
P&D Contractor: Speedy Engineering & Trading Co., Ltd.
Main Contractor: Build King Construction Limited
Facilities Manager: Campus Management Office, The Hong Kong University of Science and Technology
O&M Agent: Campus Management Office, The Hong Kong University of Science and Technology
Executive Architect: Wong Tung & Partners Limited

Project of the Year Award – Public Use Building

Merit:

TAI PO TUNG CHEONG STREET LEISURE BUILDING

a. Architectural Services Department (ArchSD)

b. Electrical and Mechanical Services Department (EMSD)



Tai Po Tung Cheong Street Leisure Building (TPLB) is located at Tung Cheong Street, adjacent to Lam Tsuen River and about 15-minute walk from Tai Po Market Station. It was commissioned in August 2022, and provides Tai Po District with the first indoor swimming pool and indoor lawn bowling green. The building was designed with a focus on energy saving and sustainability, showcasing the implementation of various green building design practices to the public. TPLB comprises a 5-storey sports centre, 1-storey community hall and 1-storey basement car park, with a total construction floor area (CFA) of about 43,000 m², providing various leisure services to the community.

The building design adopted scientific design approaches to create a sustainable and energy efficient place to the public. Performance-based sun-path analysis was used to predict the intensity and direction of sunlight, in order to identify the best locations of vertical glazing to bring in adequate sunlight to the main games arena whilst reducing heat gain and maintaining occupant comfort through the advanced use of façade fins design.

Computerized Fluid Dynamic (CFD) Modelling was used to facilitate the natural ventilation design for indoor swimming pool during summer season. CFD simulation analysed the resultant wind velocity and flow direction across different seasons, enabling determination of optimal physical sizes and locations for openable windows to allow natural cross flow ventilation.

The building design also adopted several energy efficiency measures and renewable energy features to achieve outstanding building performance - minimising energy input, utilising high energy efficient equipment, and reclaiming waste energy wherever possible. Additional features including free air cooling, occupancy-based demand control for air-condition system, photo sensors at perimeter zones to regulate the operation of interior lightings, lift power regeneration and service-on-demand escalators were implemented to further reduce the energy consumption. An enthalpy wheel was incorporated into the air handling units to minimise energy demands by reclaiming waste heat. The renewable energy system comprises a grid-connected photovoltaic (PV) and solar water heating system to provide primary heating for potable water, contributing to the building's





energy reduction. A study of glare implications on the surrounding neighbourhood from PV panels in different roof locations was also carried out to identify the optimum placement to maximise energy yield without unduly causing potential disturbance to the local community.

While the adoption of BIM was not a compulsory requirement for this public works project when the construction commenced in early 2017, the contractor was encouraged to initiate its use during the construction phase to expedite coordination efforts and enhance constructability. Clash reports were generated to provide a visual representation of clash locations, enabling efficient coordination among professionals from different disciplines and facilitating the resolution of any issues that may arise.

Efficient maintenance plays a pivotal role in ensuring sustainability. With this in mind, the Architectural Services Department collaborated closely with the maintenance agency department, Electrical and Mechanical Services Department (EMSD), throughout the design and construction stages to ensure agile measures were well considered for future operation and maintenance, such as optimizing delivery routes for equipment, providing easy access for frequent maintenance locations, and installing flooding sensors to enable early warnings to users. To overcome limitations in accessing system information, a web-based Central Control and Monitoring System (CCMS) was established to enable real-time data monitoring and allow remote supervision, ensuring both major routine and emergency maintenance needs are met effectively. These joint departmental efforts have contributed to the overall sustainability and reliability of the venue.

According to collected electricity bills, the annual energy consumption was approximately 5,332

MWh, which was around 6% lower than predicted in the BEAM plus assessment and approximately 30% lower than EMSD's Energy Utilisation Index (EUI) in buildings of similar kinds. This positive outcome resulted not only from the efforts of the project team, but also from EMSD's ongoing optimization and fine-tuning of the building services systems at post-occupancy stage.

In terms of environmental performance, the building has achieved an Excellent rating in IAQ Certification and GOLD rating in BEAM Plus NB v1.2, highlighting its commitment to sustainability. TPLB also achieved three credits in the Innovation and Additions category of the BEAM Plus assessment. One of these credits is attributed to the implementation of cool roof, where most of the available roof space are covered with greenery. This not only provides a pleasant outlook for the surrounding neighborhood but also contributes to a reduction in building heat gain, promoting a more comfortable environment.

ORGANISATION:

Architectural Services Department (ArchSD) & Electrical and Mechanical Services Department (EMSD)

PROJECT ADDRESS:

Tai Po Tung Cheong Street Leisure Building,
25 Tung Cheong Street, Tai Po

PROJECT TEAM:

Building Services Engineer: WSP (Asia) Limited

Building Developer / Owner: Leisure and Cultural Services Department

Project Manager: Architectural Services Department

Quantity Surveyor: Rider Levett Bucknall Limited

Structural Engineer: WSP Hong Kong Limited

Architect: DLN Architects Limited

Sustainable Design Consultant: Allied Environmental Consultants Limited

MVAC Contractor: Hsin Chong Aster Building Services Limited

Electrical Contractor: Che Luen Electrical Engineering Company Limited

Fire Services Contractor: Pyrofoe Engineers Limited

P&D Contractor: Wing Tat Plumbing Engineering Limited

Main Contractor: Hansion Construction Company Limited

Facilities Manager: Leisure and Cultural Services Department

O&M Agent: Electrical and Mechanical Services Department

Project of the Year Award – Retrofit Building

Winner:

TKO PLAZA

Arup



ARUP



TKO Plaza, a commercial shopping center situated in Tseung Kwan O, is a remarkable example of sustainable development and the collaborative efforts between corporate and asset levels to transition towards carbon neutrality. Completed in 2004, this expansive plaza spans approximately 49,000m² and offers a range of amenities, including retail stores, F&B outlets, a carpark, a wet market, and a shopping arcade. The owner of TKO Plaza, Nan Fung Group, is committed to sustainable practices and has set ambitious carbon emission reduction and net-zero targets in line with the climate goals outlined in the Paris Agreement.

Nan Fung Group understands the urgency of addressing climate change and has aligned its goals with a science-based target of limiting global warming to 1.5 degrees Celsius. To achieve these targets, the group has adopted a hybrid approach that combines top-down carbon reduction strategies at the corporate management level with bottom-up feasibility assessments of decarbonization initiatives at the asset level. This comprehensive approach ensures that both macro-level and micro-level considerations are taken into account. By integrating findings from both approaches, Nan Fung Group formulates an ambitious yet practical decarbonization roadmap.

In order to implement these strategies effectively, Nan Fung Group enlisted the expertise of Arup as a consultant. Arup played a crucial role in both the corporate-level Science-Based Targets (SBTi) and the asset-level Retro-Commissioning of the project. At the corporate level, Arup collaborated with Nan Fung Group to establish the assessment boundary, conduct a thorough carbon inventory review of the portfolio, and develop a decarbonization roadmap that adheres to the requirements of the SBTi framework. This roadmap provides a clear direction for achieving the carbon reduction targets set by Nan Fung Group.

At the asset level, Arup undertook extensive energy performance analysis by conducting site investigations, on-site measurements, and trend-log data analysis. This comprehensive analysis enabled the identification of operational improvement opportunities (OIOs) and energy management opportunities (EMOs) specific to TKO Plaza. By pinpointing areas for improvement, Arup's analysis informed the development of practical strategies to enhance energy efficiency and reduce carbon emissions at the asset level.

However, the project faced challenges related to data availability and operational implications. Data availability posed a major obstacle to identifying potential energy-saving opportunities (EMOs) and operational improvement opportunities (OIOs). To address this challenge, the installation of a building





management system was implemented, connecting various field devices such as sensors and actuators. This system provided valuable operational data that helped the project team understand characteristics like chiller operating sequences and patterns. With this data, potential energy efficiency enhancements could be identified and implemented.

Operational implications also presented obstacles to the adoption of EMOs and OIOs. During upgrading works, certain services may need to be suspended, affecting building operations. For example, replacing the chiller plant may disrupt air conditioning services. Additionally, these works could impact environmental quality, potentially leading to complaints related to air quality, thermal comfort, acoustics, and visual quality. To minimize these implications for building users, a holistic sustainable design approach was adopted. Environmental quality was evaluated alongside energy performance, and simulation-based analysis using a digital twin facilitated the testing and optimization of potential initiatives, reducing adverse impacts compared to conventional trial-and-error methods.

To evaluate the effectiveness of the proposed measures, simulation with a digital twin, calculations, and on-site measurements were conducted. The project underwent two Retro-Commissioning processes in 2018 and 2022 to assess the progress and outcomes of implementing energy-efficient measures. This comprehensive review encompassed building performance in terms of energy efficiency, environmental quality, and carbon emissions. The results of these evaluations provided valuable insights and informed future strategies for further improvement.

TKO Plaza serves as a role model for sustainable development and collaboration between corporate and asset levels. The project exemplifies the advantages of a data-driven approach and highlights the benefits of regular performance reviews through Retro-Commissioning. By implementing Retro-

Commissioning as a lifelong program, TKO Plaza aims to continuously improve the operation of existing buildings towards net-zero performance. The project also emphasizes the importance of ongoing monitoring, reporting, and verification of energy efficiency and carbon emissions to ensure the effectiveness of sustainability initiatives.

TKO Plaza's commitment to sustainability and its adoption of innovative practices have positioned it as a leader in the industry. The project's in-depth building performance analysis, practical carbon management, and the integration of Retro-Commissioning using a data-driven approach showcase excellence and innovation. The extensive use of a digital twin enables accurate evaluations of energy-saving and wellness strategies, ensuring the optimization of building performance. The project's success serves as an inspiration to other organizations, highlighting the importance of innovation, excellence, and continuous improvement in achieving sustainable and efficient building operations.

In conclusion, TKO Plaza stands as a remarkable example of collaboration between corporate and asset levels in their pursuit of carbon neutrality. The project's data-driven approach, in-depth building performance analysis, and practical carbon management demonstrate the benefits of sustainable practices and ongoing performance evaluation. The continuous efforts of Nan Fung Group and Arup in implementing energy-efficient measures and evaluating their effectiveness through Retro-Commissioning have set a benchmark for sustainable development in the industry. TKO Plaza serves as an inspiration to other organizations, emphasizing the importance of innovation, collaboration, and ongoing improvement in achieving sustainable and efficient building operations. With its ambitious carbon reduction targets and commitment to the Paris Agreement's goals, TKO Plaza paves the way for a greener and more sustainable future.

ORGANISATION:

Arup

PROJECT ADDRESS:

1 Tong Tak Street, Tseung Kwan O, New Territories

PROJECT TEAM:

Building Developer / Owner: Nan Fung Development Limited

Project Manager: Arup

Sustainable Design Consultant: Arup

Project of the Year Award – Retrofit Building

Merit:

RENOVATION WORKS OF PROVIDENT SQUARE, NORTH POINT

Mott MacDonald Hong Kong Limited



Providence Square, one of the largest neighborhood malls in North Point district, is re-positioned and re-branded into a modern shopping centre, Worfu. It brings a new retail experience and new identity into the heart of the community. The large-scale refurbishment of Worfu has given the formerly known Provident Square an opportunity for a new lease on life to become a local destination for the community. The refreshed identity of the 19,488 m2 Worfu combines an extensive facade upgrade, internal layout reconfiguration to create a modern, relaxed and inviting environment and retrofitting of building services installations to meet the demand in future and to improve the energy control and efficiency.

The renovation of the mall was carefully planned and executed in three phases. This approach ensured that the mall could continue to operate smoothly during the entire construction period. By dividing the works into phases, the retrofitting works were able to be carried out without causing any inconvenience to the users. One important aspect of the design was to ensure that the distribution zone, such as primary air-handling unit, were strategically demarcated to avoid extending across different phases.

The project includes a significant addition of food and beverage (F&B). To accommodate this, the existing building services installations in the mall were upgraded to handle the increased capacity. In the drainage design, there was collaboration with the architect and structural engineers to identify possible area for above-ground grease traps. This eliminates the need for installing underground grease traps and can avoid excavation work within the existing building. Additionally, the increased number of F&B outlets requires an increase in ventilation louver area. Given the limited façade space, installation of the new ventilation louvers without compromising the building's aesthetic was a collaboration with the architects.

The retrofitting works were carried out from 2018 to 2021 and the major building services installations retrofitting works include:

1. Additional of escalators and vertical lifting platform to enhance the accessibility of the mall;
2. Replacement of all existing lighting to LED lighting and all primary air-handling units, fan coil units and ventilation fans to higher efficiency air-side equipment to improve the energy efficiency;
3. Installation of different types of sensors for lighting control and air side equipment control to improve energy control;



4. Adoption of lighting control system and replacement of all air-side equipment to improve the indoor environmental quality;
5. Building services installations comply with building energy code 2018 and LEED V4 ID+C (Commercial Interiors).

To enhance energy efficiency and reduce carbon emissions, the building services installations were upgraded to comply with the Building Energy Code 2018 and LEED V4 ID+C (Commercial Interiors). As part of this effort, all existing lighting has been replaced with LED lighting, which is known for its energy efficiency. Additionally, lighting control system has been implemented, including timer control, daylight control and dimmer control, to further optimize energy usage. These systems allow for the turning off or dimming of lighting in areas that are not in use or when natural daylight is available.

In addition to the lighting upgrades, all existing air-side equipment, such as primary air-handling units, fan coil units and fans, were replaced with high-efficiency equipment. These new units are equipped with variable frequency drives, which allow for better control of the equipment's speed and energy consumption. Furthermore, automatic control was implemented on both the air-side air conditioning system and the water-side air conditioning system. This enables the reduction of chiller water flow rate and supply air flow rates when the air conditioning consumption is low, resulting in energy savings and carbon reduction. High-efficiency sump pumps, escalators with automatic speed reduction were installed in the project to further contribute to reduction in energy consumption and carbon emissions.

External glazing was strategically incorporated into the design to optimize the amount of natural daylight that enters the shopping arcade. This integration allows for a more pleasant indoor environment. Additionally, the high-performance glazing, in combination with external shading devices, effectively minimizes the reliance on air-conditioning.

Improving energy efficiency was a major goal for the retrofitting project. By adopting the online energy benchmarking tool from EMSD, the energy performance of Worfu is better than 90% of the same type of premises (i.e. among the top 10th percentile).

To ensure a smooth transition and soft landing for equipment operation, the commissioning process for the project was strategically planned to minimize disruption to the shopping arcade, which remained in operation throughout construction. Most commissioning works, including the commissioning of chilled water valves and dampers in the air-distribution system, were carried out at night. Building services engineers from the property management team were involved in the commissioning stage to ensure proper operation of the systems. Their earlier involvement since the design stage allowed for any T&C related issues to be addressed and solved. Front-line staff regularly collect opinions from tenants through regular contact and provide feedback to the property management team. In addition, customer satisfaction surveys are conducted regularly through well-designed questionnaires. The feedback collected through these surveys is used to review and improve the design and provisions of the building, ultimately enhancing its operation and performance.

ORGANISATION:

Mott MacDonald Hong Kong Limited

PROJECT ADDRESS:

No. 21-53, Wharf Road, North Point

PROJECT TEAM:

Building Services Engineer: Mott MacDonald Hong Kong Limited

Building Developer / Owner: Maulden Investments Limited

Project Manager: Gleeds (HK) Construction Consultant Company Limited

Quantity Surveyor: Gleeds (HK) Construction Consultant Company Limited

Structural Engineer: CT & Associates (HK) Limited

Architect: LEAD8

Sustainable Design Consultant: Mott MacDonald Hong Kong Limited

MVAC Contractor: Well-found (Ying Fai) Engineering Company Limited

Electrical Contractor: Well-found (Ying Fai) Engineering Company Limited

Fire Services Contractor: Galaxy Engineering Holding Company Limited

P&D Contractor: Well-found (Ying Fai) Engineering Company Limited

Main Contractor: Tactful Building Company Limited

Facilities Manager: Savills Property Management Limited

O&M Agent: Savills Property Management Limited

Facilities Management Team Award

Winner:

DESIGN-BUILD-OPERATE A DISTRICT COOLING SYSTEM (PHASE II WORKS) AT KAI TAK DEVELOPMENT AND OPERATION AND MAINTENANCE SERVICES OF DCS IN WEST KOWLOON CULTURE DISTRICT

Hong Kong District Cooling Company Limited

HKDC
by **VEOLIA**

**District Cooling System (Phase II Works) at
Kai Tak Development**

Client: Electrical and Mechanical Services
Department (EMSD)

Cooling Capacity:

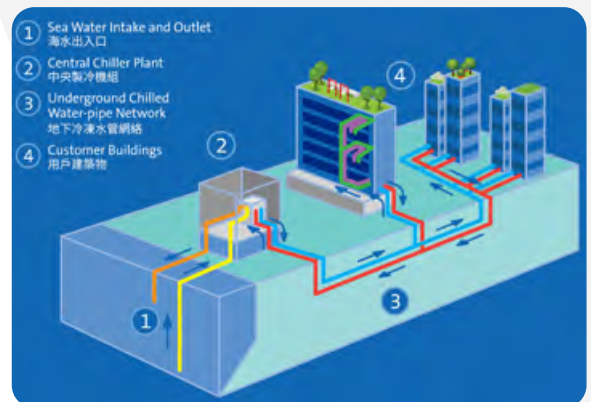
Ultimate: 81,000 RT

(North DCS Plant + South DCS Plant)

Existing Consumers:

- EMSD Headquarters
- Children's Hospital
- HKPF Kowloon East Regional Headquarters
- Kai Tak MTR Station
- Sung Wong Toi MTR Station
- Cruise Terminal Building
- Trade and Industrial Tower
- Inland Revenue Centre
- Airside
- Other shopping mall and school building etc...

Start Date: Jan 2013



M+ District Cooling System

Client: West Kowloon Cultural District Authority (WKCDA)

Cooling Capacity:

Existing: 4,900 RT

Ultimate: 29,900 RT (Main DCS + Sub-main DCS)

Existing Consumers:

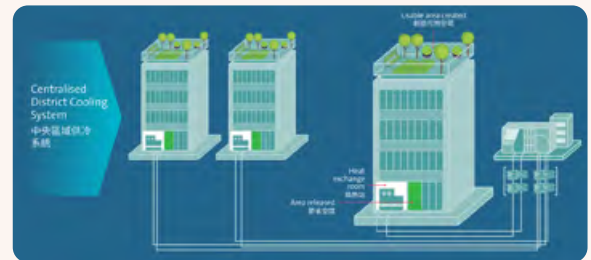
- WKCDA Tower
- M+ Building + Conservation & Storage Facility (CSF)
- Freespace

Start Date: Mar 2022



Key Objectives for DCS services

1. Reliability
2. Service Level - Temperature
3. Energy Efficiency - Enhance COP
4. Safety
5. Assistance to smooth addition of new customers



ORGANISATION:

Hong Kong District Cooling Company Limited

PROJECT ADDRESS:

- 1) Kai Tak DCS - 33 Shing Kai Road, Kai Tak, Kowloon
- 2) M+ DCS - M+, West Kowloon Cultural District, 38 Museum Drive, Kowloon.

PROJECT TEAM:

Owner:

- 1) EMSD
- 2) WKCDA

DCS FM TEAM:

Hong Kong District Cooling Company Limited

Facilities Management Team Award

Merit:

HONG KONG PALACE MUSEUM

ISS EastPoint Property Management Limited



Building Information:

- 9 Floor building
- Nine Exhibition Galleries across 7,800 sqm
- Palace Academy covering 1,600 sqm
- Auditorium 580 sqm
- Water cooling chiller plant (5 units) with heat pumps, solar tubes and humidifiers for 24 hours indoor climate control
- BMS for closely monitoring and real-time control of room temperature and relative humidity

A truly unique operation requiring a market leading team by ISS:

- Flagship facility where user experience is at the core of the operation;
- Full IFM operation where efficiency and technology enable centralized focus in right areas of operation;
- Differentiated approach to cater to varying needs of facility and users, where all touchpoints are considered (air, light, temperature, humidity, etc.);



westKowloon
西九文化區



- Extremely narrow margin for error, requiring very diligent and precise monitoring as well as quick rectification action and intelligent reporting;
- Focus on self delivery united team, with HSE and quantifiable smart ESG underpinning operation;
- Extensive head office support with dedicated Operations Performance Team as well as Technology platform support;
- A truly unique solution with passion, partnership and intelligence at its heart, where visitor comfort has to be combined with optimum conditions to preserve priceless artifacts.

MVAC System of HKPM:



Examples of Scope of Work

1. Review the galleries & storage indoor trend log every 2 days
2. Temperature /RH Sensor Calibration to ensure the BMS readings are accurate.



On-going climate control actions:

- A. For temperature
- ☐ Deviation >2°C → Calibration / Offset
 - ☐ Deviation >5°C → To be replaced
- B. For Humidities
- ☐ Deviation >5% → Calibration / Offset
 - ☐ Deviation >10% → To be replaced

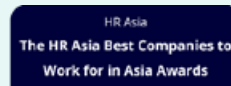
3. Input the site measured reading and BMS reading for comparison.

[illegible]

Vincent Ma,
ISSHK CEO

"ISS HK exists to facilitate the performance of our customers' sites and we take the responsibility that our partners place in our abilities as seriously as we place the expertise and welfare of our Placemakers who deliver for our customers."

ISS Hong Kong Awards & Recognitions:



ORGANISATION:

ISS EastPoint Property Management Limited

PROJECT ADDRESS:

West Kowloon Cultural District, 8 Museum Drive,
Tsim Sha Tsui, Kowloon, Hong Kong

PROJECT TEAM:

Building Services Engineer: Arup

Building Developer / Owner: West Kowloon Cultural District Authority

Quantity Surveyor: Rider Levett Bucknall Limited

Structural Engineer: Arup

Architect: ROCCO Design Architects

MVAC Contractor: China State Mechanical & Electrical Engineering limited

Electrical Contractor: China State Mechanical & Electrical Engineering limited (Shun Cheong Electrical Engineering Co Ltd)

Fire Services Contractor: China State Mechanical & Electrical Engineering limited [Pyrofoe Engineers Ltd]

P&D Contractor: China State Mechanical & Electrical Engineering limited (Atal Building Services Engineering Ltd)

Main Contractor: China State Construction Engineering (Hong Kong) LTD

Facilities Manager: ISS Eastpoint Property Management Ltd.

O&M Agent:

MVAC & BMS - Southa
ELV & Security – CHUBB
Fire Service – CHUBB
Lift & Esc – TKE & ANLEV

Facilities Management Team Award

Merit:

MANULIFE TOWER

Savills Property Management Limited



Established in 1986, Savills Property Management Limited (SPML) is a leading professional property and facilities management company which currently manages over 65 million square feet of prime properties in Hong Kong and Macao, involving close to 500 client instructions.

Manulife Tower, a 21-storey Grade A commercial building in Kwun Tong, is one of the largest properties solely owned by Manulife (International) Limited in Hong Kong. The building comprises 18 office floors on 3/F - 23/F, two floors of F&B shops on G/F - 1/F, a sky garden on 2/F, and a two-story carpark on B1/F - B2/F which connects it with the adjacent tower of the One Bay East twin office tower development.

SPML commenced facilities management services for Manulife Tower in March 2021 and has continuously scaled new heights in management excellence, such as achieving Final Platinum rating of the BEAM Plus EB V2.0 Comprehensive Scheme.

The building management team carried out a range of enhancement projects spanning from energy saving and waste management to health and safety and client satisfaction:

Energy Saving

- **Installation of photovoltaic (PV) system**

An extensive PV system consisting of 270 PV panels was planned, designed and installed on the roof of Manulife Tower. With a capacity of 150 kWp, the system is estimated to generate approximately 150,000 kWh of electricity each year, which is equivalent to over 3% of the building's total power consumption, and bring in an annual income of around HK\$450,000 under the CLP Feed-In-Tariff (FiT) Scheme.



- **Replacement of chillers**

To enhance chiller plant efficiency, the team arranged to replace two constant speed screw type air-cooled chillers with a coefficient of performance (COP) of 3, with two variable speed scroll type modular air-cooled chillers with a COP of 3.3. The replacement works not only led to enhanced chiller efficiency and energy saving, but also enhanced chilled water temperature control.

Waste Management

- **Reduction of waste**

Six umbrella dryers were placed at various entrances of Manulife Tower in lieu of umbrella bags, which has greatly reduced the consumption of plastic products at the property. In addition, recycling bins are placed on each office floor for the collection of not only paper, aluminum can and plastic bottles, but also glass bottles and batteries.

Health and Safety

- **Tailor-made tool trolley**

To alleviate the manual workload of on-site technicians, a tailor-made tool trolley, made with unused wooden board, was developed by the team. This invention enables the transfer of step platforms, tools and materials by a single technician in one go with ease, and has greatly enhanced work efficiency and safety.

- **Strengthening of false ceiling panels**

False ceiling panels in corridors are prone to wind-induced damage during typhoons. As a precautionary measure, the team sought to strengthen the false ceiling panels by stabilising each panel with rivets, thus eliminated a potential risk without altering the false ceiling's design.

- **IoT water quality sensors for condenser water system**

As water quality of the condenser water system is critical to the health of occupants, as well as the efficiency of heat exchange at the chillers, the building management team arranged for the incorporation of IoT water quality sensors to the system, so that real-time readings on key indicators such as pH, ORP, conductivity, etc., would be uploaded to an internal dashboard via the Internet, allowing the team to check the parameters on their desktops. This has enabled the close monitoring of water quality and swift maintenance response in case of any abnormalities.



Client Satisfaction

- **Installation of additional turnstile**

Noting occupants' dissatisfaction about long queues at the turnstiles located at the G/F lift lobby during peak hours, the team took prompt action to install an additional turnstile for occupants' use. This has greatly aided the clearing of queues during peak hours and received appreciation from client and occupants.

ORGANISATION:

Savills Property Management Limited

PROJECT ADDRESS:

Manulife Tower, One Bay East, 83 Hoi Bun Road, Kwun Tong, Hong Kong

PROJECT TEAM:

Building Owner: Manulife (International) Limited

Facilities Manager: Savills Property Management Limited

Facilities Management Team Award

Merit:

PARK CENTRAL SHOPPING ARCADE

Hong Yip Service Company Limited - Park Central Shopping Arcade



Park Central is one of the largest and well-established shopping arcades in Tseung Kwan O (TKO) since 2002. In order to facilitate the future expansion of TKO development, major interior renovation and retrofitting of building services installations have been carried out from 2015 to 2019.

To focus on the health, wellbeing, and productivity of mall occupants while also improving energy efficiency and reducing carbon emissions, our facility management team considered 4 major objectives and strategies:

- 1) Energy efficiency: we target to reduce energy consumption and associated carbon emissions by optimizing building systems and implementing energy-efficient technologies and practices.
- 2) Waste reduction: we target to minimize waste generation by implementing recycling programs and promoting waste reduction practices.
- 3) Health and safety: we ensure the building meets health and safety standards and regulations and implement emergency response plans to protect occupants in the event of emergencies.

- 4) Occupant satisfaction: we promote occupant satisfaction and well-being by providing a comfortable and healthy environment, offering amenities such as fitness center and healthy food options, and encouraging sustainable practices.

In order to enhance energy efficiency of our mall, we have implemented some technologies and practices, including:

- 1) Replace all fluorescent tube lighting to LED lighting for carpark and BOH area, which is completed on last year.
- 2) New escalators of the mall were installed with Inverter control, to saving energy when the escalator is idle.
- 3) Optimizing water supply to existing AHU/PAUs by energy valve.
- 4) Modified the operating schedule of E&M equipment to optimize the energy use and ensure system is provide on demand.
- 5) Main entrance and atrium of our mall installed windows and skylights for natural light to minimize the artificial light, also we use solar films to reduce sun glare, solar heat gain and improve comfortability.



6) Apply LED motion Sensor lighting to replace tradition fluorescent tube for BOH area to automatically adjust lux level based on occupancy, can reduce energy use by up to 50%.

The overall consumption is keep decreasing, comparing to 2015, the electricity consumption almost decreased 30%, and we hope that we can maintain downward trend. Besides the mentioned methods, our team has keep looking different technologies and review the practices to improve the energy performance.

To minimize waste generation, we cooperate with recycling companies, provide different recycle bins such as 3-coloured bins, food waste bins and we organized recycling activities in shopping mall to promote waste reduction practices.

Health and safety of occupant is top of the agenda at our team.

For the building we maintain the facility and E&M systems to minimize downtime and ensure the building meets health and safety standards and regulations, including lift, escalator, fire service, MVAC, electricity system and water quality. For example, we employ qualified contractors to test and certify the FS system working properly and accordance with FSD requirement to ensure the fire safety.

For occupant we promote physical activity, encourage our occupants apply sustainable transportation practices, such as using stair instead of escalator and lift, it helps to improve public health and save energy.

In addition, our team will monitor indoor air quality, besides odor, we also monitor CO2 level, and take corresponding action to improve air quality.

Occupant satisfaction is essential for facility management team because it directly impacts the user experience, productivity, tenant retention, reputation, and overall success of the mall. For collaboration among facility management teams and occupant can help to improve efficiency, effectiveness, and user satisfaction. Therefore, we have following implemented.



- Establish an energy saving policy / guidelines / action plan / targets to team members.
- Collect staff members' opinions and suggestions on energy saving through suggestion box / email / meeting.
- Offering wellness programs and amenities and encouraging sustainable practices.
- Collect occupiers' opinions and suggestions on comfortable and healthy environment.

We believe that education and promotion play a crucial role in raising awareness, changing behaviors, and encouraging sustainable practices among occupants, tenants, and visitors. Here are some strategies we used to promoting energy-saving practices in a shopping mall. For internal staff, we provide training courses and encourage them to participate in seminars and events. And for the public, we launch environment awareness campaigns that promote energy-saving, environmental protection behaviors and highlight the mall's commitment to sustainability.

We prioritize occupant well-being and engage them in sustainability initiatives. We continue to explore new technologies and promote a culture of sustainability. Our goal is to create a sustainable mall that enhances occupant well-being while minimizing environmental impact.

ORGANISATION:

Hong Yip Service Company Limited - Park Central Shopping Arcade

PROJECT ADDRESS:

No.9, Tong Tak Street, Tseung Kwan O

PROJECT TEAM:

Facilities Manager: Hong Yip Service Company Limited

Facilities Management Team Award

Merit:

RETRO-COMMISSIONING FOR SHA TIN RACECOURSE GRANDSTAND FOLLOWING AIR CONDITIONING INFRASTRUCTURE UPGRADES

The Hong Kong Jockey Club



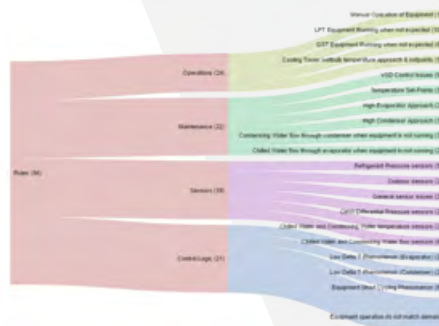
Sha Tin Racecourse (STRC) is one of the two racecourses for horse racing in Hong Kong with both turf and all-weather tracks that operated and managed by the Hong Kong Jockey Club (HKJC). STRC has two multi-storey grandstands, namely Grandstand 1 (G1) that was built in 1978 and Grandstand 2 (G2) that was built in 1985, with a total internal floor area up to 200,000 square metres and a total capacity of 85,000 people. They are equipped with various facilities such as racing support services, racing centre, paddock, betting halls, food and beverage service outlets, restaurants, viewing balcony, recreational amenities, etc. to provide a world-class hospitality and sporting entertainment experience as well as dining and racecourse entertainment facilities to members and public. STRC has been operating for more than 40 years and has a comprehensive racecourse strategic master plan to identify business orientation and asset life upkeep cycle as to upgrade venues and infrastructures with more green, sustainable and energy efficient operations.

Property Facilities Management's operational performance objectives for premises are to provide integrated, customer-centric, sustainable and cost-effective property services exceeding

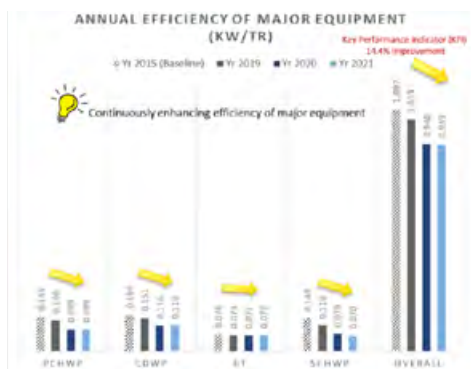
stakeholder expectations as well as ensure the club's properties and their associated services are managed efficiently and effectively.

With an aim of adding air conditioning provisions to meet extended business needs and replacing aged air-cooled chillers by water-cooled ones for energy conservation, STRC Grandstand underwent four phases of air conditioning infrastructure (ACI) upgrades from 2009 to 2014. A centralized water-cooled chiller plant has then been formulated by 8 nos. water-cooled centrifugal chillers with adaptive frequency drives having a total cooling capacity of 8,000RT to replace those individual aged air-cooled chiller plants. These chillers are connected to fresh water cooling towers condensing water circuit for heat rejection. The chilled water distribution is a decoupled by-pass system with variable flow on secondary side. Four secondary chilled water loops are operated via variable speed chilled water pumps to provide chilled water to the entire Grandstand area.

After these ACI upgrades, retro-commissioning (RCx) was introduced to review the performance of the entire chiller plant in terms of energy efficiency and system optimization. Continuous Monitoring-Based Commissioning (MBCx) software was installed in 2016 that tailor-made 86 operational rules were established for identifying any abnormalities



of operational data collected from Building Management System (BMS). Low delta temperature phenomenon in both secondary chilled and condensing water systems as well as overpumping phenomenon in primary chilled water system were also found. Consequently, the following energy saving opportunities (ESOs) were identified:



1) Secondary Chilled Water Pump (SCHWP) Speed Optimization

The chiller plant operation is based on two operational modes: Raceday and Non-Raceday Mode. Different differential pressure (DP) settings are adopted to govern SCHWP running speed in order to supply sufficient chilled water. MBCx identified the occurrence of low delta temperature phenomenon ($<5.0^{\circ}\text{C}$). In order to optimize the pump speed control under different cooling demands, additional DP sensors, water temperature sensors and pressure independent control valves were installed. Moreover, an automatic DP set-point reset algorithm was developed based on outdoor enthalpy so that maximum efficiency can be achieved.

2) Primary Chilled Water Pump (PCHWP) Speed Optimization

MBCx detected excess flow on de-coupler that caused over-pumping in primary chilled water loop. Variable speed drives (VSDs) were installed for PCHWP to optimize water flow rate. The speed of PCHWP can be adjusted to maintain a constant differential pressure throughout the system. There has been a reduction of approximately 14% in total surplus flow rate of chilled water passing through the de-coupler.

3) Condensing Water Pump (CDWP) Speed Optimization

MBCx also revealed a low delta temperature ($<5.0^{\circ}\text{C}$) across the condenser. Based on the

condensing water flow demand, the minimum VSD speed settings of the CDWP were adjusted from 30Hz to 25Hz.

4) Cooling Tower (CT) Fan Speed & Staging Optimization

Low wet bulb (WB) temperature approach ($<3.5^{\circ}\text{C}$) was observed in MBCx process. The control logic was reprogrammed by adjusting the minimum VSD speed settings from 30Hz to 25 Hz and approaching to step down CT fan number when the WB temperature approach is less than $<3^{\circ}\text{C}$. A modest energy savings was achieved through a simple modification to the BMS program.

5) Chiller Staging Logic Optimization

After investigation of control logic, the RCx team found that less than 3 chillers were running most of the time (88%) and 1 or 2 chillers were operating close to their full capacity (90%-100%) which occurred for 12% of their total operating hours. The revision of existing control logic conditions was proposed to ensure the chillers were always operating close to their highest efficiency range (50%-80%).

After RCx and the related ESOs implementation, the average annual saving for 2021 was 844,913 kWh compared with baseline year (2015). The energy savings in 2021 might be related to COVID-19 pandemic impact due to the change of racecourse operation modes. However, the key performance indicator of this project was chiller plant performance which had a significant 14.4% improvement from 1.097kW/ton (2015) to 0.939kW/ton (2021).

ORGANISATION:

The Hong Kong Jockey Club

PROJECT ADDRESS:

Sha Tin Racecourse, New Territories, Hong Kong

PROJECT TEAM:

Facilities Manager: Property Facilities Management, The Hong Kong Jockey Club

Retro-commissioning (RCx) Consultant: Energenz Consulting Limited

MVAC Maintenance Contractor (Chiller Plant): Trane Service Hong Kong

BMS Maintenance Contractor: Siemens Limited

Best Digital Innovation Award

Winner:

INTEGRATED SMART MANAGEMENT SYSTEM

Hongkong Land (Property Management) Limited



Hongkong Land is a major listed property investment management and development group. Founded in 1889, Hongkong Land's business is built on excellence, integrity and partnership. The Group owns and manages more than 850,000 sq. m. of prime office and luxury retail assets in key Asian cities, principally Hong Kong, Singapore, Beijing and Jakarta. Its properties hold industry leading green building certifications and attract the world's foremost companies and luxury brands. In Hong Kong, the Group's Central Portfolio consists of 12 interconnected prime commercial buildings forming the heart of the financial district in Central, providing over 450,000 sq. m. of Grade A office and luxury retail space.

Hongkong Land remains committed to continually enhancing the quality of service and pursuing sustainable best practices for its renowned properties. Since 2012, the Group pioneered the Integrated Smart Management System (ISMS) and Centralised Monitoring Centre (CMC) - innovative initiatives aimed at redefining facilities management through integrated technology. ISMS seamlessly connects various operational systems across different buildings to reduce reliance on manual labor. It provides valuable

insights by benchmarking operational and tenant usage data to enhance efficiency. This enables the implementation of greener operations with higher energy efficiency, while further strengthening service quality. By leveraging ISMS, Hongkong Land is committed to delivering a sustainable, efficient and exceptional service experience for tenants and surrounding communities.

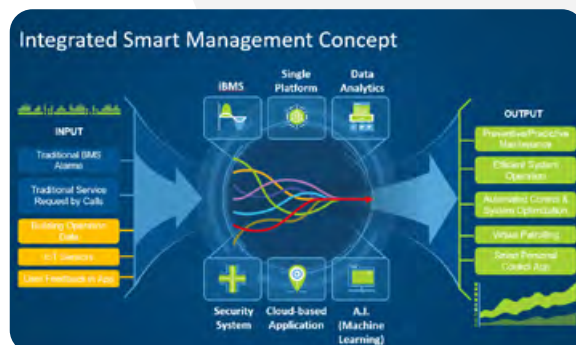
Nowadays, ISMS includes the following 5 major components to realise the goals:

(1) Integrated Building Management System (IBMS)

IBMS is the foundational framework system of ISMS. All of our Central Portfolio's buildings services systems are linked to the IBMS through a single platform, effectively creating a comprehensive data warehouse of daily building operations. Our CMC staff perpetually monitor and control the building services systems of Central Portfolio Buildings 24/7, guaranteeing the reliability of systems and quality of data acquisition.

(2) IoT Integration

LoRaWAN connectivity achieving 100% coverage has been established throughout the common areas of our Central portfolio buildings. Additionally, various Internet of





Things (IoT) sensor types have been installed to fill data acquisition gaps in iBMS. These sensors capture data such as indoor environmental quality, waste and recycling levels, water leak detection, and tenant consumption. This wealth of new information enhances user experience while unlocking opportunities to advance our sustainability practices. The valuable insights gained from comprehensive IoT monitoring further strengthens our commitment to best-in-class facilities management.

[3] AI Data Analytic Platform

An AI-powered Optimization and Analytics Platform (JEDI) has been developed upon the framework of IBMS to optimize building services systems across our Central portfolio properties. JEDI autonomously optimizes chiller plant operations through utilization of advanced, data-driven AI models. These models accurately predict cooling loads, select the best-suited combination of equipment, and establish optimized operational parameters. In doing so, JEDI determines the most efficient and optimal method of chiller plant function. Moreover, JEDI incorporates Fault Detection and Diagnosis (FDD) technology to automatically analyze system and equipment status via machine learning and rule-based algorithms. This allows for early prediction of potential failures, reducing downtime and wasteful energy usage. By integrating cutting-edge predictive analytics, JEDI ensures continuous improvement of our facilities management capabilities.

[4] In-app Personal Comfort Control

Our Tenant-exclusive App, Centricity, now empowers occupants to adjust indoor thermal comfort controls according to personal preferences. Leveraging Comfy AI machine learning capabilities, tenants can customize and optimize the thermal comfort within their

premises by submitting preference requests. Centricity thus provides a dynamic solution responsive to individual needs and feedback, enhancing the user experience within our premier properties.

[5] Integrated Security Management System

Closed-circuit television (CCTV) monitoring systems provide over 90% coverage of common areas across our Central portfolio properties. To maximize the benefits of this extensive CCTV network, around-the-clock remote virtual patrols have been implemented. This increases the scope of monitoring possible per shift while reducing manpower needs. Additionally, video analytics functions identify suspicious behaviors and generate alerts to the security team. This enables immediate response to any potential incidents. Through technology-enabled solutions, we ensure optimal safety and security standards are upheld within our prestigious buildings.

Amidst the rapid advancements of technology, we have moved beyond merely achieving successful development of ISMS. A project called "Control Tower" has been initiated to evolve ISMS to its next stage. With the guiding concept of "One for All," we utilize a single, unified platform to connect both internal and external stakeholders in unprecedented ways. Control Tower breaks down traditional boundaries by encompassing building services, operations data, procurement processes, and tenant systems/applications. Leveraging cutting-edge technologies such as digital twin visualization, predictive modeling, and data lakes, Control Tower reimagines what is possible in terms of efficiency and effectiveness in facilities management. By bringing all relevant parties together on one sophisticated platform, Control Tower will redefine excellence in property management.

ORGANISATION:

Hongkong Land (Property Management) Limited

PROJECT ADDRESS:

Central, Hong Kong

PROJECT TEAM:

Team Leader: Hongkong Land (Property Management) Limited

Team Member:
Hongkong Land (Property Management) Limited
JEC Engineering Corporation

Best Digital Innovation Award

Merit:

A NOVEL ARTIFICIAL INTELLIGENCE ALGORITHM FOR ENERGY OPTIMIZATION IN THE SMART BUILDING

- a. Civil Aviation Department
- b. Electrical & Mechanical Services Department
- c. REC Green Technologies Co., Ltd.

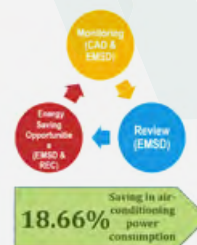


Buildings in Hong Kong account for 90% of electricity consumption and contribute to 60% of carbon emissions, creating an urgent need to reduce energy usage. Optimizing HVAC systems, which consume 50% of energy in commercial buildings, offers a solution. By implementing an Artificial Intelligence Energy Optimization Solution (AI-EOS) using techniques like Artificial Neural Networks (ANN) and Particle Swarm Optimization (PSO), this project achieved significant energy savings without compromising thermal comfort. The findings and methodology can be applied to various building types, promoting sustainability and reducing carbon emissions in Hong Kong. The findings and methodology can be applied to various building types, promoting sustainability and reducing carbon emissions in Hong Kong.

The Civil Aviation Department Headquarters at Hong Kong International Airport is an environmentally conscious building with intelligent systems. It has implemented AI Energy Optimization Solutions (AI-EOS) for its HVAC System, achieving a 15% reduction in stage 1 and 3 reduction in stage 2. Using AI Data Driven Methodology and optimized control algorithms, the HVAC system's performance was enhanced without major equipment replacement. The

implementation occurred in two stages, with energy savings reaching 18%. Collaborative efforts between the CAD, EMSD and the REC team contributed to improving system performance and reducing carbon emissions for CADHQ.

Traditional control logic often falls short in optimizing HVAC system operations based on dynamic cooling loads and environmental conditions. AI-EOS addresses this issue by continuously analyzing data and making real-time adjustments, resulting in improved performance and energy efficiency.



Application of AI-EOS in HVAC System

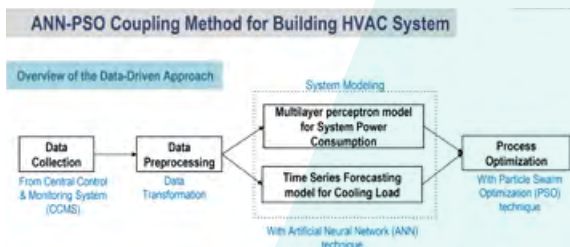
• ANN-PSO Coupling Method for Building HVAC System

The combination of Artificial Neural Networks (ANN) and Particle Swarm Optimization (PSO) with AI-EOS allows for continuous optimization of HVAC systems while maintaining thermal comfort. By employing ANN modeling methods and utilizing real-time data, the project team can identify effective strategies for energy savings. Challenges such as equipment deterioration and data collection were addressed through techniques like Artificial Intelligence Data-Driven (AIDD) methods and proper data pretreatment.

• Implementing the Predictive Data Selection (PDS) Method

The implementation also utilized the Predictive Data Selection (PDS) method to optimize HVAC systems effectively. The PDS method combines piecewise selection and intra-hour prediction techniques to reduce computational time while

maintaining modeling accuracy. It enables real-time adjustments based on predictive data, ensuring optimal energy consumption without compromising comfort. The integration of ANN-PSO and the PDS method in AI-EOS showcases their practicality and effectiveness in optimizing HVAC systems. This approach has the potential to be applied in various building types, promoting energy efficiency and sustainability.



Project Development

AI-EOS development at CAD Headquarters involved retro-commissioning the HVAC system, continuous monitoring, and implementing the AI-EOS server. Stage 1 focused on rule-based control algorithms, while Stage 2 integrated advanced techniques like ANN and PSO.

During RCx, operational improvements were identified, such as not reaching the set point for condensing water temperature. The EMSD and REC teams monitored E&M systems for energy-saving opportunities. AI-EOS aimed to improve energy efficiency, reduce consumption, and enhance operational performance. Its implementation ensured seamless integration with the existing Central Control Management System. The CAD Headquarters successfully utilized AI-EOS to optimize its building systems and achieve significant energy savings.

Results

According to the results of the analysis of Stage 1, it is found that the energy saving by AI EOS is 738,841 kWh, which is 4.59% of the overall building energy consumption and 15.30% of the energy consumption of the HVAC system. The energy consumption of Stage 2 during the M&V stage under EOS mode and AI-EOS mode are 184,654.93 kWh and 178,444.66 kWh respectively. Cumulatively, the energy savings achieved by AI-EOS reached 18.66% when considering both stages. These results demonstrate the effectiveness of AI-EOS in optimizing energy consumption and promoting energy efficiency in the building. Collaborative efforts between CAD, EMSD, and REC contributed

to enhanced system performance and reduced carbon emissions for the building and the industry.

Impact of the Innovation – Can be applied in different contexts

This innovation can be shared with building owners, managers, and industry professionals to demonstrate the practicality and significant energy savings achieved. The time series model and predictive data selection techniques can be applied in different contexts, contributing to energy optimization. By employing ANN modeling methods and external peer review, energy savings can be achieved without compromising comfort. AI-EOS has been successfully implemented in other public and private buildings, showcasing its potential for widespread adoption.

Factors Contributing to Project Success

The commitment of the owner, the dedication of the Operations and Maintenance team, and the competency of the AI-EOS service provider were key factors in the success of the project. Their commitment to energy conservation, staying updated with advancements, and multidisciplinary expertise enabled the delivery of an efficient and reliable AI Energy Optimization Solution.

With EMSD's support, this case as one of the Best Practice – "Artificial Intelligence Energy Optimization Solution for Central Air-conditioning system" has been shared through "Best Practices for Operation and Maintenance Services" in EMSD's website bestpractice.emsd.gov.hk/assets/videos/source/A1.mp4.

ORGANISATION:

- (a) Civil Aviation Department
- (b) Electrical & Mechanical Services Department
- (c) REC Green Technologies Co., Ltd.

PROJECT ADDRESS:

Civil Aviation Department Headquarters,
1 Tung Fai Road Hong Kong International
Airport Lantau, Hong Kong

PROJECT TEAM:

Owner: Civil Aviation Department, the Government of Hong Kong Special Administrative Region

O&M Agent: Electrical and Mechanical Services Department, the Government of Hong Kong Special Administrative Region

Project Contractor: REC Green Technologies Co. Ltd.

Best Digital Innovation Award

Merit:

ENERGY MANAGEMENT SYSTEM WITH A.I. OPTIMIZATION

Link Asset Management Limited

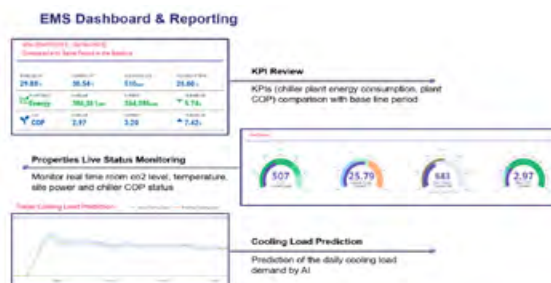


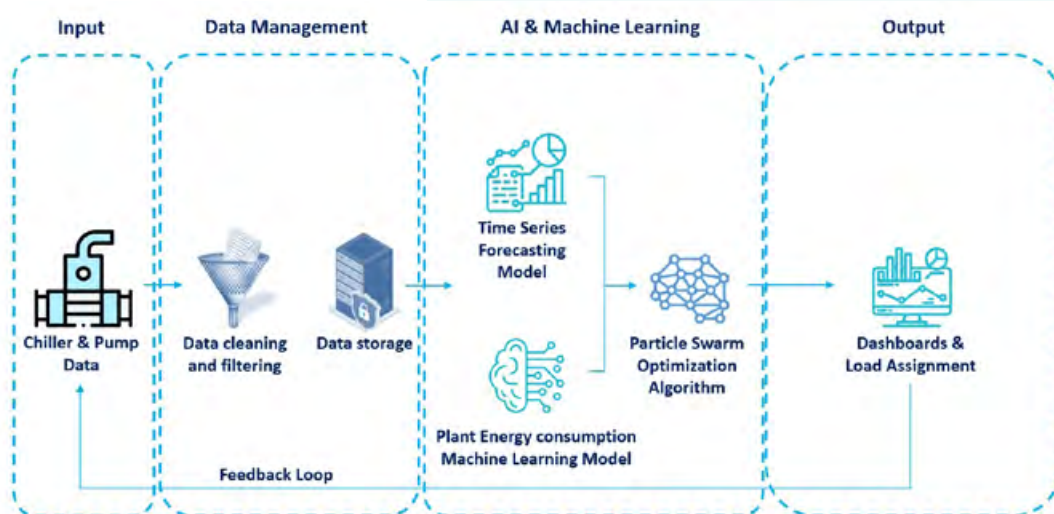
Link have been focusing on sustainability and energy saving, the company has set a target of achieving net-zero carbon emissions by 2035. To achieve this goal, Energy Saving Opportunities (ESOs) have been undertaken and Energy Management System (EMS) is one of the recent major digital innovative energy saving measures.

The implementation of EMS with artificial intelligent (A.I.) Optimization was started in T Town as pilot project in December 2021, the system uses big data analysis of building information with A.I. Chiller Plant Optimization (CPO) and targeted to achieve 4% electricity saving against the baseline year.

With the rapid growth and well development of A.I., cloud-based EMS was adopted and sit atop of the existing Building Management System (BMS) for system optimization. The EMS collects real-time data and control on-site chiller plant operation.

The data is processed via a cloud service and presented at an online energy dashboard which enable real-time monitoring and notification of the system operating parameters. EMS also features a fault detection and diagnostic function that detects abnormal operation to avoid energy wastage and observe irregular data for suggesting predictive maintenance.





The EMS Chiller Plant Optimization utilizes A.I. technology for cooling load prediction and chiller plant optimization. The machine learning algorithm predicts the building's required cooling load, selects the most energy-efficient chiller running sequence, optimizes the centralized A/C chilled water supply temperature and chilled water flow rate by VSD speed control to obtain the optimal operation pattern without compromising of the thermal comfort. EMS with AI models would continuously analysis and improve based on dynamic data to achieve on-going commissioning which allow continuously detect future opportunities for energy optimization, fine tuning of the system algorithm and updating platform features with market trend.

The project adopted industry-standard International Performance Measurement and Verification Protocol [IPMVP] – Option C for measurement and verification of energy savings and apply cooling degree days [CDD] regression model to adjust the weather impact in baseline year. The yearly electricity saving is 4.7% versus baseline, and the chiller plant coefficient of performance [COP] enhances by 7.8% under EMS CPO operation while maintaining indoor air quality.

The successful implementation of the EMS in T Town demonstrates the effectiveness of this digital innovation in optimizing energy consumption and reducing carbon footprint in the built environment.

ORGANISATION:

Link Asset Management Limited

PROJECT ADDRESS:

T Town 30 & 33 Tin Wah Road Tin Shui Wai,
Yuen Long New Territories

PROJECT TEAM:

Building Services Engineer: Jardine Engineering Corporation

Building Developer / Owner: Link Asset Management Limited

Project Manager: Link Asset Management Limited

Quantity Surveyor: Link Asset Management Limited

Sustainable Design Consultant:
Jardine Engineering Corporation
Honeywell Limited

MVAC Contractor: Jardine Engineering Corporation

Electrical Contractor: Jardine Engineering Corporation

Main Contractor: Jardine Engineering Corporation

Facilities Manager: Link Asset Management Limited

O&M Agent:
Jardine Engineering Corporation
Honeywell Limited

Other:

Link Property Management Services Limited –
Property Management Team
Link Property Management Services Limited –
Repair and Maintenance Team

Best Digital Innovation Award

Merit:

NEW WORLD ENERGY CENTRE - ECOWORLD

New World Property Management Company Limited

新世界物業管理有限公司
New World Property Management Company Limited
PMB Licence Number 新界物業管理公司執照號碼: C 000012



New World Property Management Company Limited (NWPMCL) is a pioneer property management company. NWPMCL established as a wholly owned subsidiary of New World Development Company Limited in 2011, is a professional property management company and committed to providing comprehensive quality services to our customers. The management company is set up to target the upmarket developments.

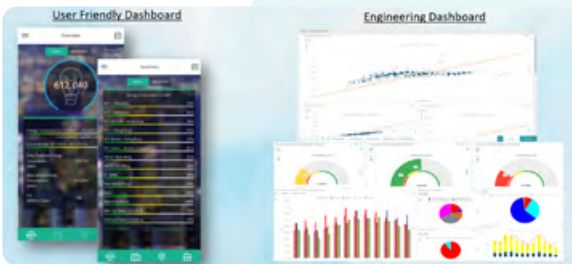
NWPMCL focuses on residential and commercial projects as one of the major businesses, complemented by a sizeable investment property portfolio comprising shopping malls, offices and residential building. Apart from directly taking care of its residential projects, the Company also

provides management services to such landmark developments owned by New World Development as New World Tower, The Forest and Manning House.

With our adherence to the Sustainability Vision 2030 (SV2030), New World Property Management Co Ltd aims to enhance sustainability awareness of our stakeholders and to create a well-lived community.



The innovation - New World Energy Centre - Ecoworld was launched in 2017. Its original objectives aims to echo with the goals of our New World group which strives to avoid, reduce and, where possible, reverse the causes of climate change across its operations. Being one of the leading developers in the construction industry in Hong Kong and the Mainland China, New World group strives to reduce our carbon footprint throughout our property lifecycle by taking up the social responsibility in solving the climate crisis. Progressive aspects of construction related digitalization is set out to address. While we work towards our New World group's Sustainability Vision 2030 energy and carbon emissions intensity reduction targets, we are also exploring viable ways to achieve further decarbonization under the Paris Agreement's 1.5°C scenario.



This means reducing our emissions through energy efficiency as well as considering viable renewable energy opportunities. Therefore, centralized system is adopted to monitor the energy and BMS data for the group. This is a real time cloud based Energy Dashboard - New World Energy Centre, including electricity consumption, water use and waste management for ESG

reporting for 39 buildings inside our New World group. New World Energy Centre, provides easy access of data logging via desktop browser and App application.

This is a digital transformation from excel report to cloud reporting. Furthermore, it would be a breakthrough for the group as top management to technician can also access to the App to monitor the energy usages for all the buildings in New World group.

The key measures of the success of the Dashboard - New World Energy Centre is that it provides easy access of data-logging via desktop browser and App application. This is a digital transformation from excel report to cloud reporting. It provides a breakthrough for the New World group as top management to technicians can also access to the web browser or the App to monitor the energy usages and the building performance for all the buildings in New World group. Mobility is of utmost importance especially under the Covid-19 situation. Engineers can access everywhere to monitor the energy and the BMS. Plant performance, electricity consumption, ESG data can be monitored easily. Every buildings would attain its independent Energy Utilization Index (EUI) while the plant performance could be shown and analyzed easily in the dashboard. The energy savings within wanted period would be shown clearly on the Dashboard - New World Energy Centre so that all New World group staffs from top management to Engineer/technicians could attain the details to further review the energy usage and plant performance.



ORGANISATION:
New World Property Management Company Limited

PROJECT ADDRESS:
N/A

PROJECT TEAM:
Team Leader: Raymond Chan Lai Kin
Team Member: Taylor Chow Chi Fung

Best Digital Innovation Award

Merit:

THE CLOUD-BASED A.I. SOLUTION FOR ENERGY EFFICIENCY AT 2IFC

MTR Corporation Limited



Two International Finance Centre (2IFC) is a skyscraper that was constructed in 2003 and currently stands as the second-tallest building in Hong Kong. A cloud-based big data analytics software platform has been implemented to optimize the central chiller plant at 2IFC. The main objective of this implementation is to enhance energy efficiency and sustainability while ensuring the building remains functional and comfortable. Additionally, this initiative will improve the overall performance of the building, minimize its environmental impact, and reduce operational costs. By adopting this innovative solution, the owners and managers of 2IFC can enhance the value of the building, attract and retain tenants, and contribute to global sustainability goals. Overall, the objective of implementing innovations for 2ifc is to create a more sustainable and efficient built environment.

To achieve the objective, a cloud-based big data analytic platform has been implemented in 2020. The software platform communicates with the existing Building Management System (BMS) and Energy Management System (EMS) as well as some newly installed energy meters at 2ifc. It monitors building load, individual chiller's performance, and energy consumption of major equipment such as chillers and chilled water pumps. Data were collected, transmitted, and analysed by the software platform. And then reports and actionable insights were generated automatically for relevant stakeholders to review and select final Energy Saving Opportunities (ESOs) for implementation. ESOs were implemented and measured for 12 months consecutively for the stakeholders to evaluate its energy saving performance. At the end of 2022, 12% of energy has been saved for the central chiller plant of 2ifc which is equivalent to over 1.2 million kWh of electricity saving and over 880 tons of CO₂e reduction.





The central element of this innovative project was a cloud-based software platform that incorporated HTTPS security protocols. This platform underwent testing and verification by a third-party SRAA consultant. Data regarding equipment and system operations, specifically from 10 direct seawater-cooled chillers with a total capacity of approximately 10,000 refrigerant ton, was collected through temperature and ultrasonic water flow transducers, as well as energy meters installed within the chilled water system. Additional necessary data for analysis was obtained from the existing Building Management System (BMS) and Energy Management System (EMS) and fed into the data logger of the cloud-based software platform. This enabled continuous monitoring and analysis of both real-time and historical data. The collected data was then analyzed, and the software platform automatically generated actionable insights. These insights were subsequently reviewed by the technical team from MTR, the project consultant, and the ACMV system maintenance service contractor. Based on these insights, adjustments were made to the operation settings of the chiller plant in order to meet the energy-saving targets.

The cloud-based software platform facilitated the collection and storage of trend logs from existing sensors, field devices, and the current Building Management System (BMS). This system ensured a secure connection to an offsite storage location provided by the cloud-based software service provider, where all collected data was stored. Within the platform, there was a hosted Fault Detection and Diagnostics (FDD) software that utilized offsite servers to receive data from the data logger. The FDD system analyzed a combination of hard-wired and virtual data points using real-time and historical time-series data. This analysis involved comparing, diagnosing, evaluating, identifying, tracking, and generating reports.

The energy-saving, environmentally friendly, and sustainable performance of 2IFC has earned it several green certifications, including the "WELL Health-Safety Rating," "WELL Performance Rating," "Platinum of LEED v4.1 - Operations and Maintenance: Existing Buildings," and "Platinum of Beam Plus Existing Building V2.0 Comprehensive Scheme." In recognition of its energy-saving achievements, 2IFC was awarded the Grand Award (Existing Building) at the 2023 Excellent Building Award organized by the Building Services Division of the Hong Kong Institution of Engineers. Additionally, it received the Merit Award from the Energy Saving Champion Scheme organized by the Environment and Ecology Bureau (EEB) and the Electrical and Mechanical Services Department (EMSD). These accomplishments in energy-saving performance have laid a solid foundation and instilled confidence in the project team to proceed with the second phase.

In the next phase, the energy-saving opportunities (ESOs) implemented in the first phase will be reviewed, fine-tuned, and further improved. The team will propose and implement new ESOs to achieve even higher energy-saving targets. Considering that the major equipment of 2IFC's central chiller plant was installed in 2003, the team will explore additional retro-commissioning and retrofitting measures based on the findings and identified opportunities from the first phase. This continuous improvement process will contribute to the ongoing development of 2IFC towards a greener future. In order to further support MTR's carbon and greenhouse gas reduction roadmap, as well as other sustainability initiatives, we are dedicated to showcasing our leadership in Environmental, Social, and Governance (ESG) principles by integrating sustainable thinking into various aspects of our operations. This approach will create long-term social, environmental, and economic value for the cities we serve.

ORGANISATION:

MTR Corporation Limited

PROJECT ADDRESS:

Two International Finance Centre (2IFC)

PROJECT TEAM:

Project Manager: MTR Corporation Limited

Digital Consultant: Hensen System Engineering Limited

Energy Saving Subsidy
節能資助

Energy Management
能源管理

Renewable
Energy Scheme
可再生
能源計劃

多元能源管理方案 減碳創新棧

#PowerUp a Low-Carbon Future
with Holistic Energy Management Solutions



CLP is committed to supporting the Government's goal of achieving carbon neutrality for Hong Kong before 2050. To empower our business customers in their low-carbon transformation journey, we are actively promoting the adoption of low carbon solutions - including energy management, subsidy schemes and renewable energy.

中電致力支持政府計劃於2050年前達致香港碳中和的目標。為全力協助工商客戶向可持續發展邁進，中電積極推動企業實踐低碳節能模式，其中包括能源管理、資助計劃和可再生能源。

Renewable Energy Certificates 可再生能源證書

An In-Demand Decarbonisation Solution for Businesses

CLP Renewable Energy Certificates offer a simple and flexible option to support local clean energy development, allowing them to claim emissions-reduction benefits and enhance their corporate image.

深受企業歡迎 助其實現減碳目標

中電推出「可再生能源證書」，讓工商客戶以靈活簡易的模式支持本地可再生能源發展，同時得以申領相關環境權益，大大提升企業形象。



Learn More
了解更多



Learn more about CLP Low Carbon Solutions 了解更多中電低碳能源方案

Details
計劃詳情





As an energy partner to SMEs, we understand that additional support is crucial to achieving low-carbon transformation. That's why we provide a range of sustainability support services to help enterprises reduce energy costs and power up their business operations. Furthermore, we are collaborating with different partners to provide a bundle of fabulous offers to SMEs participating in energy-saving and carbon-reducing initiatives.

中電作為業界能源夥伴，我們深明中小企要實踐低碳轉型，外界支援至關重要。有見及此，中電提供一系列可持續發展配套服務，協助中小企客戶提升能源效益，節省營運支出。另外，我們積極與不同夥伴合作，為參與節能減碳活動的中小企提供各種獨家禮遇，優惠一浪接一浪，低碳賞不停。

CLP 中電 X DBS



By setting up your HKD current or savings deposit account with CLP's bank autopay / direct debit through DBS, you can enjoy **higher interest rate** on your new fund deposits to **settle and pay all your bills including electricity bill**. More, you will also receive **CLP Renewable Energy Certificates** and additional banking services privileges, allowing you to fully enjoy the advantages from new developing opportunities.

現透過星展銀行開設港幣高息活期存款賬戶兼登記中電自動轉賬服務，存入新資金後即享**高息存款優惠**，可用來繳交**包括電費在內的所有賬單**。另外，更可獲贈**中電「可再生能源證書」**及額外升級銀行服務禮遇，率先掌握發展新機遇的優勢。

Reducing carbon footprint starts with digitally managing your electricity account 減碳由電子化管理電力賬戶入手

By switching to CLP eServices, you can manage your account electronically and contribute to environmental protection.

立即轉用中電e服務，以電子化形式管理電力賬戶，為環保出一分力。

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Source : Gartner®, Voice of the Customer for Enterprise Wired and Wireless LAN Infrastructure, Peer Contributors, 29 May 2023

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ESG-centric Digital Twin

for Complying with Regulatory Requirements



Mandatory ESG (Environmental, Social & Governance) disclosures for complying with a growing wave of regulations is an increasing challenge for organisations. Integrating ESG aspects into the day-to-day decision-making process has become essential for business success. ATAL's ESG-centric Digital Twin enables organisations to automate operations and perform data analytics for ESG insights and business intelligence in addressing specific challenges from energy saving and maintenance optimisation to space utilisation and emergency response.



Better ESG and Decarbonization

ETCO Plate-tube Evaporative Chiller helps you more successful:

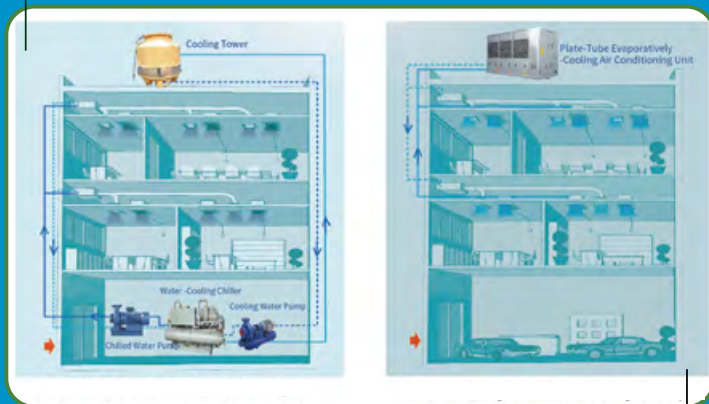
- Environment, Social, Governance (ESG) and Decarbonization
- HK Electric Smart Power Care Fund & CLP Eco Building Fund subsidy HKD300,000 to HKD500,000 for each air-con retrofitting project
- Return On Investment (ROI) is less than 15 months and continues the return more than 10 years

**ETCO Chiller is
All-in-one Design**



Less Energy, Water & Footprint

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ETCO Smart Cooling Central Air Conditioning Room Layout

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and 80kA 1 sec for different current rating
- Patent design busbar support

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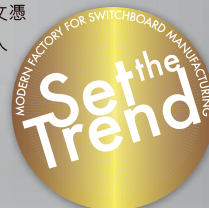
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以香港及澳門為目標市場的輝域電機亞洲（香港）有限公司（下稱輝域），專門設計、製造和組裝不同種類的低壓電開關櫃、馬達控制中心和控制箱。為確保產品質素，該公司着重以人為本，並於今年獲僱員再培訓局頒發「ERB人才企業嘉許計劃—企業大獎」殊榮。

輝域與姊妹公司忠輝工程有限公司同樣植根香港，創立超過30年至今，在業界擁有豐富經驗，更一貫視人才為重要資產，故通過不同措施培訓員工，並鼓勵他們考取專業資格、取得相關學位或文憑課程，在工作崗位上發揮所長，達成團隊目標及個人理想。作為一間肩負企業社會責任的公司，輝域亦有聘請自閉症員工，期望透過提供不同類型的工作機會，鼓勵更多需要支援的新一代適應社會，達致和諧共融。



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Viking Johnson – United Kingdom

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5. Trash Rack Cleaning and Screening Systems



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Innovation

AI ENERGY OPTIMIZATION FOR HVAC SYSTEM ANN-PSO COUPLING METHOD FOR BUILDING HVAC SYSTEM

ANN MODELING

- Collect all the historical data for different ambient conditions, chillers, cooling towers and water pumps etc. directly from the BMS (Building Management System).
- Use these data to establish an ANN model for the entire water-side system performance.

PS OPTIMIZATION

- A PSO method is adopted as the optimization strategy, i.e. determine the minimum energy setting for the HVAC equipment under a given set of conditions.

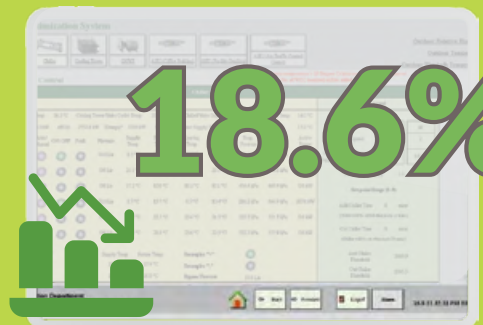
AI-EOS DEVELOPING PATH

1. Identify the energy-saving figure
2. Collect data for training the AI model
3. Preprocess the data for the AI model
4. Train the AI model by machine learning algorithms such as neural networks
5. Test the AI model by a separate set of data to evaluate its accuracy and reliability
6. Deploy the AI by using real-time data from Existing CCMS to optimize the chiller plant's performance
7. Monitor and fine-tune the AI model to ensure that it continues to provide accurate and reliable predictions

ACHIEVEMENTS

Saving in HVAC System Energy Consumption by

18.6%



BEST PRACTICE FOR EXISTING HVAC SYSTEM



Can be applied in any engineering system as long as sufficient quality data can be collected with correct data classification



Simple & effective time series model for short-term, intra-hour prediction applications has been developed



Enhance the computational time without lowering accuracy compared to multi-parameter models





China Zun, Prc



ICC, Hong Kong



Industrial Process CT



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- ◆ Customized Size Design
- ◆ Industrial Cooling Solution
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Achieve energy efficiency and carbon neutrality goals

Support sustainable business development by providing continuous energy data, reducing carbon footprints, and assisting in ESG report generation and effective sustainability business management.

About JEDI

We use data-driven insights powered by AI and machine learning to enhance the building management experience and deliver better outcomes for end-users. Our one-stop solutions are customizable and have supported key clients in public transportation, property development, universities, and healthcare. We help clients achieve their ESG goals towards net-zero by empowering their strategy in sustainability. JEDI is a member of JEC.

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