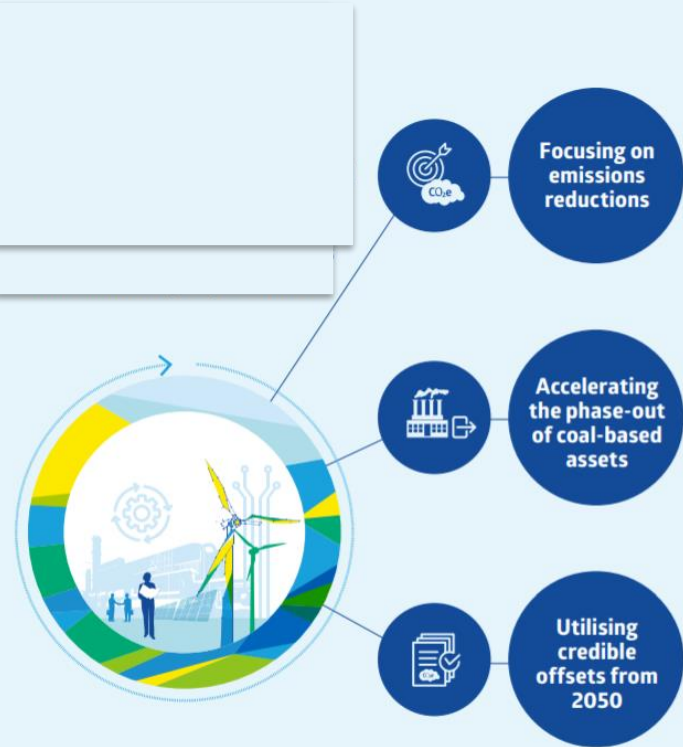


Digital Energy Management Solutions

Speaker: Ir Stanley Lam
CLPe Solutions Limited





CLP'S KEY TARGETS AND COMMITMENTS

BY 2030	BY 2040	BY 2050
▶ Meet science-based GHG emissions intensity targets	▶ Phase out coal-based assets	▶ Achieve net-zero GHG emissions across CLP's value chain
<p>0.3 kg CO₂e/kWh ↓ 52% from 2019</p>	<p>0.1 kg CO₂e/kWh ↓ 84% from 2019</p>	<p>NET-ZERO</p>



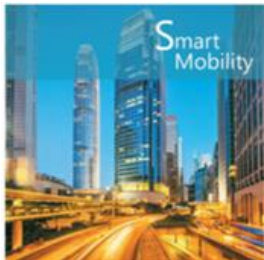
Smart City Blueprint - Hong Kong Government

Objectives:

- Leverage Innovation & Technology to **address** urban **challenges**, **improve** city Mgt. and people's life
- Enhance **HK's attractiveness** to global businesses and talents
- Inspire continuous city innovation and **sustainable** economic **development**

Citizen: Visualize the benefit of technology deployment on efficiency gain and better environment

Government: Drive Policy, coordinate cross department collaboration, provide centralized



CLP SUPPORTS DECARBONIZATION

**Journey towards Net Zero Carbon Emissions
to Combat Climate Change**



**Use Clean
Energy Source**



**Electrify the
Economy**



**Enhance Energy
Efficiency**



Core Offerings of CLP's Smart Solutions



Multiple Buildings



Building Portfolio

Energy Visibility, Baselineing, Benchmarking
Measurement & Verification

Building/Complex

BMS



Building Management
System, Monitoring and
Automation

Building Scope



AI Building Analytics,
Fault Detection &
Diagnosis



Tenant Space

Smart Sensor Automation



Sub-Metering, Indoor Cooling &
Lighting Automation, Air Quality
Monitoring, Space Management

Chiller Plants

PlantPRO



Real-time Chiller Plant
Optimization Control

AI Solutions for Chiller Optimization and Automation





High HVAC energy consumption

- 65% of HVAC energy consumption in buildings is consumed in the plant room alone



Lack of Automation and Control

- Manual control of chillers or fixed chiller sequencing systems often results in energy wastage and missing saving opportunities



System Downtime

- The unexpected breakdowns of chiller units can lead to costly and ad-hoc repair



Shortage of Energy Professionals

- Difficult and high-cost to obtain professionals on data analytics for chiller plant optimisation



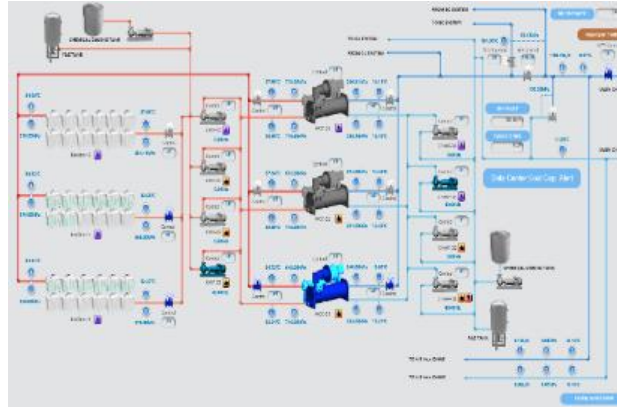
Challenges of HVAC Optimisation



中電源動



Chiller Types



Plant Complexity



Aging of Equipment



Weather



Occupancy

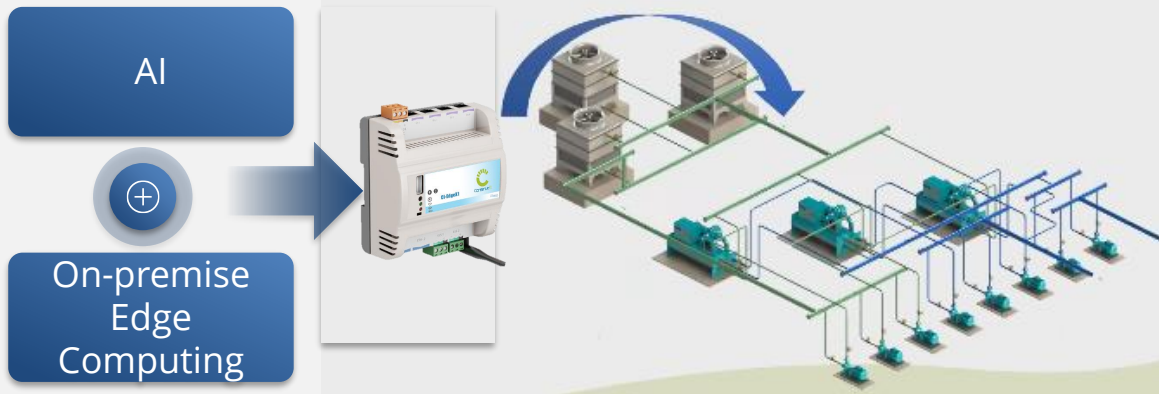


Other Site Constraints





AI-based chiller plant control and optimisation system



Key Features:



Control and Automation



Measurement and Verification



Machine Learning Data Models



Detection of System Faults



Report and Chart Builder



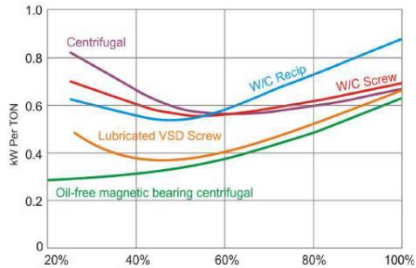
BMS Limitations on Control Optimisation



1 Equipment are deteriorating at different rates



Chillers

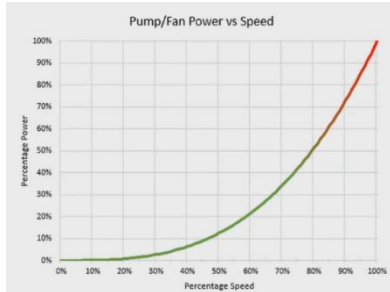


Chiller operate at what part load condition?

2 Too many variables affecting each equipment



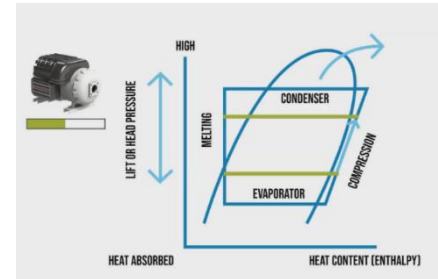
Pumps



VSD control at what frequency?



Cooling Towers



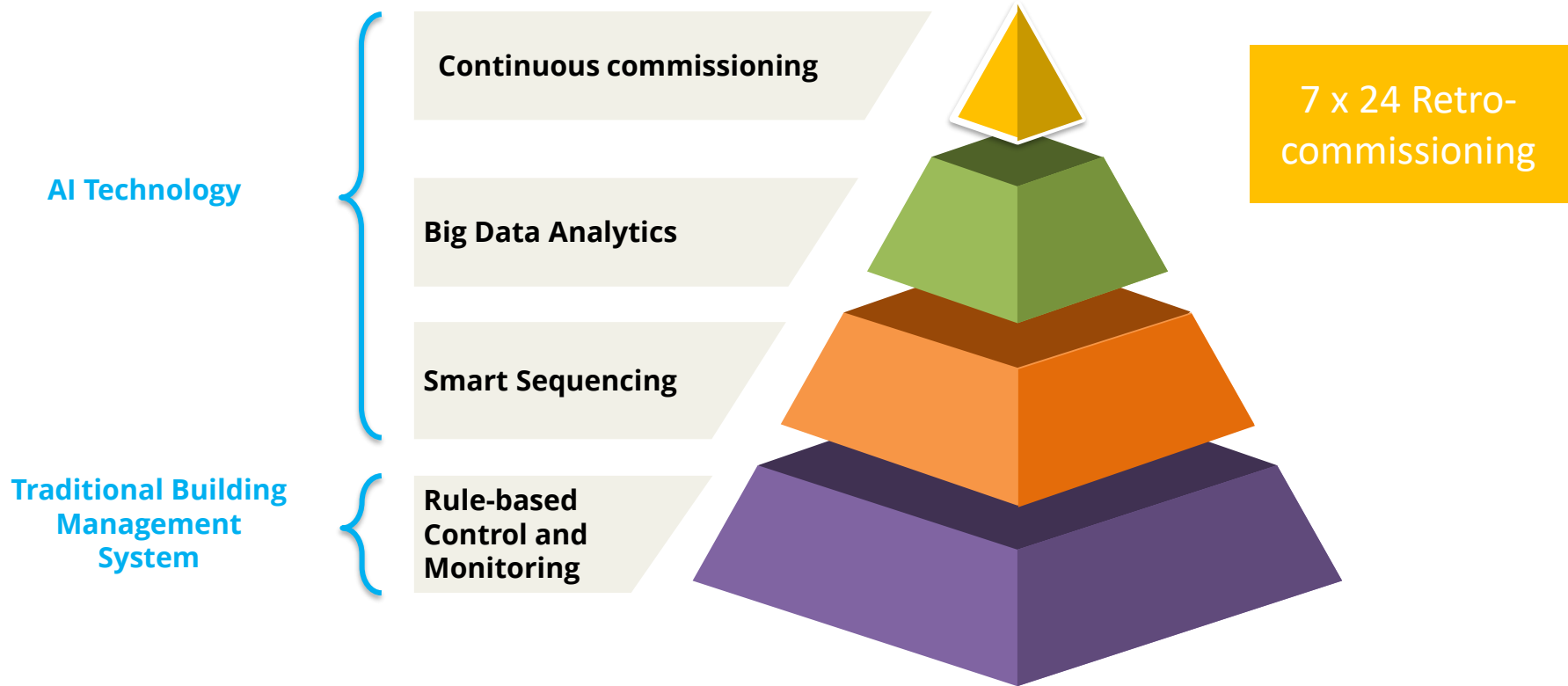
How many Cooling Towers to operate?



Chiller Plant Optimisation using AI



中電源動





最新動態

中電源動 (CLPeS) 將軍澳廣場冷凍水機組優化項目榮獲 Business GOVirtual Tech Awards - Digital Transformation of the Year



中電源動 (CLPeS) 為將軍澳廣場進行的冷凍水機組優化項目於 BUSINESS GOVirtual Expo & Conference 主辦的 Business GOVirtual Tech Awards 2022 勇奪 Excellence Awards - Digital Transformation of the Year。中電源動於將軍澳廣場使用了由 Smart Energy Connect (SEC) 平台開發的人工智能冷凍水機組優化及自動化解決方案 PlantPRO，成功協助將軍澳廣場優化冷凍水機組，平均節省超過 15% 的用電量及減少 30 噸二氧化碳排放量，相當於 330 萬部智能手機充電所產生的排放量。

Business GOVirtual Tech Award 旨在表揚在技術研發方面表現優秀並提供尖端產品及服務的行業參與者。SEC 及中電源動將繼續擴展能源管理解決方案，協助客戶達成其減碳目標。如欲了解更多細節，請電郵至 enquiry@clpsec.com 與我們聯絡。

Business GoVirtual Tech Award



蔡碧林接受本報訪問時指，信和置業 (00083) 旗下物業公司「信和管業優勢」致力透過可持續發展的方式營運及服務，基於電動車充電器的需求增加，信置亦致力增加充電器數目，希望今年旗下物業電動車充電器，由 2021 年底的 860 個，大幅增加 67% 至 1,400 個，當中凱滙設有 400 個充電器，預期今年年底充電器單位佔現時管理的商用及住宅停車場車位數量大約一成。

信置與 Tesla 將加強合作，陸續於 6 個物業新增 V3 Supercharging 充電站，預期全部今年內落成，當中藍灣廣場的充電站為 Tesla 在香港的第 50 個充電站，加上奧海城的超級充電站，旗下共有 7 個物業安裝 Tesla 充電器。

除 Tesla 外，信置也與本地初創 Halo 及 Shell 合作，於中港城設立 Universal 電動車充電設備 Shell Recharge 充電站。目前信

置旗下已有 21 個住宅物業向政府遞交申請「EV 屋苑充電易資助計劃」。

採智慧平台 PlantPro 助減耗能

廢物處理方面，蔡碧林指信置於 10 個地點有廚餘收集機，並聯乘 63 間食肆，將廚餘運至小灣灣處理，目前使用量約八成。

信置亦與第三方合作，推動可持續物管服務。蔡碧林稱，信置目前與中電 (00002) 及香港地產科技公司庫瓦 (Negawatt) 合作，其中以奧海城三期和藍灣廣場為中電源動智慧平台 PlantPro 試點，擺脫傳統手動控制，能使供冷機組的運作和保養得以優化，可降低 10% 的能源消耗，而兩個正使用 PlantPro 系統的試點物業，預計每年可節省 40 萬千瓦時用電量。



Chiller Plant Optimization and Automation



中電源動

Energy Saving !
2-year payback



Continuous Commissioning of your chiller plant using AI technology



Advanced Staging Algorithms



Smart Sequencing



Optimised Cooling Tower Strategies



Why Is Different?

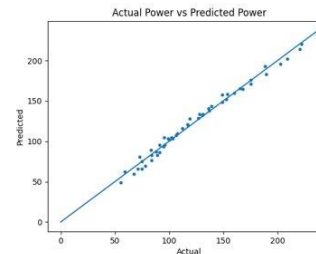
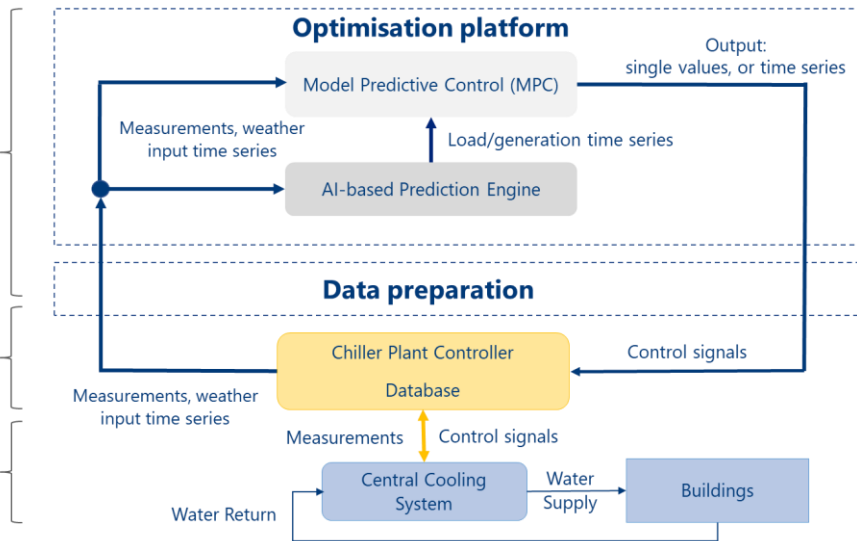


Optimisation platform that sits on top of the existing chiller plant system

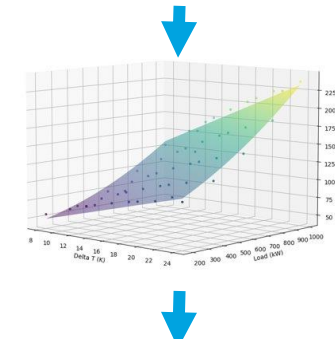
What AI can achieve

Chiller plant controller that AI installs

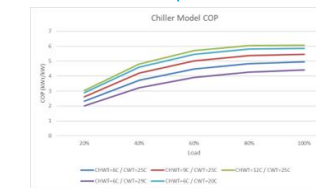
Existing infrastructure on site



Optimisation algorithm minimises the difference between the actual power & model predicted power



Results in mathematical model that predicts the power as a function of the cooling load



The Coefficient of Performance (COP) is then derived





AI has the ability to control the following equipment



Chillers



Pumps



Cooling Towers



Valves





Control Strategies



Advanced staging algorithms



Smart sequencing



Chilled water temperature optimisation



Condenser water temperature optimisation



Pumping and distribution optimisation



Optimised cooling tower control strategies

Optimisation Pyramid

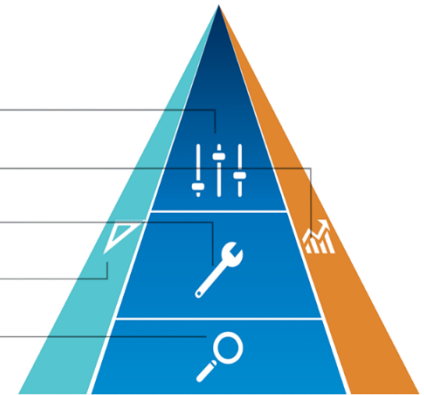
Control & Optimisation module

Reporting & Chart Building module

Maintenance & Diagnostics module

Measurement & Verification module

Management & Monitoring module



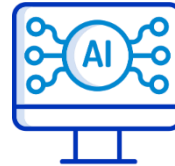


State-of-the-art technology



Machine Learning Backed Data Models

- Automatically build data models of the chiller operations to ensure that all decisions are made based on well-informed real-time and learnt data



Automatically Generated Control Algorithms

- It adopts same series of proven and heavily tested algorithms will be implemented on each site
- It utilises a combination of machine learning to provide the best overall combination of algorithms to significantly reduce energy consumption



Automated Alerts if Operations Deviate from Target Efficiency Level

- By using machine learning models, calculates the electrical consumption for the given load and conditions for each chiller
- An alarm is raised to investigate the machinery if it deviates from the target efficiency level





Deployment Options

Flexible with or without a BMS

No Boundary on BMS and Chiller



中電源動



New Build

AND



Retrofit



Daikin McQuay



York



Trane



Smardt



Climaveneta



Carrier



Others





A chiller plant optimisation, control and M&V solution using AI



Chiller Plant Performance Monitoring

- Ensures complete control of all HVAC devices and easy management in the plant room and allows of with continuous monitoring of its performance



Chiller Plant Measurement and Verification

- Measures the process on a continuous basis, enabling real-time comparisons of the measured actual efficiency versus design data



Chiller Plant Analytics & Fault Detection Diagnosis (FDD)

- Turns data into actionable knowledge thanks to a dedicated high-end diagnostic engine, which allows access to the operation of main Plant equipment components



Chiller Plant Control and Automation

- Enables automated control of all components and continuously optimises the plant working conditions by promptly adjusting equipment staging and sequencing



Advanced Chiller Plant Optimisation

- Continuous and advanced optimisation such as intelligent staging and sequencing of chillers, auto-adjustment of operating set points, based on optimal performance



Chiller Plant Continuous Commissioning and Tuning

- Ensures continuous commissioning and tuning of the chiller plant

Performance

Reliability

Optimisation



Smart Office Solutions

Problems Faced by Office Managers



Poor indoor air quality hampers workers' comfort and health



Energy wastage resulting from air conditioners and lighting being turned on 24/7



Bulk lighting switch in hidden location reduces flexibility in lighting control



Lack of visibility on energy consumption data





Breakdown of energy consumption in a typical office

14%



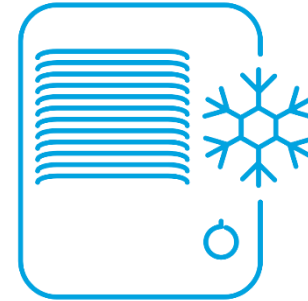
On Office Equipment

15%



On Lighting

54%



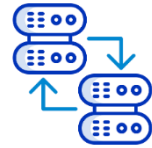
On Space Conditioning





Smart Sensor Automation

One-platform to provide automated solution for optimizing operation and energy saving



IoT Devices

with 90+
brands Integration



Gateway



CLPSEC Cloud



SSA Web
platform



Hottest Features

Smart Lighting Control

Smart Thermal Control

Room Booking System

Indoor Air Quality Monitoring

Energy Consumption Monitoring

Water Consumption Monitoring



EC Workspace – Office Automation & Control



Space Utilization

Room booking system,
motion sensor & 3D
people counting sensors



Energy Conservation

Energy consumption
sensors



Showcase

Solar & Smart
Solutions showcases



Health & Comfort

IAQ and Temperature
sensors



Flexible Lightings

Zoning and automation
control



Promotion & Presentation

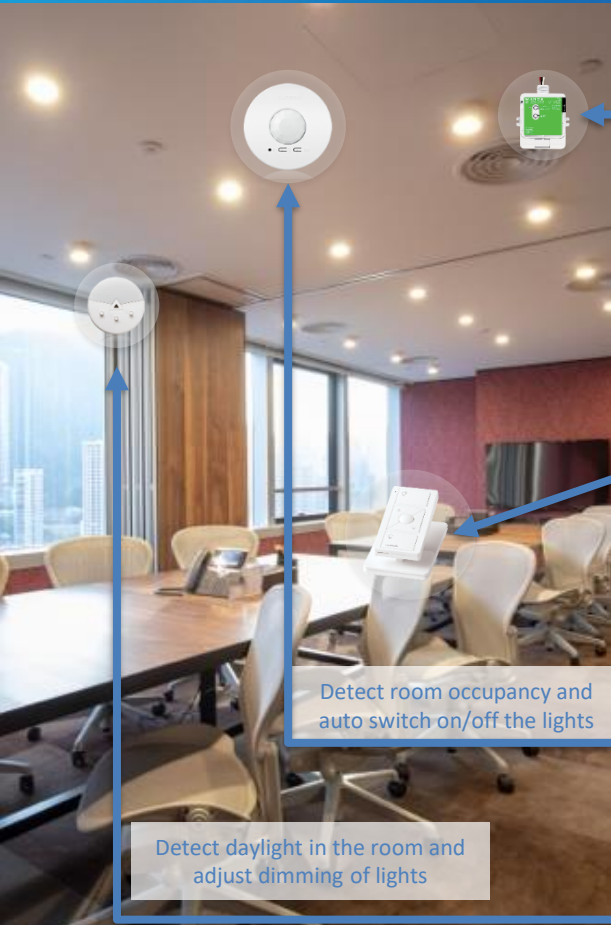
Large display devices at main
entrance & showcase area



Smart Lighting Control



中電源動



For auto control lights by

- Occupancy status
- Daylight
- Scheduling

For users to control lights by zone/scene through

- Wireless remote
- Web portal (with interactive layout plan)

For communicating with other systems (if any)

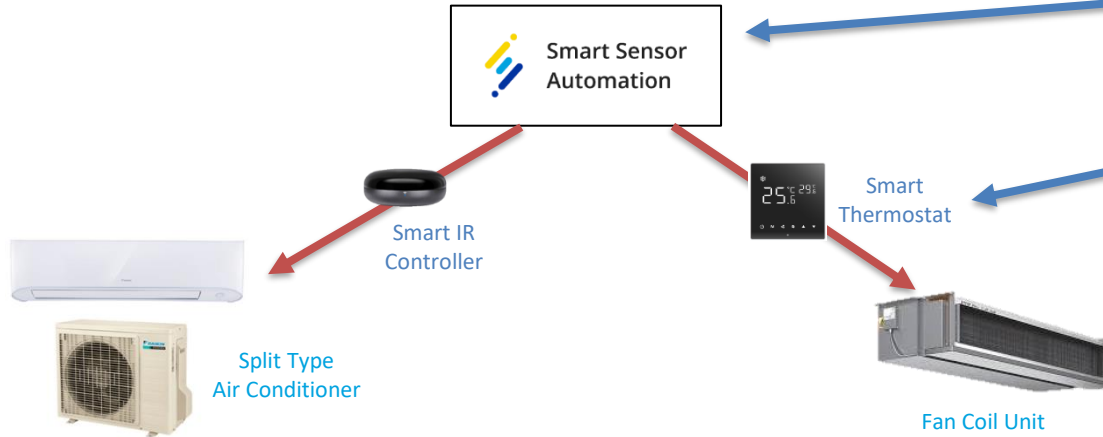
- HVAC
- Room Booking
- Audio
- BMS



Smart Thermal Control



Combine temperature and motion sensors to perform smart control strategies for optimising indoor temperature and creating comfortable space environment



Functions:

- Control the FCU remotely via web portal
- Get the real-time information of the ambient temperature and relatively humidity
- Automated the fan coil unit control by predefined temperature threshold



Benefits

- Saving the manpower cost of tuning the FCU manually
- Faster response to the changes of the ambient temperature and keep the comfort level of the environment
- Saving energy by tuning the FCU based on temperature sensor reading

Room Booking System



中電源動



Web Browser Scheduler
Book room from desktop application on your calendar system

Mobile App
Book rooms from anywhere and anytime



Display Panel
Use room displays panel to quickly find and book rooms



30% of Scheduled space goes to waste costing companies thousands of dollars



40 mins/day is the amount of time 40% of employees waste trying to find a meeting room



Improve User Experience

- To double confirm booking
- Release the room instantly upon cancellation
- Maximise space utilisation



Optimise energy consumption

- Control temperature and lighting based on real-time occupancy



Boost Productivity

- Check in through QR Scans or NFC tags
- Reschedule booking anywhere anytime



Catering and cleaning services

- Organize room management services with simplified booking



Room Booking System



中電源動

EC Booking is compatible with CLP SEC's Smart Sensor Automation platform and is integrated with different features like motion sensor, lighting and HVAC automation system to give you a whole new experiences of smart office

4



Smart Lighting



Smart Thermostat

- Lighting to turn on and off according to meeting room status/
- Pre-cool the room 5 mins before the meeting



1



EC Booking

Manually check in and out/Reservation function

2



Gateway

Commands passed through the gateway to the SEC cloud and compared to automation setting


3



Impact of Air Quality on Staff Health



productivity can be improved by

50% 

If indoor air quality is improved



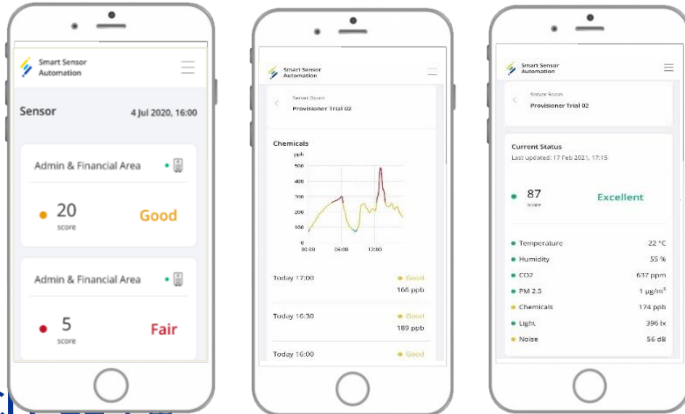
IAQ Sensor



Air Purifier



Data Visualisation and Control Platform



With environmental sensors, an intuitive online platform, and an automatic Air Purifier, our IAQ solution offers everything you need for health and sustainability.

Why is indoor air quality important?

- Level of **indoor air pollutants** can be **5 times higher** than outdoor level
- Poor IAQ **hampers occupants' comfort and health**
- **Drop in productivity**
- **Lack of visibility** on IAQ

3 Key Advantages

- ✓ **IAQ Monitoring:** Know what is in the air you breathe using environmental sensors (e.g. CO₂, VOC, PM_{2.5}, HCHO, Temp and Humidity)
- ✓ **Automation:** Clean the air around you automatically
- ✓ **Report & Analytics:** Monitor and track real-time and historical data



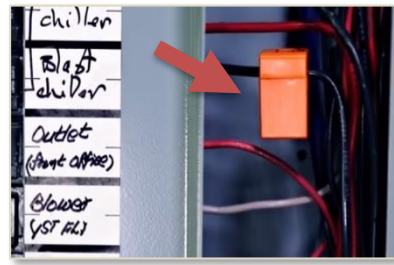
Energy Consumption Monitoring



中電源動



Wireless, self-powered sensors



Able to breakdown your electricity bill into....
Floor level, room level or even devices level



Real-Time Monitoring & Benchmarking: Visualise your energy data with intuitive, easy-to-use dashboards



Detect Saving Opportunities: Find cases of unexpected consumption



Quantify Energy Saving Efforts: Evaluate real savings from your retrofits



Alarms for Abnormal Status: Set up alerts so that you can act in time



Using non-invasive method to measure the water flow rate, instant volume and total volume



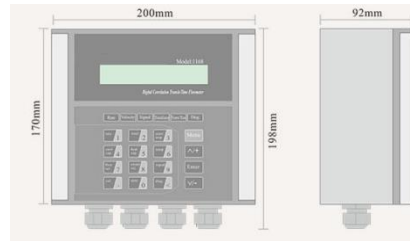
Two models of transmitter to serve different pipe size

Model: SL1168

- Pipe Size: 25 –1200 mm
- Accuracy: +/-1%

Model: SL1188

- Pipe Size: 25 –5000 mm
- Accuracy: +/-0.5%



Data Logger

Clamp-on transducers



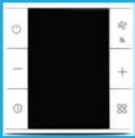




Water pipe



Open for integrating with range of sensors



中電源動

Gateway 	People Counting 	Water Leakage Sensor 	Energy Monitoring 	Fan Coil Unit Controller 	Environmental Detector 
Lighting Switch 	Motion Sensor 	Combustible Gas Sensor 	Smart Socket Outlet 	Infra-red Controller 	IAQ Sensor 
Module Switch 	Motion Sensor 	Door Sensor 	Smart Plug 	Temperature and Humidity Sensor 	Respirable Suspended Particulates Detector 





Smart Sensor Automation has been deployed by 60+ customers at the following locations



Offices



Shopping Malls



Real Estates



Restaurants



Exhibition Centres



Schools



Gas Stations



Bookstores



Warehouses





**THANK
YOU**

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Mobile: 9025 6567