



3. OTHER EMERGING PRACTICES / TECHNOLOGIES *(OT Jul 22)*

Introduction

- (1) These slides contain potential innovative / performance enhancement technologies that may be applied to green building projects / existing buildings.
- (2) Sources of these technologies include: past CPD events held by HKGBC, information on the Internet, suppliers or trade/industry organisations that proactively approached HKGBC, or case sharing by government departments.
- (3) Interested users may directly contact the concerned suppliers whose information or website addresses have been indicated on the slides.

Construction Method & Management

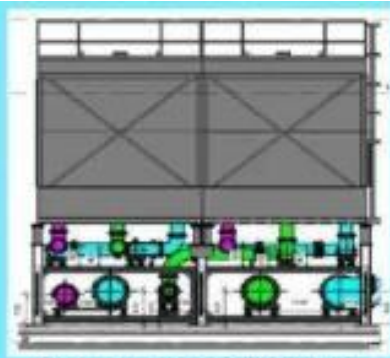


DfMA and MiMEP



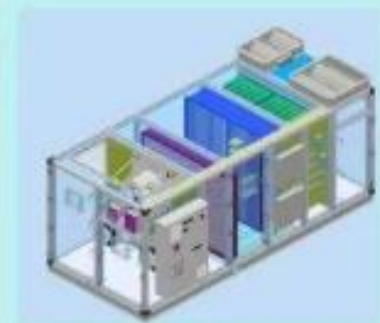
Multi-trade Horizontal Module

- Suitable for building areas with standardized and regular room layout such as open plan office and service corridor
- Components include:
 - Electrical cabling system
 - A/C Terminal box
 - Air ductwork



Modular Condensing Pipework for Cooling Tower

- Suitable for all buildings with cooling tower installation
- Components include:
 - Condensing pipes and fittings
 - Valves
 - Vibration isolators



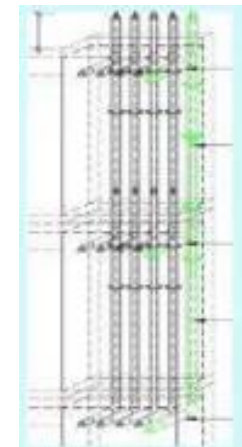
Integrated Air-handling Unit

- Suitable for all buildings with AHU installation
- Components include:
 - AHU
 - LMCP & DDC Panel
 - Chilled water valve set



Pump Room Module

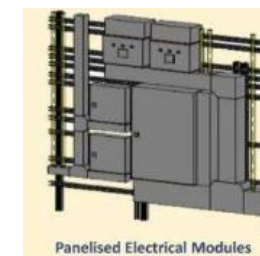
- Pump modules are integrated with structural frameworks and water tanks



Pipe duct



Air ducts



Panelised Electrical Modules



sunying.com.hk

www.cscrobotic.com/mimep/

DfMA: Design for Manufacture and Assembly
MiMEP: Multi-trade Integrated Mechanical, Electrical and Plumbing

Source: ArchSD, HKSAR Gov't



Off-site prefabrication of rebars

Year	2019 (ton)	2020 (Q1&Q2) (ton)
Prefabricated Rebar Supplies to Government Projects	27000	11600
Prefabricated Rebar Supplies to Non-Government Projects	50900	37300
Total	77900 (24.7% of total cap)	48900 (30.9% of total cap)

Remark : Since 2016 Approximately 80 contractors have been using Off-site prefabrication yards;
Approx. 60 contractors applied CITF subsidies

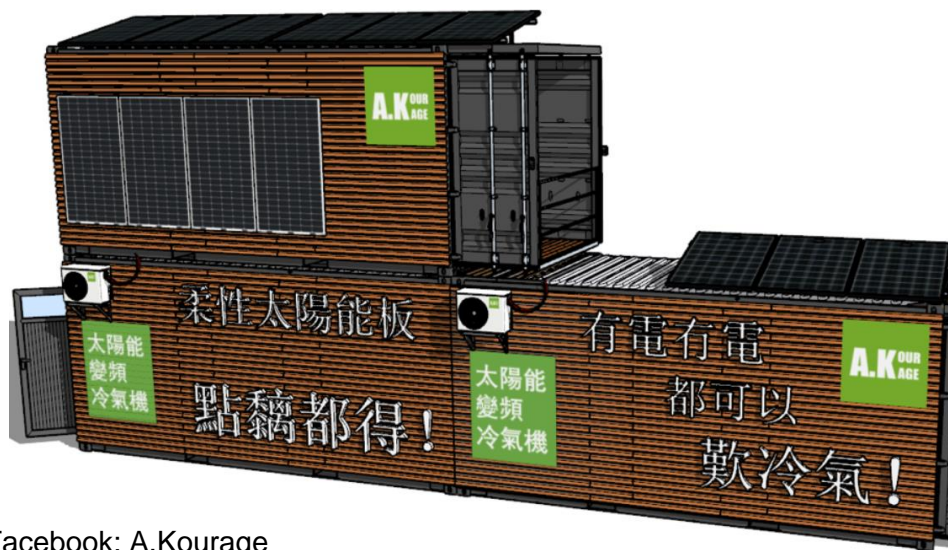
The government is keen to promote the use of off-site prefabricated rebar and has selected **24 pilot projects**, in which the contractors are required to apply a **minimum of 70%** prefabricated rebar products.

Plant	Capacity per year (tons)
VSC Construction Steel Solutions Ltd	96,000
Golik Steel HK Ltd (Tai Po Plant)	100,000
Golik Steel HK Ltd. (Tsing Yi Plant)	60,000
SW Construction Ltd. (Shiu Wing)	60,000
Total	316,000

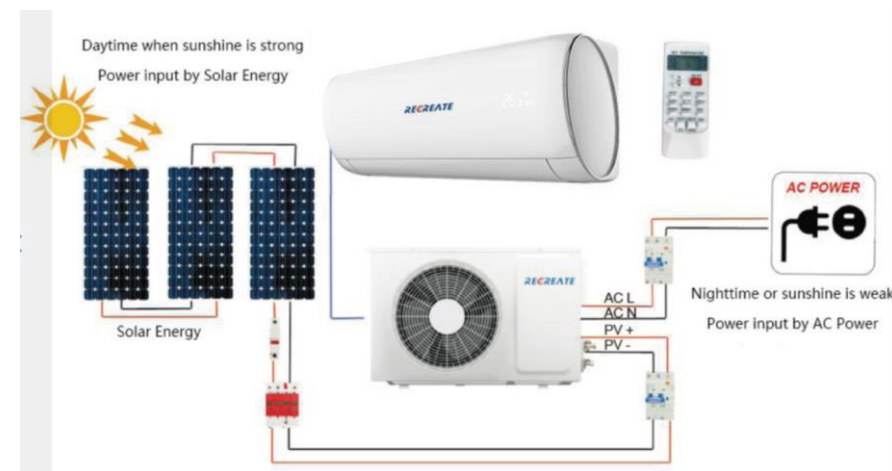




Solar-powered construction sites



Facebook: A.Kourage





Battery clean power supply for construction sites

Ming Pao Daily News | 2021-02-03

| A08 | 港聞 | 創科線

Ampd Energy

地盤引入淨能櫃 逐步淘汰柴油發電機

柴油發電機為建築地盤內的機械設備提供動力，但排放大量廢氣、黑煙、噪音。本地初創企業 Ampd Energy 開發「淨能櫃」，取代柴油發電機，用家連接電網替櫃中逾萬顆鋰離子電池充電後，再讓重型機械連接取電，過程中不排放任何廢氣。信和集團創新部創新聯席董事楊孟璋表示，集團決定要求承建商於所有新項目中使用淨能櫃，冀改善地盤工作環境及帶動建造業數碼化。



REC Green Technologies | 盈電環保
Battery Energy Storage System on construction site | 淨能櫃：建築工地電池儲能方案

能源儲存系統，其系統最初主要供數據中心、醫院等作後備電文順表示，3年前開始發現建築地盤對於**潔淨能源**有需求，現時逾 40 組淨能櫃。

地盤內燃燒柴油發電，向天秤、燒焊等機械供電，會產生噪音及廢離子電池，蓄電後可向重型機械供電，不會排放空氣污染物。



Smart Power for Construction Site

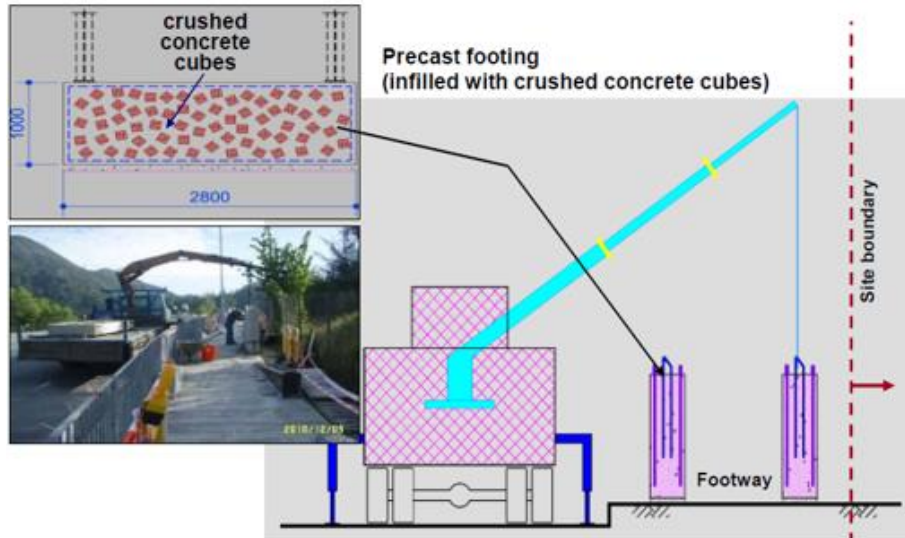


<https://www.hkelectric.com/en/smart-power-services/smart-power-construction-sites>

<https://www.clp.com.hk/en/business/business-insights/construction-site>



Modular hoardings without welding



可重用、
模組化、
環保物料
圍街板結構



Bolt and nut eliminate welding and thus no bad smell / nuisances



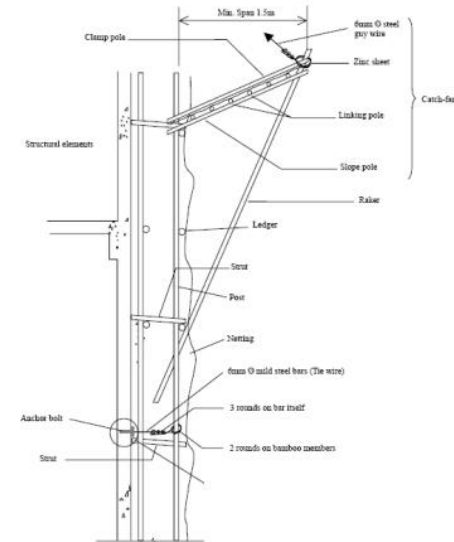
Source: Housing Authority



Metal scaffolding

Benefits:

- Strong & durable
- No fire risk
- Modular -> quickly install
- Fully reusable
- Less waste



Prefabricated ready-to-use planks



Low-noise demolition methods



Non-Explosive Chemical Expansion Agent (Soundless Chemical Demolition Agent)

Unlike explosive chemicals or expansive compounds, soundless chemical demolition agents do not produce vibrations, and hence, they are completely quiet and safe to use.



Hydraulic Crusher for Concrete Breaking

Use of hydraulic concrete crusher is much quieter than using hydraulic breaker in demolition project.

and many other methods on EPD website

Site Aspects



Structural root cell modules for planters



The project was built on top of an underground shopping mall making it difficult to provide a long-term planting solution for large established trees. Another challenge was the site's exposure to extreme weather events. Typhoons could damage the majority of trees in this project.

In order to solve these issues, a sizeable, interconnected planting pit was created using a structural root cell module system with suspended pavements above. This provided the trees with sufficient soil volume to grow while also giving hard walking surfaces for the pedestrians.

structural root cell module
provide optimal growth zone for tree roots
provides a load bearing structure beneath hard landscapes.
allow loading of quality top soil for tree root systems
without fear of settlement





Smart parking facilities



<https://www.rec-gt.com/solutions/automated-parking-system/>



安樂工程參與香港科學園引入首個自動智能泊車系統。

OR



A smart parking system to identify available spaces, reduce vehicle idling time & pollutant emission.

Materials & Waste



Re-use plastic in construction materials



EcoBricks is Hong Kong's first circular economy-based solution that has the ability to turn all seven types of plastic waste into sustainable construction materials



Biochar replacing cement



Biochar+ Products - Circular Materials

CLS collects woody waste such as bamboo scraps and wooden pallets from construction sites and convert them back to construction materials. Our goal with our construction materials project is to create circular material solutions for the construction industry. Cement is a carbon-intensive material. The cement is the source of about 8% of the world's carbon dioxide emissions. If the we can **replace cement with biochar**, it will be equivalent of growing hundred thousands of trees.

carbonlitesystem.com

<https://www.hk01.com> > 社會新聞 > 初創企業研發木... ▾

初創企業研發木廢料變耐用新建材擬申用於皇后山公屋 | 香港01 ...

2021年6月18日 — **Carbon Lite System (CLS) Environmental Technologies**為計劃旗下其中一間初創企業，研究將廢棄木材變為新能源。創辦人之一、行政總裁梁培輝指，他們將 ...

Use of Synthetic Macro-fiber in On-grade Slab



Close up of synthetic macro-fiber



Adding fibers into revolving drum



Close up of concrete composition



Close up of fibers at fracture surface



Profile of broom finished surface

ACHIEVEMENTS:

- **Performance** – Improved toughness; better crack control
- **Durability** - Corrosion free; less maintenance
- **Handling** - Quick, easy and safe applications
- **Sustainability** - reduced carbon footprint

It helps to replace:



Courtesy: Hong Kong Housing Authority



Mass Engineered Timber (MET)



Hong Kong studio LAAB designed a food kiosk, called Harbour Kiosk, on the Avenue of Stars on the Tsim Sha Tsui promenade, made out of red balau wood.

<https://www.scmp.com/lifestyle/arts-culture/article/3077529/how-wood-trending-renewable-building-material-even-high>

Faced with the high carbon footprint of concrete and steel production, timber is becoming a compelling third option, timber is a natural way to lock up carbon and unlock sustainable design.



<https://www.rubner.com> > references > reference > mact...

Mactan Cebu International Airport · Rubner Holzbau

The new airport in the Philippines, with the first roof structure in Asia to be completely made from **glued laminated timber**



New facilities for waste recycling

Dual-refuse chutes



Waste separation must start at the kitchen



Dedicated Self-service Recycling Room



On every floor / A comprehensive room on G/F



一般垃圾

可回收垃圾



黃錦星 Wong Kam Sing Source: Facebook page dated June 2022 ...

6月26日 11:15 · 🌐

【屋苑新設計：回收便利點？】

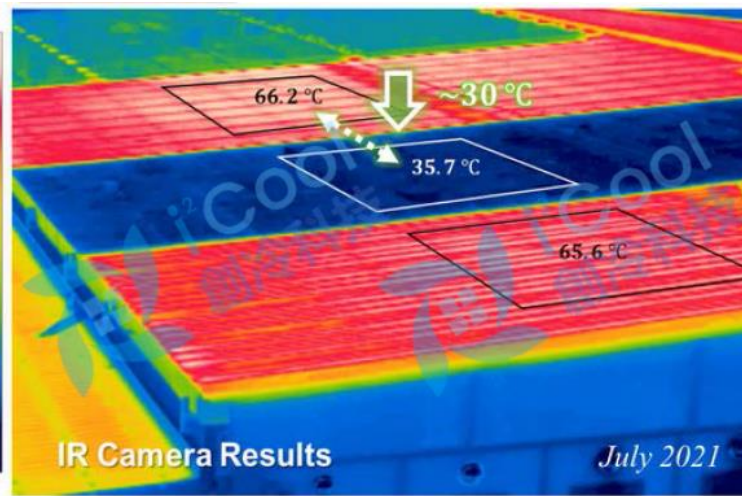
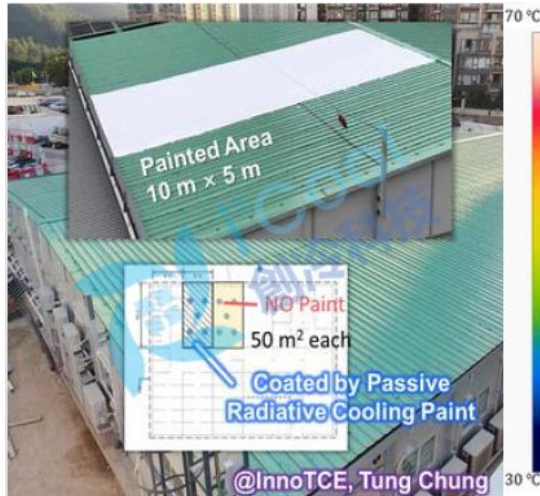
為配合加強全民減廢，迎接垃圾收費新篇章，早前與屋宇署余署長 Clarice 及其同事交流，討論如何拆牆鬆綁，令新建住宅樓宇的回收空間可與時並進，配合多元化回收所需。

例如外地主流做法，是於大廈樓下的合適地點及面積，可容許設置一站式回收空間。放諸香港，此類空間應設計可讓居民回收廢紙、膠、金屬、玻璃樽、四電一腦、小家電、慳電膽/光管、充電池等，甚至廚餘及其他可回收物，令源頭分類回收、暫存管理及送往轉廢為材的下游設施都可於整體上更暢順。

Energy Use



Daytime passive radiative cooling paint



- DRYING TIME 風乾時間** At least 5 hours under 25°C 最少5小時 (25°C)
- OVERCOATING TIME 重塗間隔時間** At least 5 hours under 25°C 最少5小時 (25°C)
- SHELF LIFE 保質期** 12 months 12個月
- COLOR 顏色** White 白色
- TVOC 總揮發性有機化合物** 符合 GB24408-2009
- BINDER 基料** PMMA Polymer 丙烯酸聚合物

Dr. Edwin TSO and his research team got -

OUTSTANDING PAPER AWARD

IN **ENERGY SUSTAINABILITY 2022**

Organised by The American Society of Mechanical Engineers

ASME ADVANCED ENERGY SYSTEMS AND SUB-ENERGY DIVISION Awards The Certificate of Recognition for Outstanding Paper Award to Siru Chen, Aiqiang Pan, Kaijin Lin, Hau Him Lee, Tsz Chung Ho, Chi Yan Tso

創科門室

城大研環保漆 製冷兼減碳

室溫降攝氏5度 料慳電10%

全球暖化令極端天氣日益頻繁，並有利利科技發展環保節能，是港大研創科門室第一項創製式輻射製冷塗料，為建築師提供新選擇，有助節省能源，把對全球日益惡化的環境影響降到最低。今次獲香港冷料技術發展聯盟人獎，讓科學冷塗料的應用更廣。

主編：(英) 吳啟華 副主編：陳仲輝

高覽：(英) 吳啟華 副主編：陳仲輝

冷塗料能令建築物的室溫降低攝氏5度，節省能源，減少二氧化碳排放，是港大研創科門室第一項創製式輻射製冷塗料，為建築師提供新選擇，有助節省能源，把對全球日益惡化的環境影響降到最低。今次獲香港冷料技術發展聯盟人獎，讓科學冷塗料的應用更廣。

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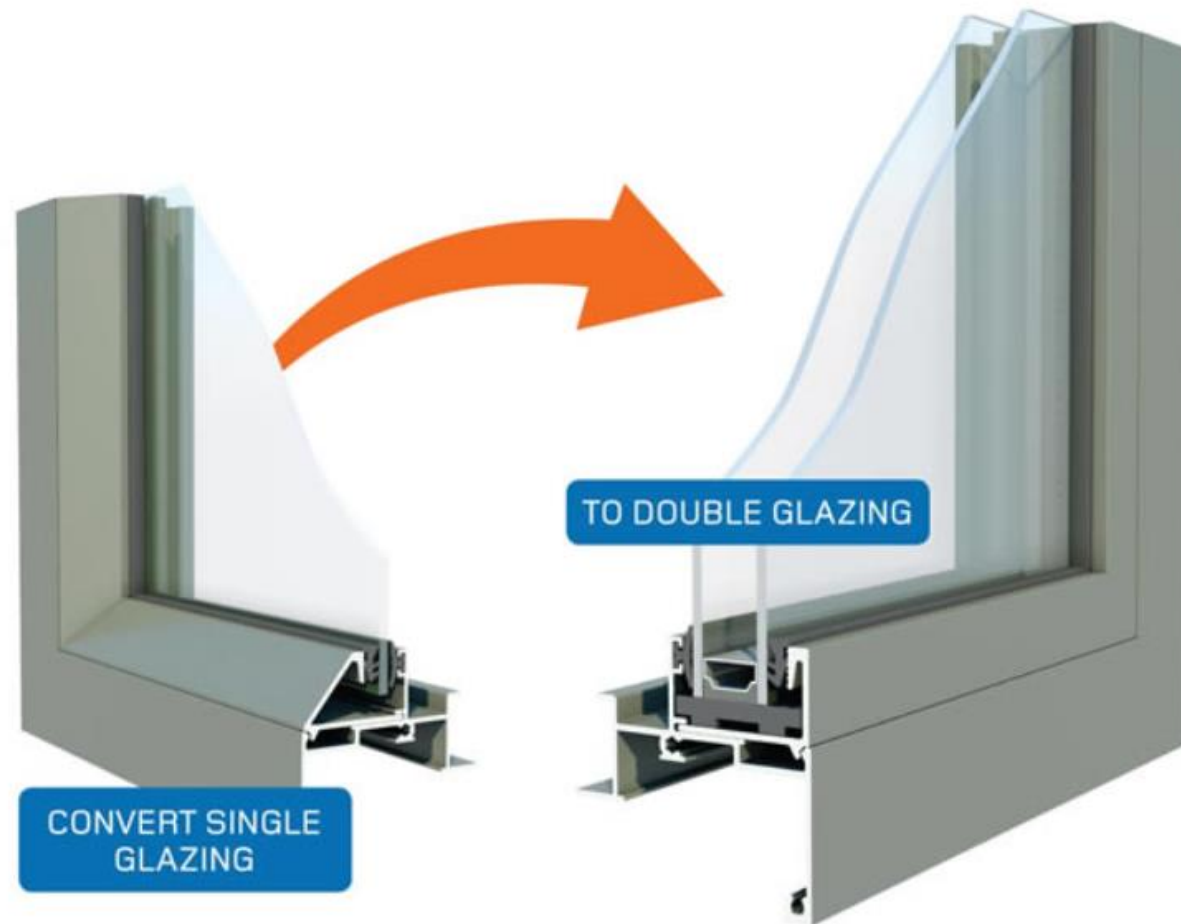


info@i2coolhk.com

<https://www.i2coolhk.com/>



Retrofit double glazing by insert replacement



Feature

- No need to replace the frame

Benefits:

- Much better sound insulation
- Save air-conditioning energy



Solar windows generate electricity

Topic: New Generation Flexible Solar Cell Technology for Building-Integrated Photovoltaic (BIPV) Applications

The Hong Kong Government has set an ambitious goal of reaching carbon neutrality by 2050, in which the increased solar energy deployment is a critical cornerstone in its overall planning. To tackle this great challenge, the City University of Hong Kong has identified the printable, flexible, semitransparent, and color-tunable organic solar cells as a prominent PV technology to promote solar energy deployment in Hong Kong. Such a new generation of solar cell technology can be integrated as tinted solar windows, façades, or curtains with buildings to generate significantly more solar electricity in an urban city, which usually has limited lands and rooftops for installing conventional SI solar panels.

Solar window generates electricity, thermal energy

A research team in Hong Kong has built a solar window that can generate power on the external side via a luminescent solar concentrator and thermal energy on the internal side via transparent solar absorbers.

JUNE 22, 2022 **EMILIANO BELLINI**

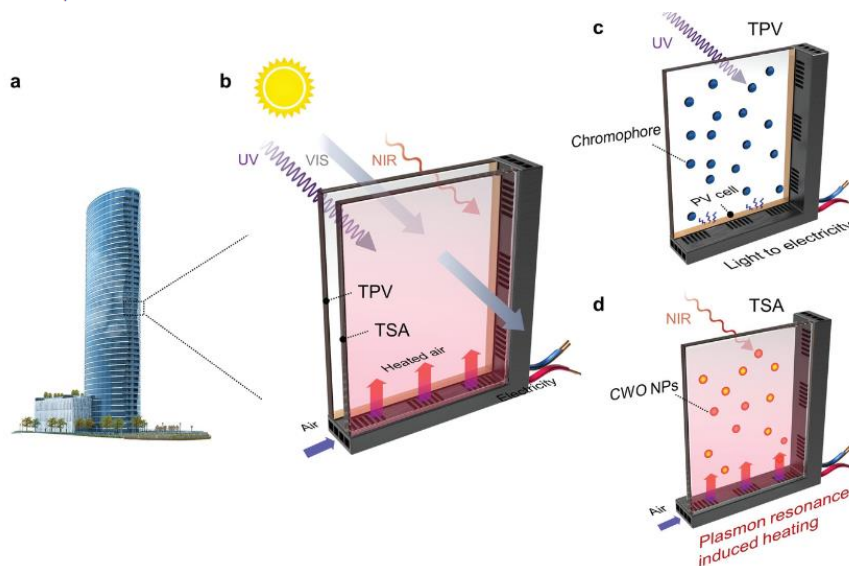


Image: Hong Kong University of Science and Technology, Advanced Science, Creative Commons

<https://www.pv-magazine.com/2022/06/22/solar-window-generates-electricity-thermal-energy/>



玻璃結合太陽能光伏板 大廈幕牆可發電 ARTI Co Ltd.

Source: Ming Pao



格蘭特玻璃

m.grandglass.com.cn



CdTe发电玻璃



Walk-on PV panels / flexible or printable PV



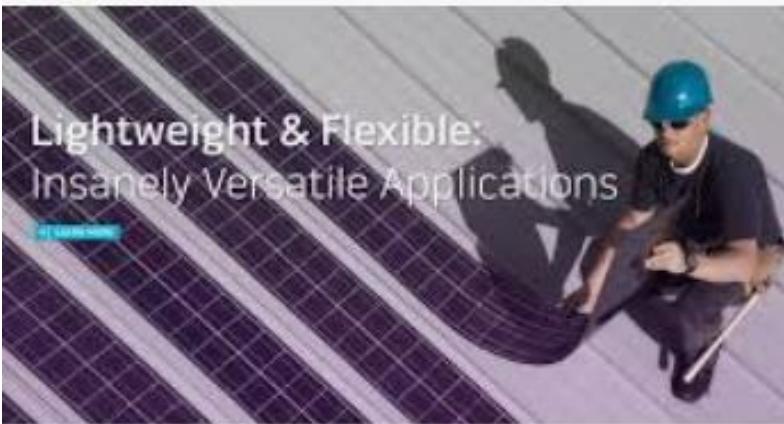
創科方案- 研究太陽能板在行人路上的應用2021-0...
inno.emsd.gov.hk



Walkable PV panels laid as floor tiles



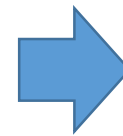
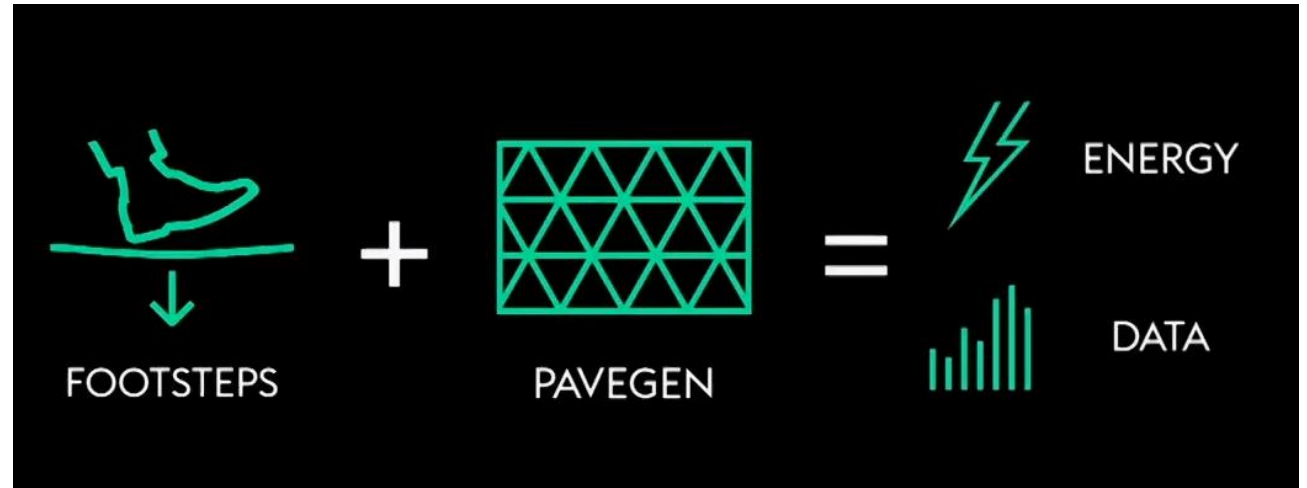
https://www.youtube.com/watch?v=MrvEJJtAH_o



These panels can be stepped on; therefore there is no reduction to the area of emergency fire escape route / refuge floor.



Pavements that generate energy (& data)





Solar hot water panels : balcony-mounted

平板式阳台壁挂太阳能热水器

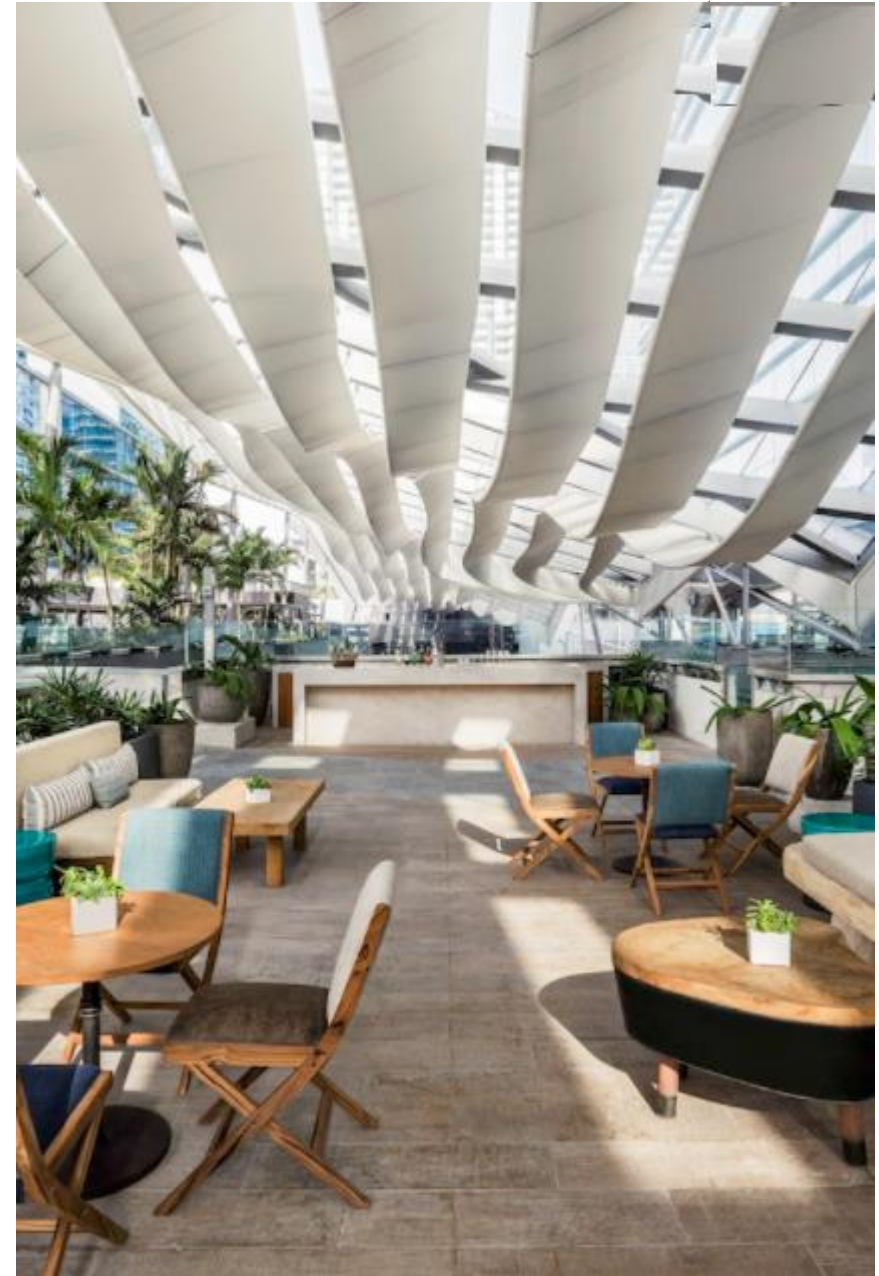
材料	参 数
外形规格	2000*1000*80/2400*800*80
吸收膜层	蓝膜/黑铬/铜铝复合
板 芯	0.4mm铝板
集管/排管	紫铜管
排管板芯结合方式	整板激光焊接
玻璃盖板	3.2mm低铁超白布纹钢化玻璃
边框	1.5mm铝合金
集热器连接	不锈钢波纹管专用接头/焊接
采光面积	≥1.88m ²
耐冻性	加防冻液耐-30℃
抗冰雹	≤ ϕ 35mm冰雹
集热器容水量	1.4L
集热器重量	32.2KG (不含防冻液)



Mall without AC in Miami, US, which utilizes natural wind



Climate Ribbon Miami





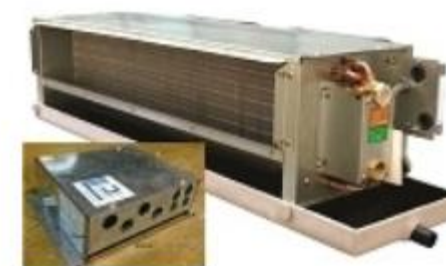
AHU EC plug fans / FCU PM motors – New build / retrofit

EC Plug Fan Retrofit for AHU
40% Deep Power Savings for Air side system



40%
Power
Saving

<https://www.ebmpapst.com/>



iFCU™ Package

(for new installation and replacement works)

- Permanent Magnet Motor Technology (PM/BLDC/EC Motor)
- Variable speed FCU, fully controllable
- Firmware customization to fit client's requirements

<https://www.rec-gt.com/solutions/ifcu/>



Magnetic bearing oil-free chillers



Magnitude® Magnetic Bearing Centrifugal Chillers ...
vimeo.com

Compressor Highlights

- Minimal refrigerant charge is safer for the environment and less costly.
- Significantly quieter operation than a full-sized chiller.
- Oil-free refrigerant system means that oil cannot make its way onto the heat transfer surfaces and degenerate the efficiency of the system.
- Required electrical startup current for MagLev compressor is just 2 amps versus a full size compressor requiring 500-600 amps.
- A MagLev compressor's weight is one-third of what a conventional compressor of similar capacity would be. It requires significantly less material and energy to manufacture a MagLev compressor, adding positively to your carbon footprint reduction process.
- Fully functional internal computer provides high level monitoring and diagnostics.

- Magnetic bearings
- No contact = No friction = Greater efficiency
- Oil-free design
- No contact surfaces = No oil or oil handling equipment
- Integrated variable frequency drive



Magnitude™ WME Compressor



Magnitude™ WMC Compressor



Variable primary flow chiller plant with optimization control



Hartman Loop

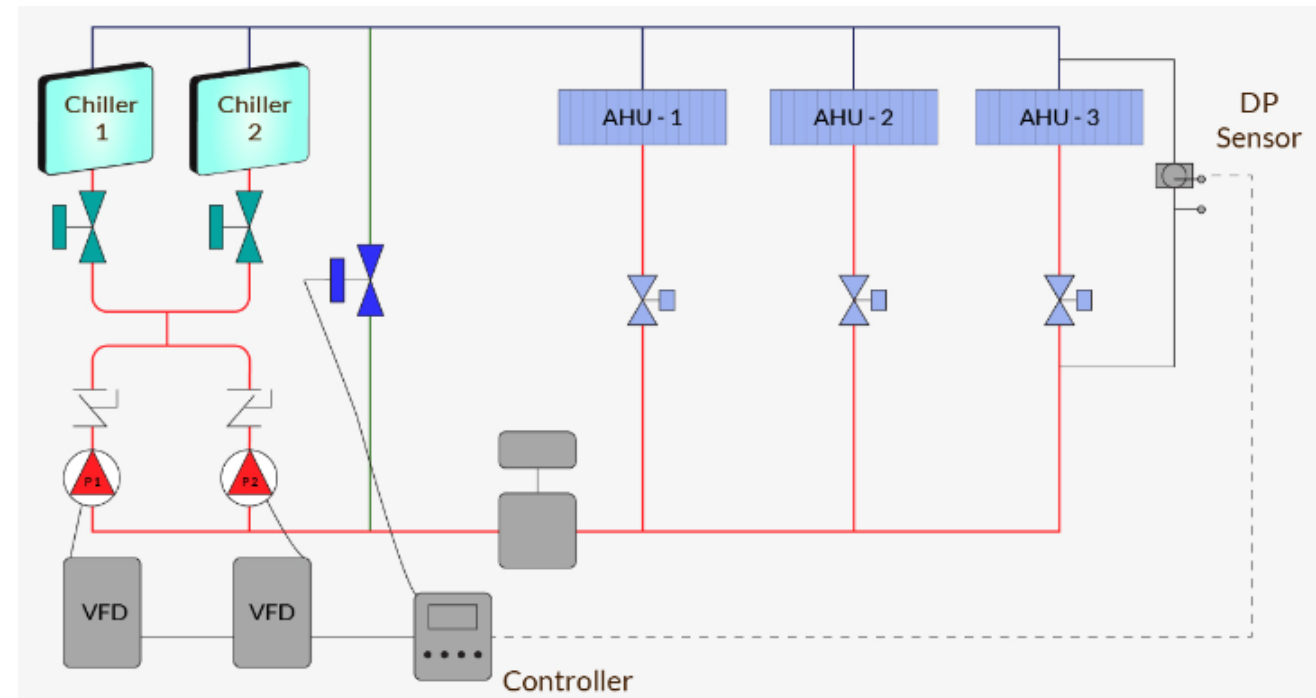
Hartman LOOP™ network-based control technologies add a new dimension to all-variable speed chiller plant operations. The Hartman LOOP is, in effect, an 'operating system' that optimizes the plant as a system and thereby affords enormous energy and cost savings.

In addition to annual energy cost reductions of 20% to 45%, this network-based system enables reductions in plant size of 20% or more with the same capacity and redundancy capabilities as larger conventional plants.

There are two separate elements of all-variable speed chiller plants:

- The chilled water generating and distribution circuit.
- The chiller and condensing circuit.

The chilled water generating and distribution circuit in all-variable speed plants is a single circuit without any decoupling lines and no mixing of supply and return chilled water.

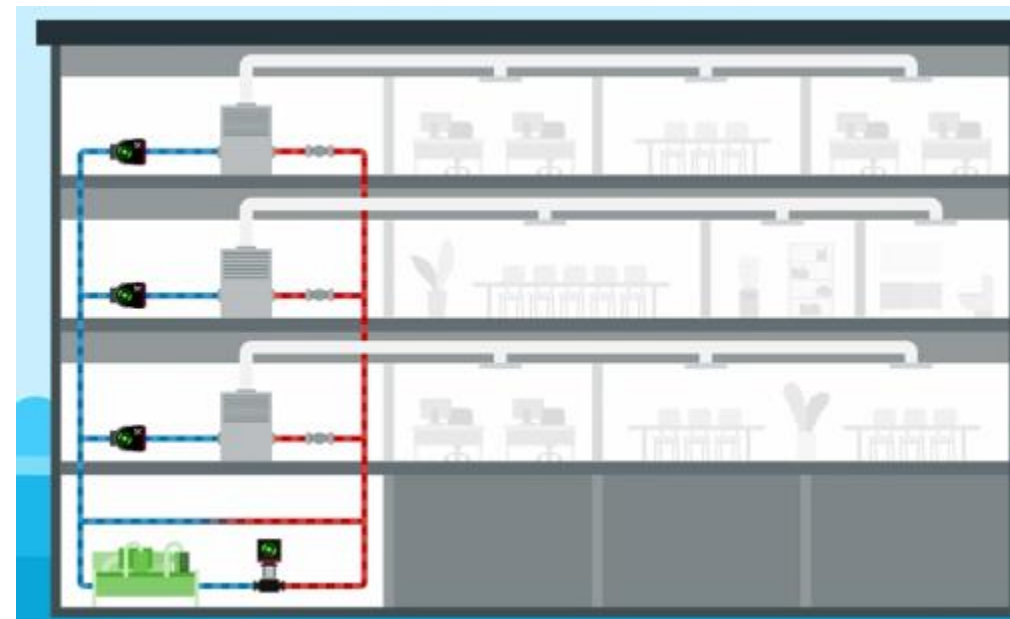




Distributed pumping for chilled water system

How to increase comfort and improve Delta T

Inadequate commissioning leads to poorly balanced systems and excessive energy use. Replacing valves with pumps ensures optimal pressure and flow to each terminal unit at all times. So, you can increase comfort and improve Delta T.





“Fan” as a standard provision by developer



Rotating louvre fan at centre



Invisible blades when OFF



Exhale fans ideas | bladeless ceiling fan



Air Induction Unit - Arup



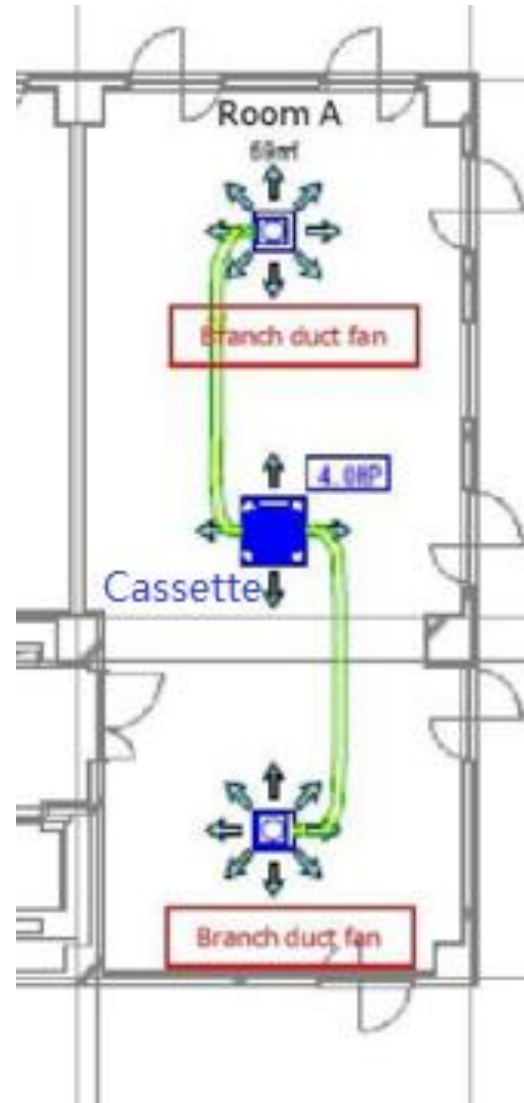
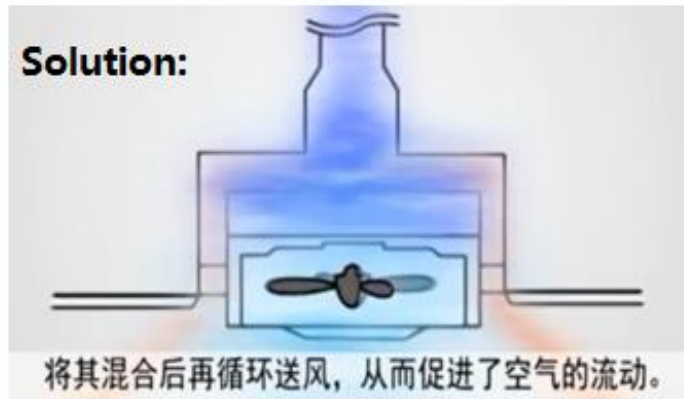
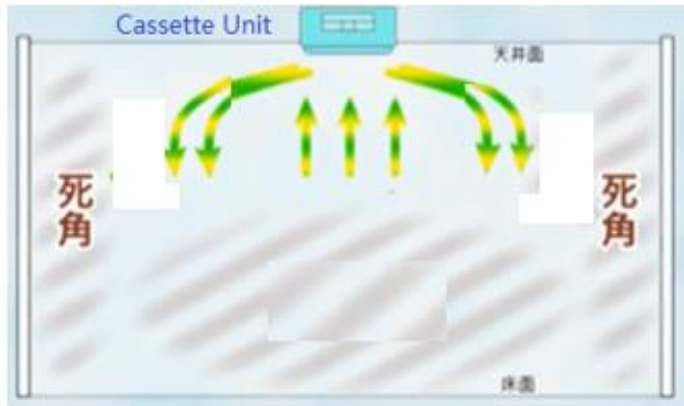
HVLS fans and evaporative coolers together

Halls / Recreational Spaces

High-volume low-speed fan



Fan-assisted air distribution to reduce the number of cassette units in a space



Rotating louvre

Fan induction unit at diffuser outlet

Local and mini-area cooling

Cool air, called “cold air” in Fig. 7.10, at around 22 °C, is supplied from a diffuser on the headboard above the head of the guest with a very low speed, less than 0.1 m/s. Relatively warm room air, called “hot air” in Fig. 7.10, is extracted back above the headboard and re-cooled. In this way, the localised space above the bed is appropriately cool enough, while the room could be relatively warmer than usual. The control logic is that when the average illumination level of the room is below 5 lx and within the time period from 11 pm in the evening to 7 am in the morning, the room temperature setting of the iFCU™ is adjusted to 25 °C instead of the normal 22 °C used by the guest. At the same time, the fan speed is adjusted to low. The “cold air” coming out from the diffuser at the headboard is able to lower the air temperature above the bed, in particular around the head of the guest, by 2–3 °C, and at the same time pushes the “hot room air” upwards. Once the illumination level is above 5 lx or time is after 7 am in the morning or the guest manually adjusts the thermostat, room temperature setting will be restored to the value before the operation of this mode but the iFCU™ is still running under a low speed.

The cool air from the headboard is not produced by using chilled water because, firstly the installation cost is huge and secondly, it is difficult to make sure there

is no condensation above the head of the guest. The design therefore involves the use of electronic cooling, and this is a thermoelectric effect, which is the direct conversion of temperature differences to electric voltage and vice versa. Here, the Peltier effect is utilised, which is the presence of heating or cooling at an electrified junction of two different conductors discovered by a French physicist Jean Charles Athanase Peltier (Pollock 1985) in 1834. When a direct current flows through a Peltier module, one side becomes cool and the other side warm; this is effectively similar to the evaporator and the condenser of a typical air conditioner. Heat drawn on the cool side, added to the electric power consumed, has to be dissipated on the warm side. It is this effect that is adopted within the headboard. However, both the cooling capacity and COP of a Peltier module are not high and therefore the effect is limited to only small applications, and this is ideal for the case used for the headboard for a single hotel guest. The temperature reduction is also limited to approximately 3 °C, but it is significant in terms of the comfort of the occupant. Room air is used to carry heat away from the warm side of the module. In this way, the temperature setting of the whole guest room is elevated throughout the night, saving substantial energy consumed by both chillers and chilled water pumps though some energy has to be consumed to energise the Peltier modules and the small fans blowing air out of the diffusers on the headboard. The whole energy exchange is still a net saving on traditional air conditioning.



Holiday Inn Express Hong Kong SoHo

Building Sustainable Futures: Design and the Built Environment

由 Mohammad Dastbaz , Ian Strange , Stephen

Selkowitz 編輯



Fig. 7.10 Principle of operation of the Peltier headboard

Local and mini-area cooling

Quick cooling when a person goes from outside to inside !

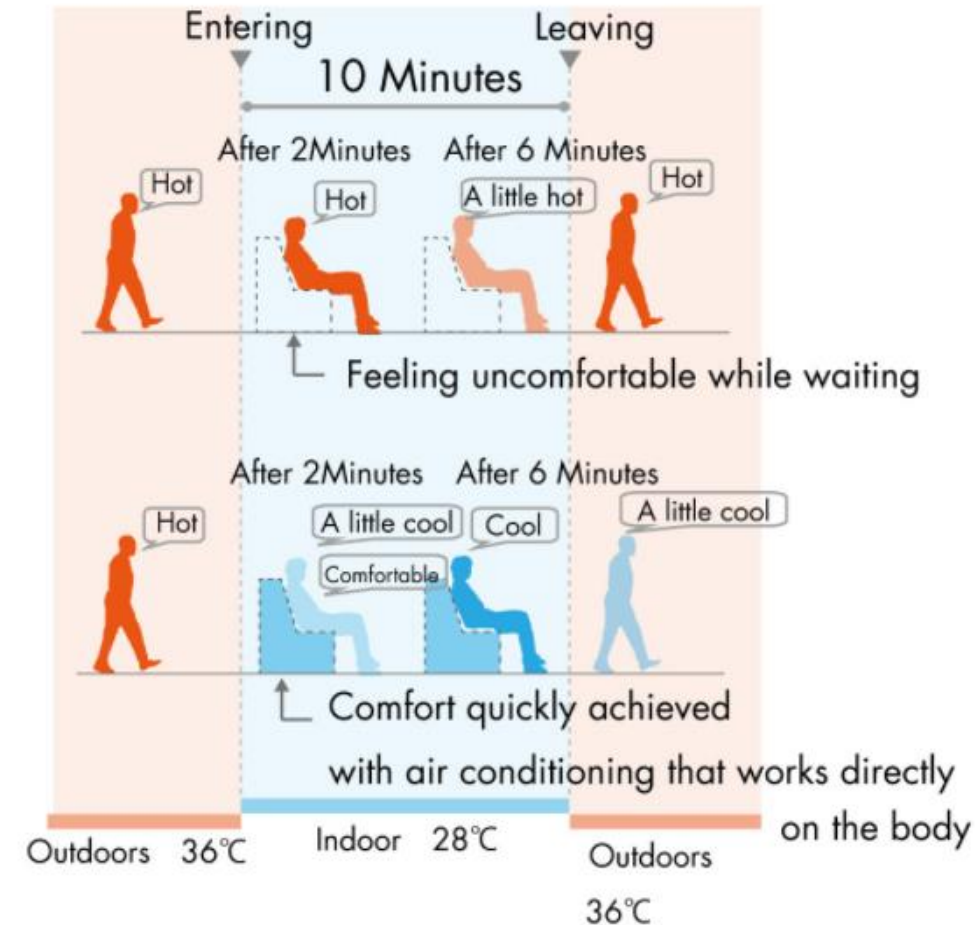
NIKKEN
EXPERIENCE, INTEGRATED

nikken.co.jp



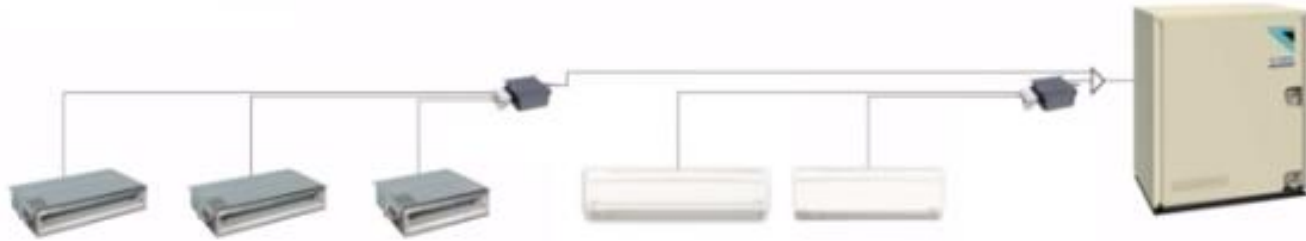
General
air conditioning

Cool/Warm Sofa





Water-source heat pump AC system for residential projects

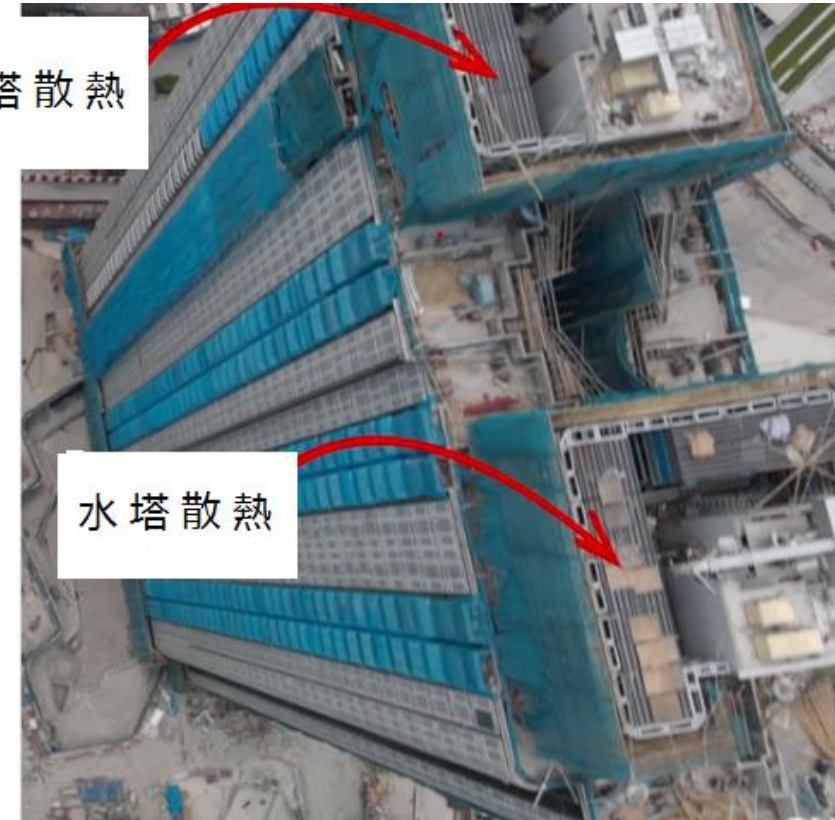


水塔散熱

AC as a service: Heat rejection medium is provided to the flat occupants by the developer.

室外機放置在
公共走廊之機房

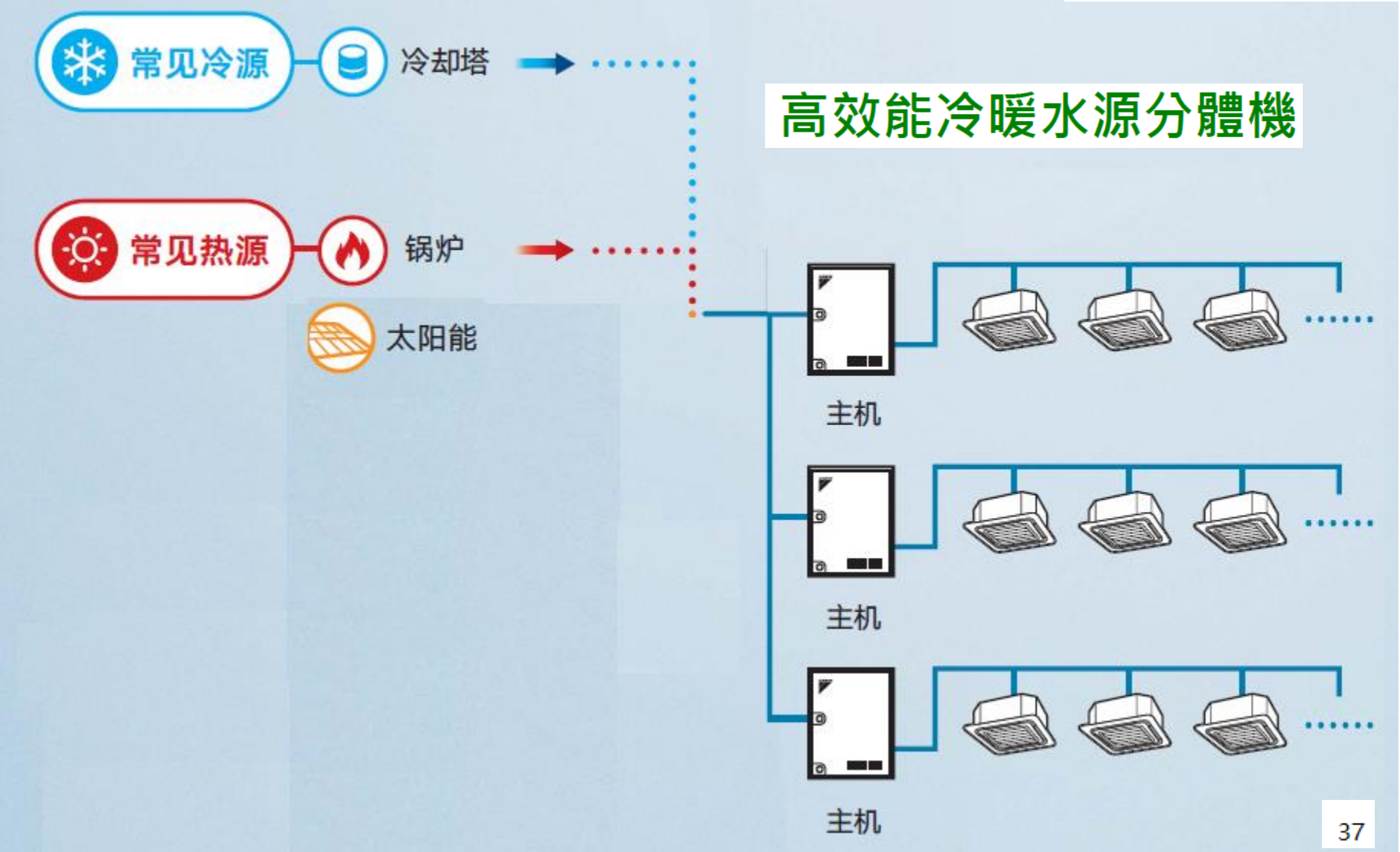
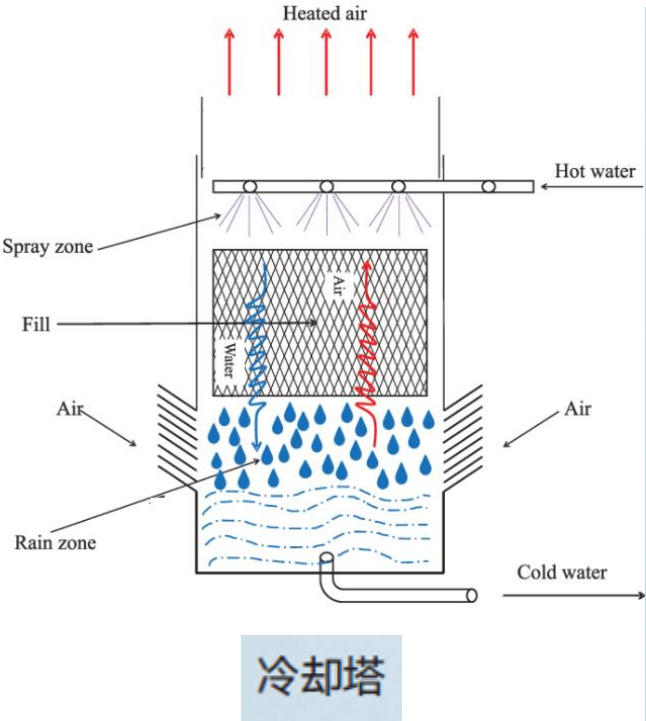
In future, would there be "Hot water as a service" ?



水塔散熱



Water-source heat pump AC system in residential development



Source: Daikin Water Source Heat Pump Series

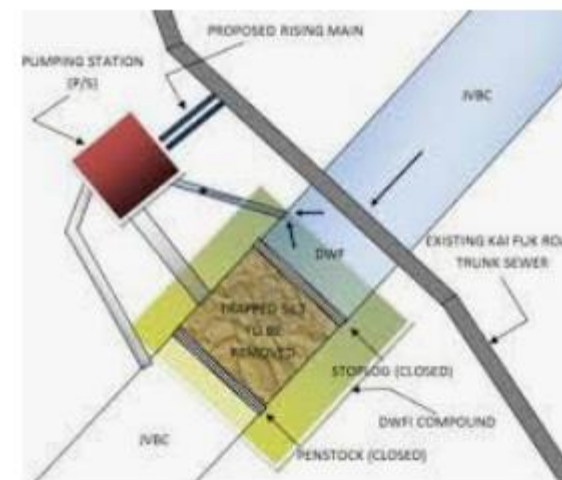
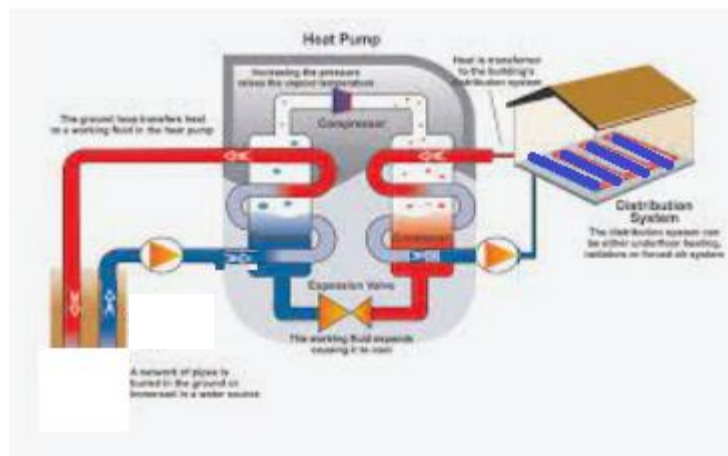


Water-source heat pump AC system

建造業零碳天地與渠務署合作 組建首個機電組裝合成雨水空調系統

建造業議會位於九龍灣的建造業零碳天地近年人流與使用量日益增加，需要提升空調系統以應付額外的需求。由於新空調系統在製冷過程中需要獲額外供應冷卻水，加上本署大型雨水箱形暗渠恰巧在建造業零碳天地的地底經過，因此建造業零碳天地的工程團隊向本署提議從地下雨水箱形暗渠抽取雨水製冷。我們樂見原本排出大海的雨水能獲善用，當然全力配合。

2019年5月，建造業零碳天地的工程團隊開始與本署商討有關方案是否可行。雙方團隊花了大約五個月時間合作和研究，終於在2019年11月為建造業零碳天地完成組建全港首個機電組裝合成雨水空調系統，得以利用新技術抽取地下雨水箱形暗渠的雨水製冷。新系統的能源消耗量比建造業零碳天地原有的冷卻塔系統少15%。 (Source: DSD website)



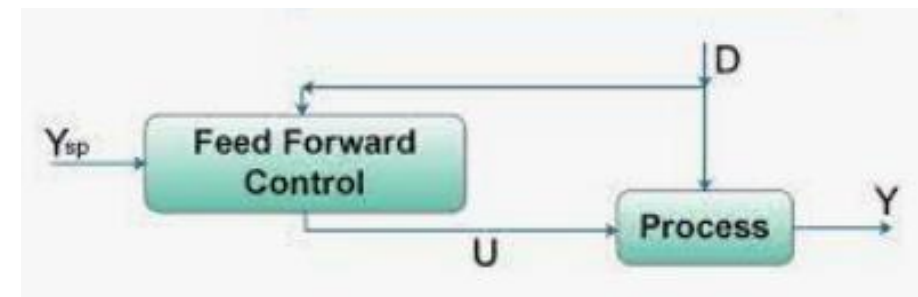


Predictive control for AC system

14 January 2022

Innovative Predictive Control System for Air Conditioning Wins Prestigious Asia-Pacific Region Award

系統於今年年初應用於一號客運大樓，並在每小時自動收集最新數據，包括來自中電提供的機場每半小時用電量；以及天文台的氣溫、濕度、日照強度、雲量及風向等數據，因此模型可以預測未來二十四小時客運大樓的溫度及所須製冷量的變化，根據預測所得數據 控制冷氣系統。換言之，系統亦能預先調節及輸出最合適的冷氣量，同時達致節能，以及保持旅客的舒適度。





Batteries for storing emergency power

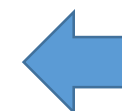
9 August 2021

CLP Power Applies Smart Technology to Save Energy and Reduce Carbon Emissions at Hong Kong International Airport

CLP Power Hong Kong Limited (CLP Power) and the Airport Authority Hong Kong (AA) have jointly designed and developed the city's largest **battery energy storage system (BESS)**

To ensure stable round-the-clock airport operations, Hong Kong International Airport (HKIA) requires reliable electricity supply and installs backup system for emergency purpose. In view of the latest development of the airport, an additional backup supply is needed for the Terminal 1 extension and other facilities.

CLP Power and the AA have teamed up to design BESS, the largest emergency backup power supply system in Hong Kong with a maximum power output of 4 megawatts (MW). Its capacity is equivalent to more than 55,000 pieces of 10,000 milliamp hours (mAh) portable power banks. BESS can store electricity produced by the existing generators during routine testing.





DC micro-grids within a building

Enable a **greener** building by DC voltage

Architecture

Power grid (AC grid) → **DC** → **DC voltage powered building / home / office / ...**

Applications: Energy efficient appliances, Wi-Fi, light bulbs, air conditioning, solar panels, batteries.

ENERGY LABEL (Green 1)

DC voltage

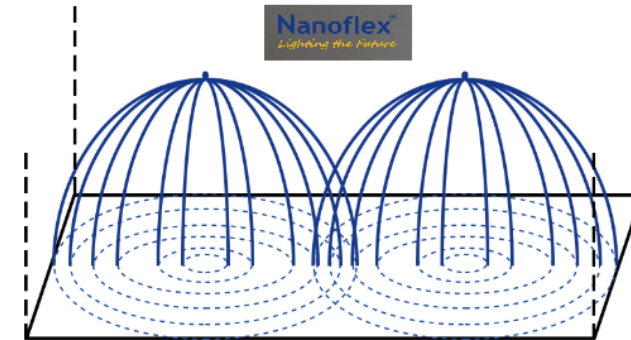
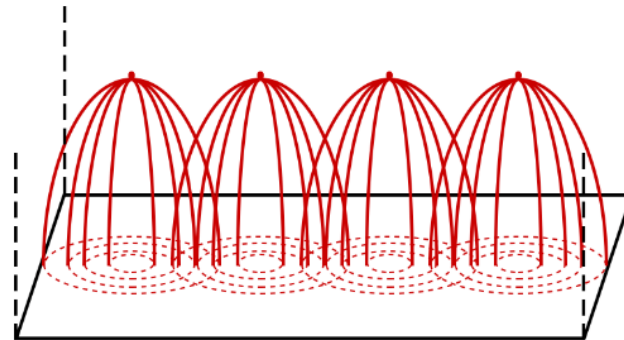
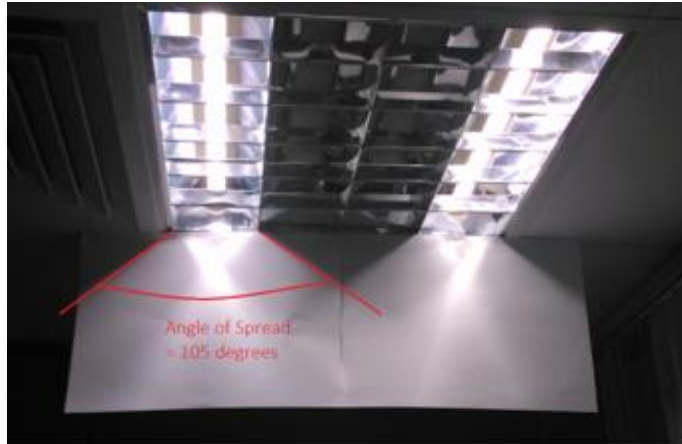
Eliminates the AC-DC-AC conversion that has energy losses

7:50 / 20:50 • Enable a greener building by DC voltage >

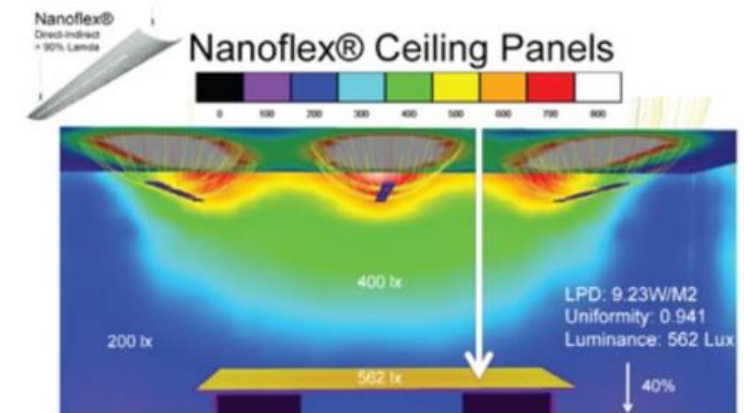
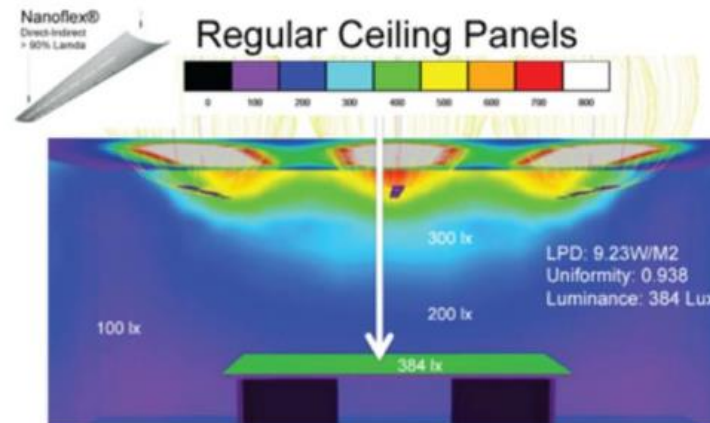


Coatings on lighting fixtures / ceiling panels to improve light distribution & reduce energy use

Old



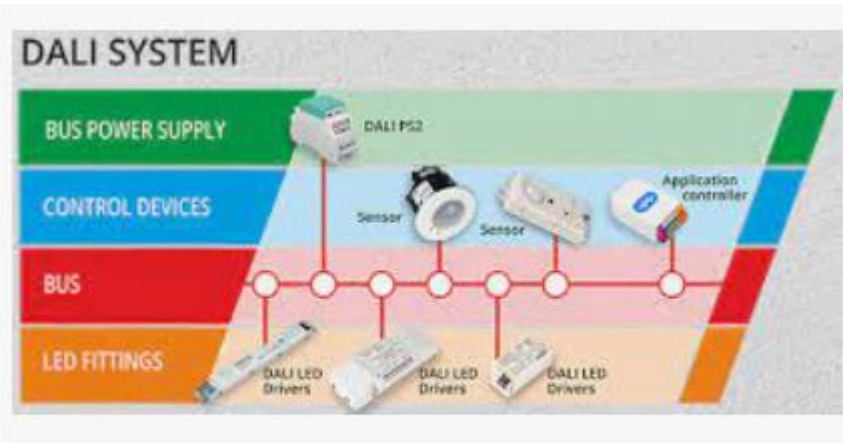
Density of lighting fixtures can become lower



Now



DALI system / individual control modules for lighting fixtures or AC equipment



What is DALI Dimming? - uPowerTek
upowertek.com

Schedules & user commands are sent from any device and relayed to our cloud servers



The gateway receives the commands and passes it to individual controllers via wireless Zigbee network



Wireless controllers turn on/off individual light fixtures according to schedule or user command



Digital energy monitor for MCB boards

一間寫字樓迎合擴充人手，需要在寫字樓了不同位置增加特定數量的辦公枱連插座、電腦、影印機、電腦螢幕等等。

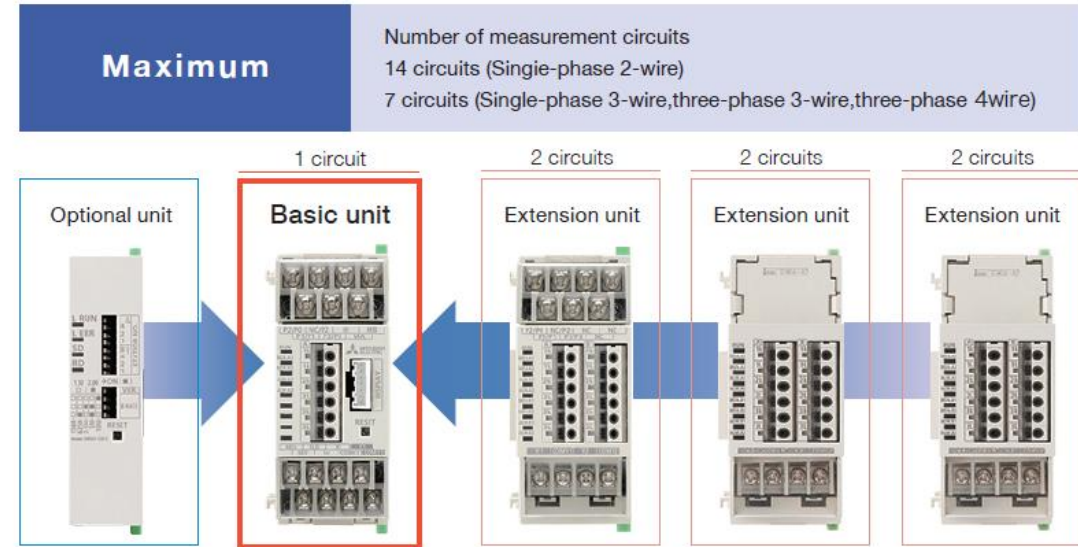
因為加裝的電器數量並不少，該公司憂慮現有數個配電箱能否承載新加電路的負載。

- 原有配電箱加裝多功能電子錶
- 配合 ECO Web Server

隨時在辦公枱上電腦 / 手機可以即時查閱有關數據

數據即時、準確

- You can start measurement at locations where you want to achieve energy saving.
- Expanding the system by adding more units as the number of measurement circuits increases.

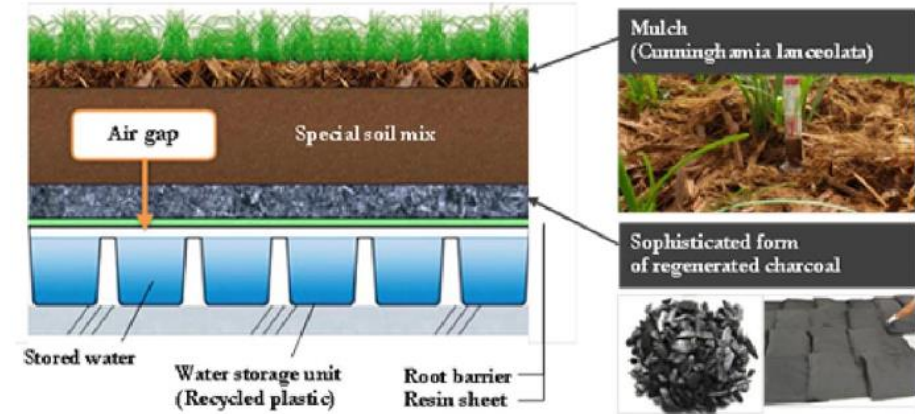
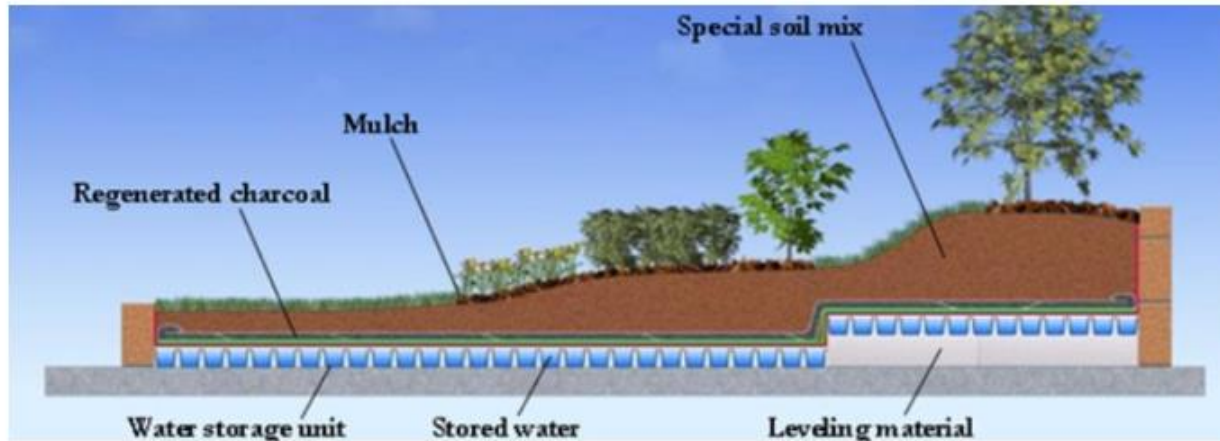


智能式評估 (配合同服器)
數位式，可遙控讀錶 (實時資料、易於管理、精準)
可主動查詢電路 電流、電壓、電費、功率因數等
較易掌握相關資訊達到即時管理
即時知道故障問題種類
可加裝模組檢測 – 漏電、溫濕度、 振動、電壓回路、 配合設備計算產量流量、P.L.C.

Water Use



Planter system that stores rainwater



INSTALLING THE MIDORI-CHAN™ GREENING SYSTEM OFFERS THE FOLLOWING BENEFITS:

- Saves costs by using dramatically less water than conventional greening systems
- Reduces temperatures of concrete decks by over 30°C
- Decreases the thermal load of the local environment by transferring heat to vegetation
- Removes more CO₂ from the atmosphere through photosynthesis
- Offers flexibility around loading constraints by tailoring soil depth, as required

- Rainwater is cleaned as it filters through Kawada's special capillary-action soil mix, plus a layer of regenerated charcoal, into water storage units
- The water storage units are locked and interlinked, much like ice-cube trays, and are designed to enable excess water to drain away naturally
- Resin nets above the water storage units enable the hassle-free installation of bags of regenerated charcoal
- Vegetation roots won't access the filtered rainwater directly due to a root barrier layer between the resin net and regenerated charcoal bags
- The water storage units ensure an air gap exists between the stored water surface and the regenerated charcoal bags

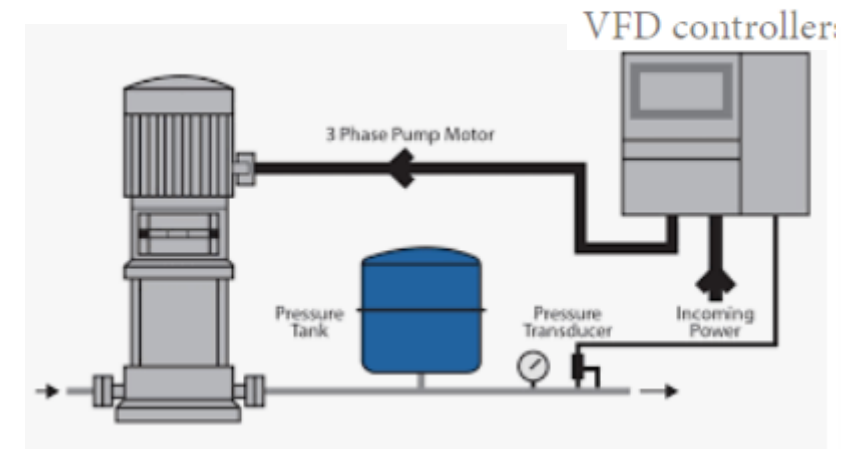
global.kawada.jp/businesses/environmental/midorichan



VFD for top floors booster potable/flushing water pumps

Pumps that operate in the traditional method require **large pressure tanks** or expensive valves to keep the pump from starting/running full speed and then shutting off in quick succession. Starting/stopping rapidly generates a lot of heat in the motor and too much of this can cause pump motor failure. This rapid cycling can also cause damage to piping and other equipment as pressures and water flow change very quickly. Because VFD's strategically increase or decrease the pump speed to match your demand, rapid cycling is a thing of the past with a VFD controller. Because it is unlikely that you need all the water your pump can produce, using a VFD controller means that your **pump** will NOT be running at full speed when you are using water. These slower speeds translate into **less wear and tear** on the pump and motor. Less wear and tear means longer pump/motor life!

VFD controllers are constantly monitoring the pressure and adjusting pump speed and only **a small pressure tank** to act as a buffer is needed. This means that the expense and space required for large pressure tanks is no longer required!



Smaller bladder tank

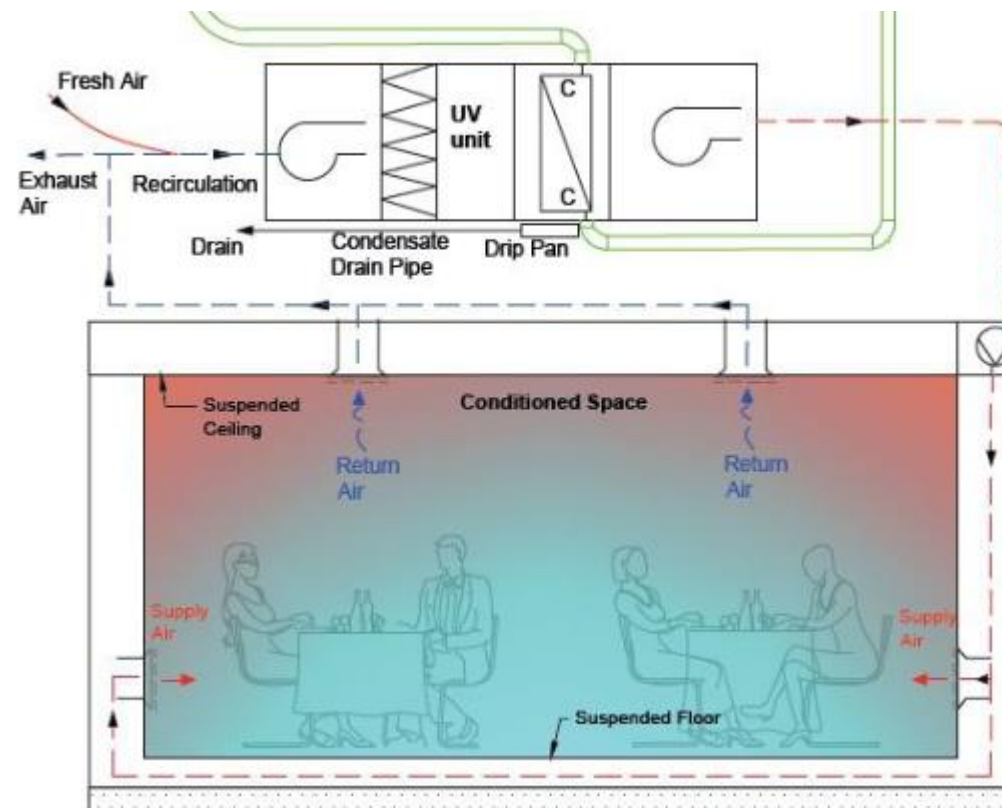
Health and Wellbeing



Innovative restaurant HVAC system that reduces the chance of COVID-19 spread

A non-conventional ventilation system to mitigate the spread of COVID-19 and improve indoor air quality in restaurants and similar indoor environments

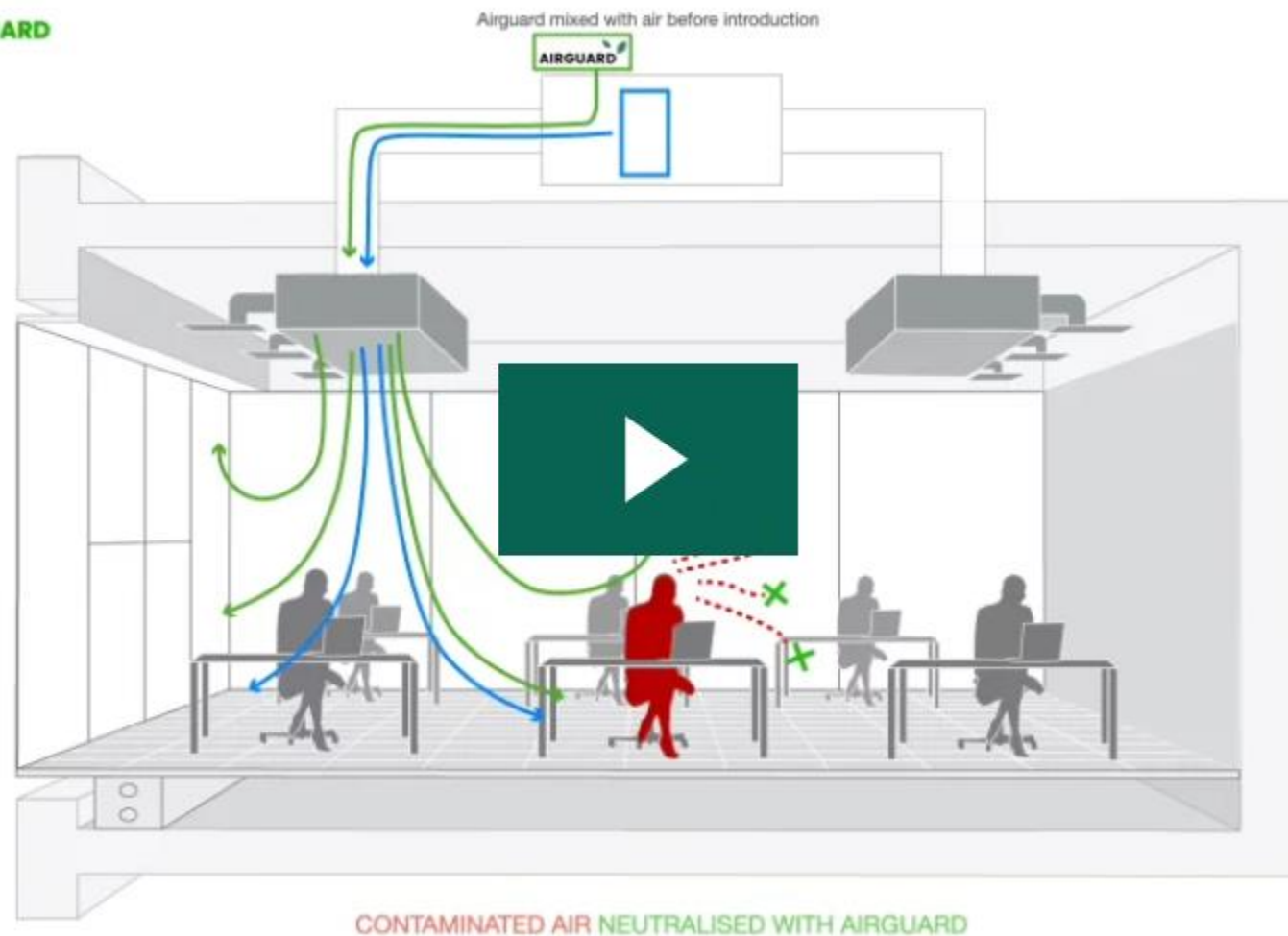
By Ir Dr H F CHAN and Ir Philip K S CHIU





“Clean air as a service” air cleaning system

SCENARIO WITH AIRGUARD



Our plant-based, non-toxic and fully biodegradable solution remains suspended in the air in a very fine fraction particle form.



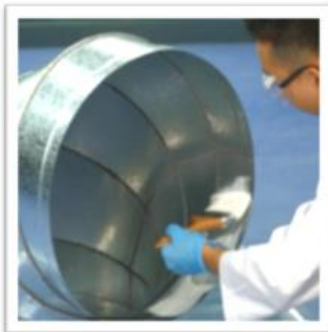
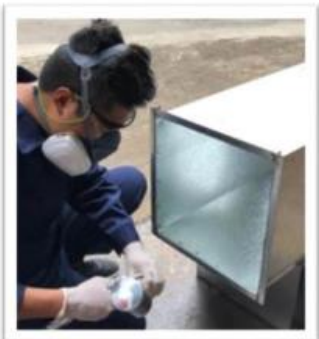
Antibacterial & dust-free air duct coating

International Exhibition of Inventions Geneva



The International Exhibition of Inventions of Geneva is the biggest event in the world to be exclusively devoted to inventions, showcasing over 1,000 new innovations and inventions each year.

NAMI's antibacterial dust-free waterborne coating prevents dust aggregation in air duct, and also inhibits the growth of bacteria, mold and mildew, ensuring good indoor air quality. The multiple functional coating is anti-dust, antibacterial, waterproof, anti-acid/alkali and eco-friendly as well as easy to apply. It can greatly reduce air duct cleaning and maintenance costs.



<https://nanoflowhk.com/>



Wall finishes that breathe (moisture)

Diatomaceous earth wall coating or plaster

珪藻土

日本田川

➤ Daichi (稚内珪藻土)

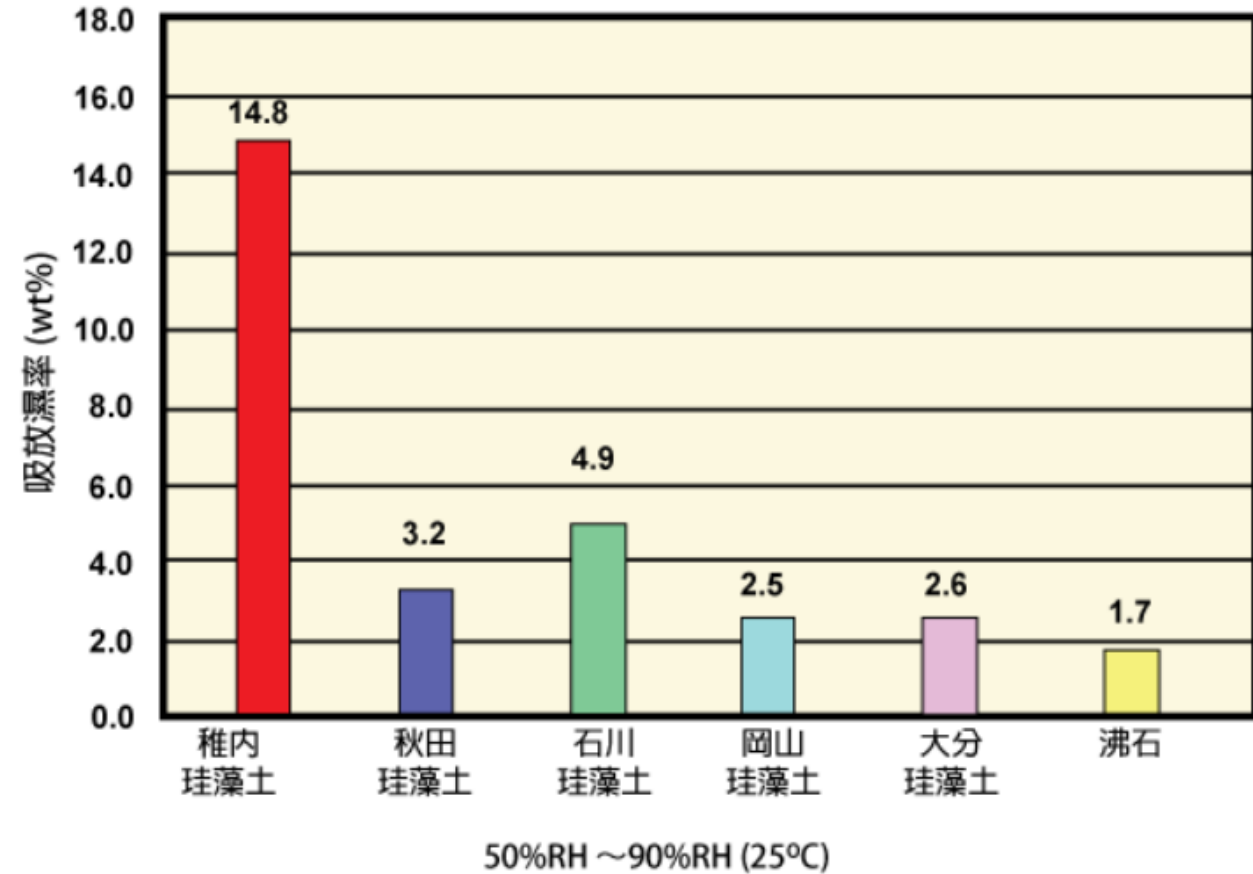
➤ Takumi (稚内珪藻土+漆喰)

➤ Sanga (淡水珪藻土)

➤ 日本藤原



吸濕量比較



<https://www.cap-global.com.hk/index.html>



Wall blocks that breathe (moisture) and are anti-bacterial



HYGROSCOPIC

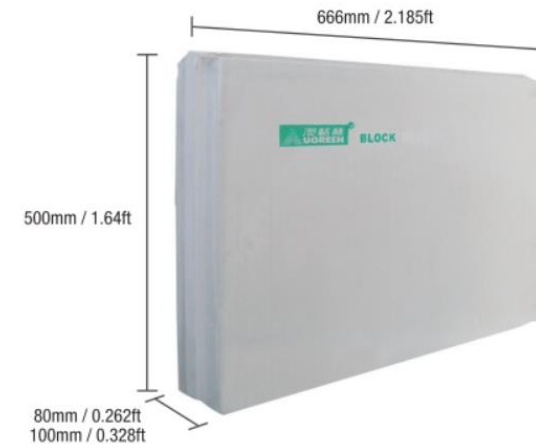
Gypsum has the natural ability to absorb excess humidity in the air and release it when needed. 'bloc therefore works as a perfect humidity regulator for the benefit of living quality.



Environmental quality plays a key role in peoples well-being. Gypsum surfaces naturally fight bacteria. Laboratory testing results in a remarkable reduction of implanted colonies.

Comfort: refers to its “breathing function” and “warmth”.

Fast: it refers to the construction speed and efficiency of gypsum block.





Additive to flushing water to fight against COVID-19 and odours

科大研發新型多功能水凝膠 抑制渠務及沖廁系統的氣味及細菌

2022-05-19



<https://hkust.edu.hk/zh-hant/news/research-and-innovation/hkust-develops-new-multifunctional-hydrogel-odor-and-microbial-control>



Terminal ends of soil stacks / roof vent pipes fitted with air treatment device



NCCO Vent有效去除通過排氣喉飄浮至天台的細菌和病毒，杜絕因為擾流效應而造成的傳染病大規模擴散風險。

<https://www.rhtind.com.hk/ncco-vent?lang=zh>

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- (1) The indications of suppliers are not exhaustive. The inclusion of any particular brands in these slides is meant to be examples only and does NOT imply endorsement.
- (2) The use of the above technologies does not necessarily mean that IA / IV points would be attained under BEAM Plus. Granting of points is on a case-by-case basis based on degree of innovativeness, amount of environmental benefit and other considerations.
- (3) Any suppliers who wish to share their innovative or performance enhancement technologies via these slides can contact HKGBC Secretariat via tel no. 3994 8868.