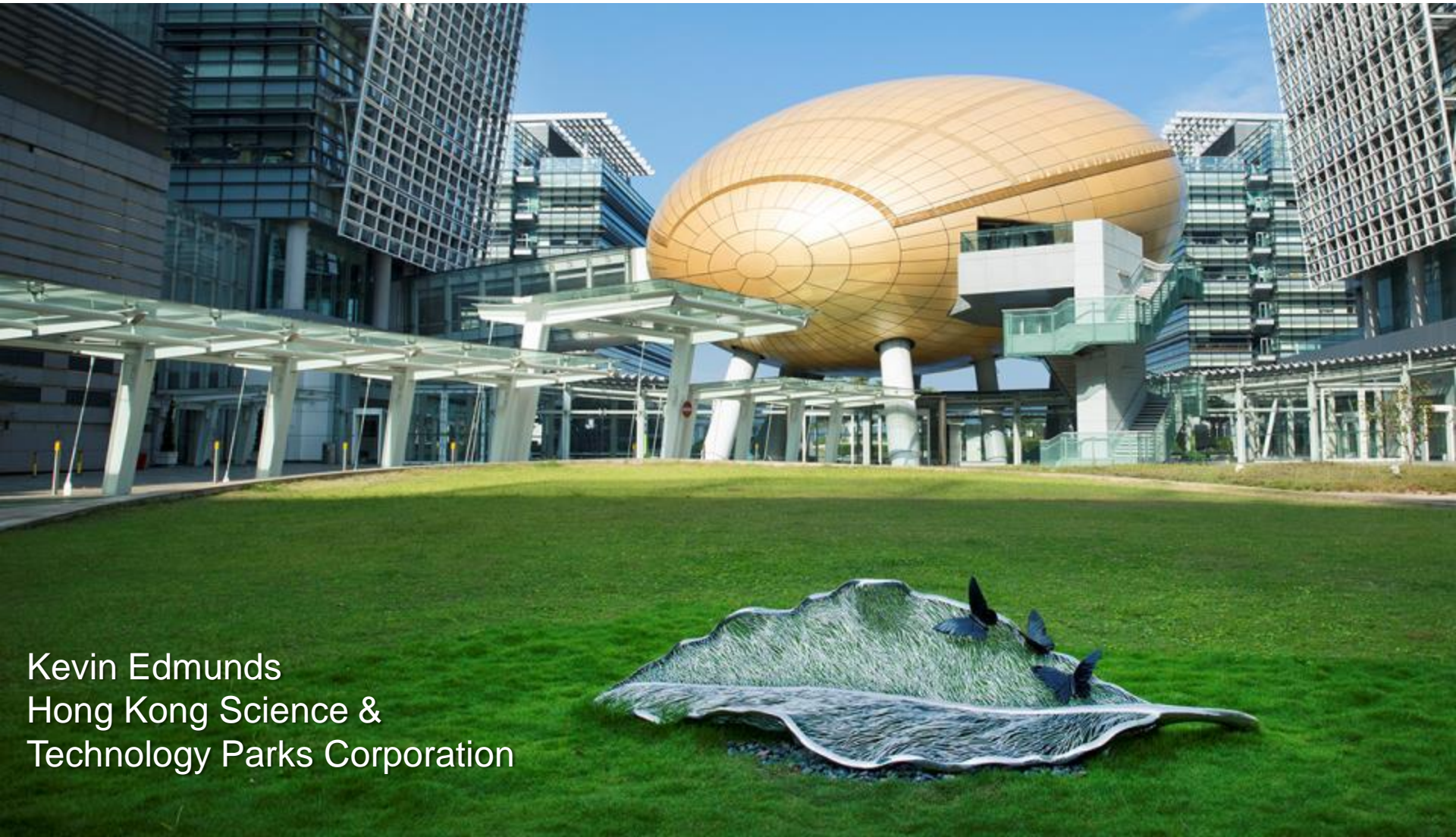


Science Park Phase 3

Innovation for Sustainable Design



Kevin Edmunds
Hong Kong Science &
Technology Parks Corporation

Hong Kong Science Park

HK-BEAM v1/99 (“Excellent”)

7 buildings (‘04-05): IC Development Centre
Wireless Centre Bio-informatics Centre
Photonics Centre Philips Electronics Bldg
Enterprise Place SAE Technology Centre

Building 12W (2014): HK’s first
LEED C&S v2009 “Platinum” office building

**BEAM Plus 1.1
“Platinum”** 12W,
15W, 16W (2015)

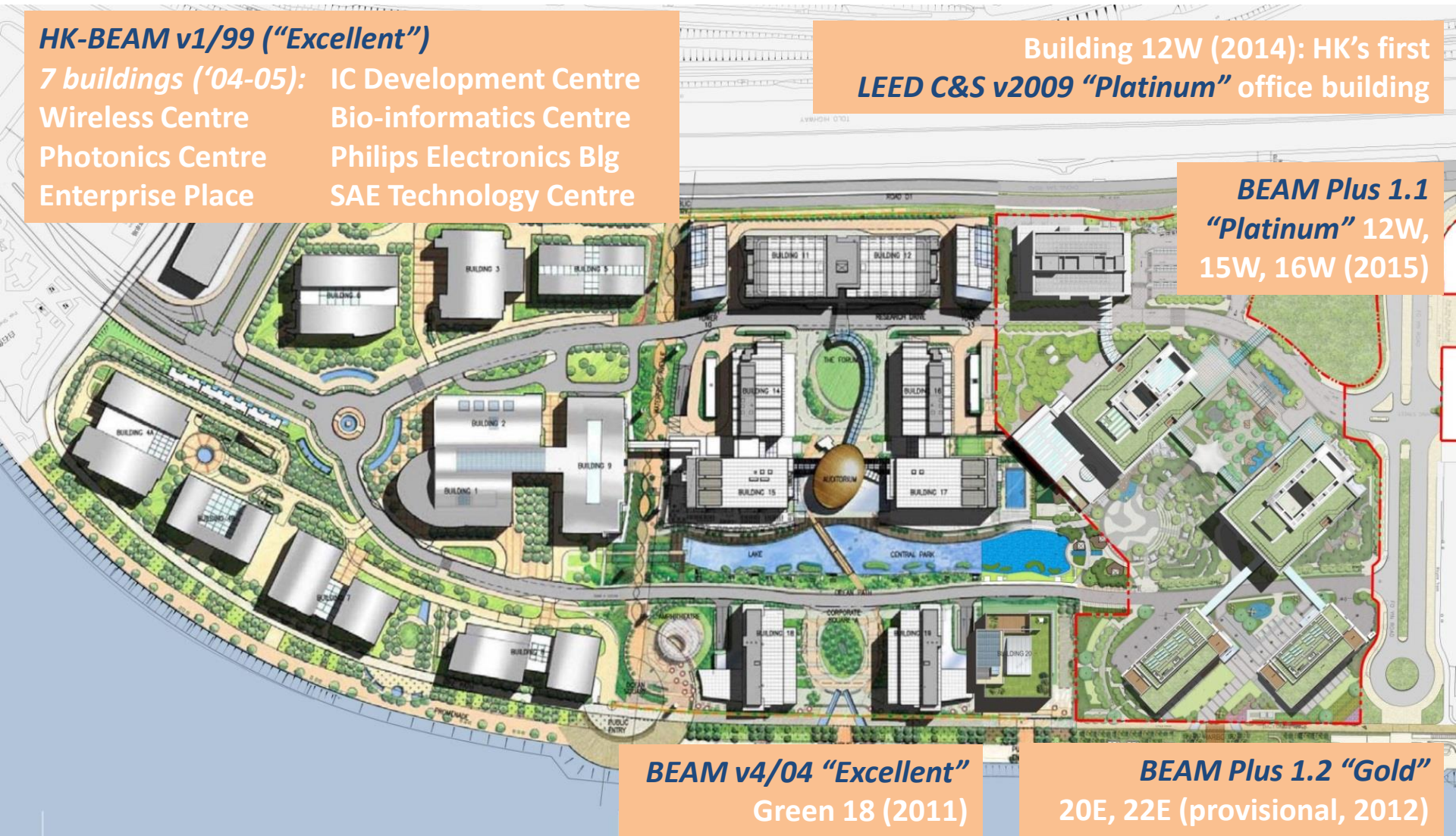
BEAM v4/04 “Excellent”
Green 18 (2011)

BEAM Plus 1.2 “Gold”
20E, 22E (provisional, 2012)

PHASE 1

PHASE 2

PHASE 3



Presentation overview

Highlight the innovative energy technologies at Phase 3:

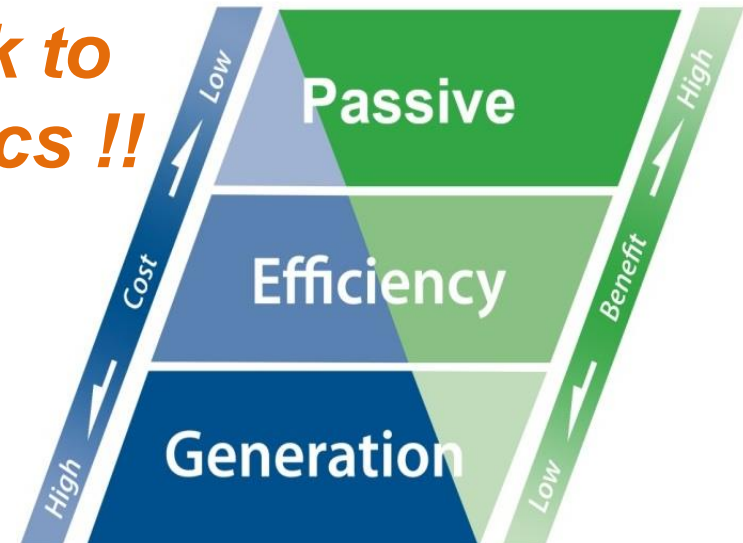
- passive / climatic design
- high performance façades
- hybrid / natural ventilation
- ultra-efficient installations
- rainwater / waste recycling
- renewable energy installations



Zoom in to three specific “multi-occupancy” applications:

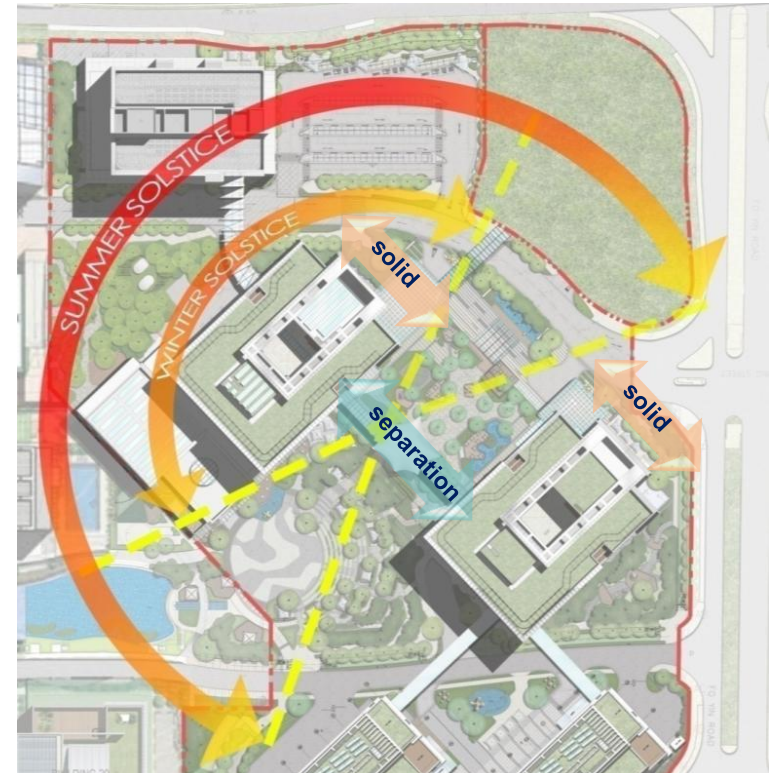
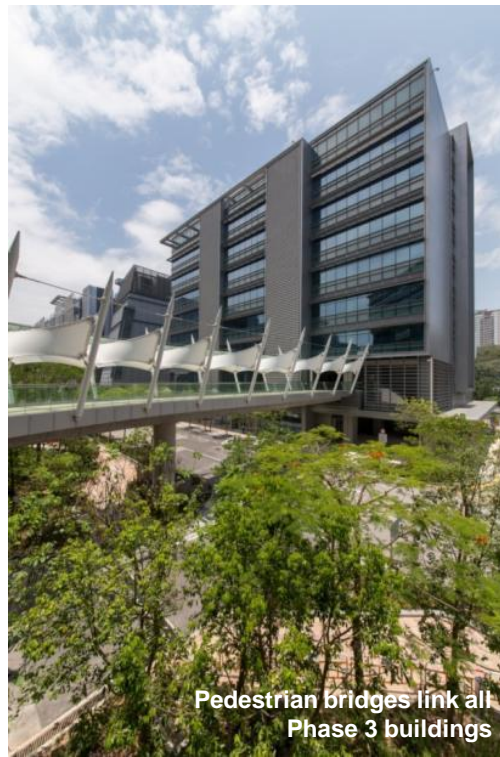
- low-energy office provisions
- sub-metering of tenants energy
- “pay-per-use” air conditioning

Back to basics !!



Permeable, Climate Responsive Masterplan

- orientation and separation enhance site permeability & ventilation
- microclimate design reduces ambient outdoor temperatures
- climate responsive massing & internal layout to reduce each building's solar footprint
- alignment with prevailing winds (average 1.5m/s predicted wind speed at pedestrian level)
- Green Deck with tensile canopies enhance outdoor thermal comfort; extensive landscaping and green roofs
- minimised daylight & wind impacts in the vicinity



High performance façades

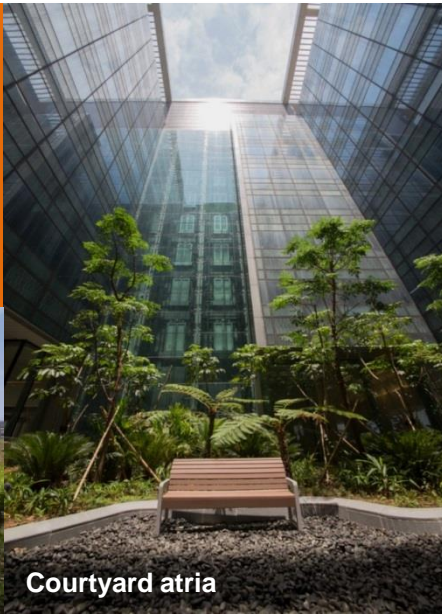


Sunshading / anti glare

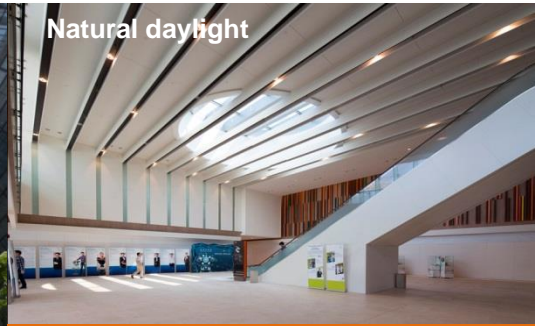
40% WWR; OTTV <12 W/m² (50% better than code)
Highly insulated spandrel panels (U = 0.5 to 0.56W/m²K)
Spectrum selective double silver low-E IGU (SC 0.29%, VLT 50%)
Insulated solid west façades



Green roofs and cool roofs



Courtyard atria



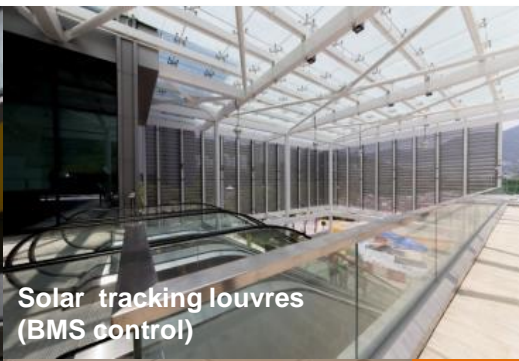
Natural daylight

Annual peak cooling load reduction	
Optimal orientation + shading	3%
+ solid west façade	5%
+ high performance low-E IGU	10%

Hybrid / natural ventilation to G/F & 1/F lobbies



Openable façade windows to foyers



Solar tracking louvres (BMS control)



Large ceiling fans



Solar-cooled water curtain (absorption chiller)

Ultra-efficient HVAC

District Cooling System (DCS) extended from Phase 2 to Phase 3 enhances load management



- CO2 controlled demand ventilation (excl. retail & labs)
- Air-side heat recovery (thermal wheels) & free cooling
- OFC serves AHUs to decouple sensible & latent heat loads
- PCM thermal storage reduces peak loads the next day
- Integrated chilled beams (CMO)

Recycling rain water & waste

Automatic Refuse Collection System (ARCs), efficient, hygienic



1,100m³ rainwater / condensate harvesting



2,000 sqft organic “Green Pad”



Renewable energy

12W: 218x mono-crystalline PV panels, 355m² surface area, 69.3 kWp installed capacity, ~ 4,000 kWh/month (>1% total landlord consumption)



- Solar hot water (absorption chiller / solar cooling wall)
- Thin film PV on tensile structures
- Solar Tubes (natural sunlight into car park)
- Hybrid solar / wind powered street lights (Phase 3c)

Transport innovations



Regenerative braking,
group selective control lifts



EV charging
(all 350 spaces)



Nat Vent & Daylit
Carpark



Facilities for
cyclists



Pedestrian
linked bridges

Education & engagement



Interactive
“totems”

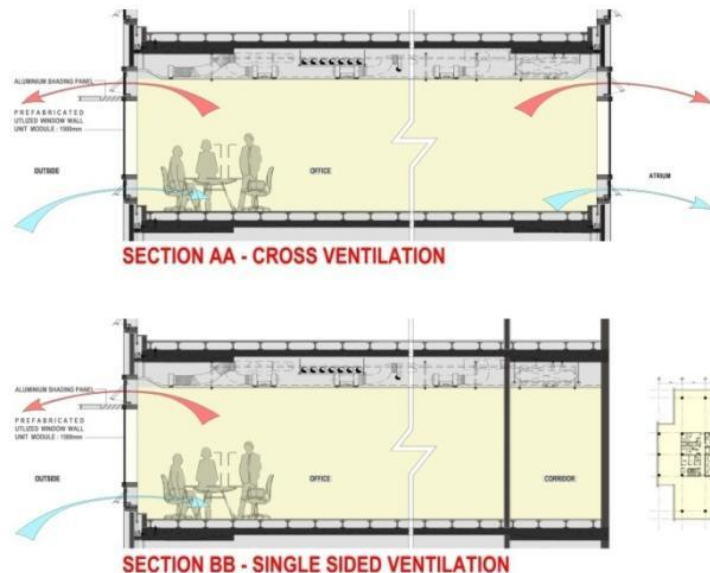


5	1	2	3	4
GREEN TRAIL 綠里里程	ENVIRONMENTAL LIGHTING DESIGN 環境照明設計	WATER CURTAIN 水簾	SOLAR THERMAL COOLING 太陽能熱力系統	VENTILATED COURTYARD DESIGN 通風中庭設計
6	7	8	9	10
SOLAR-INSULATED ROOF FACADE 太陽能隔熱外牆	SOLAR EFFICIENT BUILDING ORIENTATION 太陽能最佳朝向設計	ENERGY EFFICIENT LED LIGHTS 節能LED光源	THERMAL STORAGE TANKS 熱力儲存	GREEN ROOF AND GREEN LANDSCAPING 綠屋頂及綠化環境
12	13	14	15	16
ACTIVE CHILLED BEAMS 主動式冷風	GREEN ROOFS 綠化屋頂	PHOTOVOLTAIC PANELS 太陽能光伏發電	SOLARIUM 太陽室	HORIZONTAL SUN SHADES 水平式遮陽板

Low-energy office design

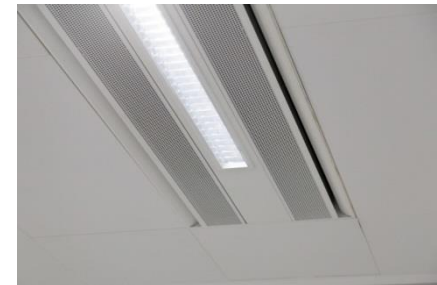
Hybrid / natural ventilation

- motorised “push button” operable windows in all offices
- 500mm upper and lower vents open in four steps (25% to 100%)
- BMS override during hot, humid, inclement weather, etc
- 510 office hours of cross-vent potential (~10% of the year)
- 205 office hours of single-sided NV potential (~4% of the year)



Low energy lighting:

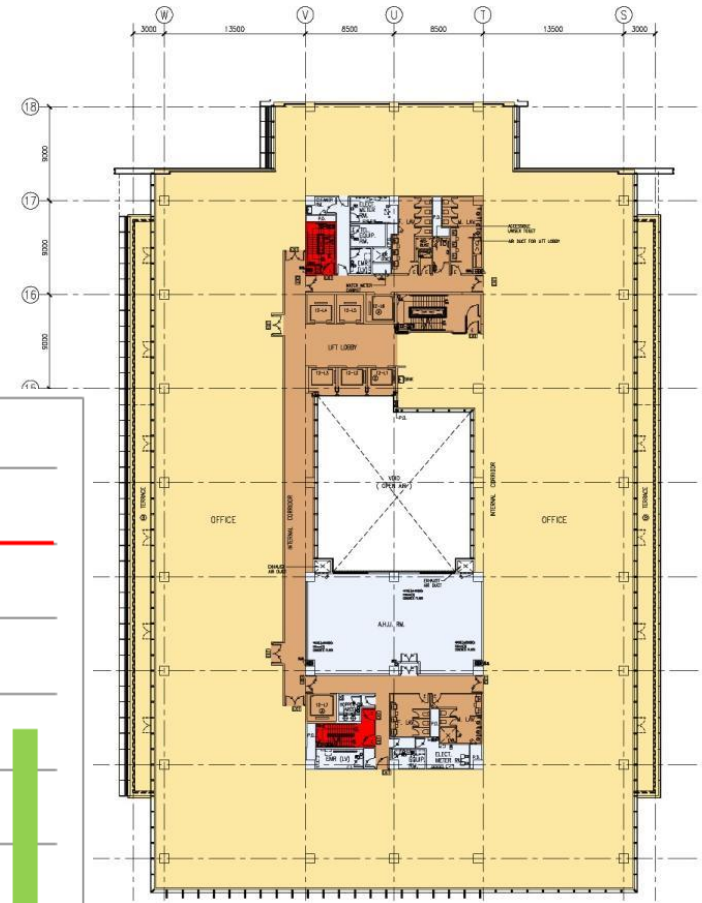
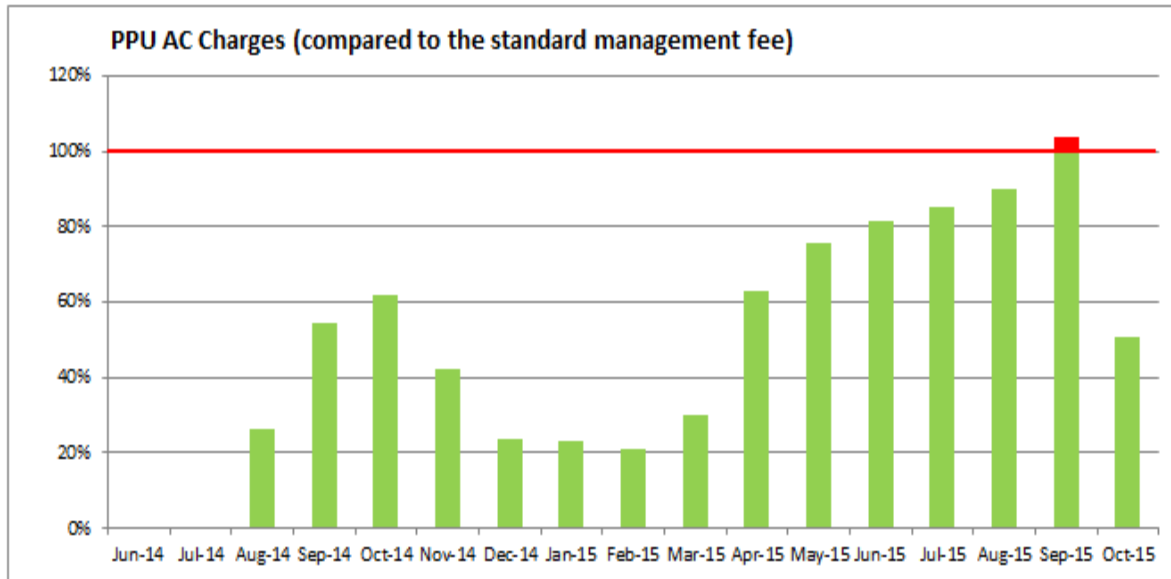
- base 300 lux (excl. labs) can be turned up to 400 lux (task lights for 500 lux where needed)
- average 7% daylight factor calculated for typical open plan offices
- “CREE” LED lighting to all R&D offices, installed LPD around 6 to 7 W/m²
- automatic daylight (perimeter) and occupancy controls



“Pay-per-use” air conditioning

Multiple AHUs (typically 4 nos per floor)

- enables AC energy costs to be decoupled from management fees (thermal flow & power meters)
- “pay-per-use” air-conditioning provides greater individual tenant control & rewards conservation
- also enhances part load efficiencies



Multiple AHU (typically 4 nos. per floor)

Tenant sub-metering



Energy Operation

Username:
Password:
[Forgot password?](#)

Log in

All fields are required

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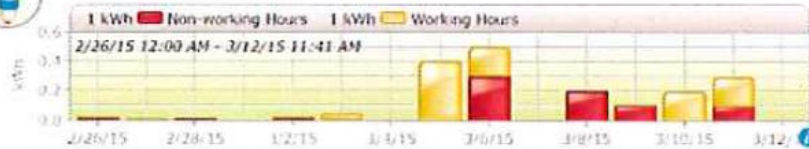
This computer is
© 2014 Schneider



HVAC



Lighting



Plugload



Locations

- HKSP Tenants (28)
 - 3DP Technology Limited_3DP技术有限公司 (1)
 - 12W-2F-U220 (5)
 - TENANT_METER_12W_2U220_HVAC_ACC
 - TENANT_METER_12W_2U220_LTG_ACC
 - TENANT_METER_12W_2U220_PLUG_ACC
 - TENANT_METER_EUI_12W_2F_U220
 - TENANT_MONTHEUI_12W_SME_2U220_3DP Technology
 - Able Trend Technology Limited_能趨勢科技有限公司
 - AdvanPro Limited_安源有限公司
 - Alex Ho & Co Solicitors_何升偉律師事務所
 - Bitex Limited
 - Clever Motion Technology Ltd_至源有限公司
 - Delphic HSE Solutions (HK) Limited
 - Ella Cheong (Hong Kong) Limited
 - Glory Hill Industrial Limited
 - Gold Peak Industries (Holdings) Limited
 - Green Peak Technologies Ltd
 - HB Heating System Limited_哈曼電熱製造有限公司
 - HK Intellectual Property Agent_香港知識產權代理有限公司
 - HK Jiuling Technology Co Ltd
 - Hong Kong Institute of Education for Sustainable Development Ltd
 - ITALEAF Limited
 - Jpectrum Software Limited_遠見應用
 - KIMO Technology Limited_動力創意科技有限公司
 - Mekoprint Hong Kong Limited
 - New Tenant 28Oct14
 - Novoheart Limited_再心生物科技有限公司
 - Right Station Limited
 - Sencon (HK) Limited
 - Shoo-In International Legal Service Limited_中國清金國際法律服
 - test test
 - Trinity Photonics Manufacturing Co Ltd
 - VALFOO Limited_味富有限公司
 - WORLDdiscoveries Asia Limited

Apply spatial filter

Portlets

The “EPMS”

ENERGY PERFORMANCE MONITORING SYSTEM

A powerful data collection, analytics & graphical interface that provides: *

For the public: key indicators of each buildings overall performance (both landlord facilities and tenants premises)

- energy conserved (HVAC, lighting, etc)
- renewable energy generated
- rain water / condensate collected for recycling
- overall reductions in CO2 equivalent
- each month's “star tenants”

For the tenants: a private secure webpage to monitor their own energy profiles

- small power electricity
- lighting electricity
- HVAC electricity

* *Contingent on each tenants' installation of a sub-meter in their premises for data sharing with the centralised BMS (a “Green Lease” requirement)*

