

Sarawak Energy's New Low Energy HQ

And first 'green building' in Sarawak



Presented on behalf of the design team by:

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IEN Consultants
www.ien.com.my

1 October 2012

[Slides by IEN Consultants and Jurubina Unireka]

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- Green Building Index (GBI)
- Design features of Sarawak Energy HQ
- Questions and answers



Launch of Sarawak Energy HQ, 18 September 2012



GREENING MALAYSIA

Over 26 Million Square Feet of Green Building in 3 years



GBI CLASSIFICATION

POINTS	GBI RATING
86+ points	Platinum
76 to 85 points	Gold
66 to 75 points	Silver
50 to 65 points	Certified

- ### GBI BUILDING RATING CRITERIA
- ENERGY EFFICIENCY (EE)
 - INDOOR ENVIRONMENTAL QUALITY (IEQ)
 - SUSTAINABLE SITE PLANNING & MANAGEMENT (SSM)
 - MATERIALS & RESOURCES (MR)
 - WATER EFFICIENCY (WE)
 - INNOVATION (IN)
- ### GBI TOWNSHIP RATING CRITERIA
- CLIMATE, ENERGY & WATER (CEW)
 - ECOLOGY & ENVIRONMENT (EEC)
 - COMMUNITY PLANNING & DESIGN (CPD)
 - TRANSPORTATION & CONNECTIVITY (TRC)
 - BUILDING & RESOURCES (BR)
 - BUSINESS & INNOVATION (BSI)



www.greenbuildingindex.org

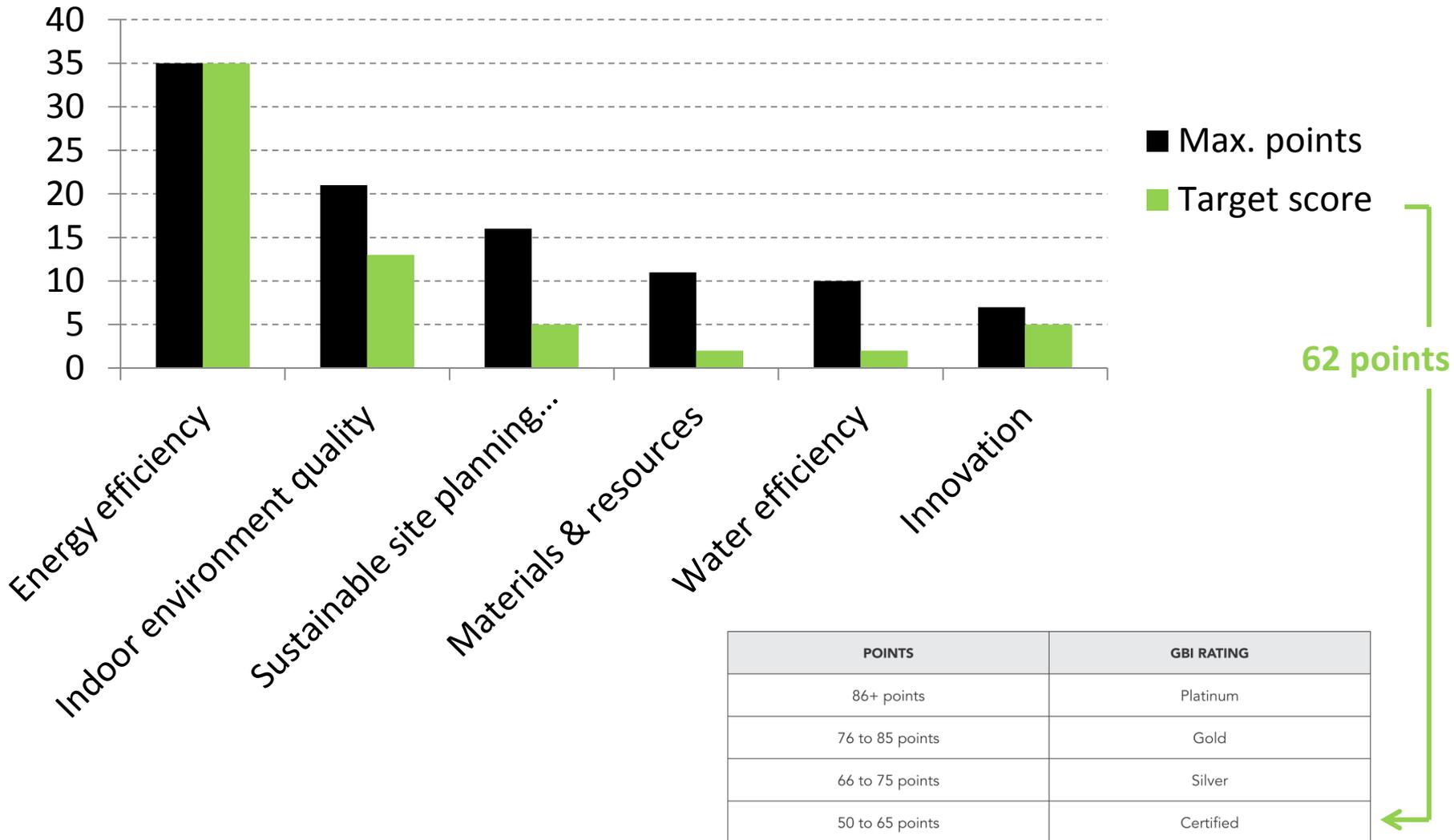
MALAYSIA GREEN BUILDING CONFEDERATION
 (03-0671-09-9363)
 A-29-9, Block A, Menara UOA, Bangsar, 59000 Bangsar, Kuala Lumpur, Malaysia
 Tel +603-2282 8232
 Fax +603-2284 8232
 Email info@mgbc.org.my
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1st green building in Sarawak

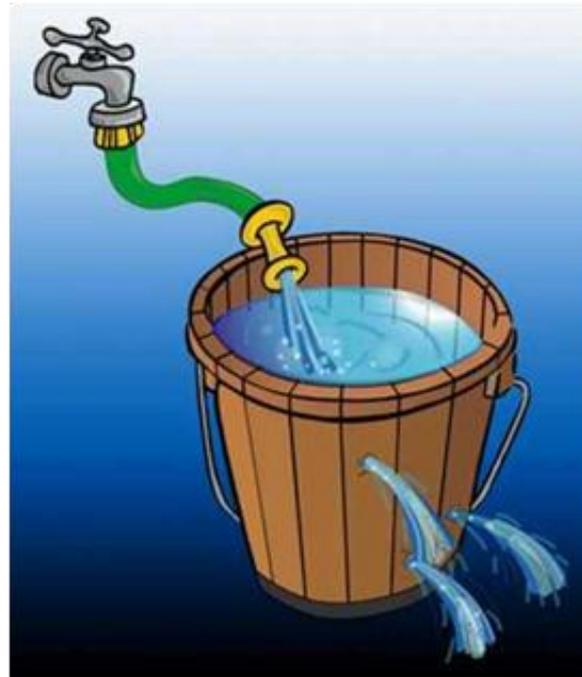
Green Building Index (GBI) for Sarawak Energy HQ



Energy Efficiency

Think of buildings like a bucket of water

Energy supply



Energy efficiency



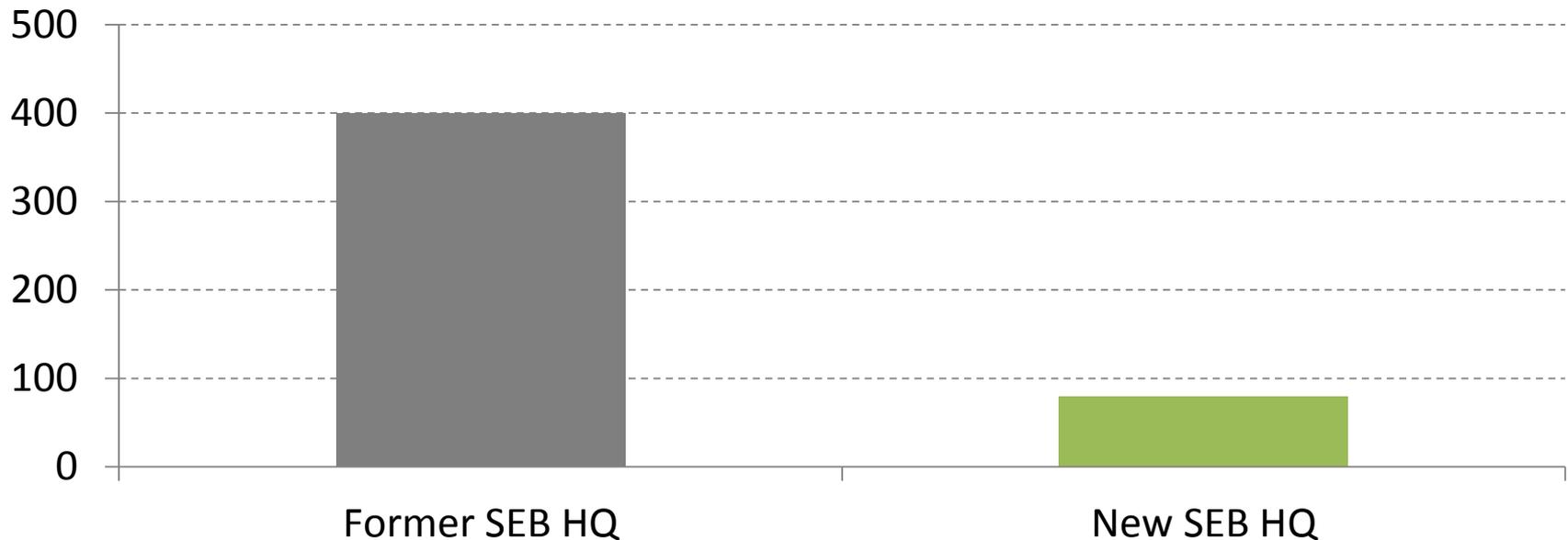
Energy waste
("plug the holes")

Sarawak Energy HQ: Very Energy Efficient

(“plugging the holes”)



**Building Energy Intensity
(kWh/m² year)**



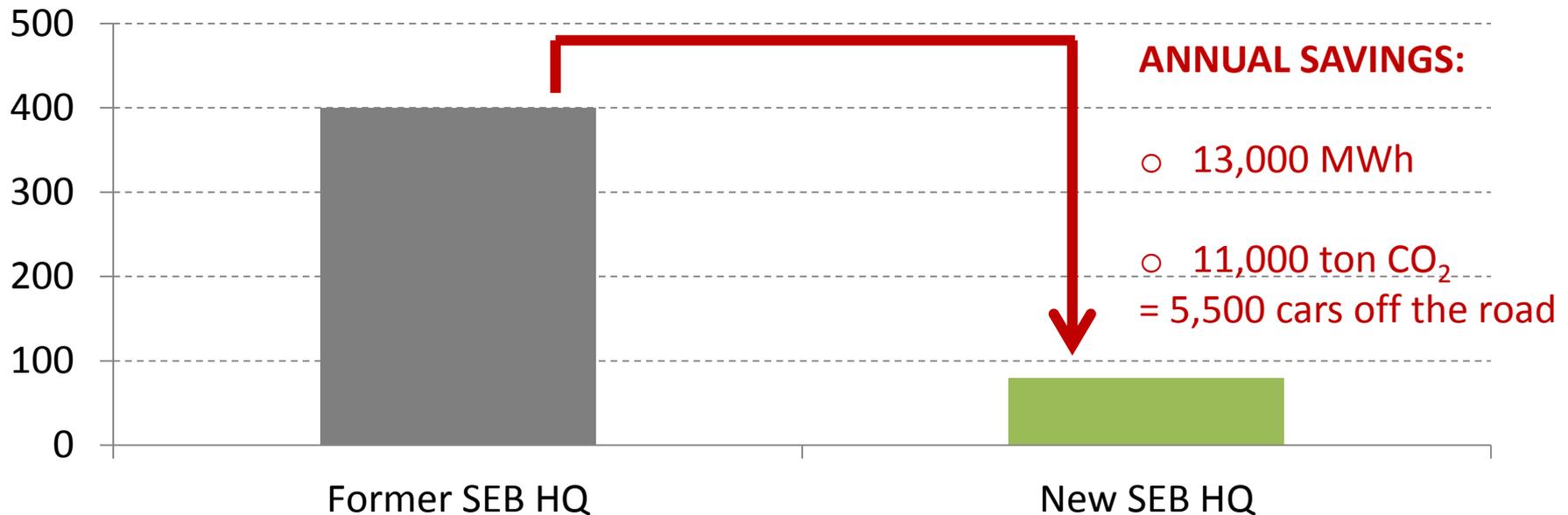
NB. Approximate figure. Energy consumption of Scada subtracted (assumed to be 1/3 of the building's energy bill)



NB. As per measured data April - July 2012

Savings for Sarawak Energy HQ

Building Energy Intensity (kWh/m² year)



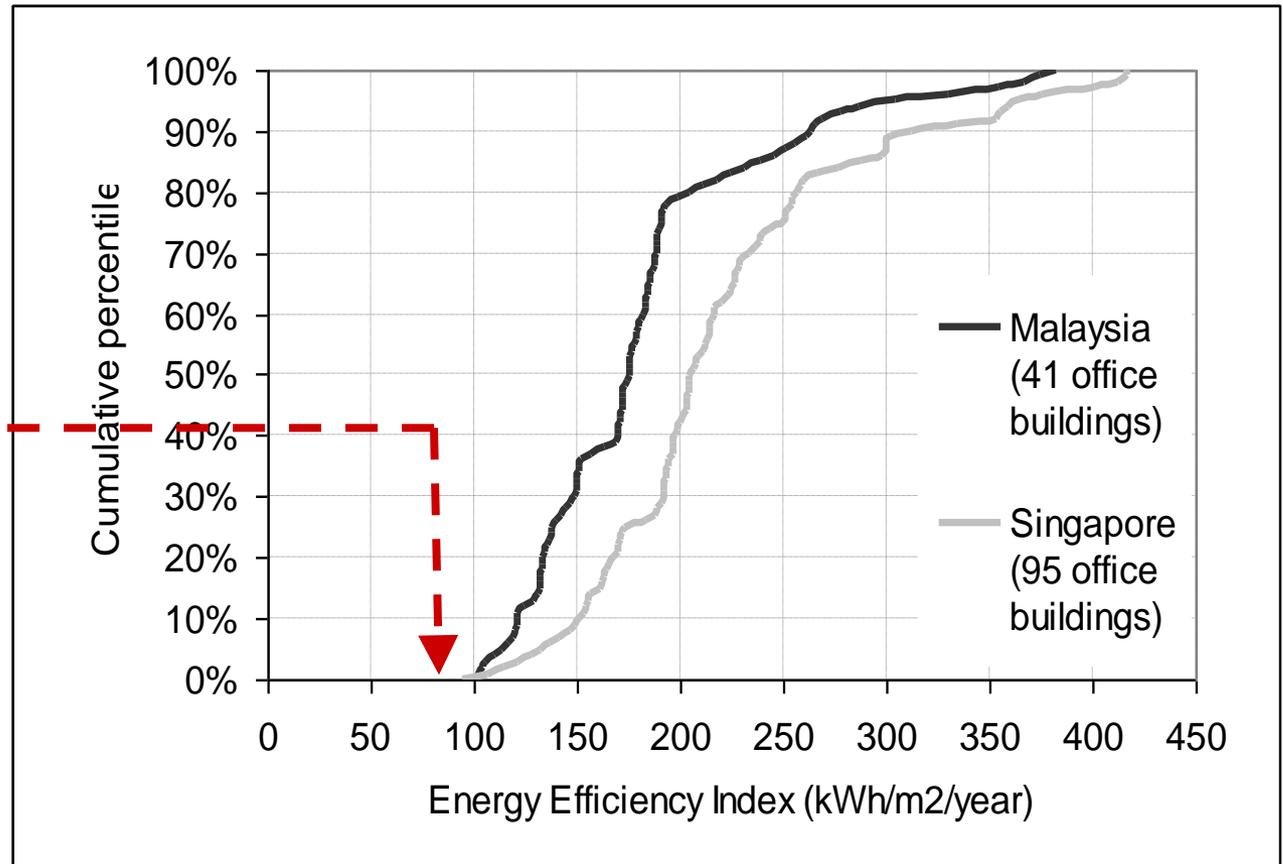
NB. Approximate figure. Energy consumption of Scada subtracted (assumed to be 1/3 of the building's energy bill)



NB. As per measured data April - July 2012

Energy Efficiency of Buildings in Malaysia and Singapore

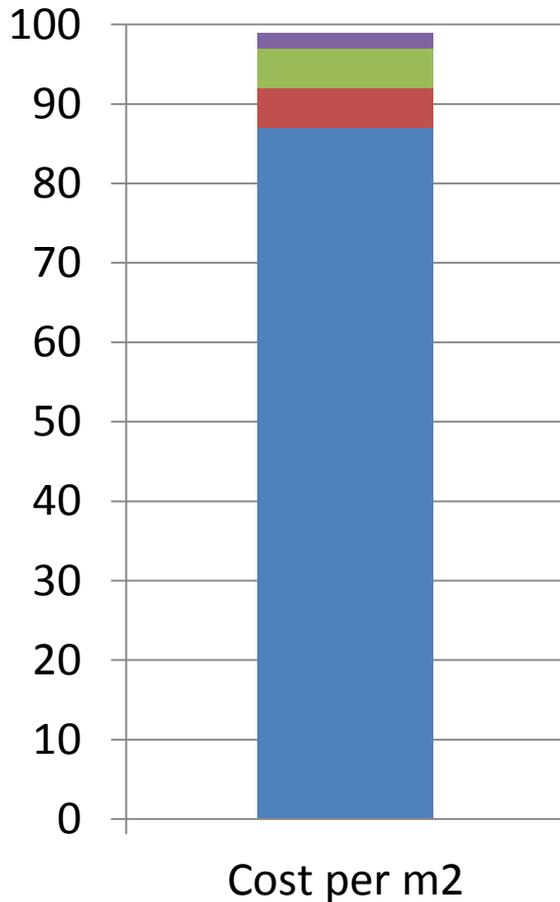
Sarawak Energy (2012)
80 kWh/m² year



Sarawak Energy is 'off the scale'

but in the right end of the scale, i.e. being highly energy efficient

Operational Costs of a Building



Studies have proven that a **good indoor environment** leads to:

- Less sick leave
- Higher well-being
- More productive employees
- Students score higher on exams
- Shops have higher sales
- Hospitals can discharge patients faster

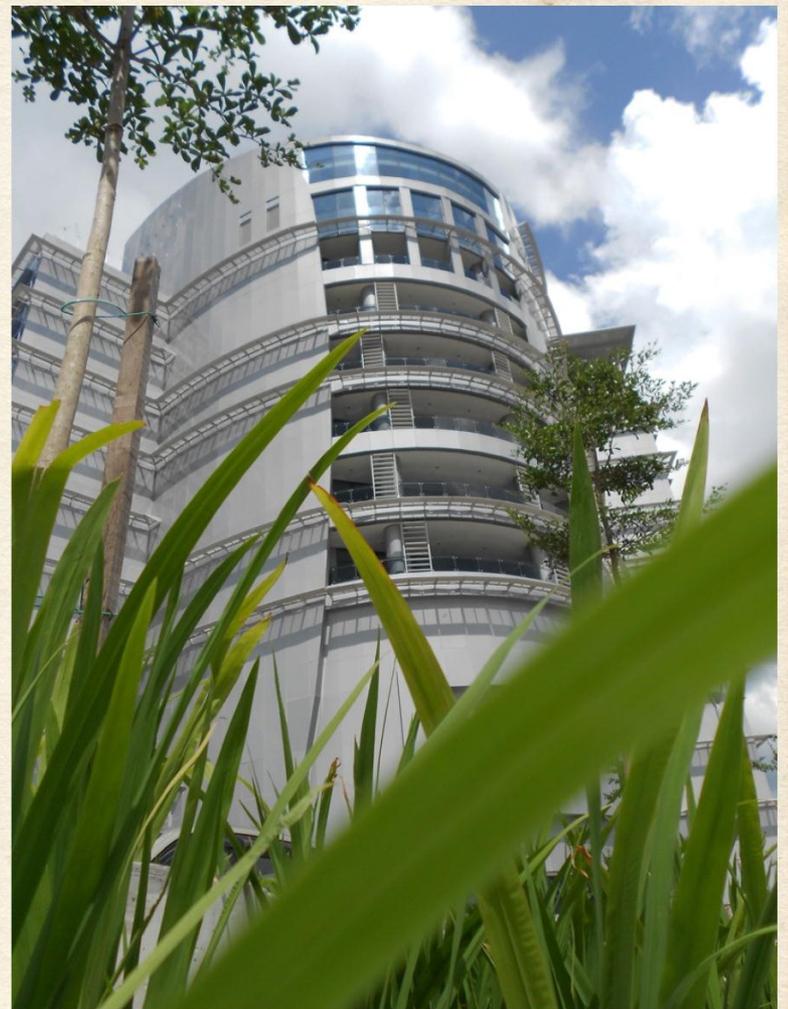
The New Sarawak Energy HQ

And the team that made it happen

Client :



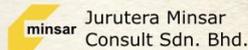
Design & Build Proponent :



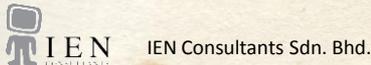
Consulting Architects, Planners & Interior Designers :



C & S Engineers :

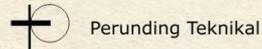


Energy Efficiency consultants:

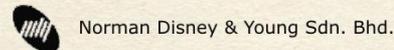


Commissioning specialist:
Pureaire Sdn Bhd

Mechanical & Electrical Engineers :



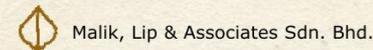
In Association With :



Landscape Architects :



In Association With :



SITE & CONTEXT



PASSIVE ARCHITECTURE

NORTH & SOUTH ORIENTATION



The building's main axis of orientation is parallel to the east-west axis and most of the windows are facing the north and south to reduce excessive heat gain.

EASTERN SIDE



MORNING SUN

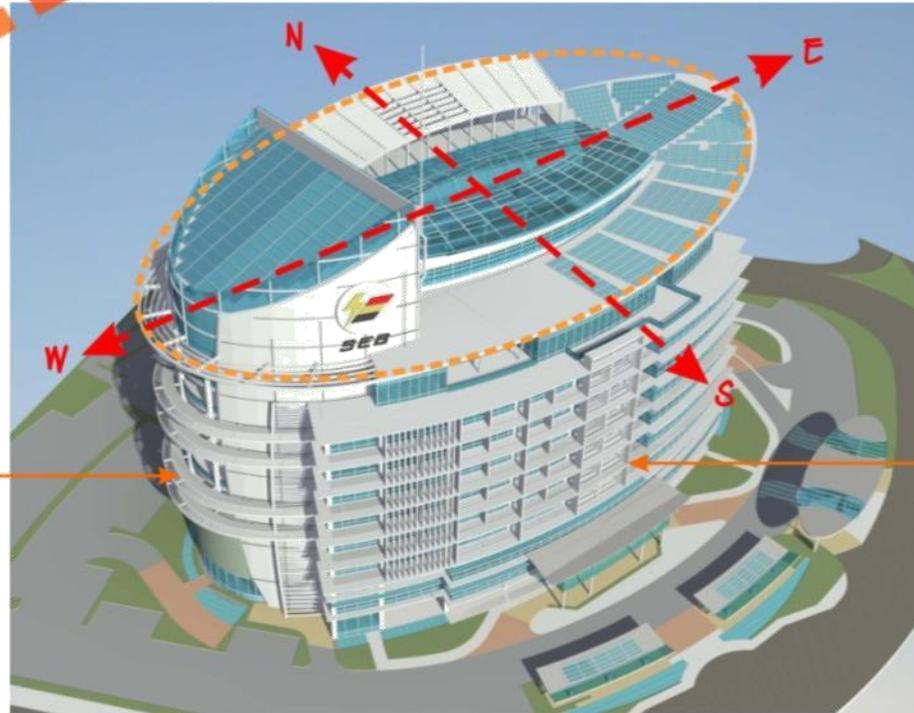
12.00 NOON



WESTERN SIDE



AFTERNOON SUN

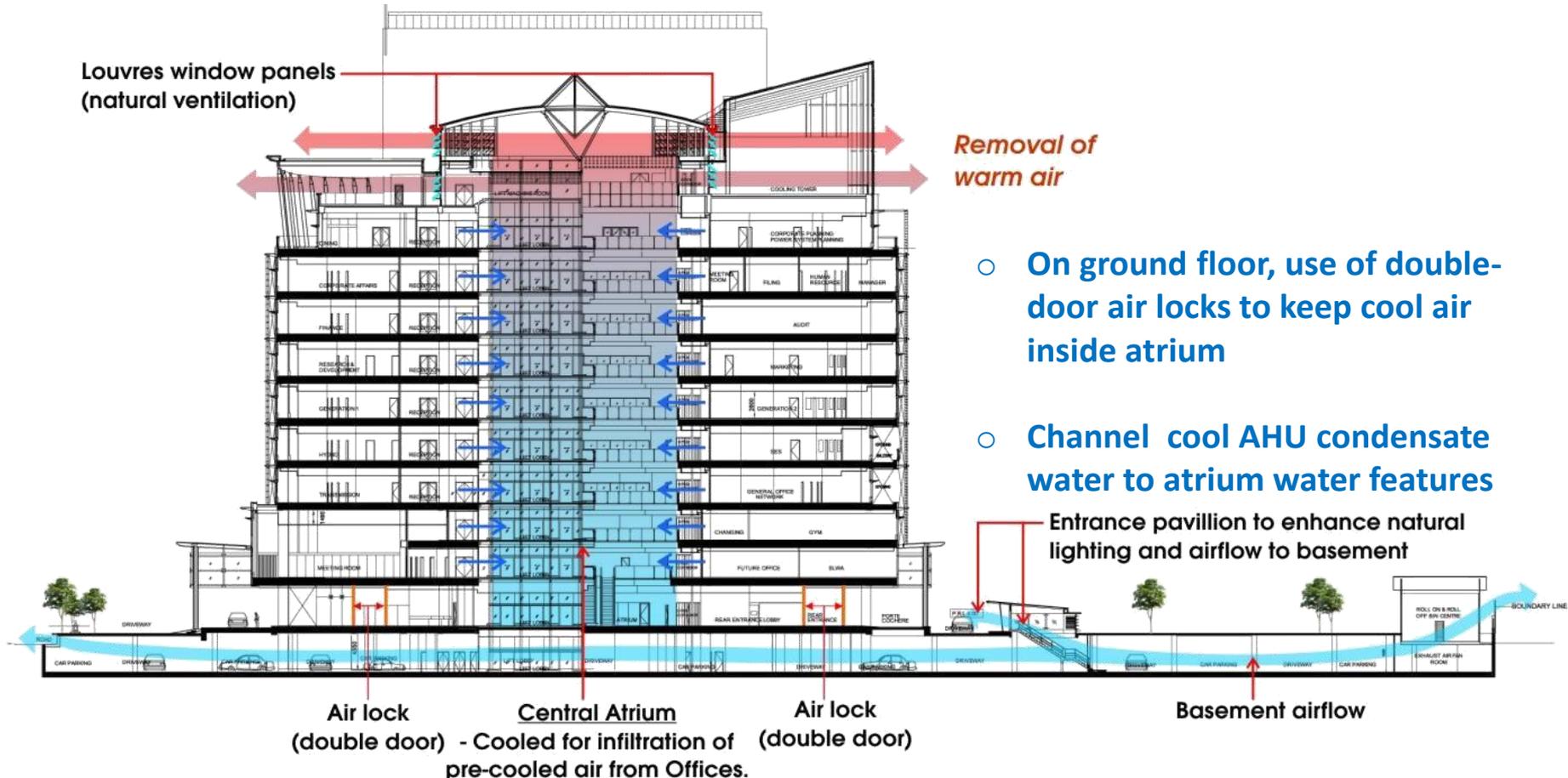


East and west facades have the highest exposure to solar heat gain and are protected by cladded walls, extended sun-shading louvers and double glazing which reduce solar heat gain and yet permit the transmittance of natural lighting into the building.

Generous glazed facades are lined along the north and south elevation. These facades are exposed to minimal direct sunlight and are featured with glazed curtain walls.

PASSIVE ARCHITECTURE

“Free cooling” of atrium from spill-over air-con from offices



THERMAL COMFORT & NATURAL VENTILATION

AHU Condensate Water Cools Atrium

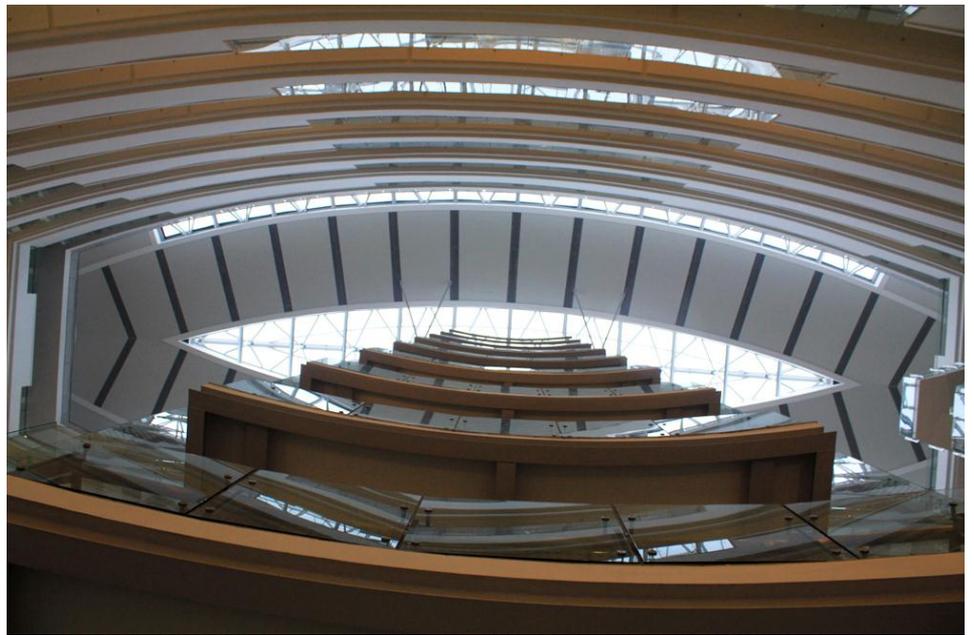
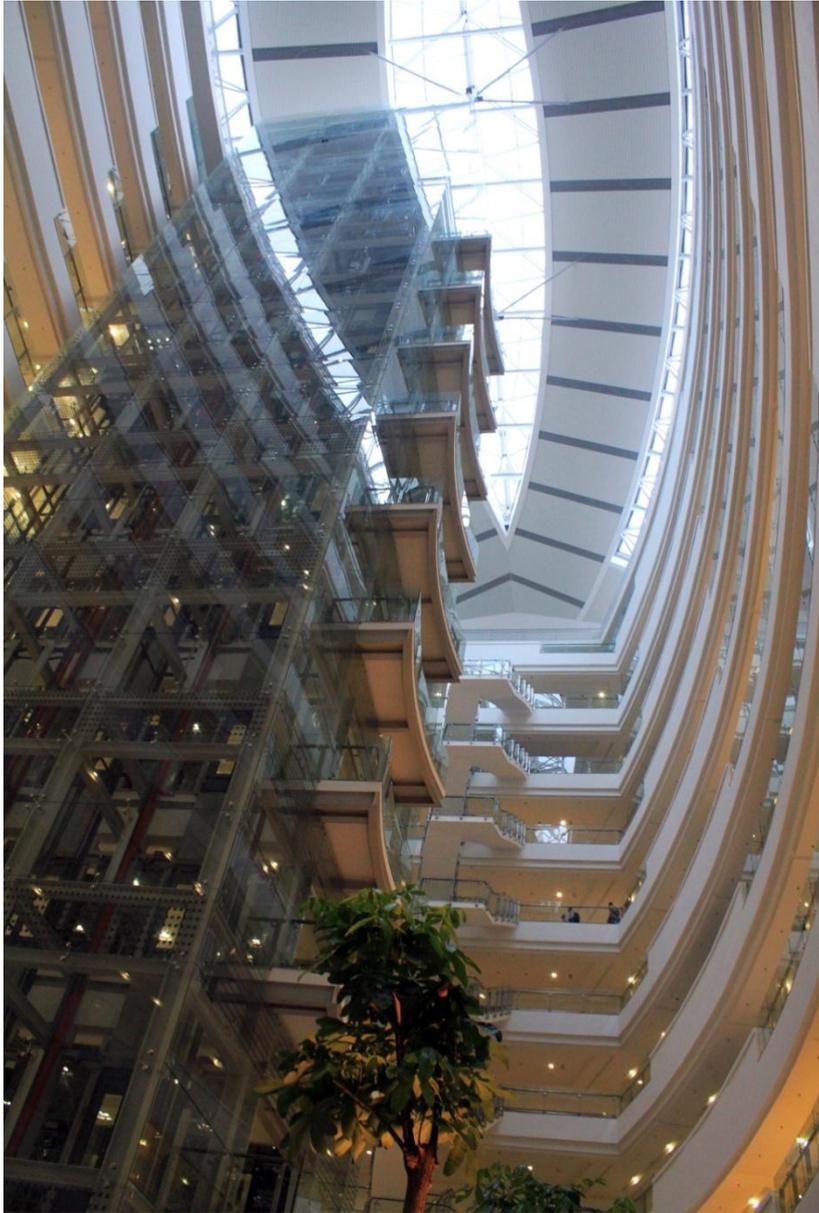


Video link: <http://www.youtube.com/watch?v=FTyNaD5VYRM>

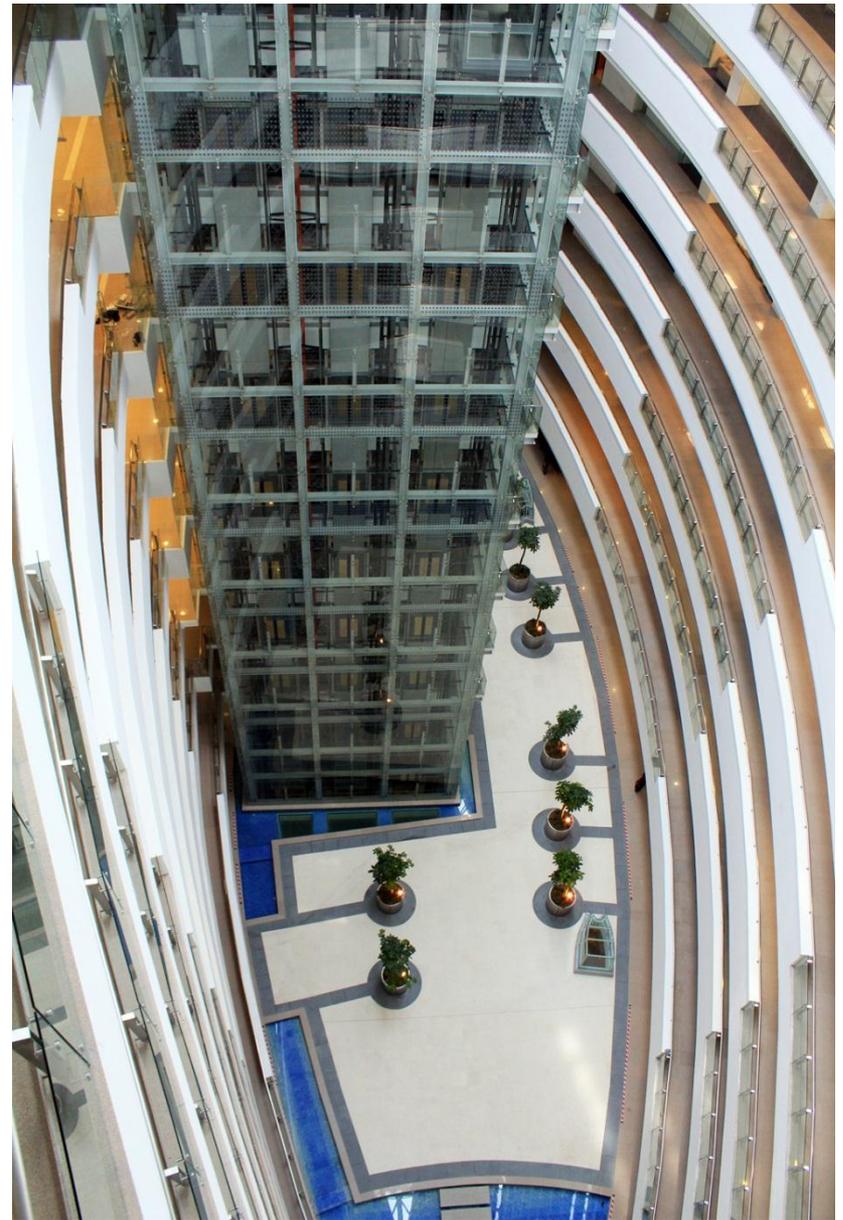
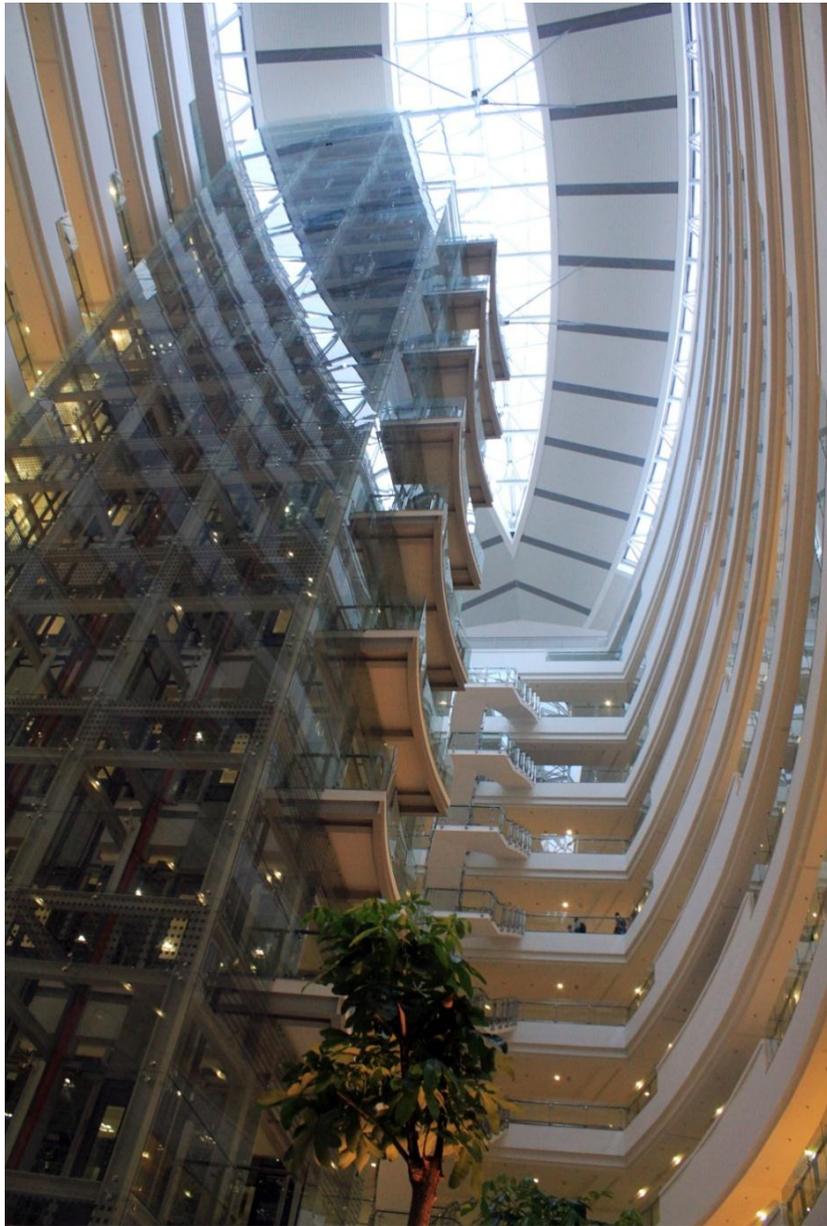


NORTH

DAYLIGHTING



ATRIUM DAYLIGHTING



DAYLIGHTING

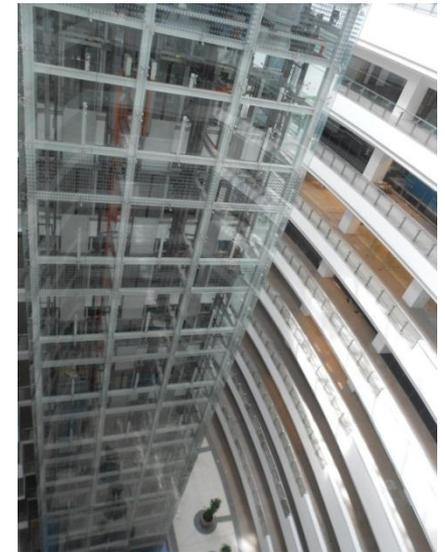
NATURAL LIGHTING



Atrium Skylight Roof Fixing



Catwalk



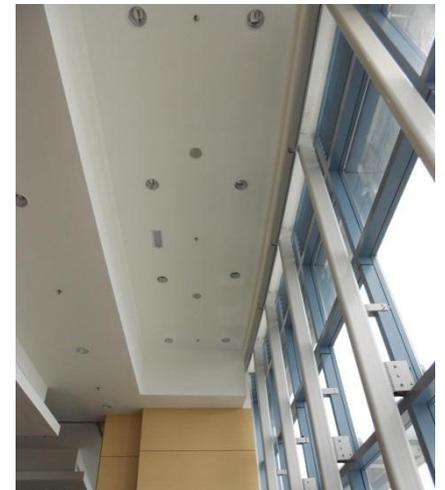
Atrium



Typical Office



Retractable Blind



Motorised Blind

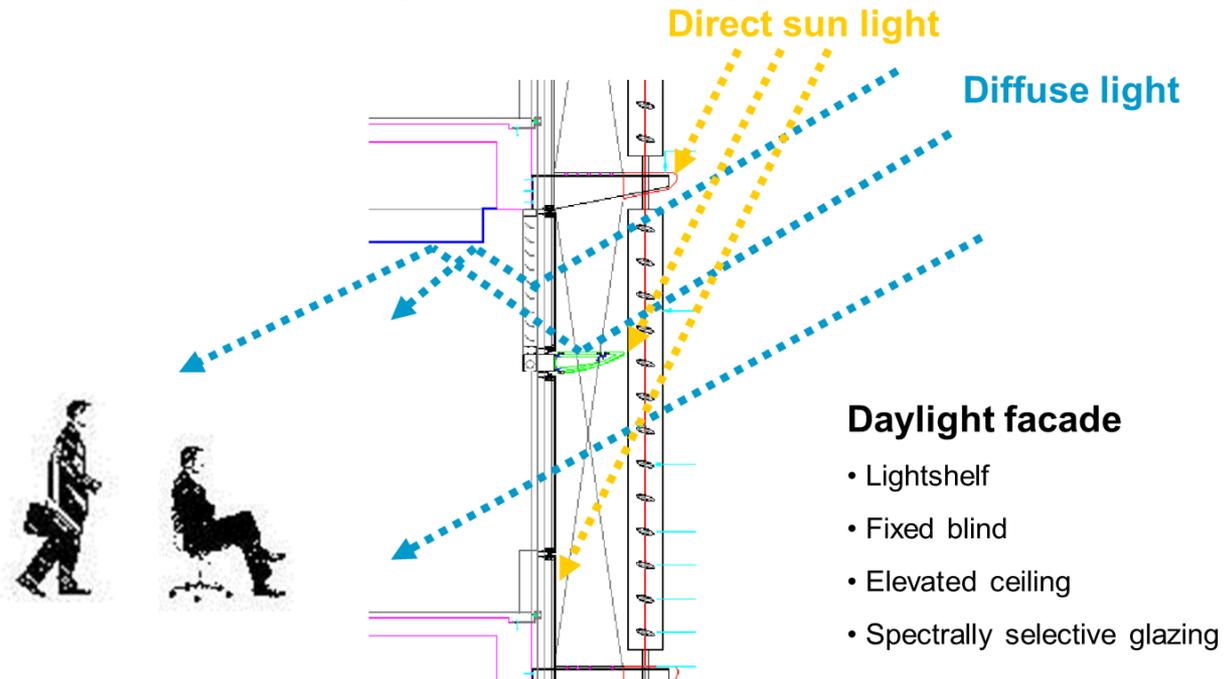
Daylighting along Facades

(reflect daylight onto ceiling and deeper into the offices)



Façade Daylighting

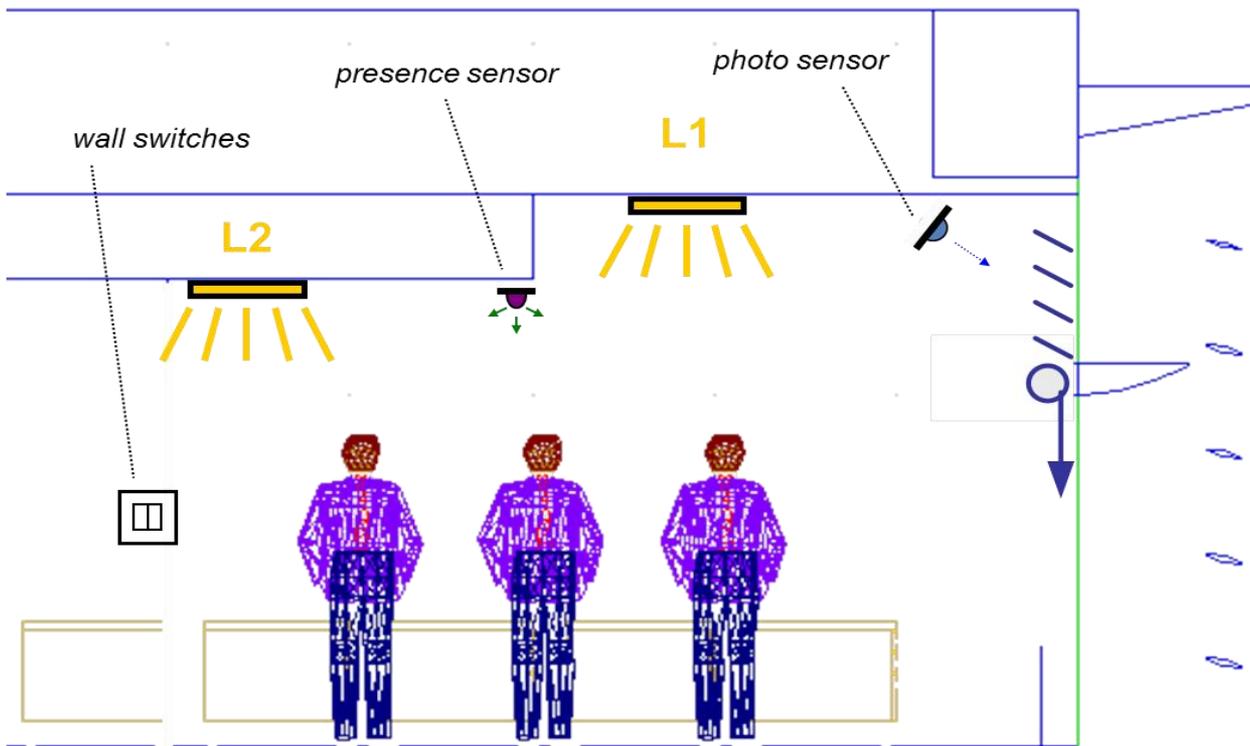
Diffuse light reflected onto ceiling; Direct sunlight blocked



Daylighting

(controls for the electric light)

Daylight Responsive Lighting



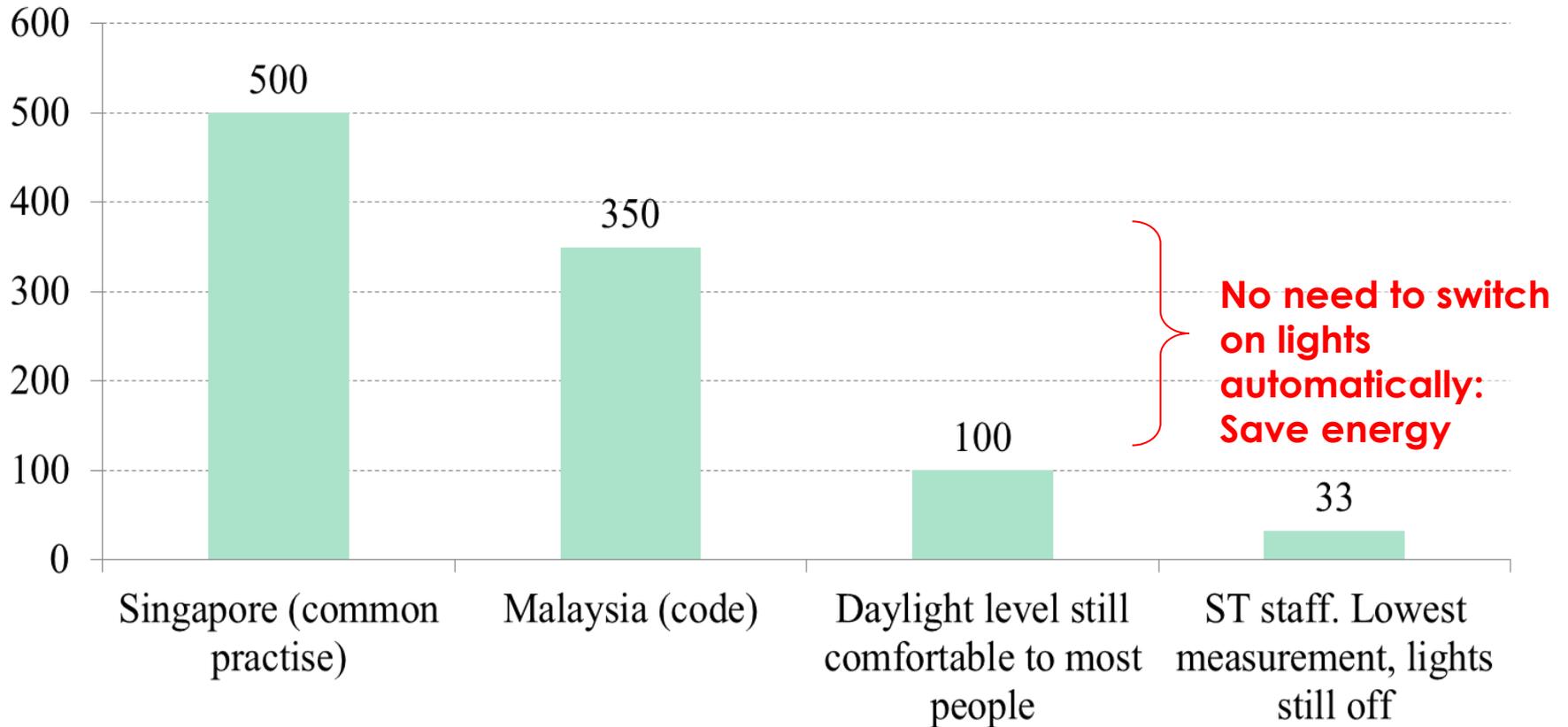
Controls:

1. Photo sensor to face upper daylighting window
2. Zoning of lighting: First 4-5 meters along façade perimeter (e.g. lights in circuit L1)
3. When photo sensors exceeds threshold value, light switches off. Possibility of manual override (with timer)
4. When photo sensor drops below threshold value, light does not switch automatically on, but must be switched manually on at wall switch
5. If people forget to switch off the lights, the presence sensor will do so

Lighting control: Automatic off. Manual on.

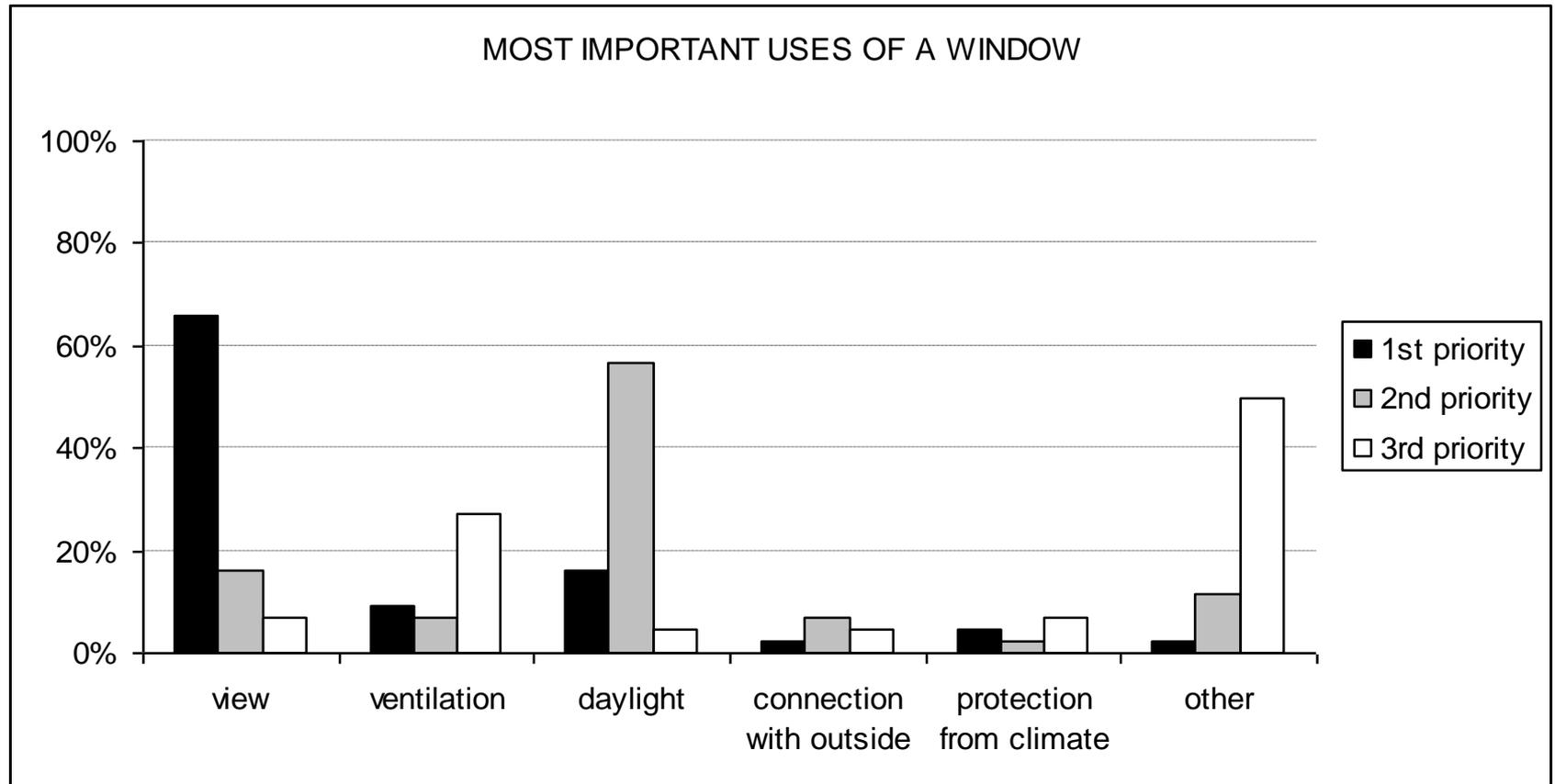
Lighting Levels

Office (lux)

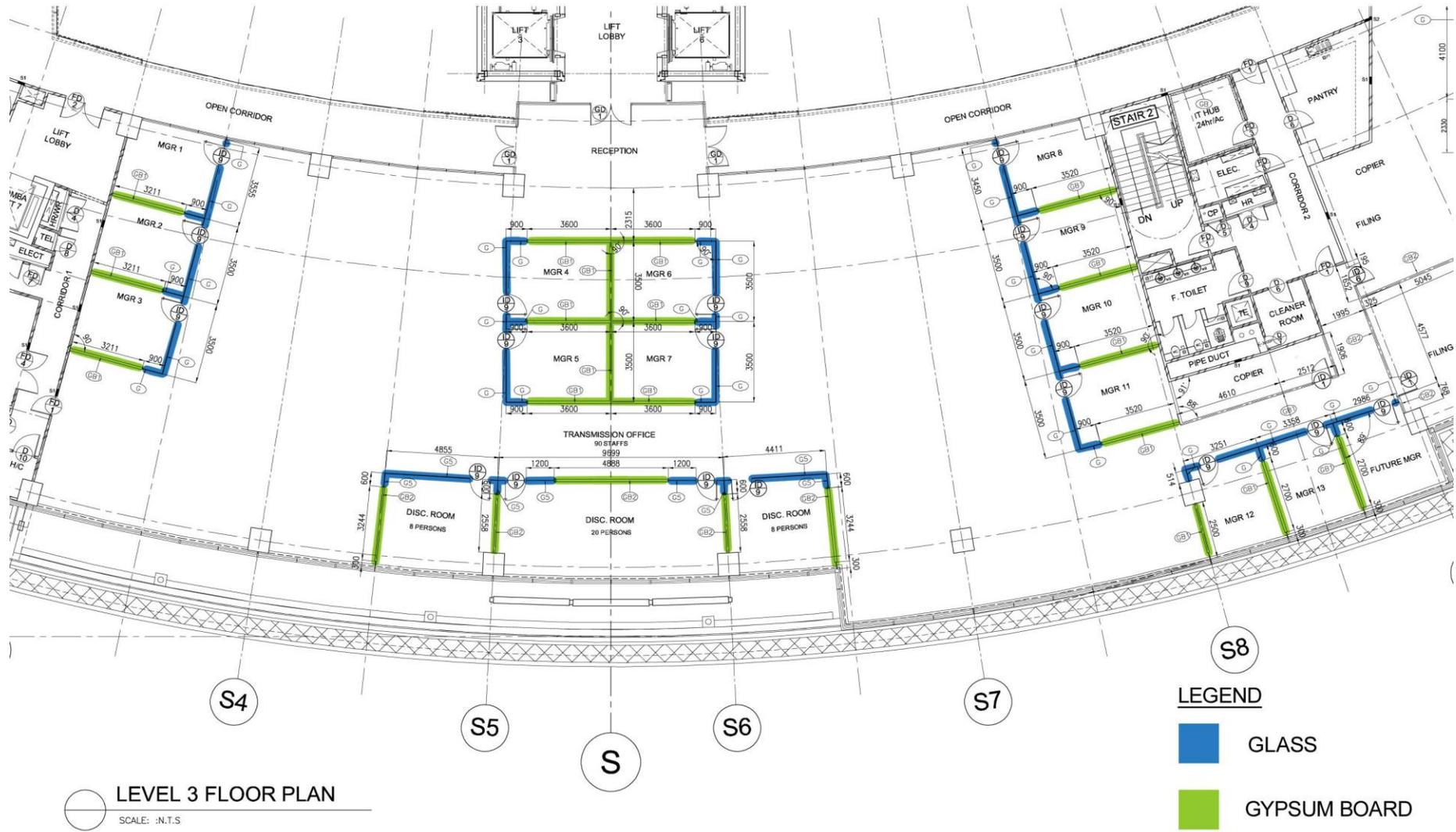


Ensure Daylight & View in Offices

(Survey among 46 building professionals in Singapore)

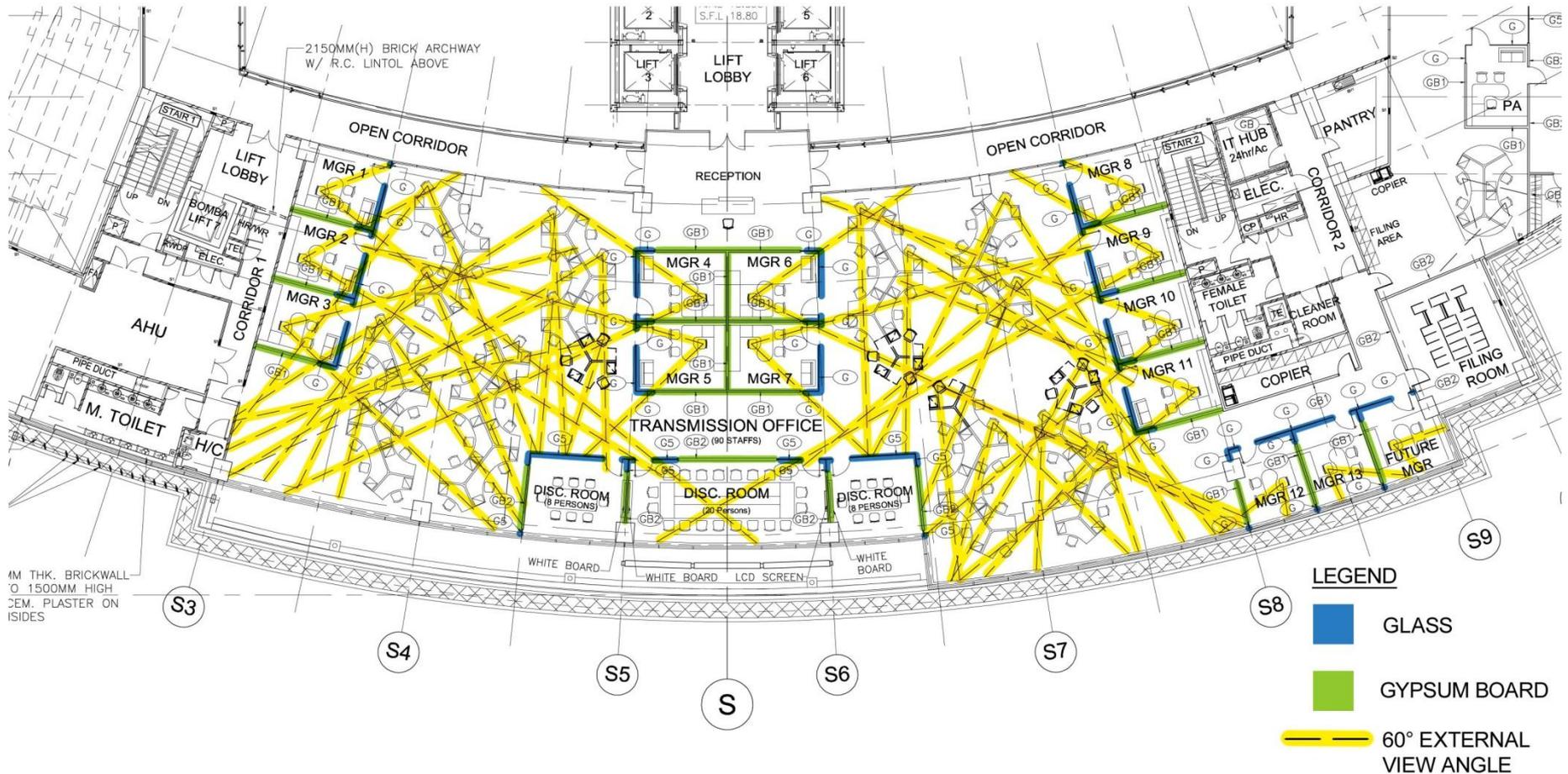


VIEW TO THE OUTSIDE



REVISED TYPICAL OFFICE LAYOUT
(900mm GLASS AT MANAGER'S ROOM)

VIEW TO THE OUTSIDE



Most SEB workspaces have view to the outside and high connectivity with fellow employees, which is part of SEB's transformation process

VIEWS & CONNECTIVITY in the office



Daylight and Rain Bows(!) in Car Park

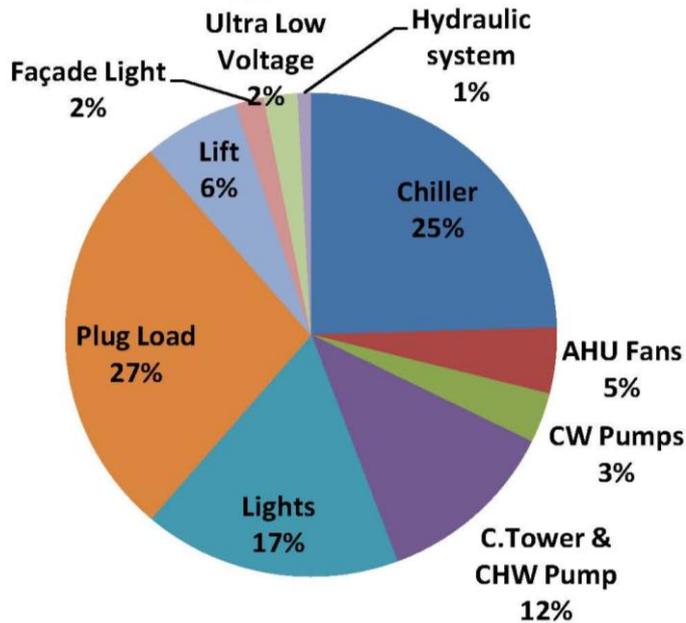


Video link: http://www.youtube.com/watch?v=d_VY98RT1qI

ENERGY BREAK-DOWN

(computer simulation)

Predicted Energy Breakdown of SEB



PREDICTED ENERGY CONSUMED PER YEAR

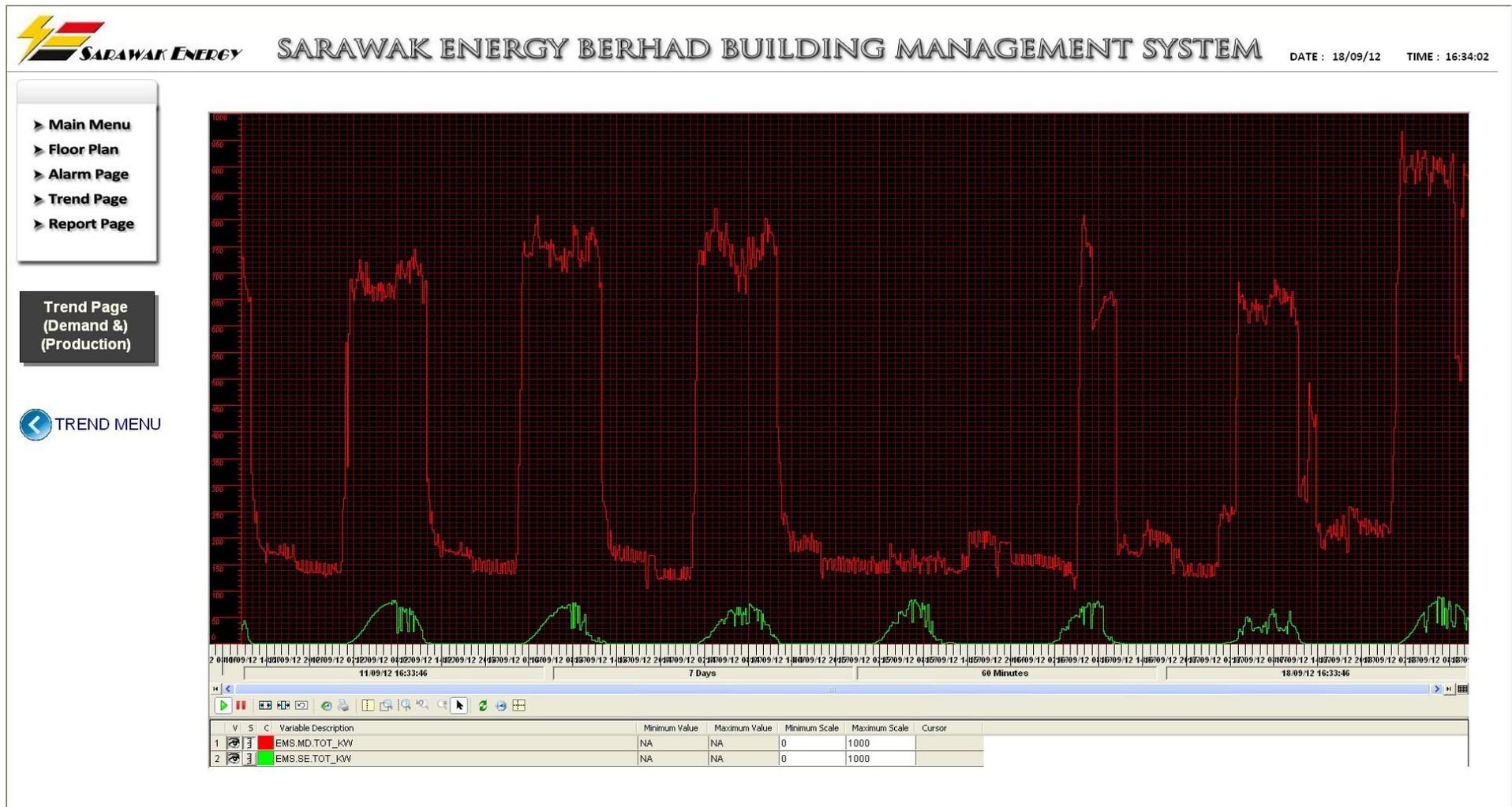
Descriptions	Numbers	kWh/m ² /year
Chiller (MWh/year)	965.6409	22.92
AHU Fans (MWh/year)	173.4494	4.30
CW Pumps (MWh/year)	132.1198	3.27
C.Tower & CHW Pump (MWh/year)	472.7487	11.71
Lights (MWh/year)	669.0509	16.57
Plug Load (MWh/year)	1079.0176	26.73
Lift (MWh/year)	280	6.94
Façade Light (MWh/year)	73.956	1.83
Ultra Low Voltage (MWh/year)	87.36	2.16
Hydraulic system (MWh/year)	34.1952	0.85
TOTAL (MWh/year)	3967.5385	98.3
Total (RM/year)	1,258,189	
Predicted Running Cost Average per month (RM/month)	104,849	

Simulated energy consumption = 98.3 kWh/m²/year

(Based on 1500 staff, GFA = 39893m² excluding car parks, Server Room & SCADA)

Current energy consumption = 80 kWh/m²/year (Based on 960 staff)

Building Management System: Consumption vs. Production (solar)



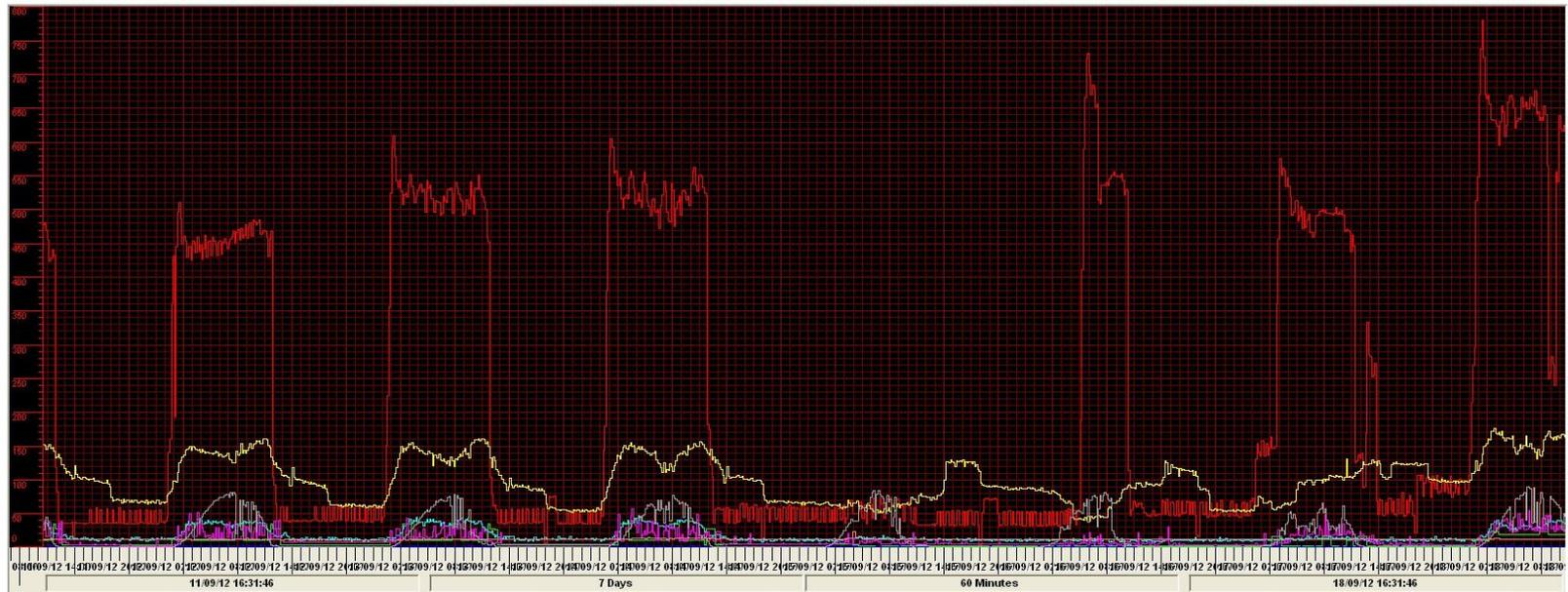
Building Management System: Key Energy Consumption Data (1 week)



- ▶ Main Menu
- ▶ Floor Plan
- ▶ Alarm Page
- ▶ Trend Page
- ▶ Report Page

Trend Page
(Key Energy)
(Weekly)

◀ TREND MENU



V	S	C	Variable Description	Minimum Value	Maximum Value	Minimum Scale	Maximum Scale	Cursor
1			EMS.HVAC.TOT_KW	NA	NA	0	800	
2			EMS.MV.TOT_KW	NA	NA	0	800	
3			EMS.LIGHT.TOT_KW	NA	NA	0	800	
4			EMS.LV.TOT_KW	NA	NA	0	800	
5			EMS.PBS.TOT_KW	NA	NA	0	800	
6			EMS.ACH.TOT_KW	NA	NA	0	800	
7			EMS.VRV.TOT_KW	NA	NA	0	800	
8			EMS.SE.TOT_KW	NA	NA	0	800	

GOOD INDOOR AIR QUALITY



General Office Area



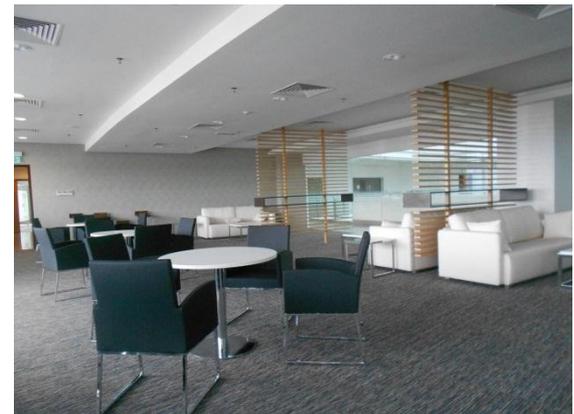
Library Reading Area



CEO's Room



Chairman's Room



Lounge / Reading Area

Good air quality for environmentally friendly products

ENERGY EFFICIENCY COOLING SYSTEM & RAINWATER HARVESTING



Air Handling Unit



Air Cooled Chiller



Chilled Water Pump



Cooling Tower



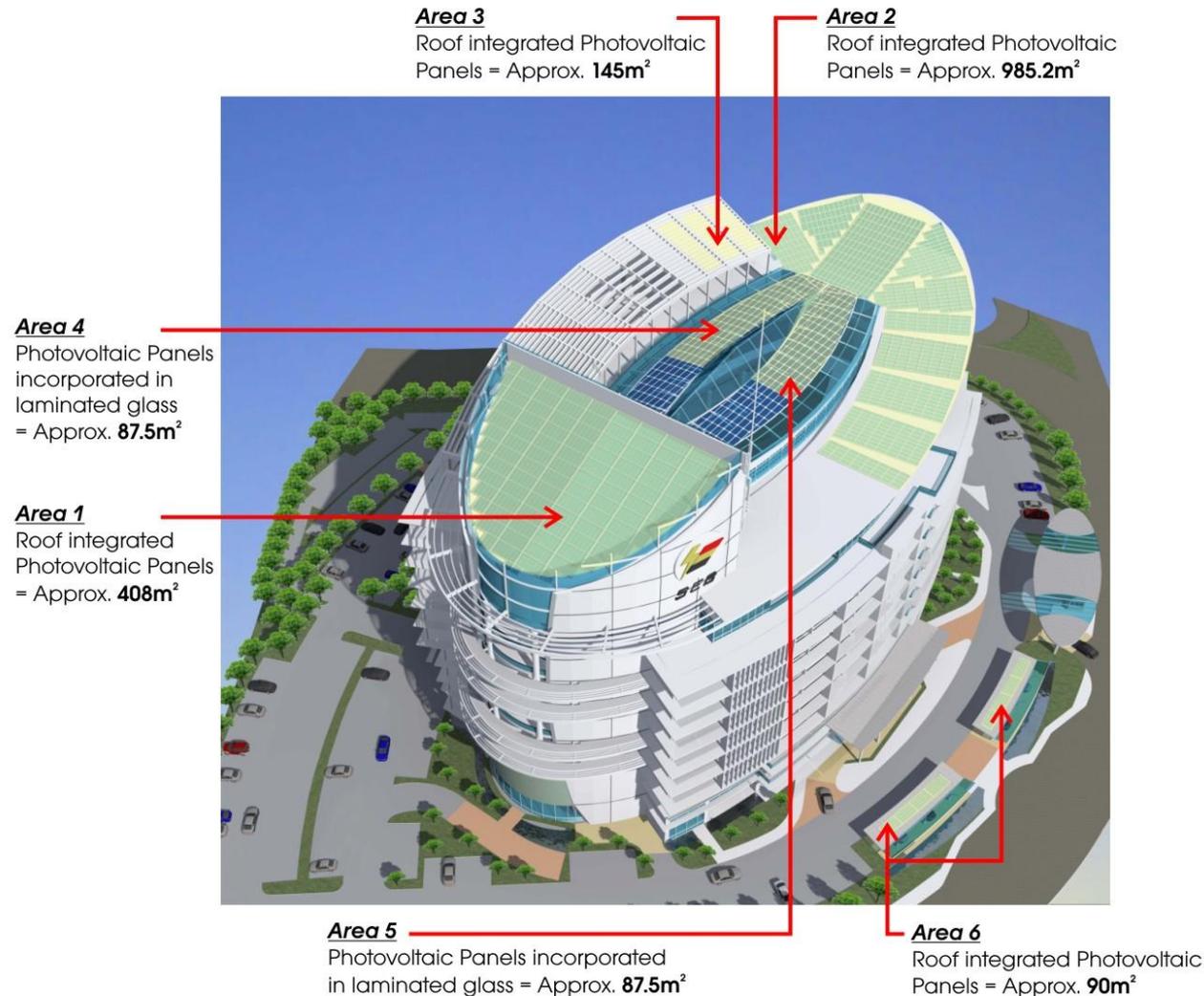
Domestic Tank



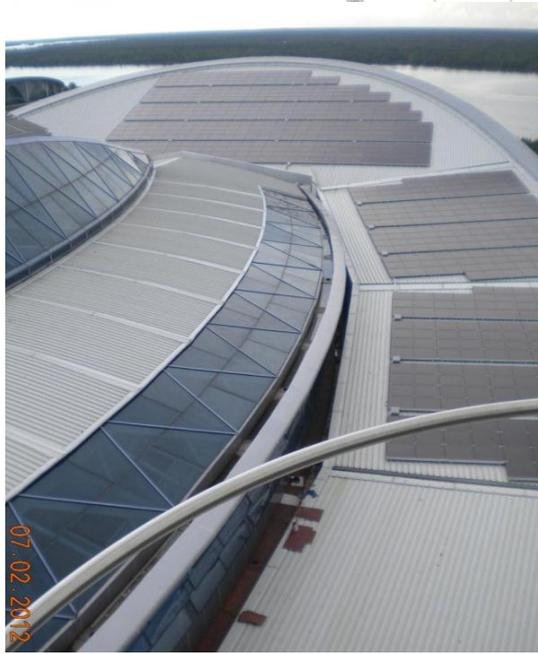
Rain Harvesting Tank
(10,000 gallons)

Grid-Connected Solar Photovoltaic Panels

(covers approx. 2% of the building's energy consumption)



WATER EFFICIENCY & RENEWABLE ENERGY



Area 2
 Type 1 PV Panels : Polycrystalline Type
 Colour : Dark Blue
 Area = 891m²



Area 1
 Type 1 PV Panels : Polycrystalline Type
 - To be mounted on builder's roofing system complete with colourbond metal roofing sheet, insulation, 'C' purlins and roof trusses by others.
 Colour : Dark Blue
 Area = 474m²

Area 3 (Sheltered VIP Car Park)
 Type 2 PV Panels : Polycrystalline Type
 - Integrated as skylighting material, sandwiched on both sides with tempered glass panel
 Colour : Dark Blue
 Area = 160m²

Photovoltaic Panels

TOTAL TYPE 1 PV PANELS AREA : Area 1 + Area 2 = 1365m²

TOTAL TYPE 2 PV PANELS AREA : Area 3 = 160m²



Building Integrated Photovoltaics Panels (BIPV)



Low flow rate tap and water efficient flushing (50% savings)

GREEN VEHICLE CAR PARKING BAY

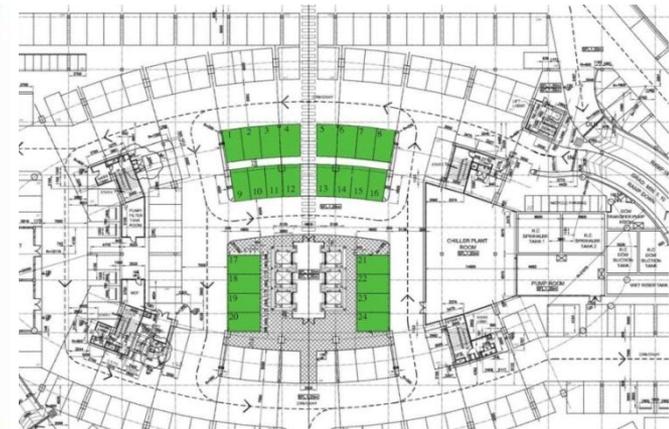


VIP Sheltered Carpark



Emerging trend for **electric vehicles**.
Here 100% electric Nissan Leaf and
100% electric Yike Bike.

IEN Office, Kuala Lumpur, August 2012



Sub-Basement



Electrical vehicles could be an
interesting new and green
business opportunity for SEB

Final Slide

Sarawak Energy:

“Power to Grow
- something to Show!”



1st Green Office Building in Sarawak

Thank you



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