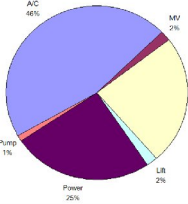


Sustainable Design Scheme

BEC Annual Energy Profile

BEC Building Loading Distribution



Annual Energy (Jul 09 to Jun 10)
for BEC = **858,238 kWh**
CO₂ Emission = **721 Tonnes/yr**
Energy Intensity = **325kWh/m²/yr**

In order to meet BEAM Plus(NB) Platinum, the sustainable design scheme shall target to reduce:

CO₂ Emission by **37%**
Peak Demand Energy by **15%**
Future BEC Energy Intensity ?
Kwh/m²/yr



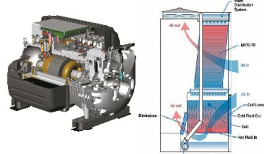
Sustainable Design Scheme

- Ultra Efficient Chilled Water Plants
- Radiant Cooling
- Flexible PV/BIPV
- Passive Energy Control (i.e. solar fin, solar shading, free cooling, natural ventilation etc)
- Smart Lighting
- Vertical Transportation



Oil Free Frictionless Chiller

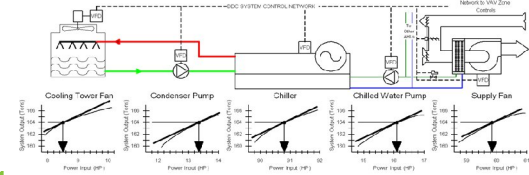
- High COP > 10 in part load condition (~15 – 25% saving)
- Variable flow for chilled water pump, condenser water pump and cooling tower fan (~20 – 40% saving in power)



Ultra Efficient Chilled Water Plant

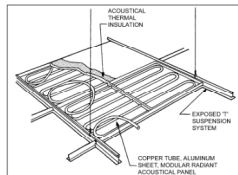
Demand Based Control

- Employ Equal Marginal Performance Principle
- Coordinating the Operation Components of a chilled water
- Optimizing the overall system efficiency



Radiant Cooling

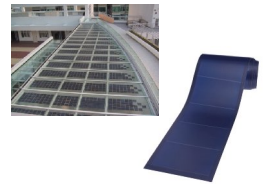
- Energy saving by radiation cooling is around **30 to 40%**
- Good thermal comfort
- Less spatial requirement, no extra load to construction
- Less maintenance as no rotary parts
- Easy for Noise Control
- Reduced Chiller capacity
- Operated under higher chilled water temperature



Flexible PV Panel and BIPV

PV and BIPV Installation

- BIPV panels on atrium roof
- Flexible PV on Roof
- Easy to Install
- No penetration to the roof
- Light weight, Durable and Flexible
- Rated Power : 144Wp



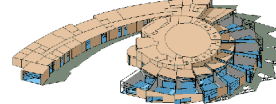
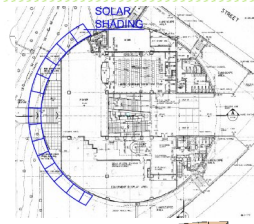
Passive Design – Night Cooling

Natural Ventilation

- **FREE** Cooling
- ↓ Energy
- Capital cost ↓ ~ 15%
- ↓ Sick building syndrome



Passive Design - Solar Shading



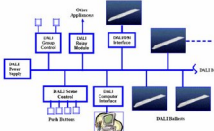
- Solar Fins or Overhang at Southern Side of Façade
- Reduce direct solar gain
- Minimize glare → Enhance IEQ



IES Modelling : Solar Shading

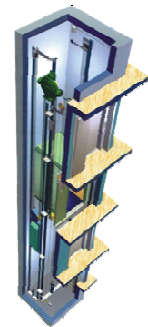
Smart Lighting

- T5 lighting with dimmable ballast at perimeter zone
- LED in lieu of spot light & Exit Sign
- High efficiency reflector
- Lower ambient lighting level (~300 lux) with local task light
- Smart lighting control such as Occupancy and Daylight Sensor and Smart Scheduling and Dimming
- 20 – 30% Saving in lighting energy)



Vertical Transportation

- Replace the existing lift to machine room-less lift
- Capacity ~1350 kg / 18 persons
- Automatic switch on/off of the ventilation fan and lighting inside the lift car when it is idle
- Use of LED lighting in lift car
- Save ~25 – 30% of lift motor energy consumption compared to traditional electric lift motor



Initial Benefits of BEC Transformation

- Establish an Iconic Building and Showcase for the Industry
- Provide Green Education to Next Generation
- Total CO₂ Emission Reduction in 20 years = Planting for 24 nos. Victoria Urban Park



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