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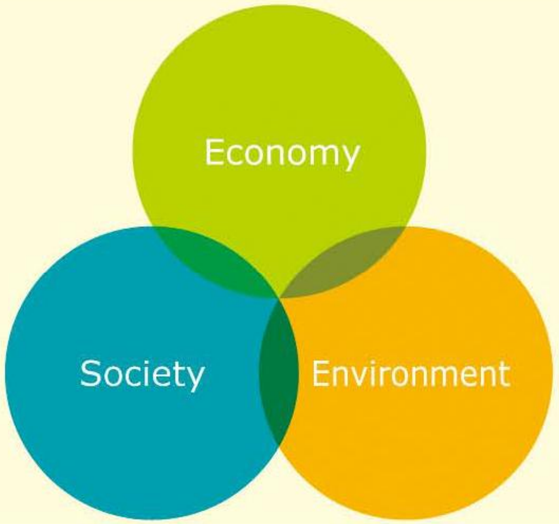
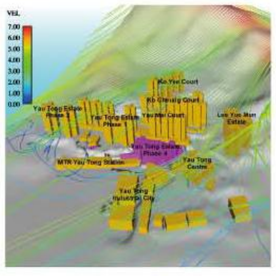
REDEVELOPMENT OF YAU TONG ESTATE PHASE 4, HONG KONG

iiSBE

SUSTAINABLE DESIGN FRAMEWORK



Environmental Sustainability



1. Hybrid ventilation system
2. Water-cooled air-conditioning system
3. Solar control measures
4. Enhance the health and comfort environment by micro-climatic studies
5. Maximized greening area (up to 35% site area)
6. Reclaimed A/C condensate for landscaping irrigation

Social Sustainability

1. Universal Design approach
2. Community engagement program
3. Neighborhood and heritage context

Economical Sustainability

1. Maximizing development potential to generate additional revenue
2. Rationalizing the structural design and re-use of completed foundation

Baseline Information

Owner:	Hong Kong Housing Authority
Building Type:	Regional Shopping Centre
Location:	Yau Tong, Hong Kong
Status:	Under construction
Heating/Cooling degree-days:	147 (heating) ; 3,131 (cooling)
Gross Floor Area above ground:	54,300m^2
Number of Stories above ground:	8
Estimated population during normal operating condition:	5,000 persons
Assessment System for Environmental Performance:	Building Environmental Assessment Method (BEAM)

Hong Kong Housing Authority

ARUP

HK-BEAM Society 香港環保建築協會

- Architect: Housing Department, The Government of HKSAR

- Environmental Consultant: Ove Arup & Partners Hong Kong Ltd

- Client: Hong Kong Housing Authority

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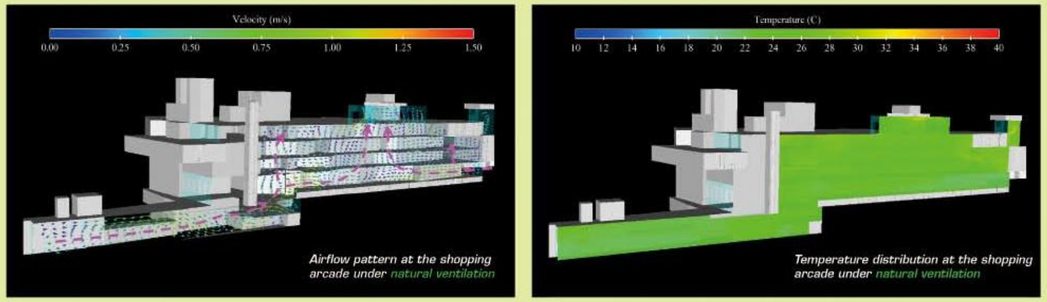
GREEN DESIGN FEATURES

1. Energy Conservation - Hybrid Ventilation System

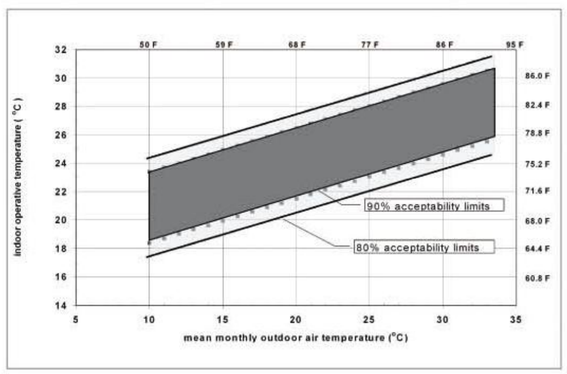


CFD Model

Computational Fluid Dynamics (CFD) technique is used in assessing hybrid ventilation system. The airflow patterns and temperature distribution are determined.

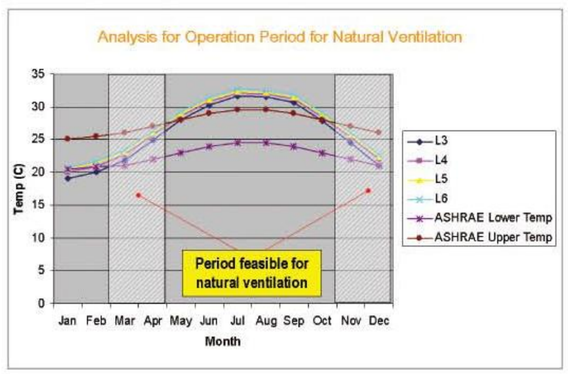
Motorized Openings

Motorized openings are installed for intake of cool ambient air at low level of the atrium and exhaust of hot air at the roof level



Design Criteria

ASHRAE Standard 55-2004 for 90% acceptable limits



Operation

Natural ventilation at mild season, i.e. spring & autumn

Air conditioning at extreme season, i.e. summer

Results

Annual operation hours of natural ventilation (% of total operation time)	**582 hr (13.3%)**
Annual cooling energy reduction	**935 MWh/year**
Annual electrical energy saving	**190 MWh/year**
Annual electricity cost saving	**US$24,000/year**
Reduction of CO_2 emission	**654,500 kg/year**
Equivalent number of mature tree for CO_2 removal	**28,457 nos.**

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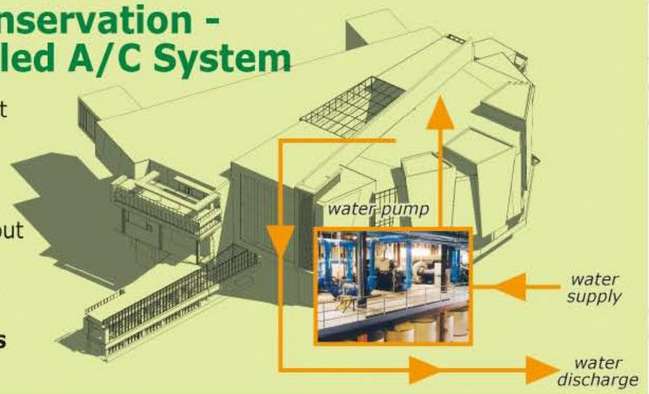
GREEN DESIGN FEATURES

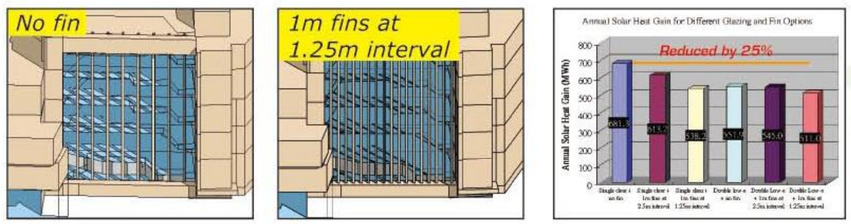
2. Energy Conservation - Water-cooled A/C System

- More energy efficient than a conventional air-cooled system
- Estimated electricity energy saving is about **6,000MWh/year**, equivalent to annual cost saving of **US$676 thousands**



3. Energy Conservation - Solar Control

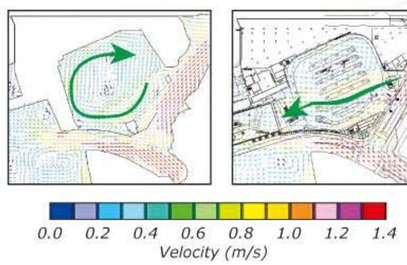
- High performance low-e glass is used
- Vertical fins and motorized blinds are considered and assessed to further reduce heat gain, equivalent to energy saving of **170MWh/year**

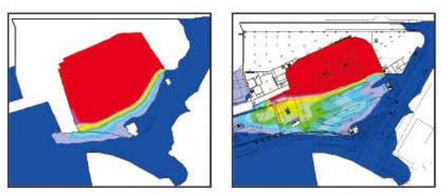


Sun shading study at summer day

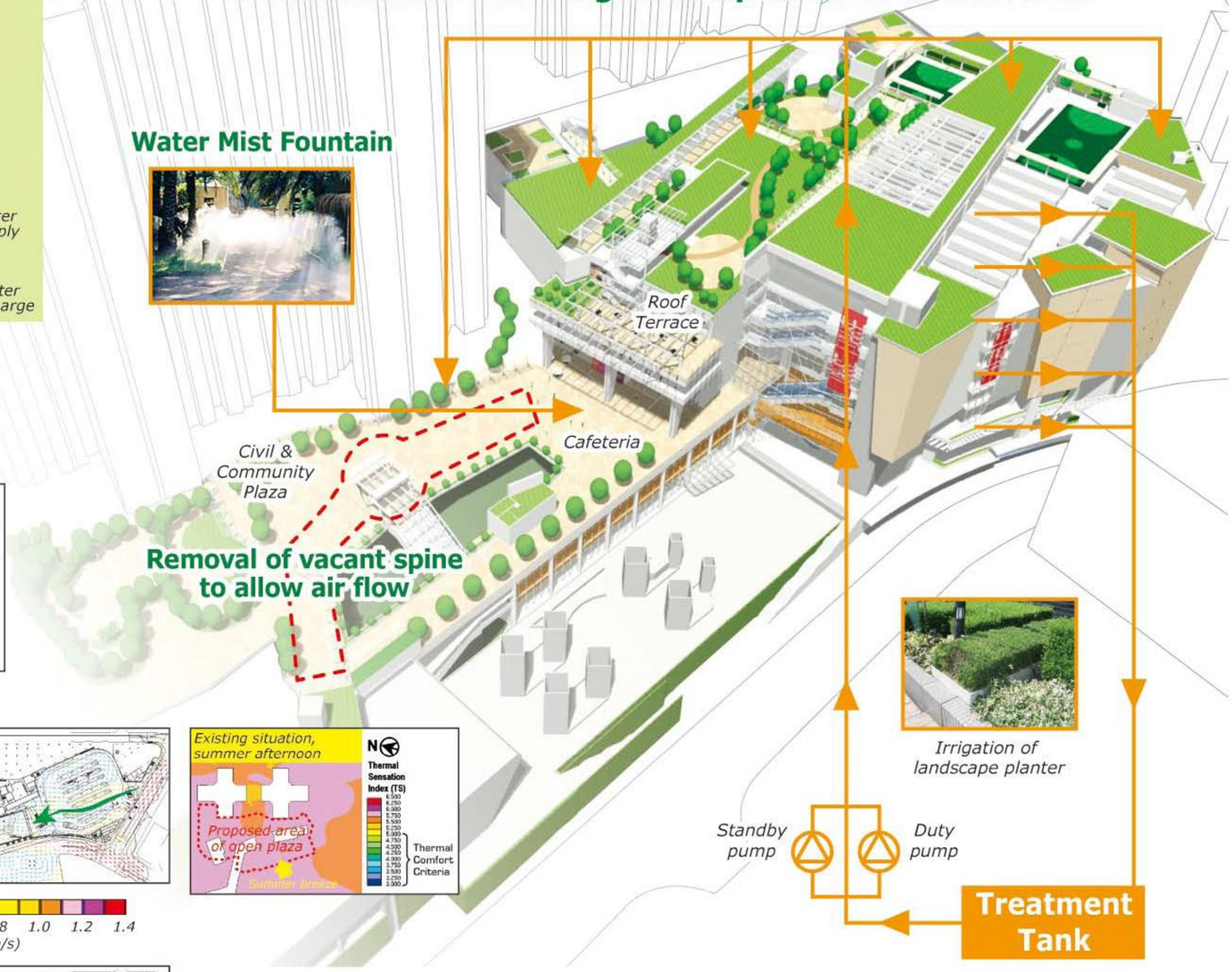
4. Enhancing Health & Comfort Environment

- Micro-climatic studies for Public Transport Interchange (PTI) , Carpark and Open Plaza
- Open foyer enhances the effect of natural ventilation at PTI reducing the capital cost and running cost of the mechanical ventilation system
- CO concentration (100% area) and NO_2 concentration (50% area) have satisfied the benchmark of **30,000 ug/m³** and **300 ug/m³** respectively as set by Environmental Protection Department
- Removal of existing vacant spine to enhance wind flow to the plaza
- Maximized greening area and installation of water mist foundation to mitigate urban heat island (UHI) effect





5. Maximized Greening Area up to 35% of site area



6. Water Conservation - Reclaimed A/C Condensate for Landscape Irrigation

- Reduce fresh water consumption and wastewater
- With a cooling capacity of 4,470 TR of the air-conditioning system, **32,488 liter** of A/C condensate can be reclaimed per day for irrigation of **8,700m²** of green area
- Estimated cost saving for water consumption is **US$2,400 per year**

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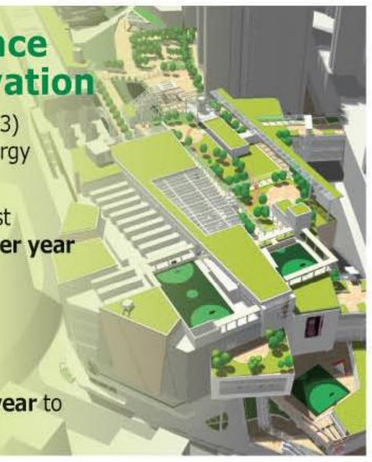
BEAM ASSESSMENT

Overall Performance in Energy Conservation



(Combining green features 1, 2 & 3)

- Estimated overall electrical energy saving – **6,900MWh/year**
- Estimated overall electricity cost saving – **US$885 thousand per year**
- Equivalent to reduction in CO_2 emission of **~ 3 million kg/year**
- Equivalent of planting **~ 136,000 no. of trees per year** to absorb the emitted CO_2

Summary of Achievement

The BEAM assessment criteria are grouped into **SIX** main impact categories, including site, material, energy, water, indoor environmental quality (IEQ) and innovation.

Based upon the current design, the Project has provisionally achieved 89.4 out of the 117.2 credits applicable in overall categories, and 28.2 out of 34.6 credits applicable in the IEQ section.

As a consequence of the client's drive and commitment towards environmental protection, high standards of building performance, management and maintenance have been integrated into the design and construction of the Project. The credits achieved at this stage are sufficient to achieve the highest rating of **Platinum** in BEAM.

	Applicable Credits	Bonus Credits	Achieved Credits	Possible Credits
Site Aspects	23.0	0.0	18.0	3.0
Materials Aspects	24.0	0.0	19.0	3.0
Energy Aspects	24.6	3.0	14.2	0.0
Water Aspects	11.0	2.0	7.0	0.0
IEQ Aspects	34.6	1.8	28.2	4.0
Innovation/ Enhancement	-	5.0	3.0	2.0
Total Credits	**117.2**	**11.8**	**89.4**	**12.0**

Summary of achieved credits in 6 major aspects of assessment

BEAM Assessment

BEAM, the Building Environmental Assessment Method, is the independent and voluntary initiative which provides recognition and performance label for buildings with due consideration on safety, health, comfort, functionality, efficiency and environmental sustainability. BEAM embraces good practices in the planning, design, construction, and management, operation and maintenance of all types of new and existing buildings. BEAM standards are aligned with local regulations, standards and codes of practice, whilst **its overall framework reflects international practices in green building labels.**

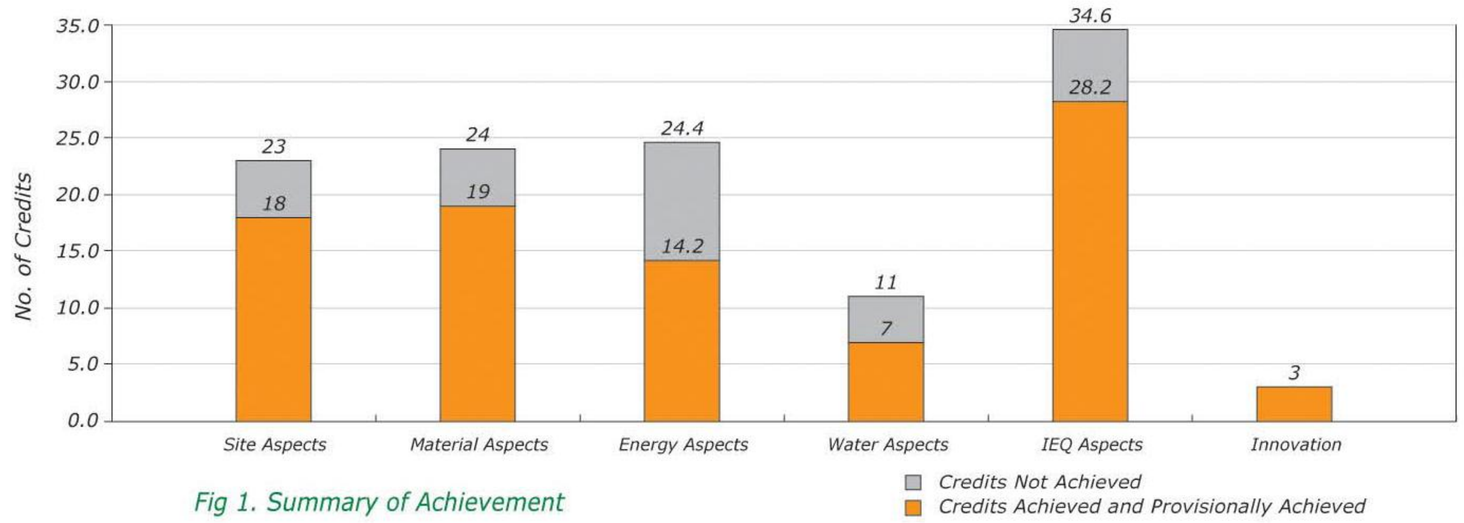


Fig 1. Summary of Achievement

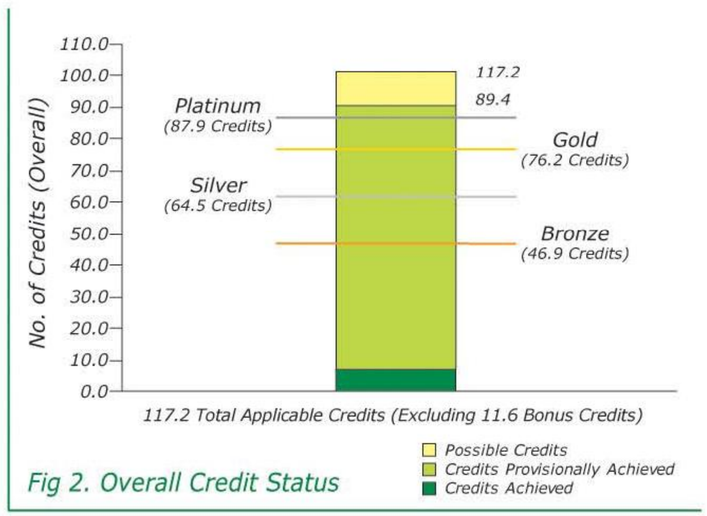


Fig 2. Overall Credit Status

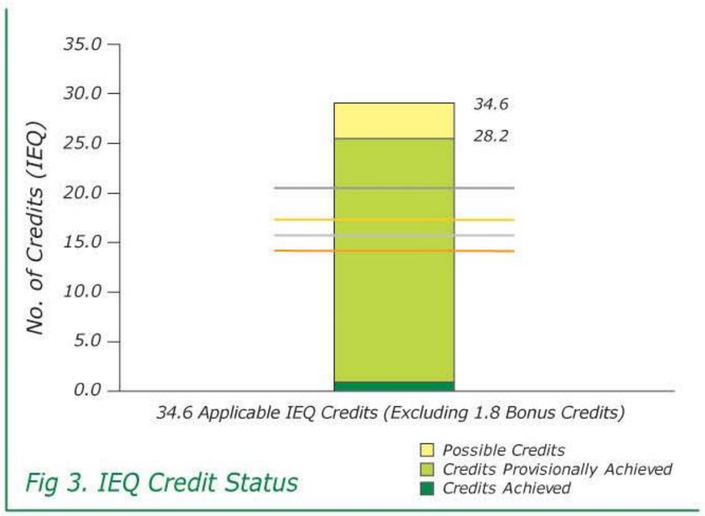


Fig 3. IEQ Credit Status

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