Project Profiles

TECHNOLOGY

1

2

3

4

Hong Kong Science Park

Pak Shek Kok

Building 4a - Photonics Centre
Building 4b - Wireless Centre
Building 5 - IC Development Centre
Building 6 - Bio-Informatics Centre
Building 7 - Philips Electronics Building
Building 8 - SAE Technology Centre
Building 9 - No. 5 Science Park West Avenue

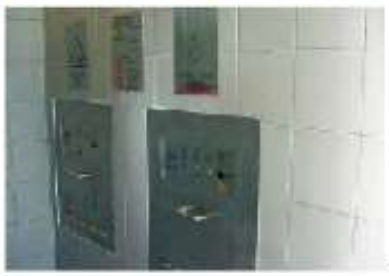
Developer/Owner
Hong Kong Science and Technology Parks Corporation

Year of assessment commencement
2002, under HK-BEAM for new building developments

Hong Kong Science Park is being built in phases on a 22-hectare site at Pak Shek Kok, beside Tolo Harbour. The project is a research and development location for high-tech companies to set up base and the site is being divided into areas designated as campus, core and corporate zones.

Construction of the Science Park buildings was carried out with reusable formwork systems and precast elements such as slabs and beams. For places where timber formwork was needed, Canadian sustainable sources of wood were used. Waste sorting for reuse and disposal was carried out and wastewater pollution control measures were followed at the various sites: treatment plants, sedimentation tanks and silt removal facilities were in use. Recycled building products were applied while constructing the project, including substantial laying of recycled glass tiles for 2,400 sq m of pavement areas.

The location and distribution of buildings at Science Park is favourable to renewable-energy applications due to the low building heights, which allow full penetration of sunlight to building roofs and facades. Building Integrated Photovoltaic (BIPV) panels are installed in conjunction with curtain wall systems and also on roofs. Later phases of the project have seen the size of BIPV systems progressively increase and the total capacity of the panels across Buildings 1 to 9 is 198 kW. The total facade area employed for BIPV panels is estimated to be more than 1,000 sq m. A cell efficiency of about 14 per cent was chosen to balance cost and



1 BIPV rooftop panels to collect solar energy
2 Timber recycling during construction to reduce waste
3 Wastewater treatment plant employed on site
4 Automatic refuse-collection station
5 BIPV panels integrated into a building facade
6 Refuse hoppers on each floor with separate chutes for paper and other solid waste
7 Design flow diagram of the automatic refuse collection system

energy efficiency based on current technology. The panels and the power-conversion units require very little maintenance and the expected life of the panels is more than 25 years. Power generated from these is connected to the local power grid, an unconventional arrangement eliminating the need for batteries that store power on the site. The lack of batteries also saves about one third of the installation cost, cuts maintenance and frees up space.

Individual buildings accommodated the application of further energy-efficient initiatives. Building facades range from shaded Insulated Glass Unit curtain wall systems to low-e double- or triple-glazed curtain wall. Extra skins are applied to elevations in selected areas, comprising acoustic insulation, solar shading devices and photovoltaic panels. Air-conditioning systems use heat pump and heat pipe systems to recover energy from office exhausts and chiller condensers respectively. All HVAC systems are separately monitored and regulated by computerised building management systems. The buildings include dedicated spaces for services ducts, which allow tenants to set up independent extraction systems for air-pollutant-generating areas. HVAC air intakes and exhaust points are placed on roof levels in opposite

"Hong Kong Science Park will continue its policy of sustainable development by embracing innovative environmental features in its future development."

— S.H. Pau,
Acting Chief Executive Officer,
Hong Kong Science and Technology Parks Corporation

directions, keeping them well above the surrounding parkland and avoiding disturbance.

Separate refuse chutes — one for wastepaper collection and one for other solid waste — are used across the Science Park in an automatic refuse-collection system linked to all buildings. Waste is directly transported via mechanised vertical duct shafts and underground pipes to a central collection station at the development's carpark building for accumulation, compression and storage of office recyclable materials. Environmental advantages of this hygienic system include minimising road-based waste transport, confining odours and integrating waste collection with other logistical flows. Other sustainable-design measures applied at Science Park include equipping lighting in office spaces and common areas with energy-efficient lamps and limiting traffic in the site. The central carpark building is provided so building users can walk through a landscaped park environment to buildings away from traffic emissions. Shuttle buses to urban areas connect with public transport networks and reduce reliance on the use of private vehicles.

Architect
Architectural Services Department

M&E consultant
Architectural Services Department

Structural engineer
Architectural Services Department

Main contractor
Shui On JV, China State Construction Engineering, Dickson Construction

Completion dates
2001 to 2005

1

The Jockey Club Environmental Building

Kowloon Tong

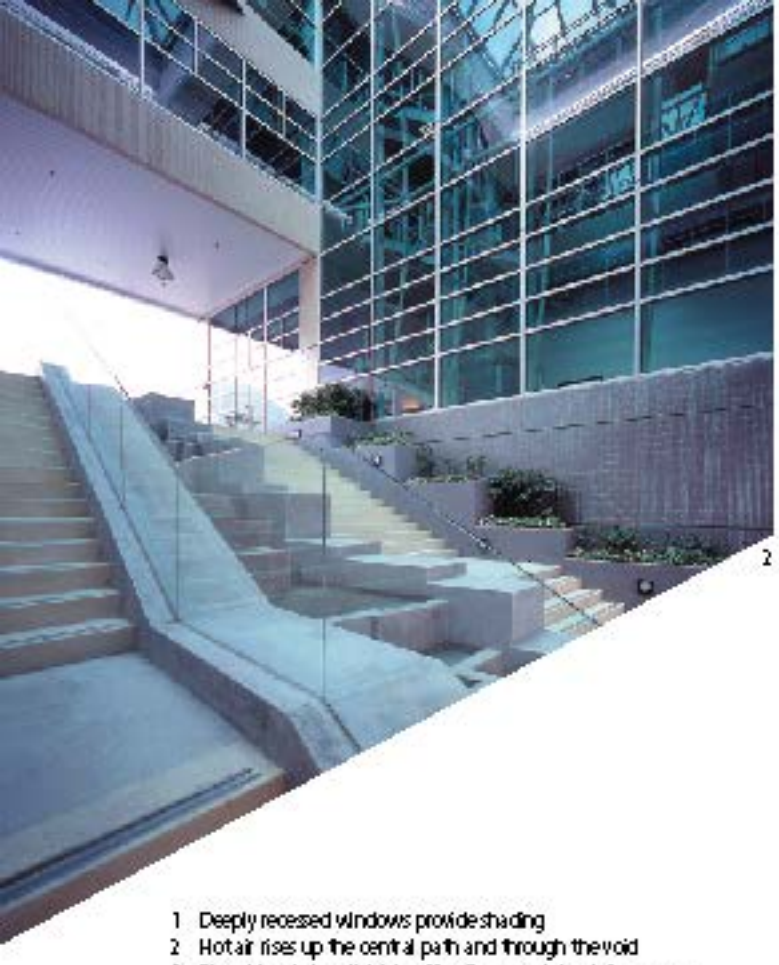
Developer/Owner
Business Environment Council

Year of assessment commencement
1996, under HK-BEAM for new building developments

The Jockey Club Environmental Building is a four-storey cylindrical building housing a 120-seat auditorium, a 220 sq m exhibition facility and two levels of office space. The building is the home of the Business Environment Council, one of the pioneers of the HK-BEAM initiative. Green design principles are noted from the facade — the building's round shape is itself a measure to minimise external wall area for containing the allowable floor area. The form also offers a lower internal cooling load, as the shape limits solar heat gain from sunlight. Exterior windows are kept to a minimum and terraced to provide shading for each other. Windows on the western and eastern sides are smaller, while large windows on the northern and southern sides have deep recesses as shading devices. The cyclindrical form also means no sharp corners are incorporated on the exterior; under fung shui principles these would be offensive to neighbouring premises.

A square atrium with a pyramidal skylight is placed at the centre of the building. With glass walls surrounding the void, natural light is introduced to the interior and the decreased need for artificial lighting translates into energy and operational cost savings. Tinted glass is used for these internal facades to cut heat transmission while the presence of the glass atrium roof means that these windows are effectively double-glazed.

A public park also occupies the site given for the development, so the building functions as an entry point to this, with a footpath and cascade passing beneath the atrium to link the park and Tat Chee Avenue. This route down the sloping site doubles as an air-circulation enhancement. An air gap at the atrium's pyramid means that warm air escapes at the rooftop, drawing cooler air in from the park at the foot of the atrium. The continuous draft effect lowers temperatures in the atrium, while openable windows optimise cross-ventilation.



2

3

"Conceived, designed, and built before we initiated the HK-BEAM assessment initiative, the Jockey Club Environmental Building demonstrates our organisation's early commitment to green building innovation and continual reduction of our building's environmental footprint."

— Dr Andrew Thomson,
Chief Executive Officer,
Business Environment Council

1 Deeply recessed windows provide shading
2 Hot air rises up the central path and through the void
3 The atrium brings light to office floors and circulation areas
4 Planning diagram of natural ventilation and other environmental features

4

Measures during construction included application of recycled material to minimise waste. Recyclable hoardings were made up of recycled polystyrene that was cast with concrete into lightweight panels. Once the building was complete, these panels were reused as internal permanent partitions within the office areas. The simple building form and repetitive details reduced the need for additional formwork. Timber used inside the building is taken from sustainable sources while water-based and low-VOC paints are used to minimise harmful impacts to tenants and visitors. For artifical lighting, electronic ballast was employed to cut the power consumption of fittings while, for the HVAC system, non-ozone-depleting refrigerant is used in the air-cooled chillers.

The Jockey Club Environmental Building's occupants follow a Fit Out Guide and Rules for Tenants that includes an Environmental Guide. The document specifies ways to improve indoor air quality through materials choice and ventilation; means to cut use of wood products; and methods to realise energy savings such as installing window blinds and subdividing lighting areas into zones.

Architect
Simon Kwan & Associates Ltd

M&E consultant
J. Roger Preston Ltd

Structural consultant
Mitchell, McFarlane, Brentnall & Partners

Main contractor
Wan Chung Construction Ltd

Completion date
1996