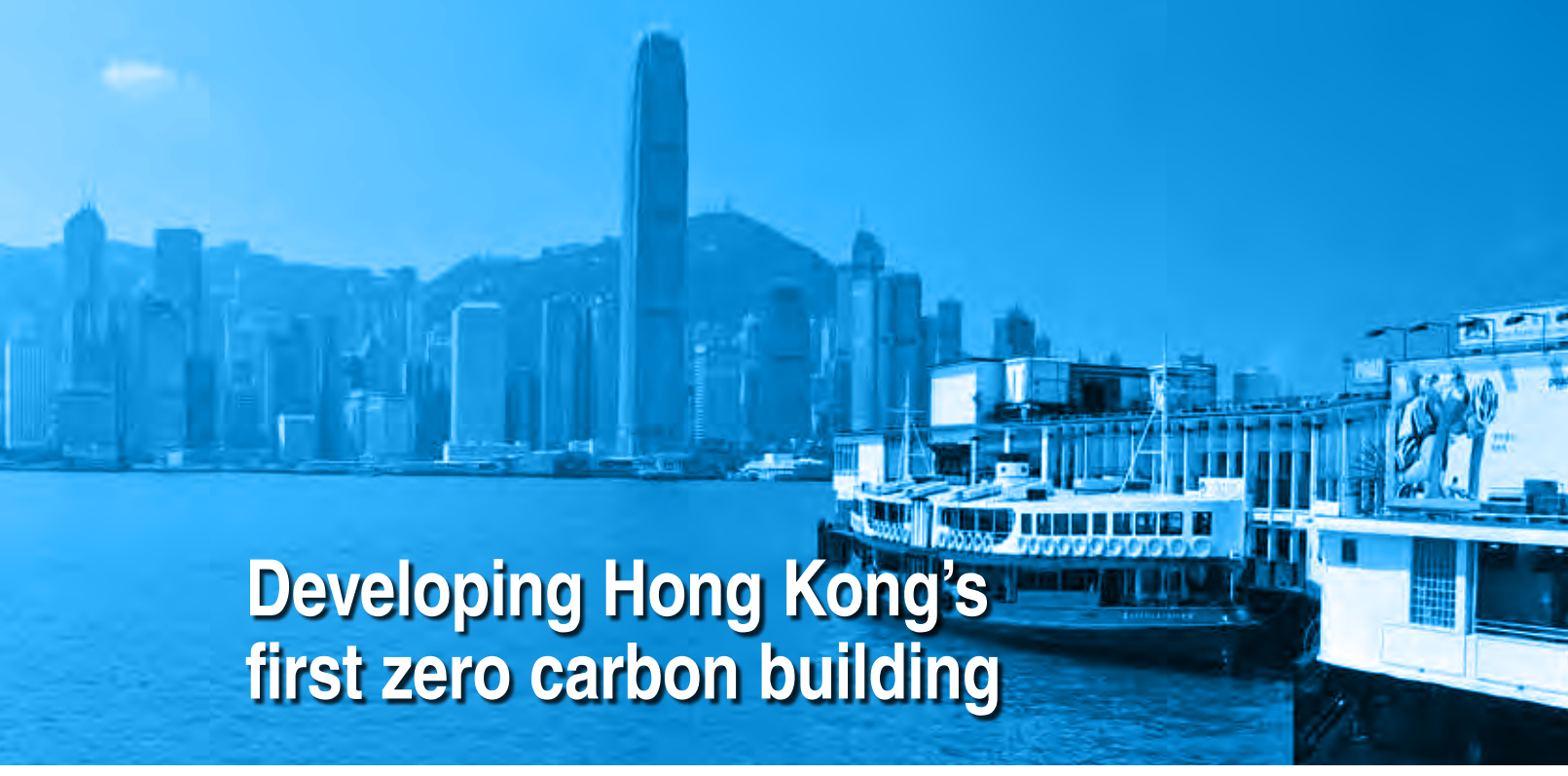

Developing Hong Kong's first zero carbon building

Fossil fuels are the dominant source of energy in Hong Kong, currently generating 75% of electricity and emitting large quantities of greenhouse gases (GHG). Buildings are the major contributor to GHG emissions in Hong Kong, as they account for 90% of electricity consumption. Therefore, buildings are both a challenge and an opportunity for reduction of GHG emissions.

GHG emission reduction requires rethink of the planning and design processes as well as behavioral change. To achieve the GHG emission reduction, active participation by the construction industry and the public is the key.

One of the visions of Construction Industry Council (CIC) is to promote low carbon building design and technologies in Hong Kong in the effort to reduce GHG emissions.

CIC is currently developing the first zero-carbon building (ZCB) in Hong Kong, which is expected to be completed and commissioned by mid 2012. It is a signature project to showcase state-of-the-art eco-building design and technologies to the construction industry internationally and locally as well as to raise community awareness of sustainable living in Hong Kong.

The ZCB is located at a site of 14,700 sq m in Sheung Yuet Road, Kowloon Bay. The ZCB with a building footprint of under 10% of the site area will be a two-storey building, comprising of an exhibition area, an eco-home show flat, an office area and a multi-function room. The remaining area of the site will be developed into a landscape area featured by native woodland, an eco-plaza, an eco-terrace and an outdoor exhibition area characterized by the "One Plant Living Loop" principle. The native woodland aims to promote biodiversity. The landscape area provides high greenery ratio for mitigating urban heat island effect.

To the public, the ZCB will serve as an education centre for them to feel and see what a zero carbon building is like, with the objective to encourage behavioral changes and cultural shift towards sustainable living. To industry stakeholders, the building will provide a platform to exchange knowledge and experience in low carbon building design and development.

The ZCB is connected to the local grid and production of on-site renewable energy offsets the power consumed from grid over

Photo: Gene Au Yeung

an annual basis, which is a "Type 2 zero-carbon building" based on the definition by United Kingdom Green Building Council (UKGBC). This ZCB even goes beyond the scope of the UKGBC definition by exporting surplus renewable energy to the local grid to offset the embodied energy of its construction process and building materials. The renewable energy is generated on site from photovoltaic panels and bio-diesel.

A Life Cycle Analysis (LCA) based hierarchical and integrated design approach was adopted, which leads to an overall reduction of 40% in energy demand (20% from passive design measures, 20% from the use of ultra-energy-efficient active building systems).

Modular design is adopted for adaptability to future change, and the landscape master layout emphasizes on the connection with neighborhood, the quality of an urban oasis and minimizing environmental loadings.

The energy consumption of the ZCB and the surrounding landscape is approximately 145 MWh/year. The building itself consumes less than 100 kWh/m2/year of electrical energy which is approximately 40% less than the baseline of Hong Kong's Building Energy Code (BEC).

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Key Features of CIC Zero Carbon Building

- Carbon neutral - It will be the first zero-carbon building in HK.
- Energy plus - It generates more energy from renewable sources than for its own operational needs.
- Climate positive – The ZCB cum open space improves the local micro-climate by reducing the heat island effect.
- Experimenting – It is an experimental showcase to inspire perception and behavioral changes among practitioners, industry stakeholders and the public to achieve carbon emission reduction.
- Evaluating – It evaluates state-of-the-art building technologies through an efficient energy management systems with smart control, taking into consideration the operational energy consumption, on-site renewable energy production, microclimate conditions and etc.
- Educating – It will serve as an education centre open for organised and guided visits. Target participants will include both industry stakeholders and the general public, particularly younger audiences.
- Evolving – Flexibilities are allowed in the design to cater for the fast-evolving low carbon building technologies and changing needs.
- Waste heat to energy - It will be the first generation plant which harvests waste heat for energy generation in HK.
- Native urban woodland - The open space will create the first native urban woodland in HK.