HKGBC Advancing Net Zero Competition

26 May 2021

Objective

1. Build up the capacity to support the building sector to advance towards carbon neutrality
2. Generate new ideas and solutions for the building sector
3. Accelerate the building sector to adopt and develop low/zero carbon design and technologies
4. Stimulate the review of current regulations and code of practices to facilitate the adoption and development of low/zero carbon design and technologies

Themes

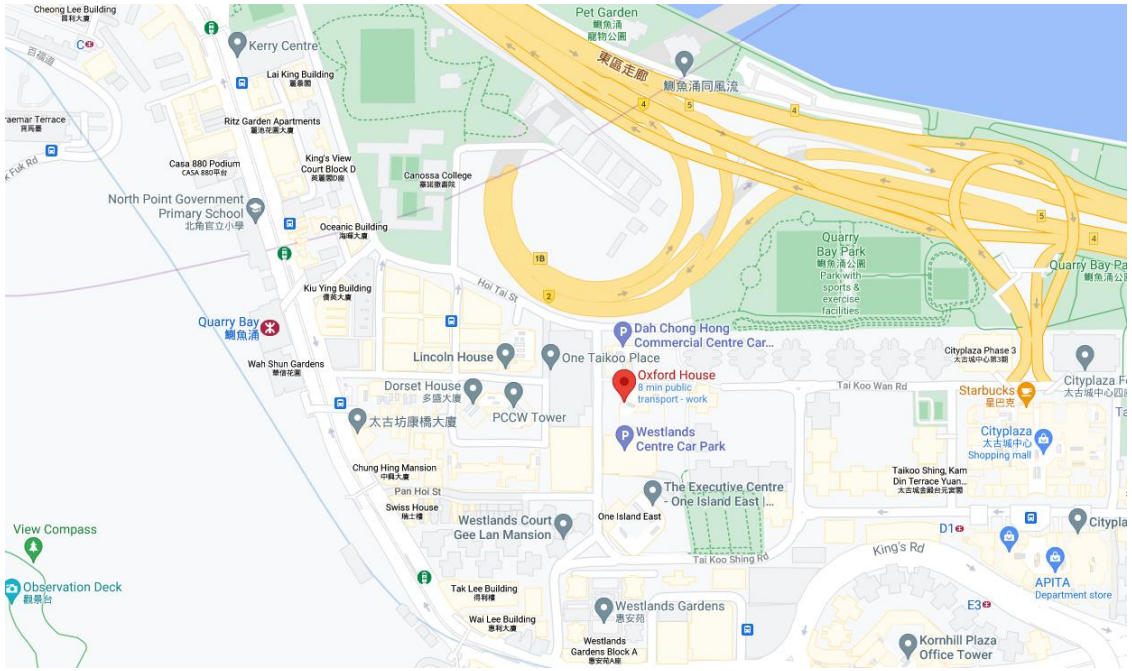
Under the key theme of 'Advancing Net Zero', the Competition seeks to address the following sub-themes:

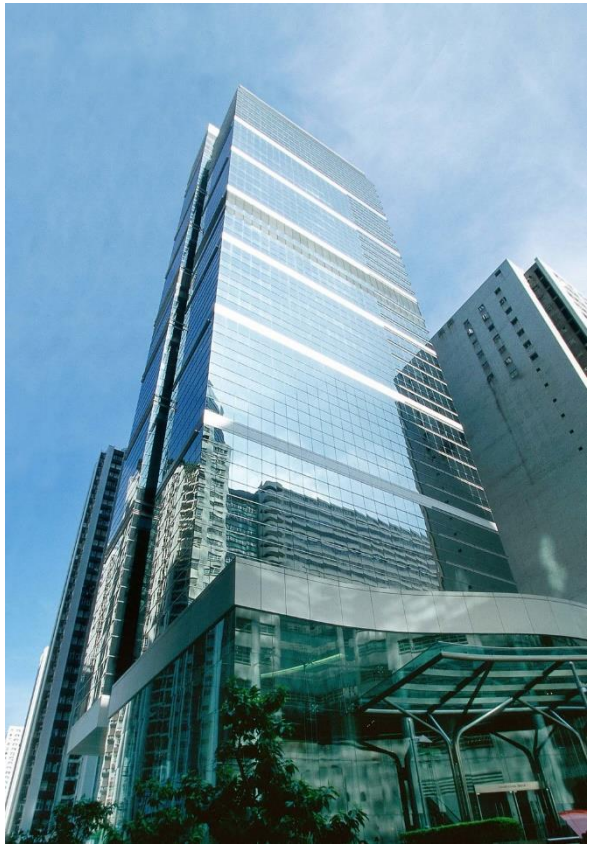
	1. Zero Carbon and Ultra-Energy Efficient	2. Embodied Carbon	3. Healthy and Sustainable
Details	Prioritize energy conservation and energy efficiency to ensure that buildings are performing as efficiently as possible	Reduce embodied carbon emissions across the lifecycle of a building, including the upfront, use stage and end of life carbon emissions generated in various lifecycle stages of a building	Provide high standards of occupant comfort with low energy consumption
Solutions	• Energy efficient design and systems • Retro-commissioning • Replacement • New low/zero carbon systems • Renovation	Leading-edge design in: • Efficiency • Buildability • Adaptability • Durability • Deconstruction & Decommissioning	Design in: • Energy consumption • Indoor air quality

Scope

Building category: Existing Building

Building Name: Oxford House, 979 King's Road, Quarry Bay





Approach

Regarding the 3 themes stated in the competition, an overall approach to carbon net zero should be developed

Zero Carbon and Ultra-Energy Efficient	• Use Renewable Energy • Smart Building Design
Embodied Carbon	• Assessment on material purchase and construction procedures
Healthy and Sustainable	• Green environment by Advanced Hydroponics System

Zero Carbon and Ultra-Energy Efficient

Power

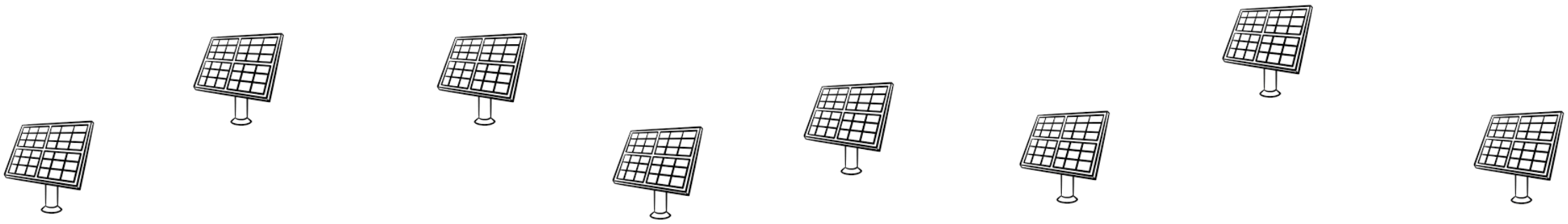
To design an energy system in a building, we must carefully consider the supply of and demand for power

Energy Demand = Average energy consumption per square foot x GFA

= 22.5 kWh/sq ft x 94,144 sq meter x 10.7639 sq ft/sq meter

=22.8 GWh per year

To reach carbon net zero, the above amount of electricity must be generated by zero carbon emitting source!



Zero Carbon and Ultra-Energy Efficient

Solution = **Solar Panel**

Monocrystalline Solar Panels

- Efficiency: 20-25%
- Readily Available in the market
- Main source of electricity

Flexible Solar Panels

- Installed at non-flat surfaces
- Lower efficiency but larger area to be attached on
- Easily replicable and replaced

Renewable Energy Certificate Scheme

- Green electricity purchased from CLP

Zero Carbon and Ultra-Energy Efficient

Energy Management

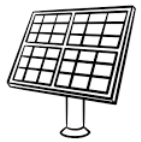
- Optimize energy use to reduce energy waste and energy loss to the environment

Smart HVAC Controls

- Measure key parameters, e.g. CO_2, Temp, Humidity
- Intelligently adjust energy use for air cooling
- Save ~50% of electricity

Lighting System

- Lighting retrofits
- Installing LED lights reduce 30% energy
- Advanced Lighting Control
- Vacancy Sensing
- Overall reduce 40-80% of energy use



Windows Shading Design

- 1/3 of commercial HVAC energy loss is from windows
- Smart shading design and system
- Automatically controlled shading system
- Advanced windows design

Desiccant Dehumidification System

- Provide high quality indoor air
- Suppress bacteria growth
- Offer comfortable and hygienic environment

Embodied Carbon

Existing Building

- Embodied carbon in existing building cannot be changed. However, improvements on later constructions and installations could be made.
- Thorough assessments on material purchase and construction procedures must be carefully conducted to ensure new installations and modifications comply with the principle of zero embodied carbon.

Healthy and Sustainable

Green Environment and Advanced Hydroponics System

- Develop a sustainable environment and promote green living is crucial for employee's health and company's sustainability
- We utilizes scrap pipelines as a plant carrier to grow different greens
  - Sustainable practice of reusing scrap material
  - Carbon Net Zero Green Farm
  - Greener office area

The End