ANREV

SUSTAINABILITY CASE STUDY

March 2015

PROFESSIONAL STANDARDS

Raffles City Hangzhou, China

SUMMARY

CapitaLand's Raffles City Hangzhou (RCH) integrated development is located near the Qiantang River in Hangzhou, the capital of Zhejiang province. It is a new landmark building in the heart of Hangzhou CBD area.

TYPE AND SCALE

The complex comprises two 250m high office/hotel/residential towers, one 10-storey shopping podium and a 3-level basement with links to public transport with total GFA of 393,000m^2.

TIMEFRAME

The construction of the project commenced in 2010 and it is expected to complete in 2015.

COST

The project is still ongoing therefore the overall cost is not finalized yet.

MAIN STAKEHOLDERS

The project is owned by Raffles City China Fund and CapitaLand.

CONTEXT AND DRIVERS

One of the CapitaLand's sustainability objectives is guided by its belief that lowering the environmental footprint of its buildings through innovation creates value for its stakeholders.

INFORMATION

Information Sources

Include here website information and media links (for video please use Vimeo)
http://www.rafflescity.com.cn/

For details, please contact
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DESCRIPTION

Raffles City Hangzhou is an integrated development project located near the Qiantang River in Hangzhou, the capital of Zhejiang province, located 180 kilometres southwest of Shanghai. Raffles City Hangzhou will be CapitaLand's sixth Raffles City, following those in Singapore, Shanghai, Beijing, Chengdu and Ningbo. The project incorporates retail, offices, housing and hotel facilities and marks the site of a cultural landscape within the Qianjiang New Town Area. Raffles City Hangzhou will reach a height of 60 stories, presenting panoramic views from the Qiantang River and West Lake, with a total floor area of almost 400,000 square metres. It is designed as the first LEED Gold certification project in Zhejiang province.

STRATEGY

Vision

CapitaLand's commitment to environmental sustainability is a natural extension to its credo of 'Building People. Building Communities.'

Goals and Targets

Raffles City Hangzhou is located in Hangzhou CBD's transportation hub which places it in the vicinity of Hangzhou Grand Theatre, International Conference Centre and the soon-to-be-built government municipal centers. Well-known designer Ben van Berkel of UNStudio has integrated the flow and motion of the tides of Qiantang River into the transformative design for the development. While the magnificent exterior excites the senses, the spacious and bright inner atrium puts the mind at ease and triggers a natural curiosity to explore the open spaces.

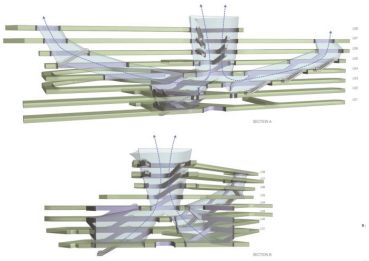
KEY FEATURES

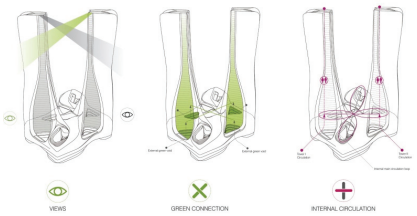
- **Facade Optimization** – Well planned external shading is the most effective method of reducing solar heat gain. Each face of a building requires a different shading treatment because sunlight strikes each side from different angles. Different scenarios have been simulated such as window to wall ratio, fin depth and daylighting performance. Tailor-made shadings with specified sizes, shapes and orientations to achieve the balance of solar gain reduction and natural light utilisation.

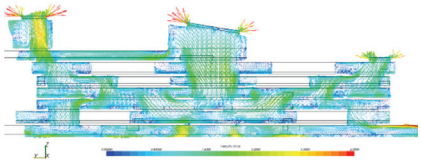
- **Microclimate Analysis** – On top of providing natural ventilation opening, an advance strategy is purposed for enhancing the thermal comfort for natural ventilated space. Besides, natural wind flow into retail podium is simulated to assist the architect to determine which tower shape and which of the convex or concave facade scheme benefits more on natural ventilation. Moreover, health and productivity of building occupants could be affected by indoor/outdoor air quality. Air quality for the space could be determined by the quality and quantity of fresh air that supplied to the space. However, external pollutant source, like kitchen exhaust, may be re-ingested into occupied zones. The CFD simulations of kitchen exhaust help designers to avoid external pollutant source into occupied zones.

- **Energy Saving** – Various passive and active design strategies are implemented into Raffles City Hangzhou, including high performance window, free cooling, natural daylighting, water thermal storage, water side economizer, air side heat recovery, demand control ventilation and high performance lighting system. By having above points, the project can achieve up to 15% energy costs saving compare with LEED baseline building.

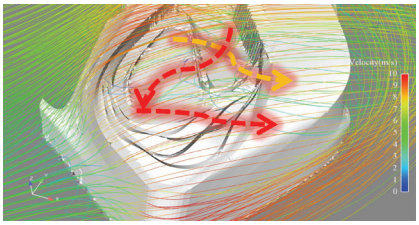
- **Water Saving** – Rainwater and grey water recycling system are adopted. Reclaimed water will be further used for irrigation, cleaning and toilet flushing. Also, water saving sanitary fixtures such as dual-flush closet, waterless urinal and low-flow sensor are implemented. The project could reduce potable water use by 42%.







Temperature profile along long axis



Streamline around the Kitchen Exhaust

IMPLEMENTATION

Approach

The owner of the Project is Raffles City China Fund, and CapitaLand was responsible for the overall project management of RCH. The design architect and engineer are UNStudio and Arup respectively. Shanghai Construction Forth Co. was appointed as the main contractor, and China Construction Third Engineering Bureau was appointed as the MEP contractors.

Challenges

- Natural Ventilation design – It is necessary to design proper air path for natural ventilation in order to maximize free cooling effect as well as comply with local fire protection code.

- External shading device design – To find the best form and shape of the shading devices which also need to balance between the performance and architectural design concept.

Critical Success Factors

- By having sustainability goal at the beginning of the project and green thinking throughout the design, construction and operation stages.

PROGRESS AND OUTCOMES

- By implementing green design strategies, Raffles City Hangzhou will save RMB 3,580,000 in operating costs per year.

- To achieve a LEED Gold certification upon completion in 2015.

CapitaLand 凯德

ARUP