Ecologically-designed retail and commercial building, Putrajaya, Malaysia

Project data

- **Project group**: Building and civil engineering works
- **Client**: Putrajaya Holdings Sdn. Bhd.
- **Project background**: Private commission
- **Estimated start of construction**: November 2011

Main author

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Comment of the Holcim Awards Jury Asia Pacific

The jury considered this project an imaginative and leading-edge response to upmarket building design. The well balanced, detailed and pre-empted combination of high-tech elements with the demonstration of ecological features contributes to creating a high-class living space that is responsive to the local climate. The sustainable building services contribute to the concept in an exemplary way. The whole building vividly visualizes its environmental issues, is partially open to the public and is socially engaged with its surroundings. The integrative engineering approach leads to a sustainable building organism and is a commendable example of best practice design processes.

Project description by author

The project is a 14-level flagship commercial hub offering premium retail areas and commercial offices located along the main boulevard of Putrajaya, the Malaysian (administrative) capital. The Putrajaya Lot 2G project faces the Ministry of Finance building and comprises two towers flanking a grand central atrium which forms an open communal thoroughfare linked together via a pedestrian bridge.

A grand central atrium which forms an open communal thoroughfare linked together via a pedestrian bridge.

The ecological design features incorporated into the concept include:

- **Double-skin façade system** – separated by a ventilated air cavity. The outer skin comprises solar-reflective vertical glass sun shading positioned to correspond with local sun angles at latitude 2.9°N. This external green glass features 6/8 ceramic fritting (in a traditional Malay “songket” pattern) with a low visible light reflectance (VLR) range of 8-15%. The inner skin comprises high-performance low-E double-glazed glass units to allow for greater reduction of acoustic penetration and higher thermal performance – with an overall thermal transmittance value (UVT) of 33.39W/m². This façade system is low in embodied energy and embodied carbon – with an energy cost of 16-35kWh/m².

- **Vertical plantscapes infrastructure** – local vegetation integrat-ed into built envelope. This living, breathing green eco-infra-structure is designed to contribute to the overall height of lift-lobby walls – connecting vegetated areas at basement Eco-cell to ground level landscaping, through to sky gardens and green atrium terraces at upper levels. The vegetation functions as a barrier against solar radiation and also acts to insulate the building – significantly reducing ongoing heating/cooling costs – reducing “heat island effect” of the locality and enhances biodiversity. Landscaping is designed in a series of habitats such that the entire development becomes a living system. Local plants become bio-puffers to break-down and remove airborne contaminants, through a number of biochemical processes – reducing existing greenhouse and volatile organic compounds.

- **Sustainable building services** – implemented for efficient performance and maintenance. Water management is through natural filtration and drainage is incorporated into a portion of the site via a bioswale – reducing surface runoff burden to public conveyers whilst collecting stormwater for the central irrigation system. Rainwater harvesting is fully utilized through collection of surface runoff into transfer tank at basement. The harvested stormwater is then filtered and pumped to irrigate all plantscapes. Renewable energy is produced and employed through photovoltaic arrays at the upper roof level amounting to an area of 220m² – generating 110KWh daily/40,172KWh annually – translating to 25,300kg of decreased CO₂ emissions per annum.

Innovation and transferability – Progress

The guiding principle in the building’s design is a sophisticated and holistic approach to engineering that considers all determining factors to the greatest extent possible. Following this, the building integrates diverse state-of-the-art technologies but also simple measures that altogether form a complex organism. This approach in design is universally applicable and transferable to all kinds of building tasks. The building itself, located in a prominent position, serves as showcase demonstrating and self-promoting this holistic design approach both in its entirety, but also through its specific single technologies undertaken.

Ethical standards and social equity – People

The high-end use is merged with openness to the public in major parts. It does not separate itself from the outside but rather welcomes people passing by even more as it gains a major part of its attraction through its open character and offers an authentic vibrancy that all users benefit from. Green areas in the inside and the outside of the building contribute to a livable environment.

Environmental quality and resource efficiency – Planet

In addition to its positive impact on the immediate built environment, the project has integrated various measures and technologies to improve environmental effects significantly. Passive elements such as external, solar-reactive shading, integration of vegetation and high insulation of facades and glazing combined with the use of regenerative energy sources help to dramatically reduce energy consumption. Interior and exterior vegetation improves inner climate as well as contributing to the enhancement of the city climate and promotion of biodiversity. Active water management that regulates storm water runoff and harvests rainwater guarantees a conscious utilization of this valuable resource.

Economic performance and compatibility – Prosperity

Economy and ecology is not mutually exclusive but determine each other. The use of regenerative energy sources as well as further measures reduces immediate consumption of resources. Higher investment costs will pay off considerably raising cost of energy and other resources and severely reducing operational expenses. Moreover compatibility will be strengthened increasingly throughout the project lifecycle.

Contextual and aesthetic impact – Proficiency

High-tech, integrative design and high-end ecological standards merge in an integrated design that articulates in form and function. Visual presence at day and night contributes to aesthetics of the built environment through well-chosen materiality and active lighting.