



Suruhanjaya Tenaga (Energy Commission)

No. 12, Jalan Tun Hussein, Precinct 2, 62100 Putrajaya

GPS Coordinates : N02° 55' 09.1", E101° 41' 17.7"

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Introduction

The Diamond Building, Energy Commission's headquarters is located at Precinct 2, Putrajaya. The building is designed to showcase technologies that will reduce building energy consumption and potable water usage, promote the use of sustainable building material and provide enhanced indoor environmental quality. The holistic approach for the building envelope, atrium design, mechanical and electrical systems, daylighting system, landscaping and material selection enables the design of an environmentally sustainable building.

The building design is in harmony with the hot humid climate of Malaysia by integrating a multitude of disciplines into the design concept. Although the building incorporates a combination of new concepts and ideas for a sustainable building, the occupants' comfort is placed at the highest priority.



Design Strategy

The diamond design was selected for its philosophical and practical values and to conceptualise an iconic office building. The diamond symbolizes transparency, value and durability; characteristics which represent the Energy Commission's role and mission as a regulatory body. The unique shape represents an optimum design approach to achieve energy efficiency.

During the design stage, extensive computer simulation of the diamond form was conducted to ensure that the expected daylight and energy performance are met. In order to maintain the occupants' visual comfort, various daylight simulation exercises were conducted to ensure adequate and well distributed daylight. The information obtained from the simulation exercises also provided useful information on the appropriate measures that can be adopted in reducing energy consumption without compromising on the occupants' comfort level.

The Diamond Building's design strategy is encapsulated through four main aspects, namely Energy Efficiency, Water Efficiency, Indoor Environmental Quality and the use of Greenery.

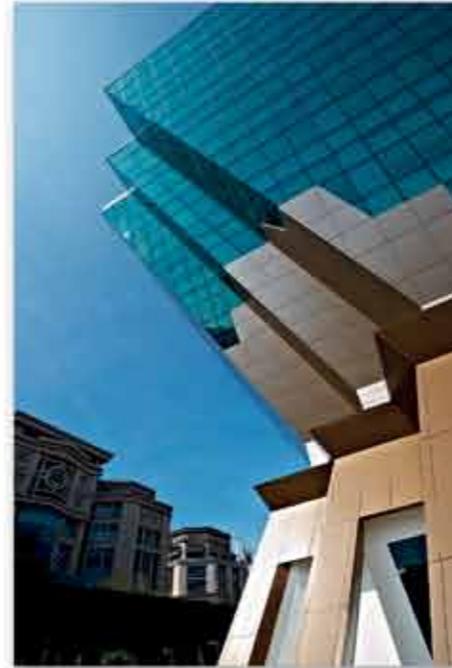
The building energy index (BEI) is a measurement on the total annual energy used in a building in kilowatt hours divided by the floor area in square meters. The BEI of a typical office building in Malaysia has an average energy index of 210kWh/m² per year. The Diamond Building is designed with a BEI of 85kWh/m² per year at 2,800 hours usage - a 65% reduction in energy consumption. At present, the building's average BEI is at 65kWh/m² per year.

The total integration of the building's systems is also taken into account. The mechanical and electrical systems are linked through the building automation system in order to control the building's performance.





Energy Efficiency



Passive Features

- **Tilting Façade**

- The tilting façade (face of the building) allows self shading for the lower floors, protection from direct sun rays into the building and a smaller building footprint, resulting in a larger area for landscaping.

- **Sunken Garden Area**

- The sunken garden located at the basement serves as a void space which provides natural ventilation to the parking area at the basement level.

- **Building Orientation**

- The building is oriented in accordance with the solar path, (the rising and setting of the sun), minimising the areas impacted by direct sunlight.



Active Features

- **Photovoltaics**

- The building is installed with thin film telluride module type photovoltaic (PV) panels having a total capacity of 71.4kWp, fed directly to the national grid. This total capacity produced is estimated to cover approximately 10% of the building's energy needs.
- In general, the expected electricity generated is 102,000kWh per year which is equivalent to RM40,000.00 cost savings annually or an avoidance of 63,000kg annual carbon dioxide (CO₂) emission.

- **Daylighting - Natural and Artificial**

- The Diamond Building is designed to obtain 50% of its daylighting needs from natural lighting.
- The crown of the building is a 'diamond dome' skylight made from laminated tempered glass. Located within the dome space are fixed blinds that filter and diffuse the daylight to provide an even and glare-free daylight for the offices around the atrium.
- For the atrium, the window size becomes larger deeper into the atrium to cater for lower daylight levels. The atrium is also optimised for daylight utilisation with Tannenbaum reflective panels.
- The glass façade is installed with low-e glazing that is reflective on the outside, allowing daylight into the building and minimising heat gain from the sun.
- A split window design for all exterior facades together with an internal light shelf helps to redirect natural light into the depths of the working space.
- Energy-efficient lighting such as T5 fluorescent tubes are used throughout the building instead of the conventional T8 fluorescent tubes. Integration with daylight sensors enables the artificial lighting to be switched off when daylight is adequate, resulting in energy savings.
- A roof light trough is incorporated to bring in sufficient daylight to illuminate the lobby area at the seventh floor.

- **Insulated Concrete Roof**

- To reduce heat absorption in the building, the roof top area is insulated using boards with a thickness of 100mm. The concrete roof is tightly insulated both horizontally and vertically.



Water Efficiency



- **Rainwater Harvesting**
- **Efficient Water Fittings**
- **Grey Water Recycling for Wetland**

Rainwater harvested is used for toilet flushing and combined with efficient water fittings such as dual flush toilets, waterless urinals and water taps equipped with aerators reduces potable water usage by more than 65%. To further optimise the water efficiency of the building, grey water collected from the wash basins is also recycled to irrigate the wetland at the ground floor.





Indoor Environmental Quality



- **Thermal Comfort via Radiant Cooling**

- Cooling in the Diamond Building is provided via radiant cooling slabs that have chilled water pipes embedded in the concrete slab itself. This is complemented with the conventional cold air supply system.
- As the highest heat capacity of the building is rested in the concrete mass, direct cooling of the concrete slabs with embedded water pipes is the most efficient means to cool the building mass.

- **Noise Control**

- The advantage of the above cooling system is that the air ventilation rate is reduced significantly. The noise from the ducts is also reduced significantly, improving the acoustic comfort.



- **Use of Sustainable Materials**

- The building design is also aimed to provide the occupants with a healthy and productive working environment. Resource use is reduced via doing away with suspended ceilings, except for small areas to conceal the ducts. This reduces the material used as compared to conventional buildings.
- Green labelled plasterboards are used for the ceiling and the internal partitions. The plasterboards have low volatile organic compound (VOC) emission and has 30% recycled content.
- The floor carpeting is also green labelled for low VOC emission and has at least 10% recycled content.
- The interior paint used in the building is also of VOC content.
- The workstations contain material that protects against ultra violet (UV) rays.





Outdoor Environmental Quality

Extensive landscaping and a sunken outdoor garden ensure not only connection to greenery but also provide a cool and shaded ambient environment for the occupants. This, coupled with a green roof helps to further reduce urban heat and effect whereby the hardscape areas are reduced and replaced with soft green landscape.

Buildings near or surrounded by greenery have lower ambient temperature (surrounding temperature) than the ones away from the greenery and it is seen as an effective way to lower the ambient temperature.





Green Building Awards Received

The Diamond Building has been awarded with Platinum Certificates for meeting the standard of the Malaysia Green Building Index (GBI) and the Singapore BCA Green Mark.

