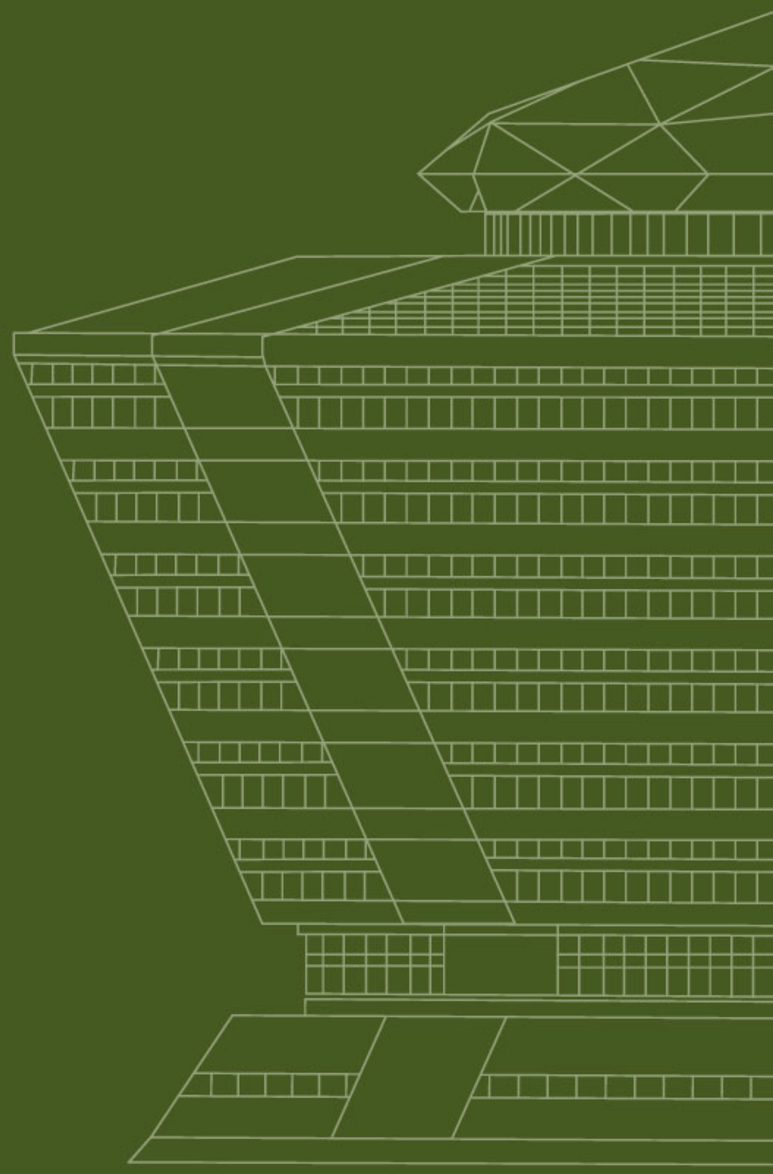
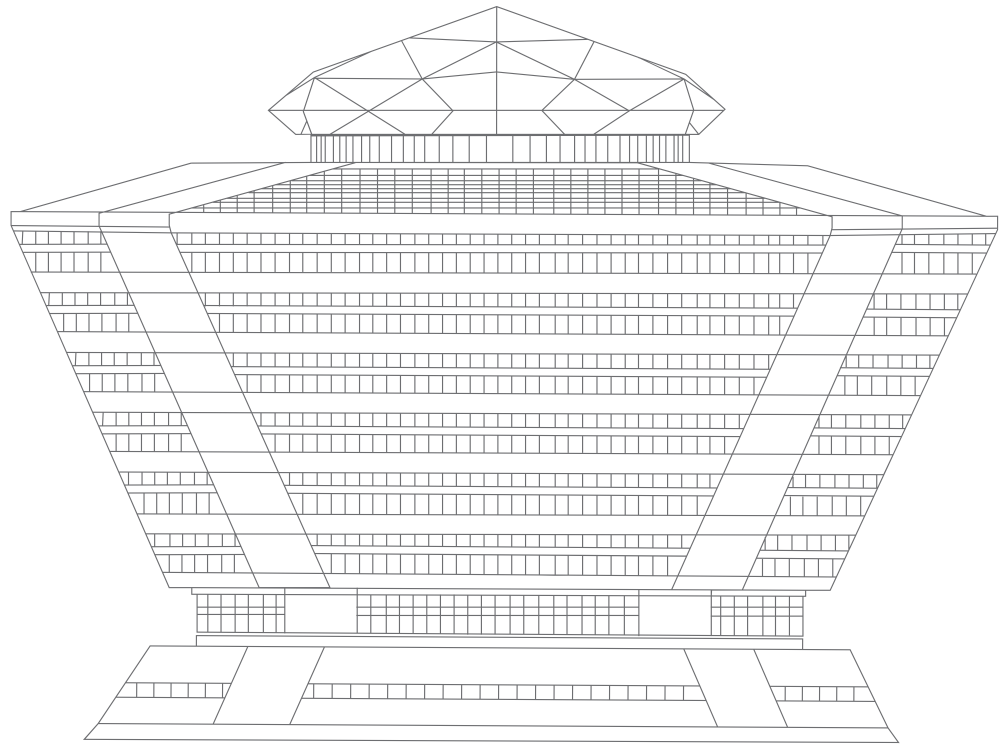
Suruhanjaya Tenaga
Energy Commission

www.st.gov.my

Suruhanjaya Tenaga (Energy Commission)
No.12, Jalan Tun Hussein, Precinct 2, 62100, Putrajaya.
Toll Free Number: 1-800-2222-78 (ST)
T: 03 8870 8500 F: 03 8888 8637
E: info@st.gov.my





ENERGY COMMISSION DIAMOND BUILDING

[THE GEM OF PUTRAJAYA]

PRECINCT 2, PUTRAJAYA
HEADQUARTERS OF THE ENERGY COMMISSION

MALAYSIA'S FIRST BUILDING ACCREDITED WITH
PLATINUM RATING FOR GREEN MARK AND
GREEN BUILDING INDEX (GBI)

FIRST PUBLISHED [2013]

PUBLISHED BY:
ENERGY COMMISSION (SURUHANJAYA TENAGA)

No. 12, Jalan Tun Hussein, Precinct 2, 62100 Putrajaya, Malaysia
Tel: (03)8870 8500 Fax: (03)8888 8637
Toll Free Number: 1-800-2222-78 (ST)
www.st.gov.my

ISBN 978-967-12023-2-6
No. Penerbitan ST(P) 10/08/2013

PRINTED IN MALAYSIA

Cover Rationale

The dark green opacity on the cover represents a fresh and flourishing environment. It depicts the Diamond Building design concept that encapsulates the essence of eco-friendliness and energy efficiency. It is also a novelty colour that portrays integrity and excellence in all aspects.

The outline of the Diamond Building symbolises the Energy Commission's key position as the gate keeper for the energy sector in Malaysia and highly resilient in the enforcement of energy efficiency practices to ensure sustainability.

The art of green architecture, combined with the science of energy conservation is showcased in the 4,928 square metres Diamond Building, an iconic 8 storey office building. The Diamond Building is the Energy Commission's social commitment to the present and future generations of Malaysia.

The Diamond gleams in Putrajaya.

CONTENTS

SHAPING THE DIAMOND

- The Energy Commission
- A Bold Vision
- A Jewel in the Crown
- The Design Concept
- Launch of the Diamond

Energy. Fueling the development of Malaysia.

> The government is taking decisive steps to ensure that our energy future is green, sustainable and diverse and that Malaysia uses energy in the most efficient manner.
> Malaysia's embracing of green technology is not only to conserve and preserve its resources, but is also envisaged to act as a new economic impetus for the country.
> By practising energy efficiency, which is expected to lead to saving of RM14 billion in Gross National Income by 2020, we can preserve the environment and energise the Malaysian economy towards becoming a developed nation by the year 2020.

***YAB Dato' Sri Mohd Najib bin Tun Abdul Razak**, Prime Minister of Malaysia, during the launch of the first completion of The Economic Transformation Programme, Solar, on 20 March 2012.*

Energy. The life and pulse of vibrant Malaysia.

The Energy Commission

Energy is the life and pulse of any society. The well-being of people, industry and economy depend on safe, secure, sustainable and affordable energy. Thus, in its efforts to further enhance the performance of the energy sector in Malaysia, the Energy Commission was established on 1 May 2001, under the Energy Commission Act 2001.

Fully operational in January 2002, the Energy Commission is primarily responsible for regulating the electricity and piped gas supply industries in Peninsular Malaysia and Sabah, delicately balancing the priorities of energy providers and the needs of consumers. The Energy Commission is committed to ensuring reliable, safe and cost effective supply of electricity and piped gas to all its consumers.

It also aims to create a competitive energy market for Malaysia, encourage energy conservations and induce sustainability of Malaysia's natural energy resources.

Under its purview, the Energy Commission administers economic, technical and safety regulations and consumer protection in the generation, transmission, distribution, supply and the use of electricity and piped gas.

The signing of the Memorandum of Agreement (MOA) for the construction of the Diamond Building was held on 28 October 2005 between the Energy Commission and Senandung Budiman Sdn Bhd.

> The Energy Commission Diamond Building is a state-of-the-art structure which incorporates green building elements, allowing for more efficient usage of energy and water compared with conventional buildings.

YAB Tan Sri Dato' Hj. Muhyiddin Hj. Mohd Yassin, Deputy Prime Minister of Malaysia during the launching of the Energy Commission Diamond Building, 31 May 2011, Putrajaya.

A Bold Vision

Taking the lead in developing and implementing solutions for environmental sustainability, the Energy Commission embarked on a bold vision to develop its headquarters in line with highest global standards in green initiatives, to showcase the best practices in environmental solutions.

The vision of the Diamond Building was first sowed in 2002 with an aim to build a facility with green and energy efficient technologies, which will aptly symbolises Energy Commission as a regulator for the energy industry in Malaysia.

The then Minister of Energy, Water & Communications approved the idea for the inception of the Diamond Building on 6 October 2004. Thereafter, a MOA was signed between the Commission, the consultant and the developer on 28 October 2005. The groundbreaking ceremony was then held on 27 July 2007.

Ground floor of the Energy Commission.

1

2

1. The Development Agreement (DA) signing ceremony for the construction of the Diamond Building, 24 April 2007.

2. The late Tun Dr. Lim Keng Yaik, former Minister of Energy, Water and Communication officiates the land breaking ceremony with the planting of a Medan Teja tree (2007).

YAB Tan Sri Dato' Muhyiddin Yassin, Deputy Prime Minister of Malaysia officially launches the Energy Commission's Diamond Building.

Launch of The Diamond

The Diamond Building was officially launched by YAB Tan Sri Dato' Muhyiddin Yassin, the Deputy Prime Minister of Malaysia on Tuesday, 31 May 2011.

> "I have high hopes on the Energy Commission Diamond Building to become a catalyst in nurturing the public awareness on the functions and roles of the Energy Commission as a regulator for both the energy and industry sector in Malaysia."

Y.B Tan Sri Peter Chin Fah Kui, Former Minister of Energy, Green Technology and Water during the launching of the Energy Commission Diamond Building and 10 Years Anniversary of the Commission, 31 May 2011.

Natural daylight reflected into discussion room at ground floor.

A Jewel in the Crown

In June 2010, the Energy Commission Diamond Building took shape to be a jewel in the crown of Putrajaya's unique architectural landscape and opened its doors to the 177 proud employees.

The Diamond Building reflects the commitment of the management and staff of the Energy Commission in adopting the best of green technology to deliver effective solutions towards environmental sustainability in Malaysia.

The Design Concept

Over and above the concerns of a conventional building design on economy, utility, durability and comfort, a green building places importance on the structure and construction process to ensure that it is environmentally responsible and resource efficient.

Efficient use of energy, water and other resources, protection of occupants' health, safety and comfort, reduction of waste, pollution and environmental degradation are the architectural focus of the Diamond Building.

The tilting facade of the Diamond form in the design concept to avoid direct sun rays into the building.

A DIAMOND GLEAMS

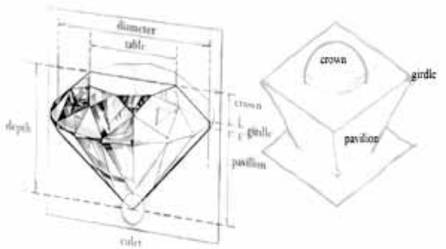
- The Conceptualisation
- The Shape
- The Design Strategy
- Green Building Accreditation
- Green Building Assessment and Rating

> The idea for the Energy Commission to have its own premises was first mooted in 2002 not only on the need for office space but on the desire to have a headquarters building that symbolizes the identity of the Energy Commission as the energy regulator.

Tan Sri Datuk Dr Ahmad Tajuddin Ali
Chairman, Energy Commission, Malaysia.

Tilted facade prevents direct sunlight while tall trees provide a shading effect.

A DIAMOND GLEAMS



Inspired by a diamond round brilliant cut that radiates with supreme excellence; the Diamond Building was designed to reflect brilliance in all aspect of its establishment towards the creation of a harmonious equilibrium between the building itself and all that resides within it and around it.

The Conceptualisation

At its conceptualisation stage, the Diamond Building aimed to be a highly sustainable development, leveraging on active and passive design, water efficiency, energy efficiency and renewable energy. The Diamond Building is designed with a Building Energy Index (BEI) of 85 kWh/m^2/year at 2,800 hours usage.

Today, the Diamond Building stands proud with an average BEI of 65 kWh/m^2/year, a 69% reduction in specific energy consumption as compared to a typical office building in Malaysia with an average BEI of 210 kWh/m^2/year.

Building Energy Index (BEI) is measured based on the total annual energy consumed in a building in kilowatt hours divided by the floor area.

"Beyond an iconic landmark, the Energy Commission Diamond Building is a new benchmark for Malaysia in terms of green technology. The Energy Commission is honoured to pave the way and set new standards for energy efficiency and solutions for environmental sustainability. We hope to inspire organisations and individuals to embrace energy efficient solutions for the betterment of the present and future generations."

Datuk Ir. Ahmad Fauzi Hasan
Chief Executive Officer, Energy Commission.

The Shape

Modelled after a diamond, the Diamond Building stands out as an imposing and unique landmark amidst the impressive architectural landscape of Putrajaya. It takes on the qualities of a diamond – transparent, value and durability akin to the characteristics of the Energy Commission in its role as a regulator of the energy industry.

Besides design aesthetics, the diamond form provides strategic advantage in reducing heat gain into the building. The façade tilt of 25 degrees prevents direct sunlight from entering the building, an important element considering Malaysia's hot climate.

The diamond shape helps minimise air filtration; preventing breezes from passing through the building. The unique form also provides a smaller building footprint which allows for more landscape area.

Glass entrance canopy with water elements to reduce heat.

The Design Strategy

In developing this contemporary and iconic building, the design focuses on practical attributes and optimises energy efficiency.

The design strategy encapsulates four key aspects:

- Energy Efficiency
- Water Efficiency
- Environmental Protection
- Indoor Environmental Quality

Green Building Accreditation

Globally, green buildings are being recognised and accredited, leading to the introduction of various tools and indices with one common objective that is to evaluate, measure, distinguish and sets apart this uniquely designed buildings from the rest.

The Diamond Building complies to Singapore's Green Mark Platinum rating and is the first building outside Singapore to be awarded such accreditation.

The Diamond Building also carries a Green Building Index (GBI) accreditation, a first in Malaysia.

> "The diamond symbolises value, quality, transparency and durability, which are the characteristics of the Energy Commission's role as a regulatory body."

Ar. Nafisah Radin
Principal Architect of the Diamond Building.

1	2
	3
	4

1. The Diamond Building design strategy integrates function and resource sustainability.
2. The Diamond Building was named the most energy-efficient building at the Asean Energy Awards (AEA) 2012 held in Phnom Penh, Cambodia and won the top prize in the category of "New and Existing Buildings".
3. Green Building Index (Platinum) Certification.
4. Green Mark (Platinum) Certification.

GREEN BUILDING ASSESSMENT CRITERIA & AWARD RATING

Assessment Criteria	GREEN MARK SINGAPORE	Maximum Points	Score	GREEN BUILDING INDEX MALAYSIA	Maximum Points	Score
	1. Energy Efficiency	116		1. Energy Efficiency	35	34
	2. Water Efficiency	17		2. Indoor Environmental Quality	21	19
	3. Environmental Protection	42		3. Sustainable Site & Management	16	15
	4. Indoor Environmental Quality	8		4. Materials & Resources	11	5
	5. Other Green Features	7		5. Water Efficiency	10	10
				6. Innovation	7	5
	Total Score	190*	95+		100	88

*Effective 1 Dec 2010

GREEN MARK SINGAPORE		GREEN BUILDING INDEX MALAYSIA	
SCORE	RATING	SCORE	RATING
90 and above	Green Mark Platinum	86+points	Platinum
85 to <90	Green Mark Gold Plus	76 to 85 points	Gold
75 to <85	Green Mark Gold	66 to 75 points	Silver
50 to <75	Green Mark Certified	50 to 65 points	Certified

Green Building Assessment and Rating

Key criteria of the GBI and Green Mark accreditation includes energy efficiency, indoor environmental quality, sustainable site and management, materials and resources, water efficiency and innovation.

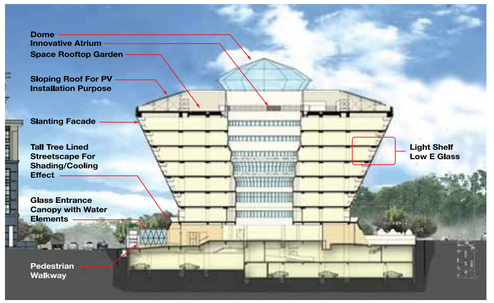
As such, the GBI and Green Mark Platinum ranking received by the Diamond Building has been subjected to stringent criteria to be recognized as one of Malaysia's best green development.

The use of low-e glass in the Diamond Building allows daylight into the building and to reduce heat from the sun.

Daylight drawn into the Roof Light Trough lit up the lounge area below.

FACETS OF PERFECTION

- Design Features
- Energy Efficiency
  - Facade
  - Natural Daylight
  - Insulated Concrete Roof
  - Floor Slab Cooling
  - Photovoltaics
  - Energy Efficiency Star Rated Fittings
- Water Efficiency
  - Rainwater Harvesting
  - Efficient Fittings
  - Grey Water Recycling
- Environmental Protection
  - Functional Greening
- Indoor Environmental Quality
  - Noise Control
  - Sustainable Resources and Fittings



Diamond Building Design Section.

Design Features

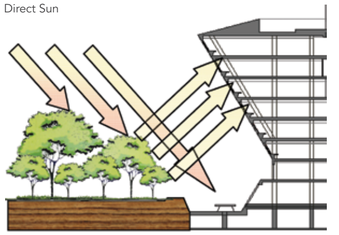
From the dome over its roof to its sunken garden and car park, every space within the Diamond Building is designed with functionality using state-of-the-art technology to optimise energy and water efficiency and indoor and outdoor environmental quality.

Energy Efficiency

This is made possible with the adaptation of green technologies into the design and built of the Diamond Building which ensures that natural resources are preserved and utilised in a sustainable manner while renewable energy is harnessed effectively as an alternative power source that fuels not only the building itself but the entire eco-system that resides within it.

Sunken garden with openings for natural ventilation of the basement.

Direct Sun

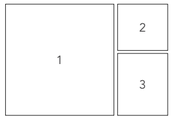


Sunlight is diffused and reflected off the landscape, reducing heat gain into the building.

Facade

The building geometry with the 25-degree inclining facade was sculpted following the solar path. The north and south facades enjoy full self-shading particularly from the hottest mid day hours whilst the east and west facades are protected from direct penetration of sunlight, reducing solar impact by 41%.

With the tilted e-glazing glass, direct sunlight is diffused; reflected off the landscape to provide glare-free day lighting for the building whilst promoting heat minimisation.



1. The diamond form with the tilting facade prevents direct sunlight into the building.
2. Surrounding landscape reduce heat gain into the building.
3. Tilting facade results in smaller building footprint which allows for a larger area for landscaping.

The Diamond Building is designed to obtain at least 50% of its daylighting needs from natural lighting.

Natural Daylight

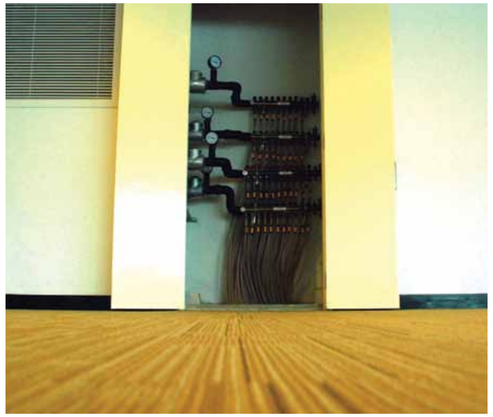
The clear dome forms the central atrium and designed for the optimisation of daylight. The side of the atrium is lined with Tannenbaum reflective panels on levels four and five to allow deflection of light into the lower floors where daylight levels are the lowest. Reflectors have an inclination of 10-degrees and reflect about 85% of the light in semi-diffuse manner. The atrium windows are larger deeper down the building to allow higher penetration of light.

Automated blinds form a canopy over the atrium and ensures that daylight filtering into the building is kept at consistent and adequate levels throughout the day. The blinds automatically shuts when there is excessive sunlight. The technology allows for the blinds to have six configurations with different control strategies for morning, mid-day and evening to ensure the appropriate daylight levels are maintained at all times.

The central atrium alone provides 50% of natural daylight needed to illuminate the building.

The atrium with Tannenbaum reflective panels on the 4th and 5th floor helps to reflect light to the lower floors.

Pipes embedded in the concrete slabs.



Chilled water pipes are embedded in the flooring to provide cooling to the building.

Insulated Roof Top

Green technology is extended to the roofing system of the Diamond Building. In keeping heat absorption low, the concrete rooftop area is insulated with 100mm insulation boards.

In addition to its heat reflective properties, the insulated roof top will also strengthen the Diamond Building structure and makes it impervious to climate change while maintaining a well balance atmosphere within the building.

Floor Slab Cooling

The floor slab radiant cooling system provides air-condition needs for the Diamond Building via pipes supplied with chilled water, embedded in the concrete slabs.

The cooled concrete slabs will passively release the cooling throughout the day that serves as one massive cooling system. This massive heat conversion keeps the surrounding temperature within the Diamond Building in a stable manner and encapsulates the entire internal environment in a cooling, calm and cosy atmosphere.

Manifold riser for slab cooling pipes (PERT pipes).

> Diamond Building:
> A shining example of energy efficiency.
> The Energy Commission's Diamond Building is a standout among the sea of government offices in Putrajaya, in more ways than one.

The Star Online, 19 October 2012.

Photovoltaics

For the Diamond Building, renewable energy is harvested through Photovoltaics (PV). Thin film PV panels are installed facing north, south, east and west. The panels have a total installed capacity of 71.4kWp, fed directly to the national grid. The total capacity produced is estimated to cover 10% of the building's energy needs. The system provides cost savings on electricity charges and avoidance of carbon emission.

PV panels transformed into energy through the use of inverting devices or trackers.

PV panels are intergrated with metal deck to create a roof for the building.

Water Efficiency

The Diamond Building incorporates effective management of water resources through the following systems:

RAINWATER HARVESTING
The rainwater is utilised for toilet flushing and landscape irrigation in the building.

EFFICIENT WATER FITTINGS
To expand on water saving measures, efficient water fittings are used within the building. These include dual flush toilet system, waterless urinals and water taps with aerators for economical water flow.

GREY WATER RECYCLING
Waste water (grey water) from toilet wash basins and floor traps is collected and discharged to irrigate the mini wetland area.

1	2
	3

1. Rainwater is collected from brim of dome and piped to water tanks.
2. Taps with aerators provide for economical water flow.
3. Mini wetlands are irrigated by grey water.

Landscape garden on the ground floor helps reduce heat gain into the building.

Environmental Protection

FUNCTIONAL GREENING

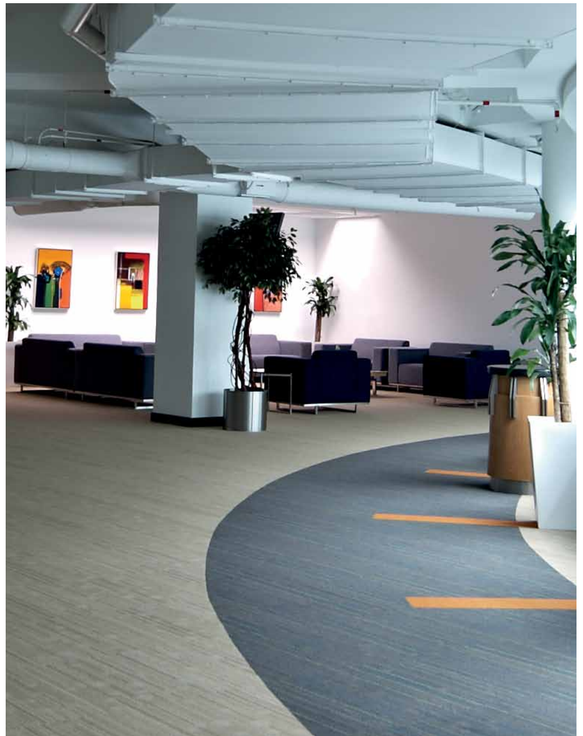
Soft landscaping and water features create a cool and serene outdoor ambience, complementing the concept and functionality of the Diamond Building. The water walls that flank the glass canopy at the entrance exuberates a welcoming feel whilst the streetscape lined with tall trees gives a shading effect.

A sunken garden was carefully incorporated into the building design to provide natural ventilation and the greenery within the sunken and landscaped garden on the ground floor helps reduce heat gain into the building.

Functional greening is also included in the rooftop. Besides absorbing rainwater, the roof garden provides insulation, lowers air temperature and combats the heat island effect.

Wetland on the ground floor, which is irrigated by grey water from the building, is home to species of Malaysia's herbs and flora.

Greeneries on the rooftop reduces outdoor temperatures up to 5°C.



Indoor Environmental Quality

The green technology adopted in the fit-out of the Diamond Building does not merely contribute to resource efficiency but it adds value to the well-being of occupants and enhances the indoor environmental quality.

NOISE CONTROL

The acoustic comfort for occupants is enhanced in the work environment with the use of the slab cooling system, which significantly reduces the air ventilation rate resulting in the minimisation of noise from air ducts.

1. Environmental friendly materials are used throughout the building.
2. Odour free indoor environment.
3. The building uses recycled content carpet with Green Label.

Recycled plaster board carries a Green Label.

Indoor Environmental Quality

SUSTAINABLE RESOURCES AND FITTINGS

To promote environmental sustainability, the interior fit-outs of the Diamond Building takes on a minimalist approach.

Ceilings materials are kept to a bare minimum and plasterboards used for the ceiling carries a Green Label, as it contains low Volatile Organic Compound (VOC) emission and contains 30% recycled content.

The carpet selected also carries a Green Label. It contains low VOC emission and 10% recycled content. In addition, all paint used in the building has low VOC emission.

Adequate daylight provide comfort to the building occupants.

Energy Commission Diamond Building