PUTRAJAYA
LOW CARBON GREEN CITY
INITIATIVES REPORT

PERBADANAN
PUTRAJAYA

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"The planning principles based on sustainable development concept, implemented from the beginning of the city's development, has set Putrajaya on a firm foundation to become Malaysia's pioneer green city in line with the Government's aspiration."

– Omairi Bin Hashim
Director, City Planning Department

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1.0 BACKGROUND

1.0 BACKGROUND

The launch of the National Green Technology Policy on 24 July 2009 by Government of Malaysia has opened a new chapter in Malaysia's effort in addressing environmental issues involving climate change and energy use through the application and development of green technology to reduce Malaysia's carbon footprint in addition to enhancing environmental sustainability. The policy has also outlined five main objectives, where the fourth objective is "to ensure sustainable development and conserve the environment for future generations".

National Green Technology Policy includes elements of the economic, environmental and social, as outlined by the following five (5) objectives:

- ***to coordinate the growth of green technology and to enhance the contribution of green technology to the national economy;***
- ***to facilitate the growth of green technology industry and to increase the contribution to the national economy;***
- ***to increase the capacity for innovation in green technology development and enhancing competitiveness in green technology at an international level;***
- ***to ensure sustainable development and conserve the environment for future generations; and***
- ***to increase public awareness and education on green technology to promote widespread use of green technology.***

As an extension to that , the Prime Minister of Malaysia in his speech during the presentation of 2010 Malaysia Budget on 23 October 2009, had announced "to develop Putrajaya and Cyberjaya as Green Technology Cities as pioneers to other urban development" as one of the measures to promote green technology development activities in Malaysia.

On 20 November 2009, the Cabinet has approved the National Climate Change Policy which outlines ten strategic thrusts and 43 key actions to address climate change phenomenon towards sustainable development goals of the country.

"The National Climate Change Policy to serve as a framework for deploying and providing guidance to government agencies, industry, and community stakeholders to meet the challenges of climate change in a holistic manner. The policy will help in identifying the integrated actions to be taken to achieve the goal of sustainable development".

Welcome remarks of YAB Dato' Sri Najib Bin Tun Abd Razak, Prime Minister of Malaysia in National Climate Change Policy, Ministry of Natural Resources and Environment Malaysia, 20 November 2009.

In addition, during the COP15 conference in Copenhagen on 17 December 2009, Malaysia has made a commitment to reduce carbon emissions by up to 40% of the intensity of gross domestic product (GDP) by 2020 compared to 2005.

"I would also like to announce here in Copenhagen that Malaysia is adopting an indicator of a voluntary reduction of up to 40% in terms of emissions intensity of GDP by the year 2020 compared to 2005 levels. This indicator is conditional on receiving the transfer of technology and finance of adequate and effective levels from our Annex 1 partners, that correspond to what is required in order to achieve this indicator."

Speech of YAB Dato' Sri Mohd Najib Bin Tun Abd Razak, Prime Minister of Malaysia at the U.N. CLIMATE CHANGE CONFERENCE 2009 – "15TH CONFERENCE OF PARTIES (COP 15)" 17 December 2009.

To achieve the Government's aspiration, Putrajaya Corporation (PJC) has decided to formulate a Green City action plan for Putrajaya. As the first step, PJC has organized a two days Putrajaya Green City International Conference from 23rd to 24th of February 2010. The conference serves as a platform for Putrajaya Corporation to learn, understand and gain experience from other countries in implementing green city programs. It has also helped PJC in identifying the direction, concept and definition of 'green city' envisaged in the development of Putrajaya.

On the 26th and 27th of April 2010, Malaysia in collaboration with PJC and Universiti Pertanian Malaysia (UPM) has organized Malaysian Green Forum (MGF), inaugurated by Prime Minister of Malaysia. It was attended by top government officials and other stakeholders aimed to explore issues related to the natural and built environment in Malaysia and Malaysia's commitment to improving the environment at the national and regional level as well as to formulate resolutions and renew commitment to address related issues in a more comprehensive and holistic way.

"Environmental sustainability can only fully materialize if there is a complete and holistic ecosystem that allows for it. The government is aware of this fact and has taken this approach in gearing the nation towards this aim. I have identified six major components of this ecosystem and together they form the acronym AFFIRM. They are Awareness, Faculty, finance, Infrastructure, Research, Development and Commercialization and Marketing"

Speech of YAB Dato' Sri Mohd Najib Bin Tun Abdul Razak, Prime Minister of Malaysia at the Malaysian Green Forum (MGF), Seri Siantan Conference Hall, Putrajaya Corporation.

1.1 Definition of Putrajaya Green City

A Green City is defined as a city planned with the principles of sustainable development with programs and initiatives to preserve the environment and natural resources in the view to reducing the negative impact of human activities onto the environment.

Other aspects that are often associated with the concept of green cities is management of renewable and non-renewable resources, management of waste and the reduction of the impact of greenhouse gases (GHG) such as carbon dioxide resulting from various human activities.

1.2 Putrajaya Green City Target

With reference to the above definition, it is clear that green city status to be achieved in Putrajaya is not limited to physical greeneries only. It also covers three main aims as follows:

i. to minimize negative environmental impacts and the use of resources
ii. to promote human interaction with nature
iii. to reduce carbon emissions related to human activities

1.3 Initiatives Towards Low Carbon Green City

The 'City in a Garden' Concept adopted in the Putrajaya Master Plan in 1995 emphasizes on the principles of sustainable development and to encourage human interaction back with nature has provided a solid foundation for the city to move towards achieving the goal of Putrajaya as low carbon green city.

What is required now is to further strengthen the existing programs and to develop them further as a scope for long-term initiatives.

With a clear scope of the initiatives, it would be easier to assess its achievements against the targets set. For this purpose, seven focus areas have been identified:

1. Planning, Urban Design & Building;
2. Integrating Nature into the Urban Fabric;
3. Energy Usage;
4. Water Usage;
5. Transportation and Mobility;
6. Solid Waste Management; and
7. City Administration and Management.

This report aims to summarize the initiatives that have been implemented since the beginning of the development of Putrajaya as well as the continuous efforts being carried out. These initiatives are collaborative efforts of various stakeholders including all internal departments of Putrajaya Corporation, government ministries and agencies, developers and all members of community in Putrajaya.

2.0 PLANNING, URBAN DESIGN & BUILDING

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2.1 Planning Principle / Concept Contributing to Carbon Emissions Reduction

The planning principles that have been applied at the early stages of layout planning and urban design in Putrajaya has directly contributed towards the reduction of carbon dioxide emission particularly in reducing travel distance and traffic generation by motorized private vehicles.:

i. Land use planning through the development of self-contained Integrated neighborhood centers in peripheral residential precincts (Precinct 6 to 19). This will enable residents to run their daily activities such as transporting children to school, shopping and leisure activities as well as religious activities within short travelling distance.

Integrated land use planning at the neighbourhood center in each peripheral residential precinct provides the residents with commercial, religious and education facilities.

Development of neighbourhood complex equipped with various facilities within one building to save land use space.

ii. The planning of a comprehensive network of pedestrian and bicycle paths is provided in the Putrajaya Master Plan and is detailed out in the Transport Design Guidelines. This requirement has been made one of the conditions for the approval of Planning Permission application and Landscape Plan.

A comprehensive networks of pedestrian/ bicycle paths are provided at peripheral precincts and city center.


Laluan
Basikal

iii. The planning and provision of residential units for public servants of various government ministries and agencies in Putrajaya has reduced the travelling distance between the place of work and residence. For public servants who originally reside in the surrounding areas of Kajang, Serdang, Bangi, Puchong, Seri Kembangan and Cheras but have since, moved to live in Putrajaya, they have managed to reduce a distance of at least 10km or more per travel trip.

The provision of 55% of the total planned home units in Putrajaya for public servants has encouraged government employees to move from other cities to Putrajaya.

Public Servants Houses planned = 32,507 unit
Public Servants Houses completed = 26,854 unit
(Source: PHSB, April 2012)

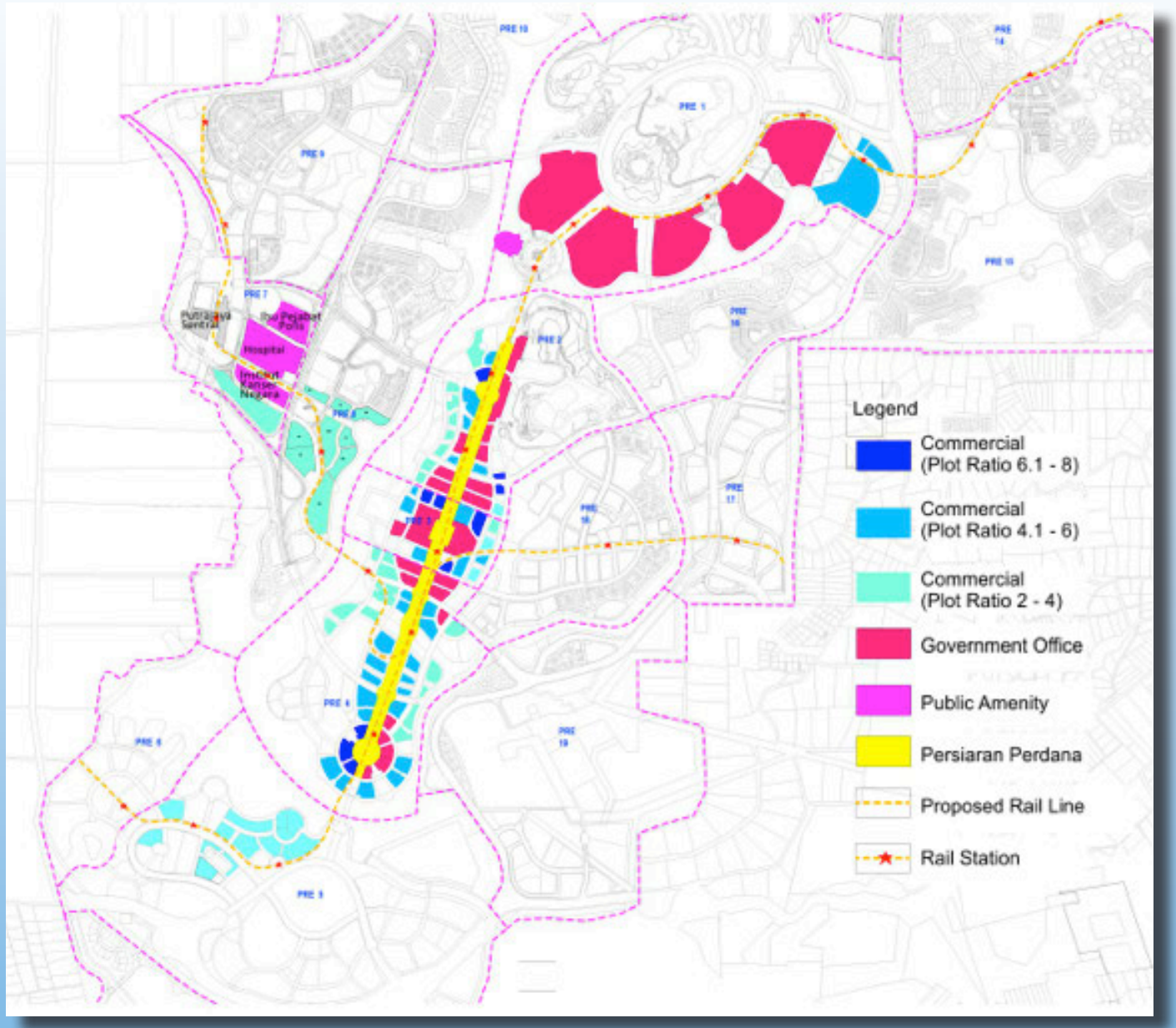
Table 2.1 Comparison on Carbon Emission Based on Public Servants Residence

Location of Residence	Distance to Putrajaya City Center (km)		Estimated $kgCO_2$/trip
	Within Putrajaya	From outside Putrajaya	
Precinct 9	3.0 - 6.0	-	1.9 - 3.8
Precinct 11	6.0 - 8.0	-	3.8 - 5.1
Precinct 14	6.0 - 7.5	-	5.1-4.8
Precinct 16	5.0 - 7.0	-	4.8 – 4.5
Precinct 18	2.0 - 3.5	-	1.3 – 2.2
Serdang	-	19 - 25	12.2 – 16.0
Bangi	-	17- 22	10.9 – 14.1
Kajang	-	20 - 24	12.8 – 15.4
Seri Kembangan	-	18 - 21	11.5 – 13.4
Puchong	-	14 - 21	9.0 – 13.4
Cheras	-	25 - 31	16.0 – 19.8

Note:
- 0.64kgCO_2/km (PGC2025: baseline & preliminary study team)

iv. The development of high density, mixed land use type of development as well as public focused public facilities and government offices on plots concentrated along major transportation routes and nodes/transportation terminal has been planned. This involves plots of land along Persiaran Perdana which has been planned to be serviced with rail transport system as well plots surrounding the area of Putrajaya Sentral (Figure 2.1).

Figure 2.1 : Concentration of high density development plots along major transport routes and transportation terminals



'Rock-filled' Putrajaya Lake Dam

2.2 Reuse of Local Resources

Efforts to reuse local resources have also been carried out by the developer, Putrajaya Holdings Sdn. Bhd. in the initial stages of development of Putrajaya. The initiative has reduced the generation of solid waste resulting from site clearing for construction purposes. Among them are:

1. the re-use of crushed rocks as construction material for the rock filled dam of the Putrajaya lake. This has directly reduced the cost of building materials by the developer.

2. Aggregate rocks are used as roadpaving material.

3. Green waste from clearing of palm trees of a former palm oil plantation area was turned into compost materials for landscaping of Putrajaya Wetlands.

2.3 Green Building Design and Certification

According to the International Energy Agency (IEA), 40% of total energy use in most countries is contributed by the building sector which is also a major contributor to carbon emissions. This has becomes more apparent as building floor spaces of increases from time to time.

IEA also has suggested that the building sector is the most cost effective sector in reducing energy consumption. Reduction of energy in the building sector can be realised if the design and the operation of buildings have taken account of green building criteria such as efficiency in the use of energy, water and the use of environmental friendly materials and construction technologies.

In Putrajaya, the developers have been actively seeking to obtain green building certification for their buildings through the design of new buildings and by building owners retrofitting existing buildings. Current status is as follows:

Six building has been certified as Green Building:

Table 2.2: List of buildings Certified as Green Building

Building	Green Building Certification
i. Energy Commission Building	GBI rating PLATINUM (Non-Residential New Construction (NRNC) BCAGreen Mark Award PLATINUM(New Buildings)
ii. Ministry of Energy, Green Technology and Water Building (KeTTHA)	GBI rating SILVER (Non-Residential New Construction (NRNC)
iii. Office Tower On Plot Z10	GBI provisional rating CERTIFIED (Non-Residential New Construction (NRNC)
iv. 3 Star Hotel On Plot Z10	GBI provisional rating CERTIFIED (Non-Residential New Construction (NRNC)
v. PJH Tower	GBI rating GOLD (Non-Residential New Construction (NRNC)
vi. Perdana Putra Building	GBI rating PLATINUM (Non-Residential Existing Building) (NREB)

Energy Commission Building

Ministry of Energy, Green Technology and Water (KeTTHA) Building

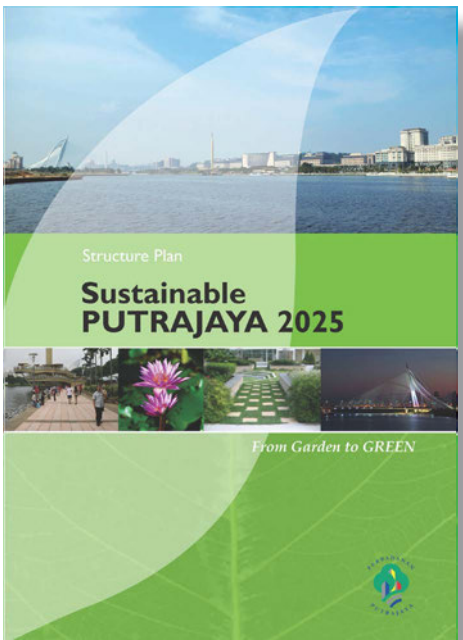
Six other buildings under construction have been designed for Green Building Certification. :

i. Government Complex Parcel F
ii. Ofice Building 2C5
iii. Office Building 2C14
iv. Office Building 3C10, 3C11
v. Office Building 3C2, 3C3 & 3M2
vi. City Campus Building 5C4

2.4 Regulatory Framework

In ensuring that the green city initiatives can be continually implemented in the long run, PJC has provided the regulatory framework to support the implementation of green initiatives according to current needs.

i. The Putrajaya Structure Plan 2005 as a statutory document to guide the planning and development of the city. It has outlined Putrajaya vision, direction and policies to support the transformation of Putrajaya from a City in a Garden into a Green City.



Strategic Objectives	Indicators	Target 2015
P4 : Promote the use of new technologies	P4.1 Number of key processes being computerised (new applications) P4.2 Percentage use of Industrialised Building System (IBS) in building construction P4.3 Number of high risk slope installed with early warning system (EWS) to reduce impact of disaster	TBD TBD TBD
P5.: Improving Green Practices	P5.1 Amount of garden waste composted P5.2 Percentage of PPj-owned buildings with green initiatives P5.3 Percentage of reduction in electricity consumption rate for PPj's owned buildings P5.4 The number of energy saving/LED used for new public parks lighting P5.5 Percentage of green areas/spaces P5.6 Number of green practice programme in PPj P5.7 Percentage of recycling implemented P5.8 The amount of fertilizer from composted garden waste used	31 tons TBD 5%kw 300 unit 40% TBD TBD TBD

ii. The Putrajaya Corporation's Strategic Plan 2011-2015 has also set two strategic objectives in achieving a green city status:

iii. New requirements are imposed in the approval for various development related applications; these will further strengthen the implementation of green initiatives at the operational level. These include:

a. From 2011 onwards, two new requirements (involving six sub-criteria) have been imposed in the approval for Planning Permission application for Commercial complexes.

b. New conditions have been imposed in the approval for Building Plan to include green building design requirements for non-residential types of development.

c. New requirements in the checklist of Buildings Plan application for consultants to include a report and assessment for Green Building Index (GBI).

iv. Since the early planning stage of Putrajaya, it has been made compulsory for buildings in the city centre to be supplied with chilled water from centralized Gas District Cooling (GDC) plants for the purpose of air conditioning The use of centralised co-generation system on a large scale has the advantages in terms of energy efficiency, as well as more being environmental friendly, in which carbon emissions resulted from buildings air conditioning can be controlled at source.

As one of green city initiatives, the use of this green technology has been made a policy in the Draft Local Plan for Precincts 2, 3, 4 and 18. This allows the Corporation to impose government offices and commercial buildings in the city center to utilise the GDC system. In addition this is also imposed as one of the conditions in the granting of approvals for Planning Permission of related developments.

Table 2.3: General Information of GDC Plants in Putrajaya

GDC Plant	Capasity	Supply to building
i. Plant 1, Precinct 1	Power Capacity – 6.5 MW Cooling Capacity – 32,700 RT	Precinct 1
ii. Plant 2, Precinct 2	Power Capacity – 10.6 MW Cooling Capacity – 32,700 RT	Precinct 2,3 & 4
iii. Plant PICC, Precinct 5	Cooling Capacity – 3880 RT	PICC
iv. Plant Wisma Putra, Precinct 2	Cooling Capacity – 2,300 RT	Wisma Putra
v. Plant 3, Precinct 5	No Information	Precinct 5
vi. Plant 4, Precinct 4 (under construction)	No Information	Precinct 4

2.5 Studies

i. Putrajaya Green City 2025 (PGC 2025): Baseline and Preliminary Study

PPj together with local experts from Universiti Teknologi Malaysia (UTM) and Malaysia Green Technology Corporation (MGTC) as well as experts from Japan, namely Kyoto University, Okayama University and the National Institute for Environmental Studies (NIES) have conducted the Putrajaya Green City 2025 (PGC 2025): Baseline and Preliminary Study to determine the quantitative environmental targets. Three quantitative targets that have been recommended in the study are:

i. Reduction in carbon emission levels by 60% to transform Putrajaya into a Low Carbon City;
ii. Reduction in peak temperature by 2 degrees Celsius (A Cooler Putrajaya); and
iii. Reduction in the final disposal of solid waste by 50% through solid waste management (3R Putrajaya).

To achieve the above quantitative targets, the study team has set 2007 as the base year and the year 2025 as the target year for the reduction of carbon emissions by 60%. The study estimated the greenhouse gases (GHG) emissions for Putrajaya in the seven sectors namely commercial, public amenities and facilities, government offices, residential, passenger transportation, freight transportation and solid waste.

In 2007, total GHG emissions were estimated at 664 $ktCO_2eq$ in which emissions from the government office sector is the highest at 180 $ktCO_2eq$ followed by the transportation sector at 161$ktCO_2eq$.

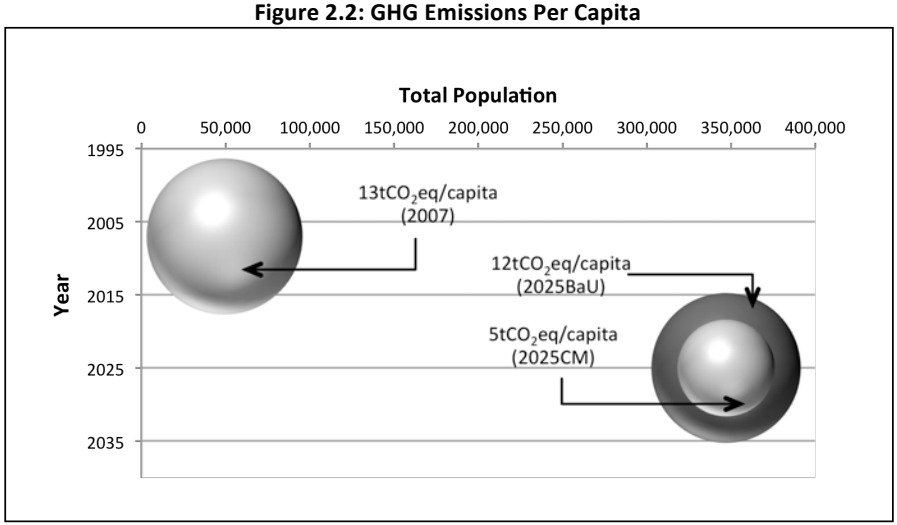
In the case where no counter measures are taken ('business as usual - BaU scenario), the GHG emissions are expected to increase by 7.5 times compared to emissions in 2007 to 4186$ktCO_2eq$. The Commercial sector is expected to generate the highest GHG emissions at 1435ktCO2eq, the passenger transportation sector, and the second highest at 1314$ktCO_2eq$ followed by solid waste sector which remains the third highest contributor at 414$ktCO_2eq$.

By introducing counter measures in the year 2025, total GHG emissions are expected to be reduced by 60% to 1780$ktCO_2eq$ compared to 2025 GHG for BaU scenario.

Table 2.4: Level of Carbon Emissions by Sector

Sector	2007 ($ktCO_2eq$)	2025 BaU ($ktCO_2eq$)	2025 CM ($ktCO_2eq$)
Government Offices	180	363	139
Commercial	65	1,435	769
Public Amenities	67	240	112
Residential	23	266	150
Transportation (Passenger)	161	1,314	368
Transportation (Freight)	20	156	89
Solid waste	148	414	189
Carbon sink	-	-	-35
Total Emissions of GHG	664	4,186	1,780
Total Population	49,452	347,000	347,000
Per Capita GHG Emmissions	13 tCO_2eq	12 tCO_2eq	5 tCO_2eq

Figure 2.2: GHG Emissions Per Capita



Twelve (12) actions have been proposed as counter measures to achieve the above three targets. Reduction in the GHG emission contributed by those counter measures are shown in the table below:

The 12 actions are detailed out in the as programmes to be implemented in the next stage of the study, the Putrajaya Green City Action Plan.

Table 2.5: Twelve Actions and Contributions of Carbon Reduction

No.	Action	GHG Reduction GHG (%)	Environmental Targets
1	Integrated City Planning & Management	15.5	Low Carbon Putrajaya
2	Low Carbon Transportation	29.0	
3	(Cutting Edge Sustainable Building)	33.2	
4	Low Carbon Lifestyles	3.5	
5	More and More Renewable Energy	2.5	
6	The Green Lungs of Putrajaya	1.8	
7	Cooler Urban Structure and Buildings	3.2	Cooler Putrajaya
8	Community and Individual Actions to reduce Urban Temperatures		
9	Use Less Consume Less	0.2	3R Putrajaya
10	Think Before You Throw	6.7	
11	Integrated Waste Management	4.4	
12	Green Incentives & Capacity Building	-	Cross category
	Grand Total	**100.0**	

ii. Putrajaya Green City Action Plan Study

Putrajaya Green City Action Plan Study was conducted through a joint project between KeTTHA and a Japanese agency, New Energy and Industrial Technology Development Organization (NEDO).

Japan Research Institute (JRI) was appointed by NEDO to carry out the study with the assistance of a consortium of eight private companies from Japan.

The study aims to provide a road map for Putrajaya to achieve a low-carbon city status. Four road maps covering the following topics have been proposed:

a. Building and Energy (13 actions, 29 programs identified)
b. Urban Transportation (16 actions, 35 programs identified)
c. Waste Management (12 actions, 22 programs identified)
d. Urban Environment (5 action, 7 program identified)

The study was launched on the 4th of August 2011 and itis in the process of finalization.

3.0 INTEGRATING NATURE INTO THE URBAN FABRIC

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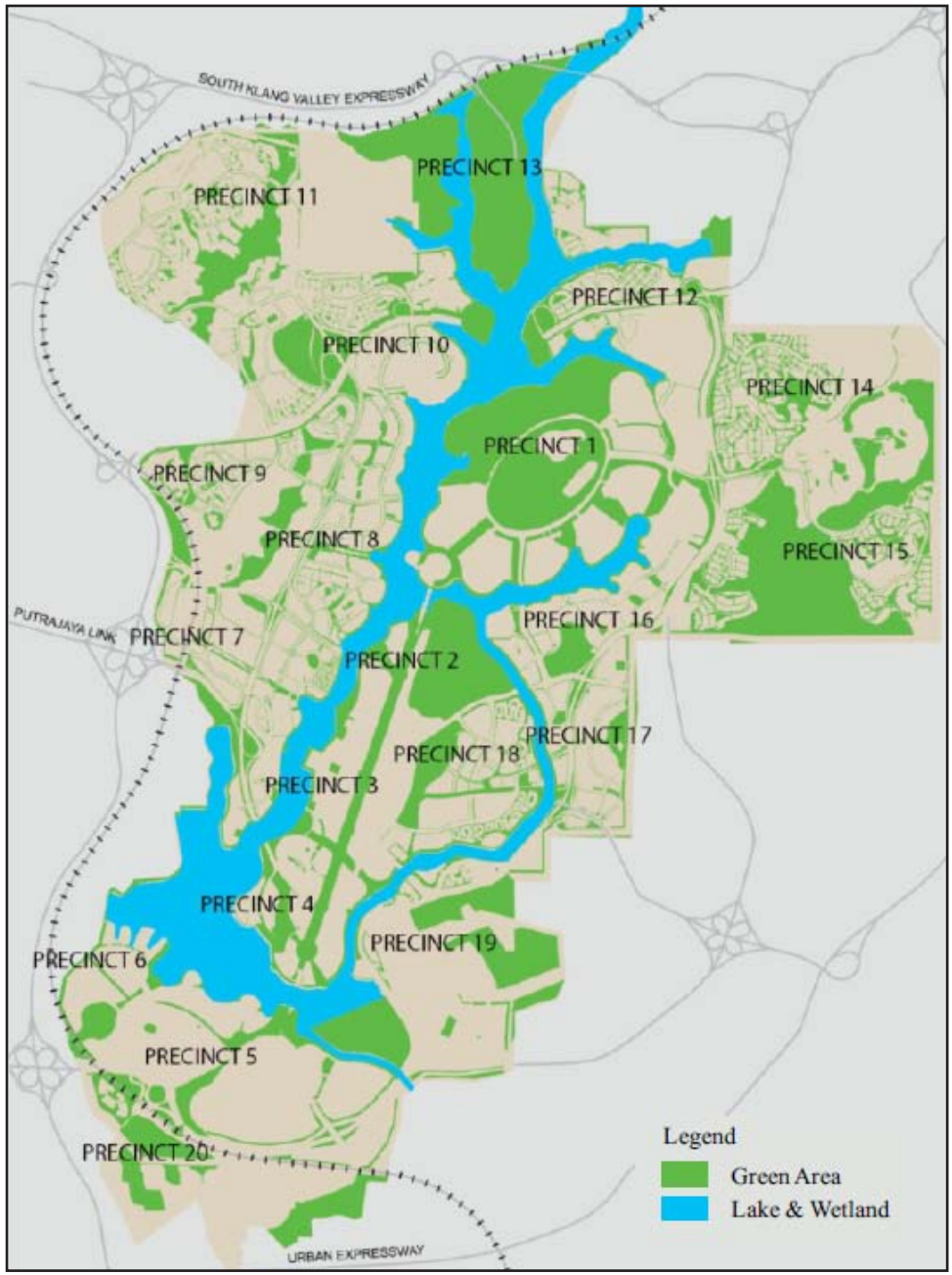
In order to achieve a low-carbon green city status, the initiative to create green areas in the physical form and the conservation of the natural green environment in urban areas must be applied. The physical green areas can be created by providing areas for tree planting as well as and creating water bodies. This is the only one initiative to increase the rate of carbon sequestration as compared to other initiatives which aim to reduce carbon emissions. In addition, this initiative will enhance biodiversity in urban areas.

3.1 Land Use Planning for Open Spaces

Putrajaya Master Plan 1997 has provided 37.6% of the total area of Putrajaya as parks and open spaces. These includes parks, green strips, buffer zones, water bodies such as lakes and wetlands. Since the development of Putrajaya in 1996, the percentage of open space has not only been able to be maintained but has been increased to up to 38.91% which is equivalent to 1918.66 hectares (Draft Structure Plan, June 2012). Until now, the total area of open spaces that have been developed has reached 36%. This is a high ratio if compared to the current population in Putrajaya.

Figure 3.1: Distribution of Open Spaces in Putrajaya



Source: Draft Structure Plan, June 2012

Table 3.1 shows a summary of public open space ratio to 1,000 population compared with the ratio recommended in the National Urbanisation Policy. Although the ratio decreases with the increase in population, open spaces estimation for the year 2025 as the population in Putrajaya reaches the target of 347,700 people are still higher than the national target of 5.5 hectares: 1,000 inhabitants.

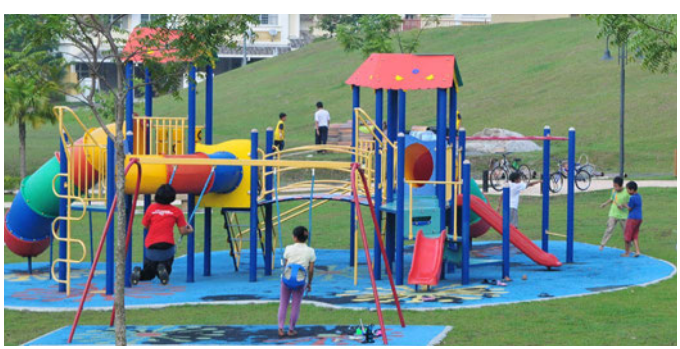
Table 3.1: The ratio of Public Open Space to 1,000 residents

	Open Space per 1,000 residents (hectares)			
	2009	2010	2011	2025
National Urbanisation Policy[1]	2 hectares			
Putrajaya	28.7[2]	28.5[3]	25.4[4]	5.5[5]

Notes:
(1): The National Urbanisation Policy Target, DPN9, Action (ii)
(2), (3), (4): MURNInet Report Putrajaya
(5): Estimation based on target population of 347,700 in year 2025

i. Development of Public Parks

In order to conserve a natural environment in an urban area, Putrajaya has been planned with a hierachy of public parks that can be easily accessible either at the city centre or peripheral residential precincts.



Public parks of various hierarchy aimed to integrate nature with thebuilt environment

12 Metropolitan parks of various themes has been developed, covering an area of 667.22 hectares representing 34.55% of the total green areas that has been allocated for.

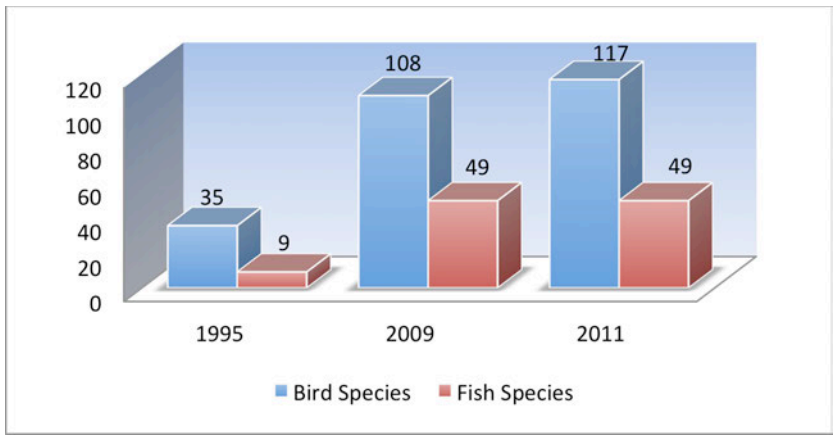
Figure 3.2: The Hierarchy of Public Parks in Putrajaya

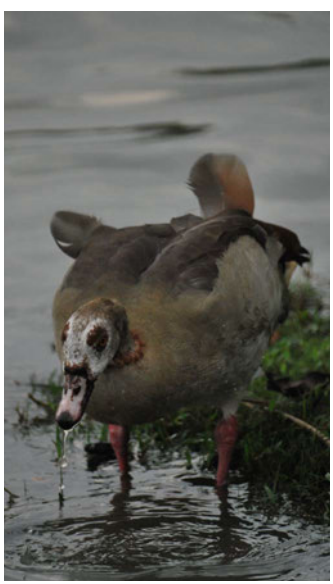
SSource: Report or Survey, Draft Putrajaya Structure Plan

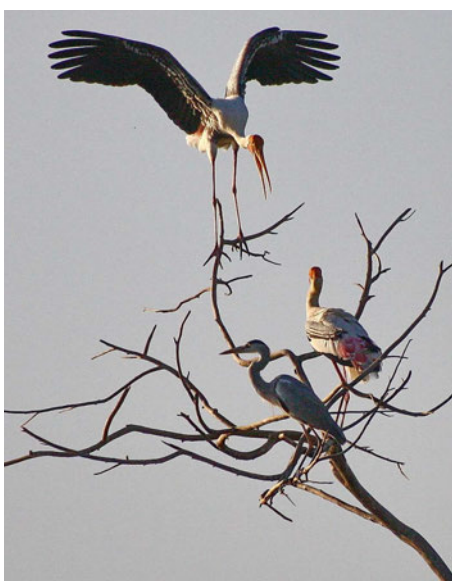
ii. Creation of Water Bodies (Lakes and Putrajaya Wetlands)

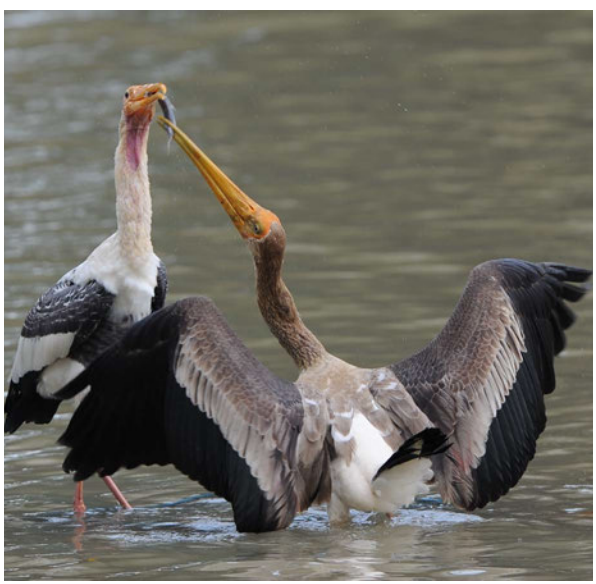
Another important component of land use in Putrajaya is the water body in the form of an artificial lakes and wetlands. The 400-hectares Putrajaya Lake and 200 hectares of wetlands area has been proven to be effective in increasing the biodiversity and ecological quality of Putrajaya. This can be observed through the inventory records of species of birds and fish that have been carried out by the Environment, Lakes and Wetland Division.

Chart 3.1: The Increase of Bird and Fish species in Putrajaya





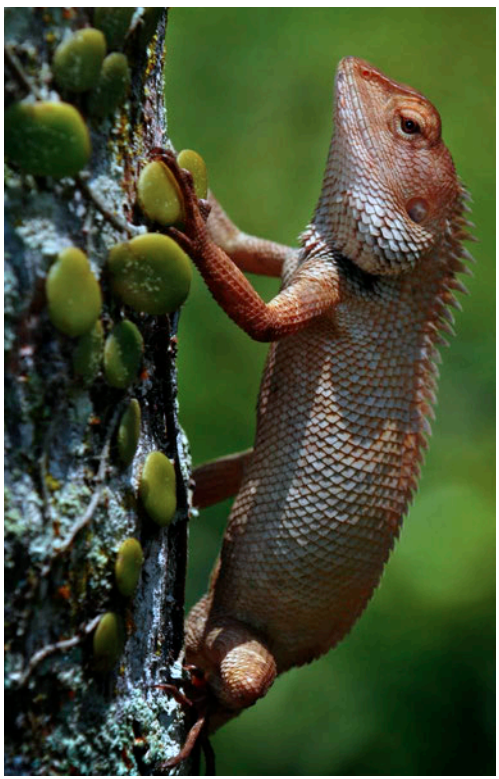


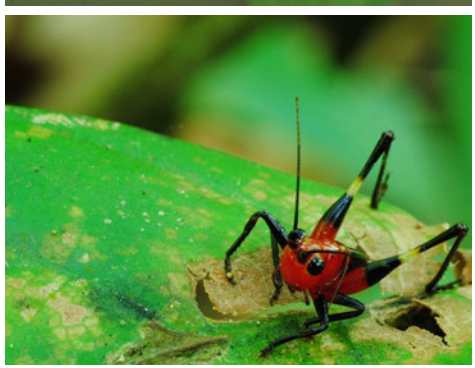


The diversity of fauna species recorded has indicated that the Putrajaya lake and wetlands been functioning well in creating a healthy and suitable habitat for fauna in an urban setting.

Table 3.2: Number of Species and Families of Fauna found in Putrajaya lake and Wetlands in 2011

Fauna Species	Number of spesies	Number of families
Insects	453	49
Amphibians	5	4
Reptiles	15	10
Mammals	10	5





The Federal Territory Tree Planting Programme 2010

3.2 Putrajaya Greening Programme

Based on Landscape and Parks Department records, the number of trees planted in Putrajaya until June 2012 was 661 963 trees. Tree planting efforts are still being carried out by the Department through various programmes involving the private sectors as well as government agencies as follows:

i. Greening the Earth Planting Programme organised by Putrajaya Corporation, the Malaysian Timber Industry Board (MTB) and Tesco on 1st of December 2011 at Taman Wawasan Precinct 2, of 1,000 Aquilaria trees have been planted;

ii. Tree Planting Programmes for the Federal Territory of Putrajaya, Kuala Lumpur and Labuan on 28th of April 2012 in Precinct 5, a total of 150 species of trees were planted;

iii. Tree Planting Programme in conjunction with the Million of Youth Gathering event on 26th of May 2012 at Precinct 18, a total of 100 trees were planted.

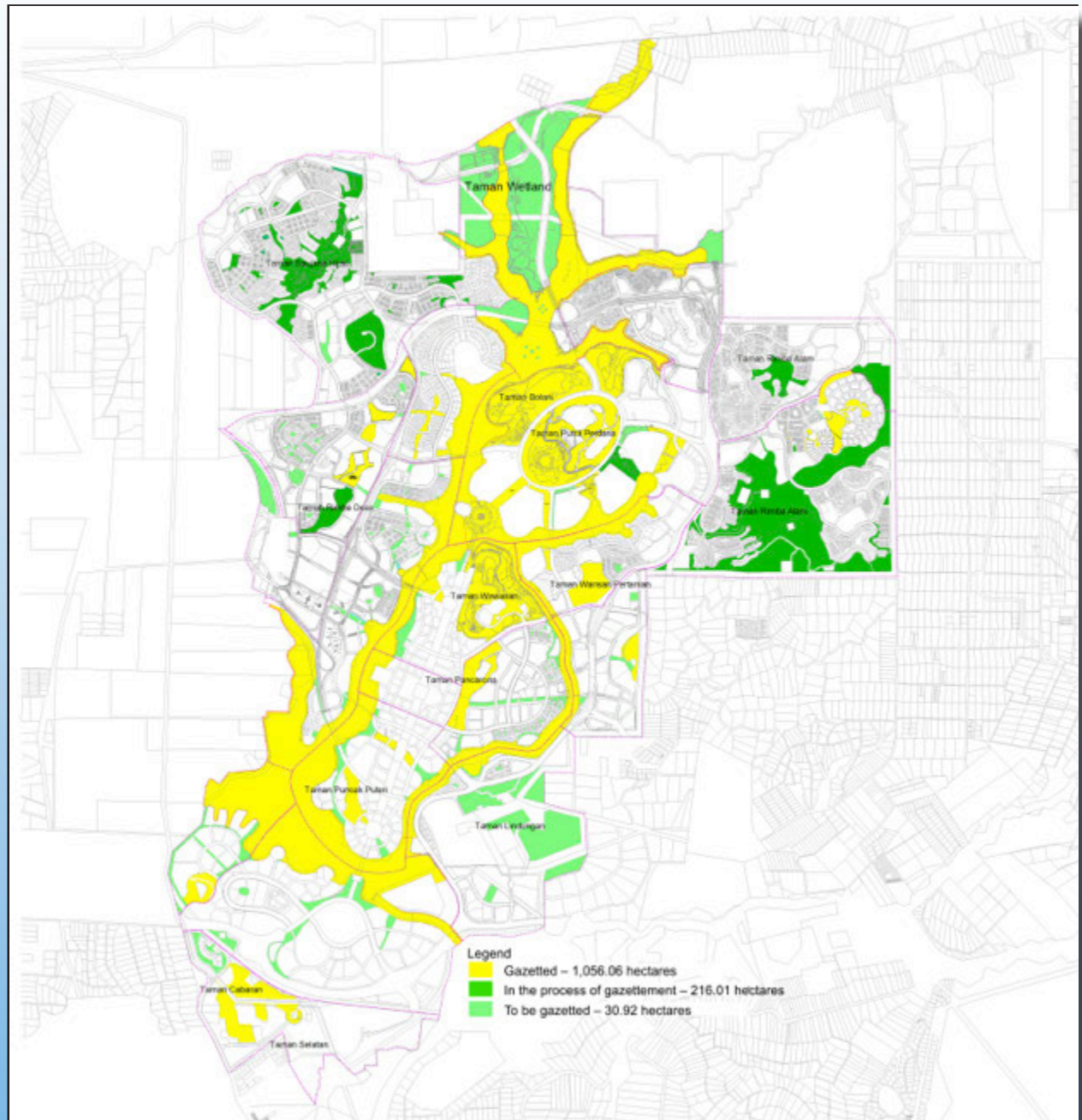
3.3 Regulatory Framework

The planning and development of public parks and water bodies in Putrajaya has an important role in the control of temperature by lowering the temperature in the city as well as to serve as carbon sinks.

For this purpose, up to July 2012, 1,056.08 hectares of open space has been gazetted under the provision of Section 62 of the National Land Code 1965 (Act 56) (Figure 3.3). The effort to gazette open spaces will be continued in stages by PJC to ensure that future generations will able to enjoy the natural environment and the quality of the environment in urban areas.

Aquilaria Tree plantings sponsored by Tesco at Taman Wawasan

Figure 3.3: The Status of The Gazettement of Open Spaces in Putrajaya



3.4 Studies

Since large open spaces is planned in Putrajaya, it is important to ensure that the parks effectively manage and maintained. PJC and the Forest Research Institute Malaysia (FRIM) has signed a Memorandum of Understanding (MOU) for the purpose of collaboration between the Landscape and Parks Department of PJC and FRIM in projects involving scopes as follows:

i. To implement and develop the Tree Inventory and Management Systems of Putrajaya;
ii. To conduct Carbon Sink Study according to plant species;
iii. To cooperate in conducting awareness programs, courses, seminars and conferences on urban forests, landscapes, and recreation;
iv. To carry out research activities related to the management of urban forests and open spaces in Putrajaya.

The above projects particularly the Tree Inventory and Management System as well as the Carbon Sink Study will be beneficial in the measurement of carbon emissions in Putrajaya.

MOU Signing Ceremony between PJC and FRIM on 13 April 2012.

4.0 TRANSPORTATION AND MOBILITY

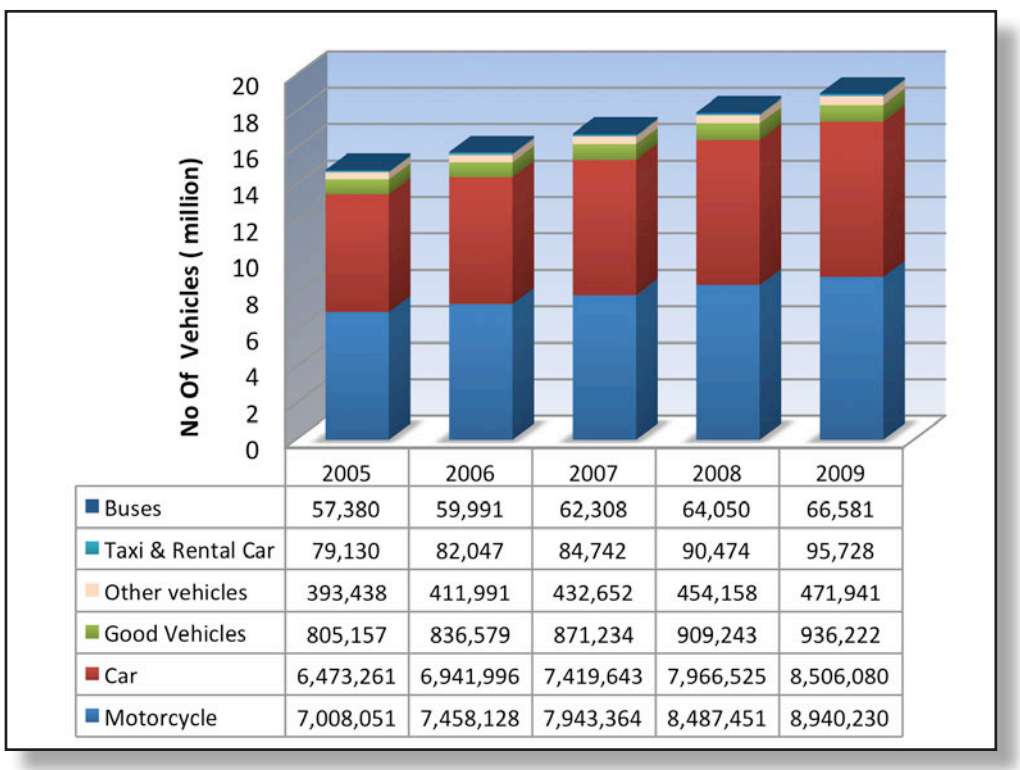
4.0 TRANSPORTATION AND MOBILITY

The transportation sector has been identified as one of the major contributor of carbon emissions at the second highest in Malaysia according to the Malaysia's Second National Communication (NC2) to the UNFCCC report and a similar trend is also reported in Putrajaya based on the Putrajaya Green City 2025 - Baseline and Preliminary Study. Similar to the energy sector, the high level of emission from the transportation sector is closely related to our dependence on fossil fuel sources. This is a serious situation as the number of motor vehicles rises from year to year. The Malaysia Department of Statistics figures indicated that the number of registered vehicles in 2005 of 14,816,407 had increased 38% to 19,016,782 in 2009.

The transition from the use of vehicles using fossil fuels to vehicles using renewable energy are expected to take a long time due to the issue of higher cost in using of the latter. This will also involve initiatives at the Federal Government level as well as vehicle manufacturing industry.

Based on the above scenario, the current initiatives undertaken by the PJC as a local authority are more focused on increasing the use of public transport by operating and managing a public bus services in the city.

Chart 4.1: Number of Motor Vehicles Registered By Type



	2005	2006	2007	2008	2009
Buses	57,380	59,991	62,308	64,050	66,581
Taxi & Rental Car	79,130	82,047	84,742	90,474	95,728
Other vehicles	393,438	411,991	432,652	454,158	471,941
Good Vehicles	805,157	836,579	871,234	909,243	936,222
Car	6,473,261	6,941,996	7,419,643	7,966,525	8,506,080
Motorcycle	7,008,051	7,458,128	7,943,364	8,487,451	8,940,230

Source: Annual Book of Statistics Malaysia 2010

4.1 Integrated Transportation Network Planning

The network of transportation system in Putrajaya was planned based on the Transportation Master Plan in which the ratio between the public modes of transportation and the private modes of transportation is based on the ratio of 70:30. An integrated transportation network with rail based system as the back bone has been planned and this will be supported by a park and ride facilities (Figure 4.1). Various modes of transportation is planned to achieve the objectives of providing an integrated transportation system. Public transportation such as public buses and rail based transport that are able to accommodate more passengers per travel trip will be encouraged and this will contribute to the reduction of carbon emissions from the transportation sector.

i. Intra-city Rail Based Transport system

From the initial stage of planning, two routes of approximately 20km long rail lines with 25 stations were planned. Line 1 will provide services to Precincts 1, 2, 3, 4 and 7 and Line 2 to the Precincts 2, 3, 4, 5, 6, 17 and 18. Part of the components that have been constructed includes an underground rail tunnel, part of the station at the integrated transport terminal, Putrajaya Sentral and a bridge crossing the Putrajaya Lake. The future operations of the rail based system are subjected to the Federal Government further considerations. Details of the development are shown in Table 4.1

Table 4.1: Rail based Transportation Development Information

	Route 1	Route 2
Route Distance	13.2 km 6.02km (completed) 7.18km (to be completed)	6.8km 2.57km (completed) 4.23km (to be completed)
Numberof Stations	18 stations: - 7 under ground station - 1 Ground Station - 10 Elevated Station	7 stations: - 2 underground station - 5 elevated station

The main benefit in providing rail based transportation in the city center is that it will promote mobility with speed, efficiency as well as able to reduce traffic congestion which in turn will reduce air pollution. In addition, the large capacity of a rail based transportation compared to private transportation in terms of travel trips are able to contribute towards the reduction of carbon emissions from the transportation sector. Table 4.2 is a comparison between the levels of carbon emissions estimated in a single trip using rail based transportation and other modes of transportation taking into consideration the same passenger capacity.

To transport the same number of passengers, 49 cars are needed on the road which will contribute up to 20 times more in terms of carbon emissions as compared to rail based transportation.

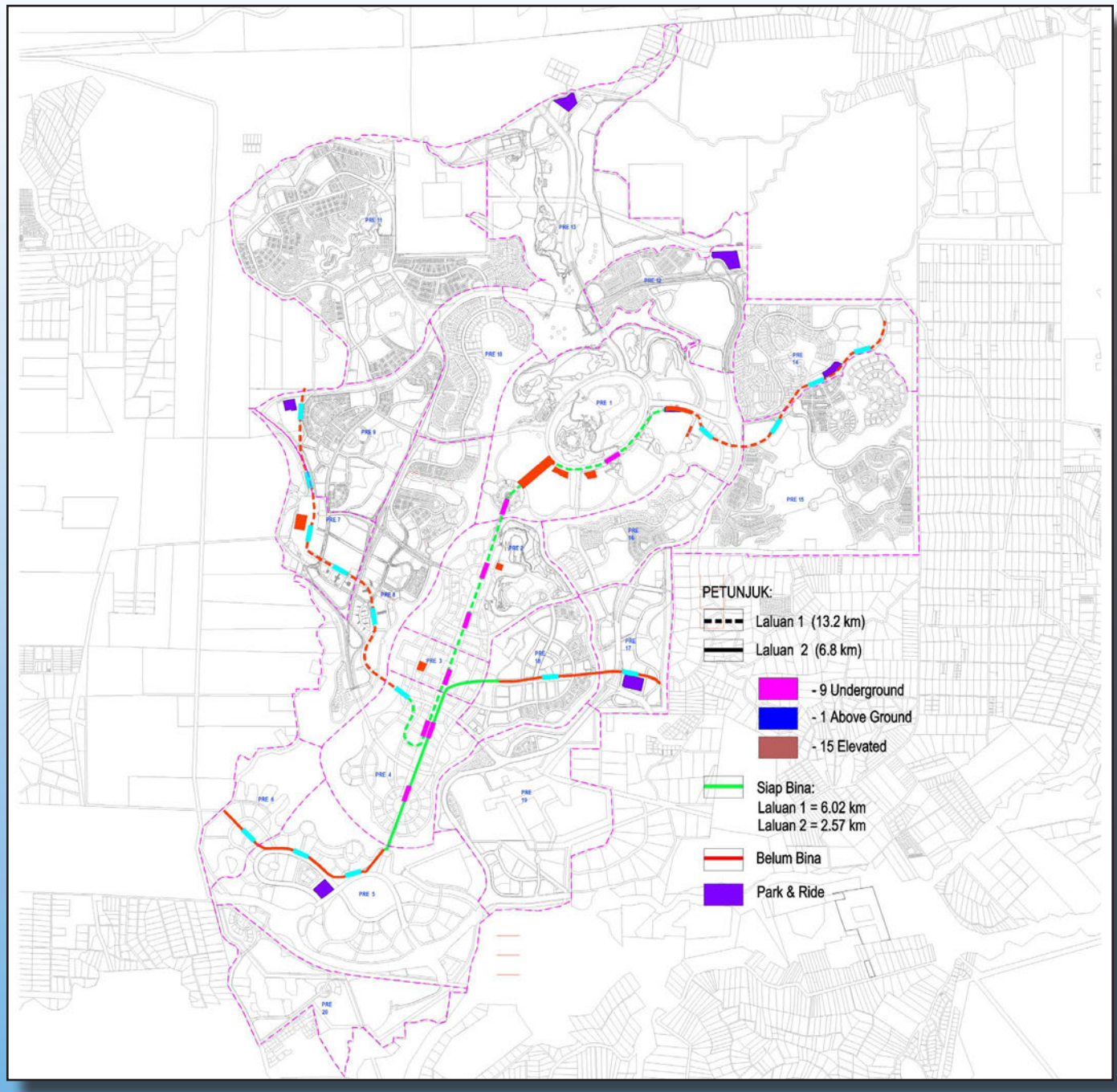
Motorcycle use is estimated to involve 122 motorcycles and this will contribute carbon emission 16 times more than rail based transportation.

Table 4.2: Comparison of the levels of carbon emission between rail based transport to other transport mode.

	Rail	Car	Motorcycle
Maximum Capasity (passenger)	244[1]	5	2
$kgCO_2/km$[2]	1.57	0.64	0.21
Estimated $kgCO_2$/ km in one trip	1.57	31.36[3]	25.62[4]

Notes:
(1): en.wikipedia.org/wiki/KL_Monorail (48 seated; 196 in standing)
(2): PGC2025: Baseline & preliminary study team
(3): equivalent to 49 cars
(4): equivalent to 122 motorcycles

Figure 4.1: Planned Rail Based Transportation Routes and the locations Park and Ride facilities in Putrajaya



ii. Park and Ride Facilities

To support the use of public transportation such as Nadi Putra buses and rail based transport in the future, seven park and ride locations have been identified, namely in Precinct 5, 7, 9, 12, 13, 14 and 17. Up until now, only two park and ride facilities located at Precinct 7 (Putrajaya Sentral) and Precinct 14 are developed. In general, two types of park and ride facilities provided are in the form of a multi storey parking facilities and an open air parking facilities.

In the future, in the case where the policy to restrain private vehicles from entering into the city center during peak hours are enforced in Putrajaya, the construction of the other planned park and ride facilities should be implemented in line with these policies.

An affordable fee of RM2 per entry is charged for the use of the park and ride facilities.

Open air park and ride facilities at Putrajaya Sentral

A total of 1407 units of car park spaces are provided in a multi storey park and ride facilities at the Integrated Transportation Terminal, Putrajaya Sentral and it was opened to the public in February 2011

iii. Integrated Transportation Terminal

One of the important components in the planning of an integrated transportation network is the development of a strategically located integrated transportation terminal to enable a quick and efficient transition between various transportation modes.

Putrajaya Sentral, located at Precinct 7 integrates various transportation modes including the Express Rail Links, intra-city buses (Nadi Putra), inter-city buses, taxis, Express buses and free shuttle services to the Putrajaya Hospital.

The condition at Putrajaya Sentral, equipped with various facilities, mode of transportation such as taxi, Nadi Putra Public Buses and Express Buses

Free shuttle services are also provided by Putrajaya Hospital at Putrajaya Sentral

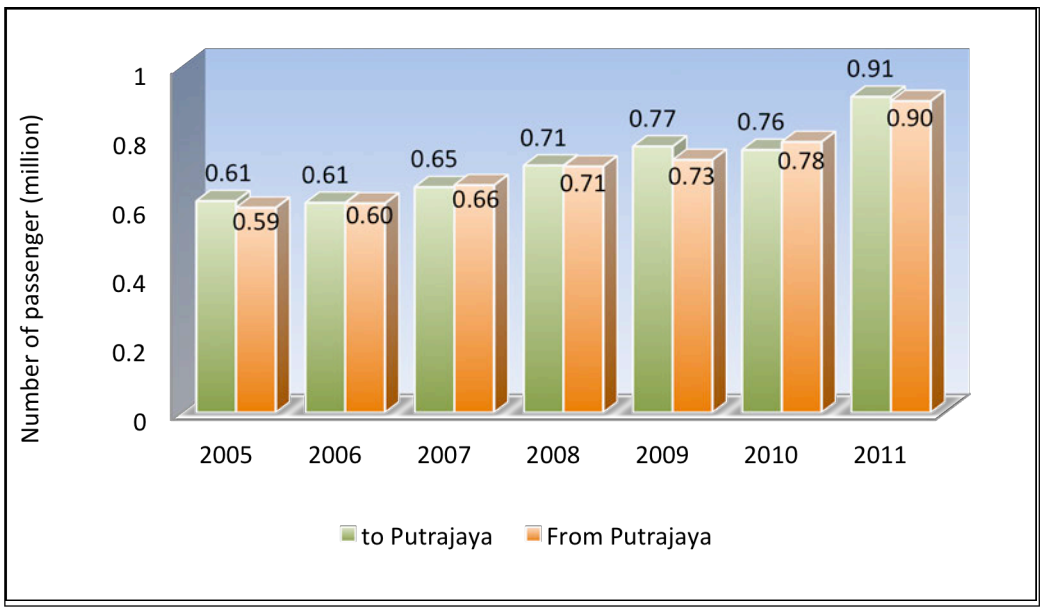
A comfortable and spacious bus waiting area is provided

Provision of shops, stalls and public toilets for public convenience at Putrajaya Sentral.

The development Putrajaya Sentral facility has encouraged the development of other public facilities in its vicinity such as the Putrajaya Hospital, the National Cancer Institute and high density residential developments such as the affordable apartments at Precinct 9.

The integrated transportation terminal which has been in operational since July 2002 is the main public transportation node connecting visitors from outside of Putrajaya as well as Putrajaya residents to the surrounding areas. Based on the record of the number of passengers from the Express Rail Link Sdn Bhd., since 2005, the number of passengers transiting at Putrajaya Sentral ERL station showed an increasing trend. Up to the end of 2011, transit ridership at the ERL station of Putrajaya Sentral has recorded a total of 1,813,182 passengers.

Figure 4.2: Total Annual number of Passengers at ERL Station, Putrajaya Sentral



The view at the Putrajaya Sentral ERL Station

4.2 Environmental Friendly Public Bus Service – Nadi Putra

The provision of a public bus service, Nadi Putra where the fleet is powered by natural gas, is an important step by PJC in providing low carbon transport services in Putrajaya. GHG emission using natural gases is 20% - 30% less compared to diesel (http://www.ngvc.org). In addition, the ability for public buses to cater for a larger number of passengers per trip not only reduces travel trip generation but also reduces traffic congestion. The advantage of the public bus service compared to rail based transportation is the implementation and operation costs are relatively lower. Through this, PJC is able to implement a variety of efforts to improve the quality of public bus services to local residents and visitors.

Various efforts have been carried out by the Transport and Traffic Section of PJC to achieve the target of the transportation policy of 70:30 modal split between public transportation and private transportation, particularly to increase in the number of passengers using public buses, Nadi Putra. These include:

i. increasing the number of buses;
ii. increasing the frequency of buses;
iii. Government subsidised bus fare;
iv. providing additional bus routes;
v. management of public bus services.

Nadi Putra Bus which charges a fare of 50sen a trip is getting increasingly popular among the residents of Putrajaya.

Maximum No of passengers:
Long Buses : 63 people (40 seated; 23 standing)
Mini Buses : 40 people(25 seated; 15 standing)

Table 4.3 summarizes the progress of the bus operation from 2008 until 2011 that has seen the increase in the number of buses made available and bus routes. Annual passenger numbers increased by 67% within the 4 years.

The increase in the use of Nadi Putra public buses is expected to have a positive impact in reducing the number of private vehicles in the city and its resulting carbon emissions. The comparison in terms of carbon emission between NGV Nadi Putra buses to emissions produced by cars and motorcycles as Table 4.4 below:

Table 4.4 indicates that to transport the maximum number of passengers on a Nadi Putra bus is equivalent to 13 cars on the road with carbon emissions 13 times higher and an equivalent of 32 motorcycles with carbon emission 10 times higher.

Table 4.3: Information on the progress of Bus Operation

Details	2008	2009	2010	2011
Number of buses available	65	70	150	175 (including 25 Midi Buses)
Number of bus routes	12	14	18	22
Total km	3,785,153	4,807,399	7,484,378	8,862,251
Number of passenger recorded	2,545,102	3,224,279	3,793,788	4,254,893

Table 4.4: Comparison of the level of Carbon emission of Nadi Putra to other transportation mode

	Nadi Putra (Long)	Car	Motorcycle
Maximum Capacity (passenger)	63[1]	5	2
$kgCO_2/km$ [2]	0.65	0.64	0.21
Estimated $kgCO_2/km$ in 1 trip	0.65	8.32[3]	6.72[4]

Notes:
(1):Transport and traffic Section, PJC (40 seated; 23 standing)
(2): PGC2025 baseline & preliminary study team
(3): Equivalent to 13 cars
(4): Equivalent to 32 motorcycles

i. Dedicated Bus Lane

Putrajaya has implemented a special lane for public buses and taxis in Precinct 1, Putrajaya. The 3.2km dedicated bus lane provides a smooth traffic flow for the buses to move at a more stable speed. Studies have indicated that factors such as vehicle speed and traffic conditions can affect the levels of carbon emissions into the air.

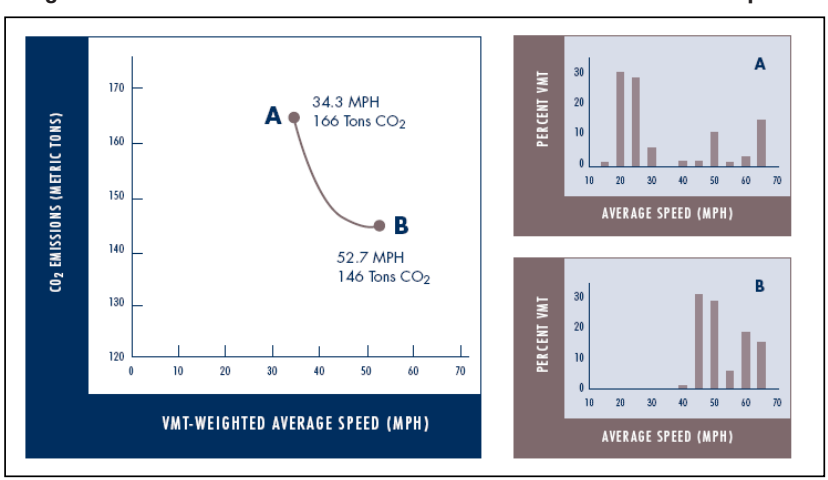
According to a study 'Traffic Congestion and Green House Gases' by Matthew Barth and Kanok Boriboonsomin, carbon emissions are also closely related to the average vehicle speed factor. In a congestion, the vehicles will experience 'stop-and-go' condition with the carbon emissions per kilometer is expected to be high. If the vehicles are moving at a high speed, more fuel is required and the resulting carbon emissions are also expected to be high.

Based on the above two conditions, the study found that vehicles moving at a steady average speed of between 40 and 60mph will be able to reduce carbon emissions. Figure 4.2 shows a histogram that is generated based on the vehicle speed as compared to carbon emissions.

Dedicated lanes provided for public transportations are not only able to increase the effectiveness of Nadi Putra's operation but also help to control carbon emissions from these buses.

Dedicated bus and taxi routes marked with yellow lines and proper signage for other vehicles

Figure 4.2: The reduction of Carbon Emissions based on the vehicles' speed



Source: Traffic Congestion and Green House Gases, Matthew Barth and Kanok Boriboonsomin..

SVMS that has been installed at a bus stop near PJC Complex.

A plasma display panel at the Prime Minister Department Office Complex

ii. Public Bus Management System

Recognising the important role of public bus services in reducing carbon emissions from the transportation sector, it is important to ensure the increase use of Nadi Putra buses from year to year. As such, a public bus management system that aims to improve the ease of use of public buses is important towards this aim.

Although the effectiveness of programmes implemented under the management of the public bus system cannot be measured quantitatively in terms of its impact in carbon emission reduction, it has a co-benefit particularly in terms of reduction in the number of vehicle and single occupancy trips.

Among the programmes to improve the public bus management system implemented by the Transport and Traffic Section are as following:

a. Installation of GPS and GPRS on board Nadi Putra buses
- allows recording of data of buses, drivers, operating routes, schedule service, bus routes, passengers number, bus location and the bus speed.

b. Display of bus information via the installation SVMS and plasma display at the bus stops
- provides bus arrival information and real-time bus departures for passengers.

c. Electronic Ticketing System
- cash and card based (KADPutra) fare collection service systems
- facilitate ticketing transactions consolidated in a centralised computer system.

d. Introduction of KADPutra card system
- facilitate fares payment for those using the bus services daily
- Passengers to get a discount on bus fares as compared to cash payments.

Public Pay Parking at Complex E

4.3 Public Pay Parking

The various initiatives in the form of incentives to promote the use of public transportation should be supported with programs to restrict the use of private transport, especially in the city centre.

The main measure undertaken is to start charging for the use of public parking spaces. These include areas near government office complexes:

i. Complex B
ii. Complex C
iii. Complex E
iv. Putrajaya Corporation Complex

It is important to restrict the use of private vehicles, especially for Putrajaya residents working in Putrajaya and if this is not taken seriously by all parties, it will be an obstacle to the efforts carried out to improve the Nadi Putra bus service as well as the use of park and ride facilities provided.

Public Pay Parking, at Putrajaya Corporation Complex

4.4 Bike Rental Program

A comprehensive network of pedestrian walkways and bicycle infrastructure planned for Putrajaya has made it easier for the implementation of a bike rental program. 'Rent-a-Bike' programme initially provided in Putrajaya's metropolitan parks such as the wetland park and botanical park is to enable the parks visitors to enjoy the beauty of nature without the interference of motor vehicles.

Startingfrom 2012, in line with the Putrajaya low carbon green city aim, the bike rental program has been extended to the city centre area Three rental centers are provided at the I-centre of Dataran Putra, the Putrajaya Sentral and Putrajaya Corporation Complex with 100 units of bicycles available for rental.

Two bicycle rental center at Dataran Putra and Putrajaya Corporation Complex.

Bike rental rates are based on the type of bicycles and the day of the week. Table 4.5 summarizes the rental rates charged. Rental deposit of only RM50.00 is imposed on all types of bikes.

Table 4.5: Bicycle Rental Rate based on the type of bicycles

Type of bicycle	Rental rates (one hour or part of it)	
	Week Days	Sat, Sun , Public Holiday
Mountain Bike (adults&children)	RM 4.00	RM 6.00
Tandem Bike	RM 7.00	RM 10.00
Post Bicycle	RM 4.00	RM 6.00

4.5 Pilot Project – Proton Hybrid Car

The Fleet Test Vehicles (FTV) programme is a pilot project to test the rolling out of Proton hybrid cars. In addition to the introduction of vehicles, this program is also to test the implementation of charging stations for the hybrid cars.

In Putrajaya, 6 government agencies involved in this fleet test program, namely:

i. Prime Minister's Office
ii. Perdana Leadership Foundation
iii. Ministry of Energy, Green Technology and Water (KeTTHA)
iv. Transportation Ministry
v. Ministry of Finance
vi. Putrajaya Corporation

Each of the above agencies has been allocated a hybrid car (Exora model or Saga Model) and each agencies are provided with temporary charging stations throughout the test period. Records and the results of this test programme are expected to help improve the national automotive industry manufacturing of hybrid car technology.

Hybrid car Exora model provided to PJC for testing

Temporary charging station is provided within the PJC complex area.

5.0 ENERGY USAGE

5.0 ENERGY USAGE

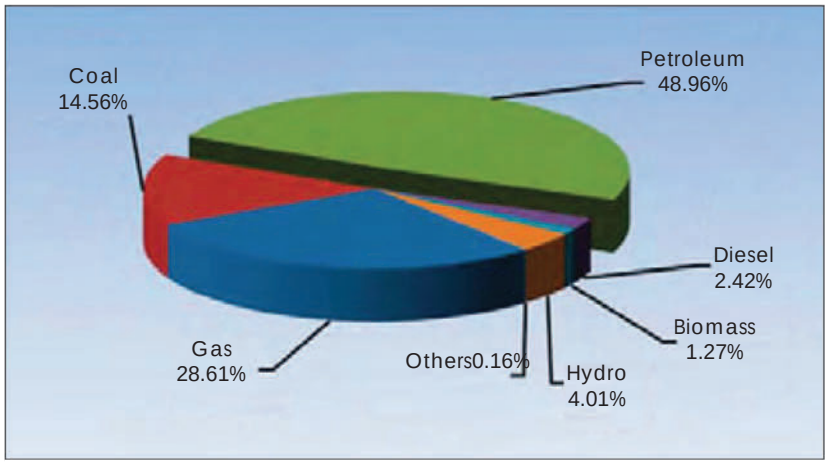
Resources to generate electricity in Malaysia are dominated by non-renewable natural resources such as fossil fuels. Based on the statistics by the Energy Commission in 2010, the reliance on fossil fuels in the electricity supply industry was about 90%. The use of the natural resources in energy supply is also one of the main causes of greenhouse gas emissions (GHG) into the atmosphere.

According to the 'Malaysia's Second National Communication (NC2)' report, the inventory of carbon emissions in the year 2000 in 10 sectors also found that the energy supply industry generates the highest percentage of carbon with 35%, followed by the transportation sector with 21%. This clearly shows that the high energy consumption of electricity would increase carbon emissions.

Dependence on non-renewable natural resources such as oil and gas which is now being enjoyed by Malaysia will be a critical issue if not addressed immediately. Power generation will be critical in the future and Malaysia's rich resources of alternative renewable energy (renewable energy resources) such as solar, hydro and biomass energy should be exploited fully for the purpose of power generation and this will directly help solve the problem of environmental pollution and carbon emissions.

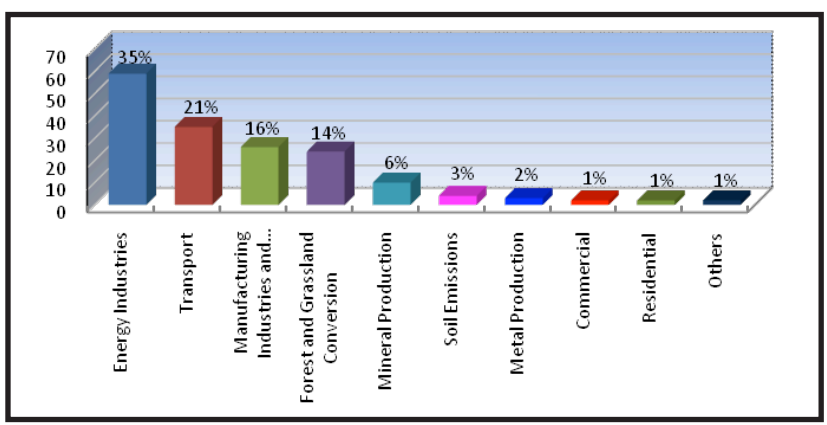
The following are some initiatives for the increase of energy efficiency and usage of renewable energy.

Chart 5.1: Generating Capacity by Fuel Type



Source: Report on Electricity Supply Industry in Malaysia, 2010

Chart 5.2: Source of Main Carbon (CO_2) Emissions for Year 2000



Source: Malaysia's Second National Communication (NC2) to the UNFCC

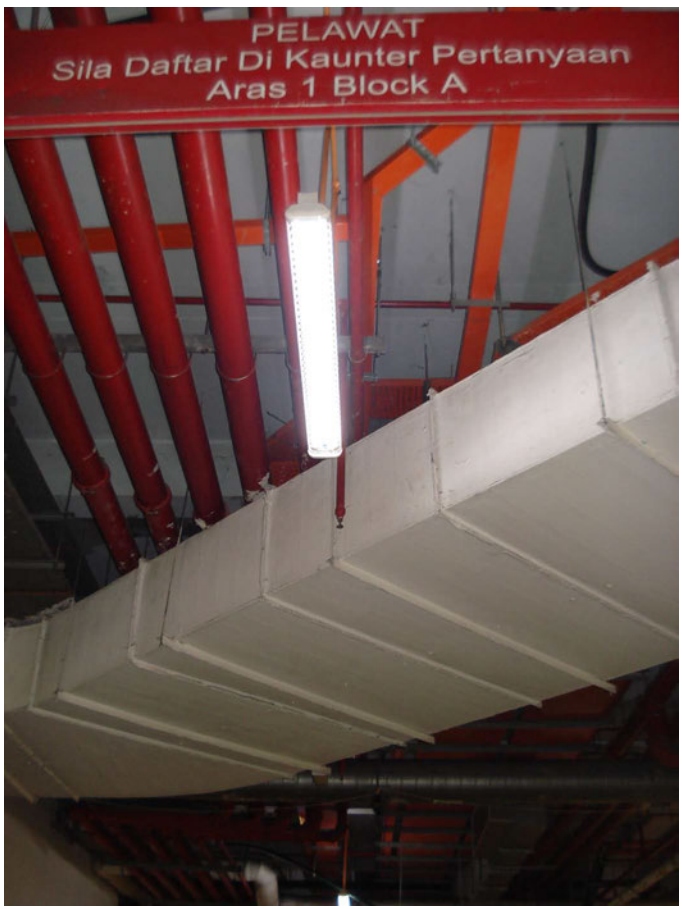
5.1 Improvement of Energy Efficiency

Design, construction materials, buildings location and the use of EE electrical appliances are among the factors that influence the energy efficiency of a building.

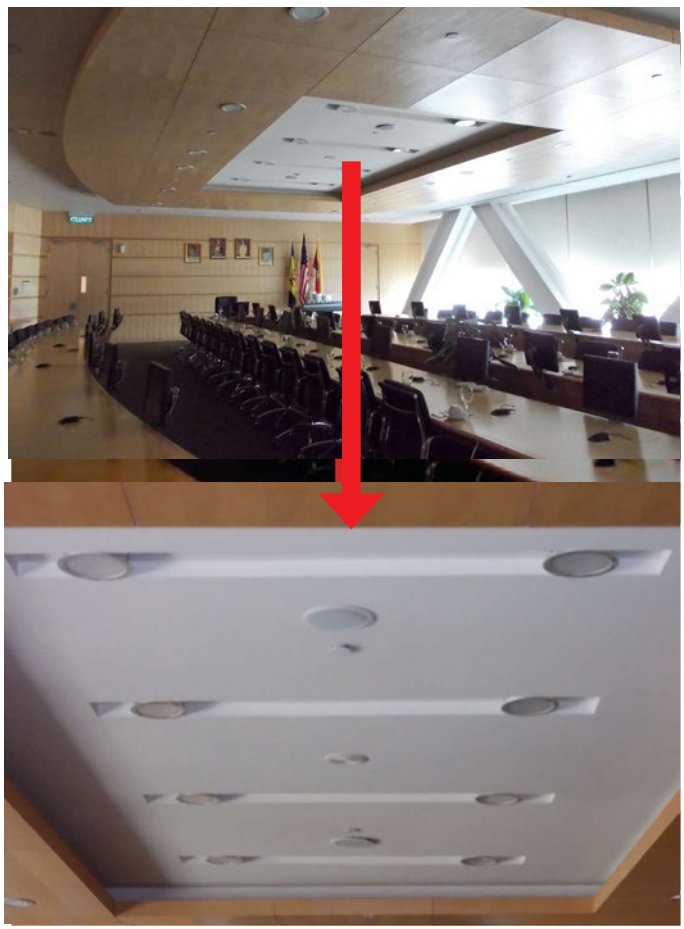
The City Development Department of PPj has already begun initiatives to 'retrofit' Putrajaya Corporation's building complexes on a small scale through the following programmes:

a. The use of energy saving and more environmentally friendly lights such as LED and T6. These types of lighting can save 30%-60% as compared to normal fluorescent lamps. The locations involved are:

- Concourse level car park (T6 lights).
- Tanjung Meeting Rooms (LED).



T6 lights as an alternative to LED as the cost is lesser.



Tanjung Meeting Room which has been refitted with LED lights.

b. Installation of solar panels on the roof of block C building to provide electricity for the lights in the block C emergency staircase (levels 1 to 9).

Block C Building, PPj Complex

2kW Solar panels

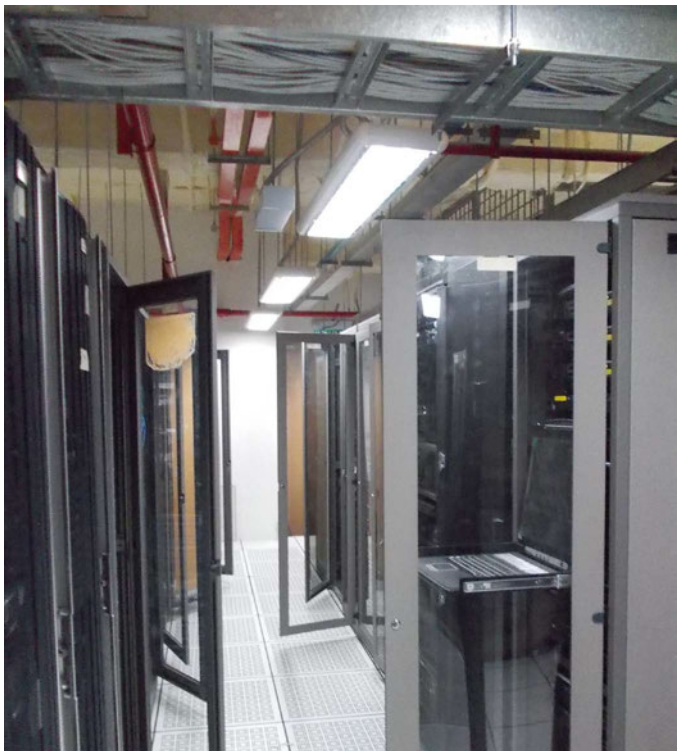
c. Green Server Farm, PPj

Beginning from mid-July 2012, the Corporation server farm has moved to a new space from level 6 to level 5 at Block A. The construction of a new server farm is also incorporating green technology features such as:

a. environmentally friendly partition wall material (ceiling Queen Energy Board) and can help save energy based on its ability as a heat insulator (heat / thermal insulation), rapid temperature drop (fast cooling effect) and ability to maintain room temperature (good sustaining for room temperature).

This paperless energy board replaces the paper-based gypsum board and reduces mold growth through absorption of excessive moisture in the room.

T6 and LED electricity saving lights



T6 lights in all server farm corridors.

LED lights for all emergency lights.

- Environmentally friendly air conditioning system without chlorofluorocarbon (CFC) emission

b. Conversion of energy-saving lights are also carried out in public areas such as at the following locations:

   - Seri Wawasan, Seri Saujana and Seri Gemilang Bridges
   - Laman Bunga Raya

Laman Bunga Raya

Seri Saujana Bridge

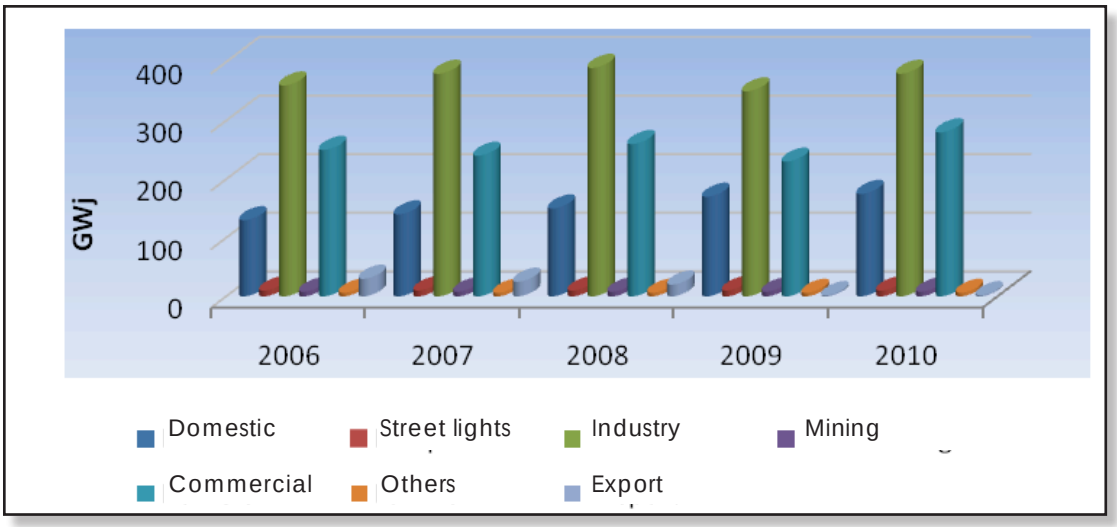
c. The uses of energy saving light bulbs are also used in new projects under the control of PPj such as small business kiosks near the Putrajaya Corporation complex.

Small business kiosks near the PPj complexes have been fitted with LED and T6 lights.

5.2 The Use of Renewable Energy

Based on the report on the Electricity Supply Industry in Malaysia - performance and statistical information, 2010, it was found that the highest sales of electricity are to the industrial, commercial and domestic (household) sectors since 2006. In Putrajaya, where there are no large-scale industrial activities, reduction of energy requirements from non-renewable resources can be carried out through the implementation of Building Integrated Photovoltaic (BIPV) systems.

Chart 5.3: Electricity Sales by TNB



Source: Report on Electricity Supply Industry in Malaysia, 2010

i. The Use of BIPV systems in residential buildings and offices

Electricity is used for cooling purposes, lighting, the use of electrical appliances, water heating, cooking and so on. The technologies for heat recovery and solar panels are alternatives to generate electricity in the building.

One of the property developers in Putrajaya, Senandung Budiman Sdn. Bhd. have already taken the initiative to integrate the use of solar energy resources in the design of buildings through the BIPV system.

a. a. 11.88 kWp BIPV system for commercial buildings

Danau Point office complex, Precinct 16.

b. 5.4kWp BIPV system for residential buildings.

Bungalows, Precinct 16.

ii. Proposed Construction of 5MW Solar Power Station

PPJ has approved the proposal for the development of 5MW solar farm by Tenaga Nasional Berhad in Precinct 11. The proposal is in line with the national target to increase the amount of energy generated from solar sources to 65MW by 2015 (Source: TNB-Energy services).

The areas that will receive the solar energy resources are Precincts 7 to 11.

Figure 5.1: Location plan of the Proposed 5MW Solar Farm, Precinct 11

The proposed site for a 22-acre solar farm.

iii. Pilot Projects

a. Bus stop, PPj Complex

Joint venture project between the Putrajaya Corporation and Malaysia Green Technology Corporation. Installation of solar panels to the bus stop will supply electricity to the lights in the bus stop. Each solar panel can supply 110watts of power.

Only LED lights are used at this bus stop.

b. Park lighting with solar-wind hybrid system

Park light powered with the hybrid solar-wind system are installed at the waterfront area near the New Millennium Monument, Precinct 2.

Daytime

Nighttime

5.3 Legislation and Policies (Regulatory Framework)

New conditions and requirements were introduced for the approval for development applications by PPj. The use of energy-saving pedestrian lights is a requirement imposed in the approval for street lights installation.

6.0 WATER USAGE

6.0 WATER USAGE

Water is a vital resource for the survival human and other flora and fauna. As such it needs to be conserved as to address the water supply shortage. Water sources are often polluted causing the shortage of water resources available to be treated for our daily consumption.

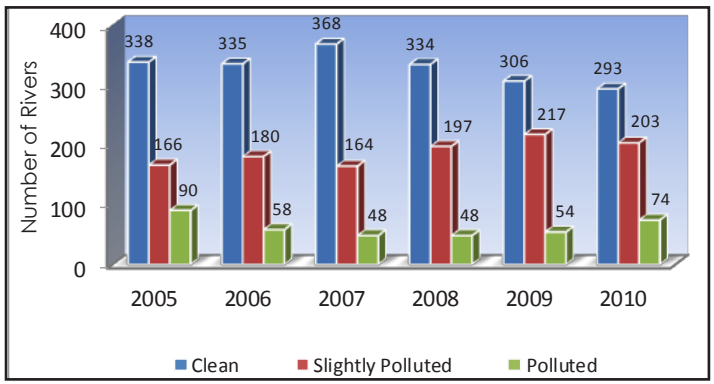
Based on the Environmental Quality Report 2010 statistics, the total number of rivers with clean status has dropped to 293 compared to 306 in 2009; while the number of polluted rivers has increased to 74 compared with 54 in 2009 (refer to Chart 6.1). The major sources of pollution have been identified as effluence from sewage treatment plants and agro-based industries.

Actions to ensure that pollution from the discharge of sewage treatment plants should be given priority in the implementation of green city initiatives.

The water supply shortage situation will become more serious in the event of loss of water or non-revenue water (NRW) before the treated water can be supplied to the consumers. In Malaysia, the NRW issue is not only a waste of clean water but also result in monetary losses.

The data from the National Water Services Commission (SPAN) and the Association of Water and Energy Research Malaysia (AWER) clearly shows the loss (see Table 6.1).

Chart 6.1: River Water Quality Trends in Malaysia (2005-2010)



Source: Environmental Quality Report, 2010

Table 6.1: Summary of Average Rate of NRW and Estimated Financial Losses

Year	2008	2009	2010	2011
NRW (%)[1]	36.93	36.63	36.37	36.70
Estimated Financial Losses caused by NRW (RM million)[2]	RM162	RM163	RM174	No information

Source: (1): www.span.gov.my
(2): Press release, January 5, 2012, Association of Water and Energy Research Malaysia

The issue of water loss also occurs in Putrajaya, where, based on data supplied by Syabas in the PJC MURNInet study, the NRW rate is between 10.8% and 13.4% from 2009 to 2011 (see Table 6.2). This problem may be due to leakage of water pipes. If the NRW rate is increasing in Putrajaya, it directly resulted in wastage of water supply and indirectly increases carbon emissions in the process of treating water.

It was observed that the use of water recorded in 2011 has decreased by 0.96% compared to 2010; whilst, the volume of treated water produced increased by 3.05%. This indicates that more energy is used to generate the volume of water that is not used by the end users. To address the issue of NRW, water utility companies should play their role in the maintenance of leaking pipes or enforcement against water theft.

PJC has also implemented water saving initiatives through actions such as the re-use of treated sewage water and the use alternative sources of water from a large-scale rain water harvesting system through the creation of a large artificial lake. Water-saving awareness campaigns should be increased as the rate of water consumption per capita in Putrajaya is quite high.

Table 6.2: Water loss rate in Putrajaya, 2009-2011

Year	2009	2010	2011
The amount of treated water generated (m^3)	17,619,149	18,801,456	19,375,275
The amount of water used officially (m^3)	15,714,618	16,946,883	16,784,325
NRW (m^3)	1,904,531	1,854,573	2,590,950
NRW (%)	10.8	9.9	13.4

Source: Bandar Sejahtera Putrajaya Reports) 2009, 2010 & 2011

Table 6.3: Comparison of Domestic Daily Water Consumption in Putrajaya, 2009-2011

Year	Domestic Water Consumption (litre/day/person)		
	Putrajaya[1]	Malaysia[2]	World Health Organization (WHO)[3]
2009	236	-	165
2010	368	-	
2011	351	203	

Source:
(1): Laporan Bandar Sejahtera Putrajaya (Putrajaya Harmonious City Report)
(2): www.kettha.gov.my
(3): www.merdekareview.com/bm/news

6.1 Water Quality Control

The control of the water quality of rivers and lakes of Putrajaya is important as the river that flows through the Putrajaya becomes the source from where water is treated in the downstream water treatment plants. At the same time Putrajaya Lake is also used as a venue for a variety of water sports activities.

In general, point source pollution of water is controlled using Gross Pollutant Traps (GPT) and the water quality control of discharges from sewage treatment plants (STP). The Wetlands also serve as a mechanism for the final stage in the management of water quality where it can assist in further filtration to ensure water quality.

i. Centralised Sewerage System

In the Putrajaya Master Plan, the provision for a centralized sewerage system that utilises an activated sludge treatment process has been proposed. The quality of effluent from sewage treatment plants in Putrajaya must comply with Standard A, Second Schedule of the Regulations of the Environmental Quality (Sewage) Regulations 2009, the Environmental Quality Act, 1974 to prevent the discharge from polluting Ayer Hitam and Langat rivers.

To date, two centralized sewage treatment plant (STP) has been developed and operated in Putrajaya as shown in Table 6.4.

Table 6.4: Basic Information on Centralised Sewage Treatment Plant

STP Number	Site Area[(1)]	PE[(2)]	Total Daily Discharge[(3)]
STP1, Pre 14	1.8 hectare	100,000	6,750m^3
STP2, Pre 5	6.6 hectare	Phase 1: 300,000 Phase 2: 300,000	48,000m^3

Source:
(1) Pre-Calculation Plan
(2) PB Development Proposal Report
(3) Source: Environmental, Lakes & Wetlands Division

Based on Wastewater Discharge Quality Report ', discharge from both STPs has complied with Standard A as required.

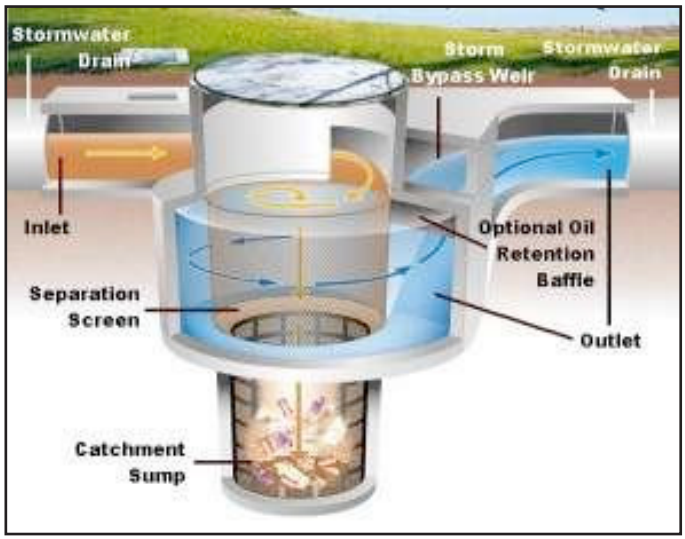
ii. The Use of Gross Pollutant Trap (GPT)

The main function of the GPT is to help control water quality to avoid point source gross pollutants particularly, from flowing into the drainage system. In Putrajaya, GPT is used as a mechanism to control quality of the lake water.

A total of 392 units of GPT were approved for construction and 353 units have been constructed. Maintenance work is carried out as often as 3 to 4 times a year. Overall, there are four types of GPT used in Putrajaya:

- Conventional
- Ecosol
- Cleansall
- Continuos Deflective Separation (CDS)

Figure 6.1: Examples of Typical Design Structure of CDS Type GPT



Refuse trapped in GPT in the process of being cleared out

iii. Putrajaya Wetland

The Putrajaya wetland with an area of approximately 200 hectares act as a filtration system for Chuau and Bisa rivers before it enters the Putrajaya lake system. The Putrajaya wetland is designed using the multi-cell and multi-stage concept, comprising of six arms and 24 wetland cells separated by weirs.

The condition of wetland cells

Figure 6.2: Putrajaya Wetlands

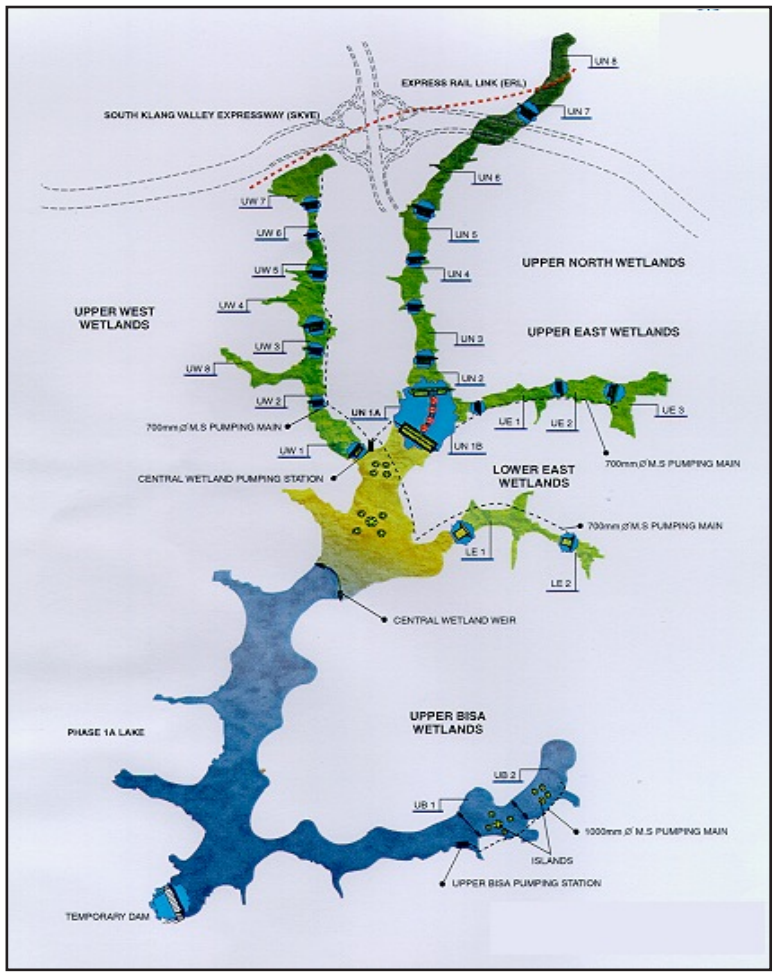


Table 6.5: Basic Information of Putrajaya Wetlands Area

Area	Plants Area	Open water	Weir & Island	Zone of Intermittent inundation	Maintenance tracks
Area (hectare)	77.70	76.80	9.60	23.70	9.40
Total wetland plants	41 spesies 41 species				

Source: Environment, Lakes & Wetlands Division

6.2 Performance of Lake Water Quality Index

Through various initiatives and mechanisms that was carried out by PJC in controlling water quality, a good water quality index for the lakes and rivers has successfully been recorded over time. This can be seen through the water quality index readings taken from inlet streams flowing into Putrajaya, the Putrajaya lake as well as the outlet outside the border of Putrajaya.

Table 6.6: Comparison of River Water Quality Index

Location	River & Lake Water Quality Index		
	2009	2010	2011
River Chuau Inlet	81.2 (Class II)	82.9 (Class II)	83.8 (Class II)
Lake Water	93.4 (Class I)	93.9 (Class I)	93.5 (Class I)
Outlet after Putrajaya Dam	83.5 (Class II)	83.42 (Class II)	85.0 (Class II)

Source: Environment, Lakes & Wetlands Division

6.3 Alternative Water Resources

As a city with planned with ample green spaces and parks of (approximately 1,356.97 hectares) (Inspection Report of Putrajaya Draft Structure Plan), the need for water for landscape irrigation is estimated in the Putrajaya Drainage Master Plan at 18.1 million litres/day. To meet the needs of high water, the PJC has been using alternative water sources to reduce its dependency on the use of treated water for landscape irrigation purposes.

i. Putrajaya Lake

The 400-hectare man-made Putrajaya Lake is the main alternative source of water for various purposesperforming as large scale rainwater harvesting system for the city.

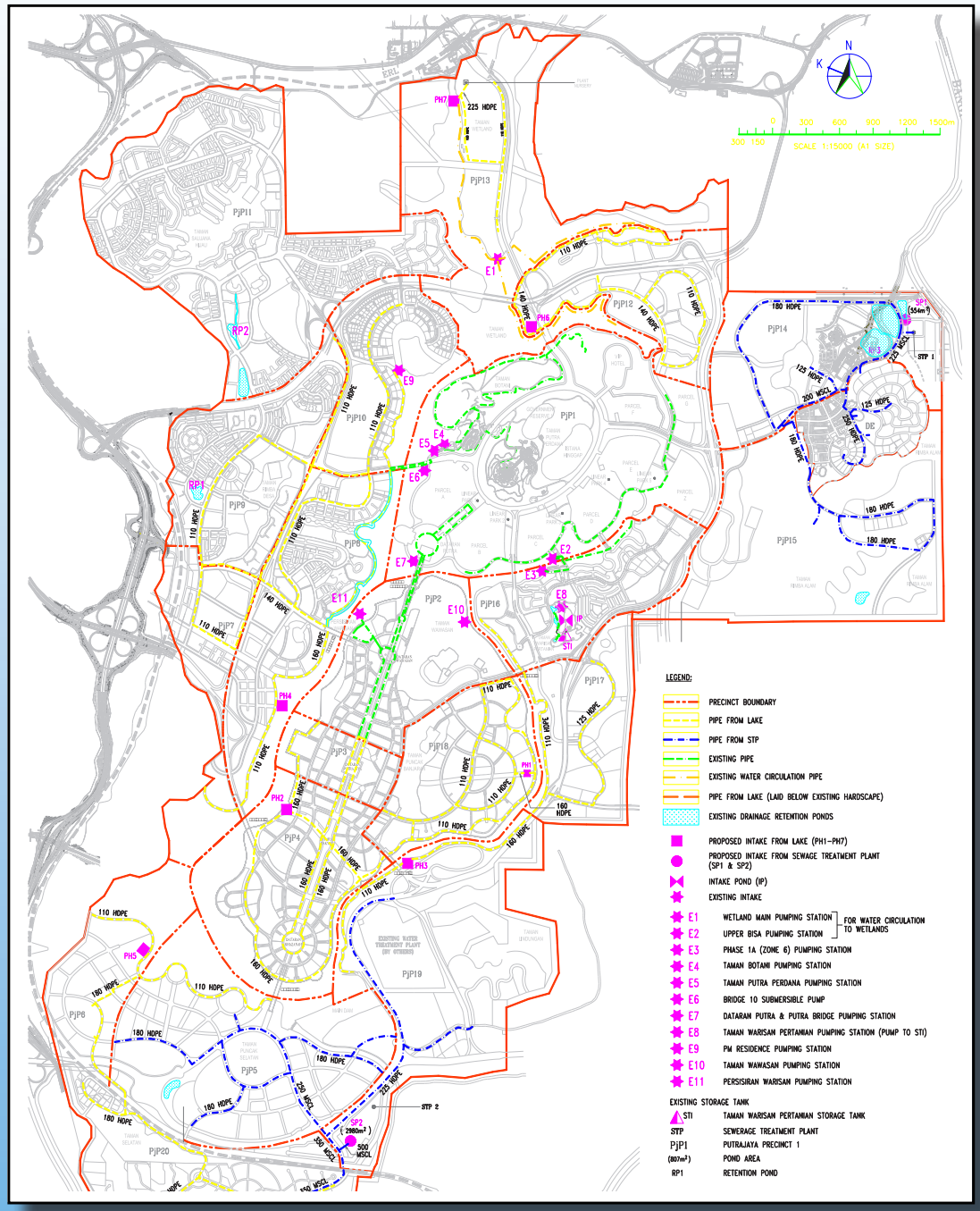
For the purposes of landscape irrigation, a total of 7 water pump houses and 11 intake points were planned along the lake waterfront area (Figure 6.3). To date, four pump houses were constructed. Details of coverage area and water requirements of each pump house are as shown in Table 6.7.

Table 6.7: Pump House Information and Coverage Areas for Irrigation

Pump House	Coverage Area	Area (m^2)	Irrigation Area (m^2)[1]	Water Requirement (m^3/day)
Precinct 18	Lake Waterfront P18	42,900.00		75.00
	P18 Streets	206,600.00		207.00
Precinct 4	Lake Waterfront 3 & 4	107,500.00		187.00
	Persiaran Perdana Precinct 3 & 4	173,200.00		50.75
	Precinct 3 & 4 Streets	464,000.00		241.00
Precinct 19	Road Reserve (R8B)	71,334.00	10,700	67.41
	Road Reserve (R8C)	162,613	24,392	153.67
	Park (LK4 East)	15,331.20	2,299.70	14.49
Precinct 6	Road Buffer	374,232.00	56,135.00	168.30
	Putrajaya International Convention Centre (PICC)	194,199.60	29,129.90	183.50
	Lake Waterfront	45,296.60	6,794.50	9.90
	Park (LK4 west)	30,480.00	4,572.00	55.50
	Maritime Centre	20,643.60	3,096.50	45.00
	Alam Warisan	29,777.80	4,466.70	36.00
	Putrajaya Water Sports Complex	20,411.40	3,061.70	19.30
Precinct 2	Lake Waterfront Precinct 2	678,500.00		1,966.00
	Persiaran Perdana Precinct 2	78,300.00		117.00

Source: Proposed Development Reports
*approximately 15% of the land requires irrigation

Figure 6.3: Location of Water Pump Houses along the Putrajaya Waterfront



One of the main functions of the Putrajaya Lake is for recreational purposes. Therefore, the use of lake water as an alternative water source is controlled and requires the prior approval from PJC so as to ensure that the water level of the lake is maintained at 21 meters. Records from 2009 to 2011 shows that 117,034,000 litres of lake water has been approved for extraction for various purposes.

Based on the volume of lake water extraction approved in 2009 to 2011, a comparison was made based on the following two aspects:

- Savings on the expenses to be paid if the same volume of water is used from treated water sources as compared to the RM500 annual permit;
- The savings on the volume of treated water resulting from the use of the lake water is equivalent to the annual water usage of residents.

Table 6.8: Benefits of Using Lake Water as an Alternative Water Resource

Item	2009	2010	2011
Approved Annual Lake Water Intake (litre)	32,886,000	32,484,000	51,664,000
Annual permits rate (RM)	RM500		
Savings Against The Use of Treated Water Resources (RM)[1]	RM52,946.46	RM52,885.28	RM83,179.04
Yearly Water Consumption[2]	equals: 444 person	equals: 438 person	equals: 696 person

note:
(1) Based on the government department rate of RM1.61/m3.
(2) Estimated based on the average daily domestic water consumption of Malaysia (203litre/person) x 365 days.

Generally, the Putrajaya lake water taken for a variety of uses as follows:

a) Irrigation of landscape area;
b) For use at the site offices;
c) For cleaning and spraying / 'wash through';
d) For the control of dust and dirt on the road;
e) For cleaning of drains and siltation in the construction area.

ii. Utilization of Treated Wastewater

The Putrajaya Drainage Master Plan has identified treated wastewater as one of the potential source water for irrigation of landscaped areas. Currently, treated wastewaters from STPs are reused for landscape watering and for general cleansing purposes in the STP area only.

6.4 Legislation and Policies (Regulatory Framework)

PJC has adopted the Guidelines on Rain Water Harvesting and Utilization System (SPAH) in Putrajaya. New conditions have been included in the approvals of the Planning Permission for Building Erection for detached and semi-detached houses.

"Need recommendations for Rain Water Collection and Utilization System (SPAH) for the development of these houses in the submission of an application for the Planning Permission for Building Erection."

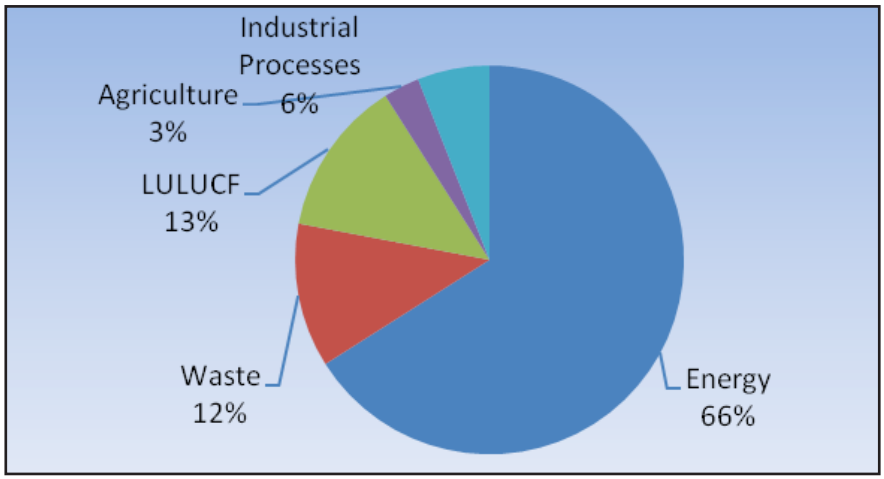
7.0 SOLID WASTE MANAGEMENT

7.0 SOLID WASTE MANAGEMENT

Referring to the Malaysia's Second National Communication (NC2) report, the solid waste is the second largest sector contributing to greenhouse gases (GHG) in Malaysia after the energy sector. The Inventory in the NC2 report shows that, about 12% of GHG are from the solid waste sector. The main GHG emission from this sector is methane.

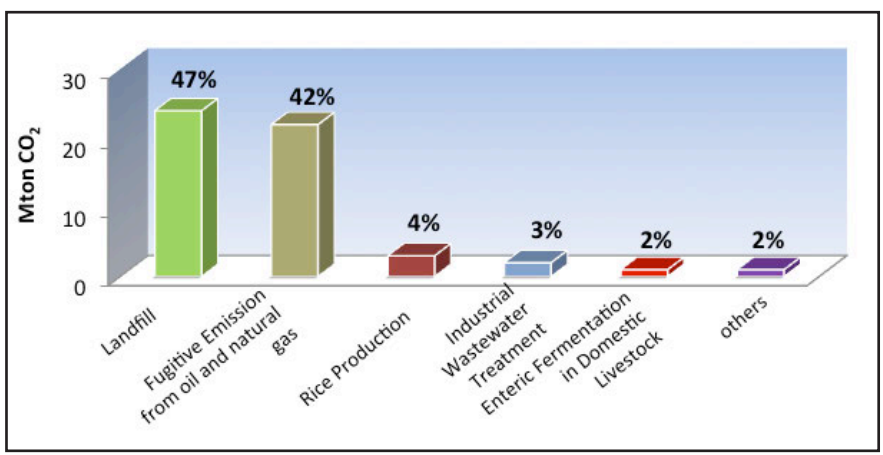
Methane content is the second highest GHG after carbon, accounting for 24% of total GHG in Malaysia according to the inventory for year 2000. These gases are mostly released from solid waste disposal landfills sites. In the case of Putrajaya, solid waste is sent out to landfills in Tanjung 12, Kuala Langat which is located about 30km away from the city. In the effort to achieve a low carbon green city status, PJC has undertaken various initiatives aimed at reducing the amount of solid waste finally disposed at the Tanjung 12 landfill.

Chart 7.1: Percentage of GHG Emissions by Sector, 2000



Source: Malaysia's Second National Communication (NC2) report

Chart 7.2: Leading Sources of Methane Gas Emissions



Source: Malaysia's Second National Communication (NC2) report

7.1 Provision of Recycling Facilities

Various facilities/services are provided by the PJC through the City Cleanliness Control Division to increase the percentage of recycling in Putrajaya. Among them are:

i. Permanent Recycling Centres (buy back centre-BBC).

To date, there are four permanent recycling centres provided in the peripheral precinct i.e. Precinct 8, 9, 11 and 16.

The recycling center in Precinct 9 is popular amongst Putrajaya residents.

Educational facilities are also available to increase awareness and to promote 3R activities.

Second-hand clothes donated by the public for charity.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PLASTIK
KERTAS

ii. Mobile recycling centres - MRC

There are two MRCs provided at Precinct 11 and 16 and operates on Sundays only at specific times as follows:

- Parcel 1C Apartment, Precinct 16, every Sunday, 9.00 a.m. to 12.00 p.m.;
- at Jalan P11A1/5, Precinct 11, every Sunday, 1.00 p.m. to 3.00 p.m.

MRC facility at Precinct 11

iii. Kerbside Programme (house to house collection)

Under this programme, each household was allocated two types of plastic bags to separate recyclable material:

- blue plastic bags for paper materials
- white plastic bags for metals, plastic and glass

The once a week collection schedule is according to :
Precinct 9: Monday
Precinct 8, 10, 14 & 16: Tuesday
Precinct 11: Friday

iv. Facilities in Residential Apartments

Facilities provided in the apartments are in metal containers. Two metal containers will be provided to separate the two different types of recycled materials, namely:

- Paper;
- Metal, plastic and glass.

v. Recycling Facilities at Office Complexes (Wastewise Programme)

In addition to the facilities and programmes carried out in residential areas, recycling programmes and facilities are also actively carried out at the office complexes. Based on the record, about 40% of total non-domestic waste is generated from the office and commercial complexes. Recycling facilities in the form of recycle bins or recycling boxes are commonly provided in the office complex. The waste collection company, Alam Flora will buy recyclable items from offices based on a specific monthly schedule.

For example, there is individuals are provided recycling boxes as well as at each and each floor of PJC Office Complex.

Large recycling boxes provided at each floor

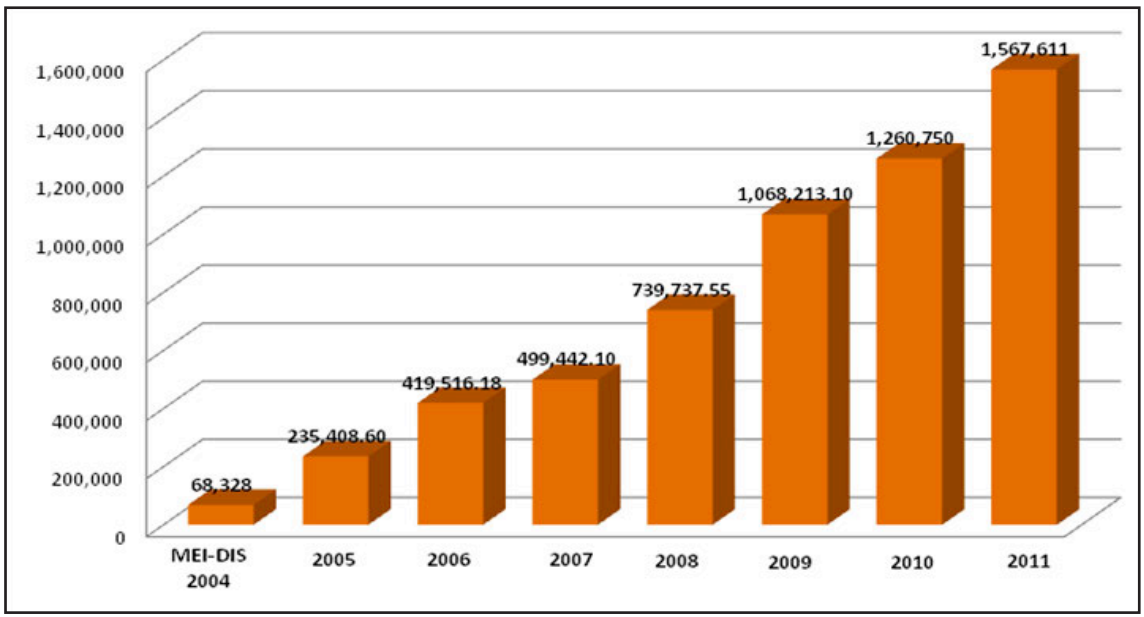
Small recycling box for each individual.

Scheduled collection of recyclable materials by Alam Flora at the government office complexes are well received by the public.

7.2 Recycling Achievement Rate

Recycling rate in Malaysia was recorded at a rate of 5% only (www.ppsppa.gov.my). This is lower compared tohe rate of other countries such as Germany (74%), Singapore (59%) and Australia (67%). The Ministry of Housing and Local Government has targeted the recycling rate for Malaysia to be 22% by 2020. In Putrajaya as a result of various facilities provided and campaigns carried out, the amount of recyclables collection has been increasing from year to year.

Chart 7.3: Total Recycling Materials Collection, 2004-2011



Source: Alam Flora and City Cleanliness Control Division

Based on the data collection of recyclable materials, the achievement as a percentage of recycled material compared to the amount of solid waste generated between 2009 to 2011 is shown in Table 7.1.

Table 7.1: Percentage of Recycling in Putrajaya, 2009-2011

Year	Total Solid Waste (kg)	Total Recyclable Material (kg)	Percentage of Recycling	Percentage of Recycling, Malaysia
2009	11,877,000	1,068,213	9.0%	5%
2010	14,695,240	1,260,750	8.5%	
2011	17,756,000	1,567,611	8.8%	

Source: City Cleanliness Control Division and Alam Flora.

7.3 Food Waste and Garden Waste Composting Programme

In addition to the solid waste recycling initiatives, efforts to reduce final solid waste sent to disposal sites are also carried out through food and garden waste (green waste) composting programs.

i. Food Waste Composting Using Compost Machine

The first food waste composting machine in Putrajaya has been operational since March 2010 and it is located at the Precinct 16 neighbourhood complex. Organic waste is collected daily from the Precinct 16 food court and Precinct 8 market to be processed into compost.

Each outlet in the food court and market is supplied with a special bin to collect organic waste. Employees of Alam Flora will collect the organic waste every day. Organic waste will be cleaned before they are added into the compost machine.

The maximum daily load for this compost machine is 100kg of organic waste and is capable of generating 200kg of compost in a week.

Enzyme will be added to accelerate the composting process. Organic waste can be composted within 48 hours.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The compost material will be allowed for stabilization for 2-6 weeks before being packed for sale.

The compost material is sold by Alam Flora in 2 types of packaging: MYR 3/kg (household users); MYR 20/20kg (landscape contractors).

Based on the data collected by Alam Flora, 50% of the composition of Putrajaya solid waste consists of food waste. If these program is to be extended to all precincts, it may proof to be very effective in reducing the final disposal of solid waste to landfills. In addition, there will be a savings on the landfill tipping fees paid by PJC.

ii. Garden Waste Composting

The solid waste in Putrajaya is not only generated by households and offices, but the extensive landscaped areas and gardens also generate garden waste in the form of dried leaves and branches. Garden waste from landscaping and parks maintenance works are also collected to be composted. A designated site for composting garden waste has been provided in Taman Wetland.

Dried leaves and branches are compiled at this designated site for further processing.

Tree trunks and branches has to be shredded before the composting process.

This tent can accommodate around 50-60 tons of compost.

Effective microorganism (EM) is added once a month to accelerate the composting process.

The process of turning the compost has to be carried out every three days for the purpose of aeration.

The final compost material is obtained within three months.

7.4 Innovative Reuse of Solid Waste

Solid waste reduction efforts in Putrajaya is also carried out through an innovative way of the reusing of solid waste. Through the PJC Local Agenda 21, residents' associations of the Phase 4B Apartment in Precinct 8, successfully produced products using collected used banners materials. A centre has been established to carry out these activities and has grown into a green economic activity for the residents.

An operation room has been set up in the residents' association's office space in Phase 4B Apartment, Precinct 8.

Various products from used banners were produced through the efforts of the local community

This program also received the support of TEKUN particularly by providing free sewing machines and training.

The Chairman of the Residents' Association of Phase 4B Apartment is hoping for more participation in this programme as it can generate income, particularly for housewives.

7.5 Pilot Projects

i. Separation of Waste At Source

The pilot programme which started in August 2009 was conducted in Precincts 8 and 9, which involving 400 homes. The homes were provided with two bins to separate organic waste and recyclable materials.

The waste separation at source programme using the two bin system.

Organic waste is collected three times a week and once a week for recyclables.

ii. Biodegradable Plastic Bag Campaign At Putrajaya Mega Farmers' Market

On April 27, 2012, the Federal Agricultural Marketing Authority (FAMA) has launched a campaign on the usage of biodegradable plastic bags at the farmer's market in Putrajaya. As an initial step, the Putrajaya mega farmers' market was the first to use FAMA's biodegradable plastic bags.

Biodegradable plastic bags were handed out for free to about 200 traders.

These biodegradable plastic bags only require one-year to degrade as compared to 300 years for ordinary plastic bags.

7.6 Per Capita Solid Waste Generation

The amount of solid waste per capita generated by Malaysian is recorded at approximately 0.8 kg per day. The total solid waste generated per day is 15,000 tons, and this can cover the Petronas Twin Towers in 9.5 days (source: Ministry of Housing and Local Government). The rates of solid waste generation in Putrajaya are summarized in Table 7.2 and this can be compared to the Malaysian scenario.

Table 7.2: Summary of the Rates Solid of Waste Generation in Putrajaya

	Kg/capita/day(kg)		
	Domestic	Commercial	Total Solid Waste
Malaysia[1]	0.628	0.269	0.897
Putrajaya[2]			
2009	0.357	0.126	0.483
2010	0.344	0.245	0.592
2011	0.369	0.267	0.637

Note:
(1) National Strategic Plan for Solid Waste Management, August 2005.
(2) Calculations based on data in Putrajaya "Bandar Sejahtera" Report & Department of Statistics Malaysia

8.0 MANAGEMENT AND ADMINISTRATION OF THE CITY

8.0 MANAGEMENT AND ADMINISTRATION OF THE CITY

The creation of a green low carbon lifestyle is critical in ensuring that the initiatives towards achieving Putrajaya as a low carbon green city can be realized. This can be done with the help of information technology, and educational campaigns at various levels. The three main target groups are the local residents, employees and visitors of Putrajaya. The impact of these initiatives may be difficult to measure quantitatively in the short term but it is important as the impact will be significant in the long run.

8.1 Online Services

Since year 2000, PJC has started providing online services to facilitate the day to day daily business between the public and PJC. Currently, there are 10 types of online services provided through the PJC's website:

- e-Cukai (Quit Rent Payment)
- e-Cukai (Assessment Rate Payment)
- e-Kompaun (Compound Payment)
- e-Tempahan (Reservation)
- e-Profile (Business Licencing)
- e-Pemajuan (Development Application)
- e-Sewa (Rental)
- e-Aduan (Complaints management)
- e-Library
- e-Lesen (Business Licencing)

On-line services will not only save time, but the public and property developers can reduce the use of paper document/forms, plans and reports. One example is through e-Pemajuan. A total of eight different types of applications related to planning and development control and can be submitted by the property developers through on-line services, namely:

- Planning Permission Layout Plan Approval
- Pre-Computational Plan Approval
- Planning Permission for Building Erection
- Approval of Earth Works
- Approval of Road and Drainage
- Approval of Street Lighting and Traffic Lights
- Erection of Building Approvals
- Approval of Temporary Permits

A huge reduction of paper consumption has been achieved through the e-Pemajuan system. A comparison on the required paper copies between the manual and the electronic applications are as shown in Table 8.1.

Table 8.1: Comparison on Required Documents and Plans between the Manual submission and Electronic submission for Planning Permission

Type of Document	Required Copies of Plans and Documents	
	Manual	Electronics
Development Proposal Report	5 sets	2 sets
A1 sized Plan	10 sets	2 sets (1)

Note: (1) only four sets are required during final Planning Permission approval.

During the processing of applications for Planning Permission, amendments and resubmission of plan and reports are normally required of the applicants. This process involves the reprinting of plans and reports and thus involves use of paper. The replacement with digital copies has helped reduce about 80% of the need for paper copies. Indirectly, PJC document storage space requirements are also reduced as well as printing costs for the applicant.

Table 8.2: Estimated Reduction of Paper for Planning Permission Applications

Type of Application	Number of A1 Plans		Reduction of Plan for Each Application
	Manual	Electronics	
Layout[1]	180-280 sheets	36-56 sheets	144-224 Sheets
Pre-Computation[2]	10-30 Sheets	2-6 sheets	8-24 Sheets
Building Erection[3]	100-400 sheets	20-80 sheets	80-320 Sheets

Note:
(1) an estimate of 18-28 sheets for a set of plans
(2) an estimate of 1-3 set sheets for a plan
(3) an estimate of 10-40 sheets for a set of plans

8.2 Reduction of paper usage for meetings

Since January 26th, 2012, PJC One Stop Centre (OSC) Meeting has taken steps to reduce the use of paper in conducting meetings. Meeting papers are no longer printed for distribution to all of the members of OSC but instead can be accessed via the OSC meeting system. Other ICT media facilities provided are tablet computers and LCD monitors in the meeting room to reduce the dependency on paper copies.

8.3 Usage of e-Guidelines

As a local authority, PJC provides a wide range of guidelines and documents for the public and staffs. From time to time, guidelines and reference documents will be updated and this will require reprints which will increase the use of paper and printing costs.

Usage of e-Guidelines as the main media for the distribution of guidelines and statutory planning documents such as the Structure Plan and Local Plans, was implemented in PJC.

e-Guidelines helps limit excessive printed copies.

ICT facilities such as tablet computers and LCD monitors replace the dependency on paper in OSC meetings.

8.4 Green Neighbourhood Lifestyle Through Local Agenda 21 (LA21) Programme

Low carbon lifestyle practices should be inculcated among the local residents to increase the sense of commitment as well as to raise awareness in environmental protection. Local Agenda 21 programme has facilitated PJC in fostering a green lifestyle, especially in aspects of 3R practices and environmental protection in the neighbourhood areas.

To achieve these objectives, various programs have been introduced by thePJC's LA21 Working Committee for Landscape and Environment. Among them are:

i. Community Garden Program

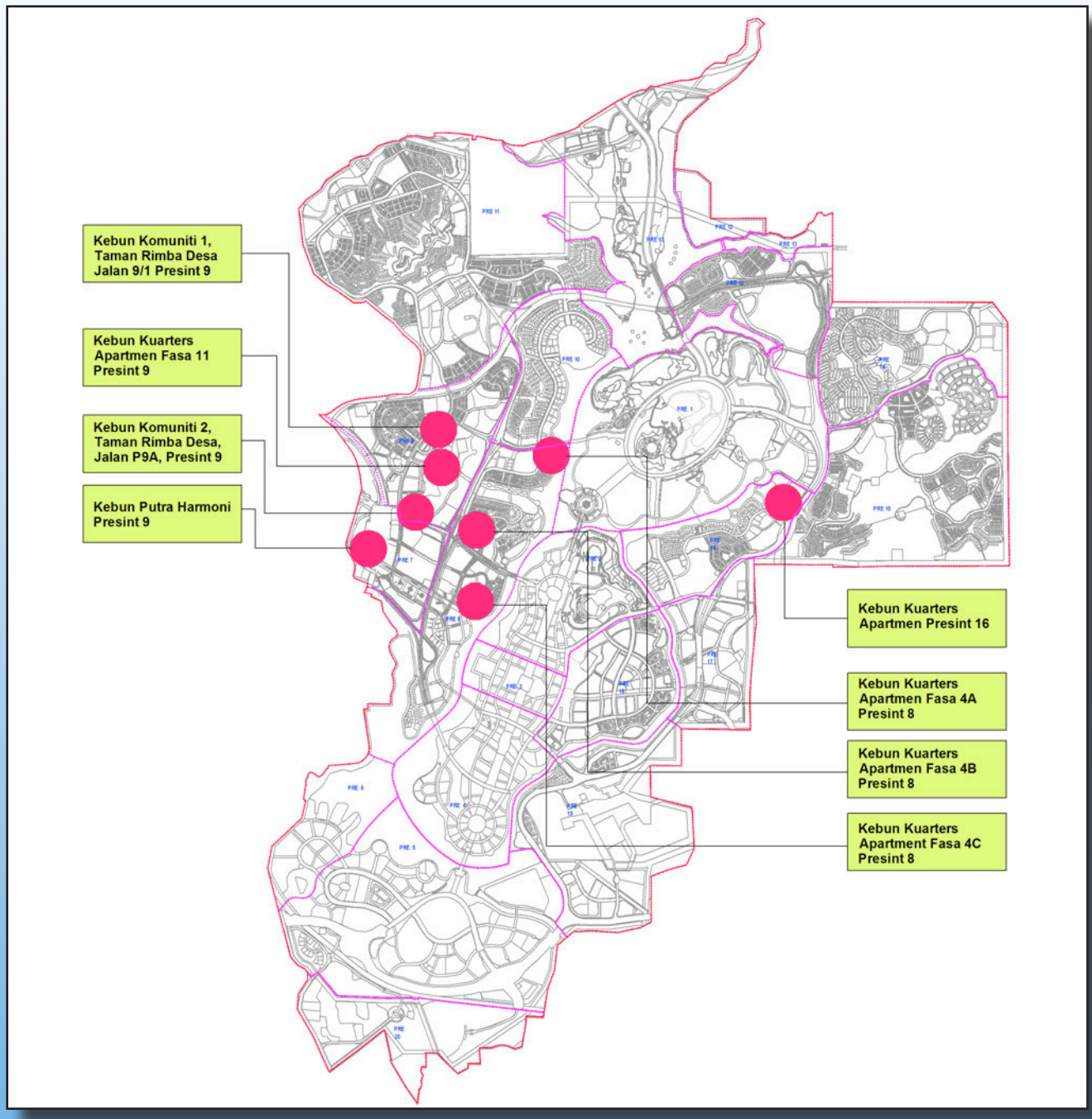
The consumption of locally produced, chemical-free food sources is encouraged as part of the green urban lifestyle. Food produced within the locality is always preferred as it reduces carbon emissions involved in transporting food from other areas. In Putrajaya, community gardens program has been implemented since 2008 under Green Earth campaign. To date, eight community gardens have been established and managed by the residents' associations of Precinct 8, 9 and 16. The community gardens are as follows:

- Community Garden 1, Taman Rimba Desa Jalan P9G Precinct 9
- Community Garden 2, Taman Rimba Desa Jalan P9A, Precinct 9
- Community Garden of Phase 11 Apartments, Precinct 9
- Community Garden of Harmony Putra Apartments, Precinct 9
- Community Garden of Phase 4A Apartments, Precinct 8
- Community Garden of Phase 4B Apartments, Precinct 8
- Community Garden of Phase 4C Apartments, Precinct 8
- Community Garden of Precinct 16 Apartments

The use of organic fertilizers and compost are encouraged. Control of weeds, diseases and insects using chemical pesticides is not permitted. Environmental friendly organic material such as Neem Oil Solution, Garlic Solution with coconut fibre and Micro Organisms are used as substitutes. Residents are also encouraged to use harvested rainwater for irrigation.

A view of Putrajaya Community gardens.

Figure 8.1: Location of Putrajaya Community Gardens



Guidance and advice are also provided to the participants through activities such as crop maintenance workshops and briefings.

ii. Green School Awards Programme, 2012

The change in the lifestyle of community changes requires time. An effective approach is through the education of the younger generation. For this purpose, the Green School Awards programme (ASH2012) was introduced with the following objectives:

- to raise awareness on the importance of preserving and protecting the environment in school;
- to foster a positive attitude and the love for the environment among the school children and teachers;
- to shape the generation that adopts green practices;
- to encourage innovation towards creating a school environment that emphasizes preservation and conservation;
- to recognize the continuous efforts of the school in environmental sustainability.

ASH2012 is based on four key concepts with different scopes of activities as shown in Table 8.3.

Table 8.3: Key Concepts and Programme Activities ASH 2012

Konsep	Activity
Go Green Global (Basic Weather Study)	Measure / observe the temperature, precipitation, humidity, wind speed and direction in the school compound
Green Finger (Lessons on Nature)	Greening the school compound: The function of trees around the school. Labelling & Inventory of trees (scientific & local name). The method of fertilization. The health of the trees.

Concept	Activity
Green Living (Waste Management, Water & Energy)	Hygiene and beauty schools • Cleanliness of drains, waste management areas and so on. • Beautification of the school building such as murals/ posters / proverbs / sayings. • Canteen Management / hygiene (organic waste/ non-organic waste, leftover cooking oil, etc.) • Cleanliness of classrooms, halls & toilets.
	Practices the 3Rs (Reduce, Reuse and Recycle) • Economical use of paper; • Adopt segregation of garbage at source (bottles, plastic, paper, etc.); • Make compost from food scraps and plants; • Collection of used cooking oil for sale; and the "zero waste day/ week/month" programme
	Resource management • Water conservation programmes in schools (Examples: Reusing rainwater (rain water harvesting) for watering plants, cleaning drains, etc. (billing records). • Electrical energy saving programme (billing records).
	Plastic bags and polystyrene containers • NO plastic bag and polystyrene containers Day Programme
Green Economy (Entrepreneurship & Innovation)	Records sales of green living and green finger produce sold.

Environmental Awareness Camp, 2012 at Taman Wetland Putrajaya.

8.5 Awards and Accolades

As a result of a joint effort in implementing these initiatives, Putrajaya has received numerous awards and recognitions such as the following:

1. Sustainable City Status in the Malaysian Urban Indicators Programme (MURNInet) 2010.
2. ASEAN Environmentally Sustainable City Award 2011.
3. Putrajaya Lake & Wetlands as Ecohydrological Operational Site by UNESCO-IHP - 2011.
4. Excellence Award for Putrajaya Wetland Park in the Green City Category by the Institute of Landscape Architects Malaysia - 2011.
5. GREENBUILD Asia Expo 2012 - Best @ show Award: Best New Product (Green City Planning).
6. 2nd place winner for the "Whole City Award", 2nd place winner for the "Ecohydrology Management of Putrajaya Lake and Wetland in Urban Ecosystem", 3rd place winners for "Community Gardens of Putrajaya" and "Healthy Parks, Healthy People" projects at The International Awards for Livable Communities, 2012.
7. Participation in the 18th Conference of the Parties (COP18) to the United Nations Framework Convention on Climate Change (UNFCCC) exhibition and side event entitled "Modeling to Bridge Science and Policy" 2012.

The International Awards for Liveable Communities 2012

18th Conference of the Parties (COP18)

Greenbuild Asia 2011

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