

INTERIM REPORT

Cyberjaya

& Smart
Low Carbon
2025

JUNE 2017

Prepared by:

APUDG



Prepared for:



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CHAPTER

TWO DECADES OF DEVELOPMENT

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The Olden Days

Looking at the transformation of Cyberjaya from old plantations to a hi-tech city.

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1.1 THE OLDEN DAYS

Background

Before 1995, there was no name for the 28.94 square kilometres (7,000 acres) of undeveloped land comprising former oil palm plantations, in the district of Sepang, south of the Malaysian State of Selangor. It was not until 1995 that McKinsey & Company, the Management Consultancy Company commissioned to do a study on the setting up of Malaysia's Multimedia Super Corridor (MSC Malaysia), came out with the idea of a 'high-tech city' based on the framework of Silicon Valley in the United States. After its formation, it was given the name Cyberjaya.

Vision

Cyberjaya would be the core of MSC Malaysia, a designated zone where technology entrepreneurs and global multinationals enjoy attractive tax breaks, access to world-class human capital and infrastructure, at developing nation costs. The ambitious project would spearhead Malaysia's transformation into a new knowledge economy, one that would make the country a better competitor on the world stage.



The establishment of the Multimedia Super Corridor (MSC Malaysia) and Cyberjaya in particular, will enable Malaysians to leapfrog into the Information Age. We hope to create the ideal environment that will attract world-class companies to use it as a regional multi-cultural information age hub,



Tun Dr Mahathir Mohamad, former Prime Minister of Malaysia, during Cyberjaya's groundbreaking ceremony on 17 May 1997



The Stakeholders

To ensure the project's success, four key stakeholders were appointed to oversee distinct responsibilities :

MALAYSIA DIGITAL ECONOMY CORPORATION (MDEC)

Government Agency responsible in advising the government related to legislation and policies and developing / promoting MSC status. Now focusing on spearheading digital transformation. Focus area includes Internet of Things, eCommerce, Cloud & Data Centre, Games, Security, Big Data & Analytics.

MAJLIS PERBANDARAN SEPANG

Local Authority responsible in providing municipal services, basic amenities, planning function, development control function as well as enforcement on municipal regulations within the Sepang District.



SETIA HARUMAN SDB BHD

Master Developer responsible in the planning, designing and developing Cyberjaya.

CYBERVIEW SDN BHD

Government-owned Company landowner of Cyberjaya & Cybercity Manager – responsible in providing infrastructure in Cyberjaya.

Under the lead of Cyberview Sdn Bhd as the Cybercity Manager, a supportive and supple ecosystem was developed to attract investors. This included providing a collaborative environment and incentives such as competitive rental rates, flexible repayment schemes, building allowances and customized solutions for investors based on their business requirements, budget and growth plans. With all systems in place, the next step of the strategy was to woo the big tech players to settle in.

The Big Tech Players

In 1996, Nippon Telephone and Telegraph (NTT) agreed to develop a research and development (R&D) facility in Cyberjaya, which proved to be the project's catalyst. Soon, other giants like Dell, HP, DHL and Shell began to follow suit. With the global icons establishing their presence in Cyberjaya, the entire ecosystem began to form naturally.

Almost two decades after its inception, Cyberjaya has reached the tipping point where it has the right scale and mass and most importantly, the proven track record in helping companies to grow and prosper.



The Early Days

In those early years, Cyberjaya became the headquarters of the local council of Sepang and the location of two (2) top Universities – Multimedia University (MMU) and the Limkokwing University of Creative Technology. For general knowledge, MMU was conceptualized to follow the Stanford-Silicon Valley model i.e. to evolve into a centre of teaching and research that would act as a catalyst for the development of high tech industry in the surrounding area.

Cyberjaya also became the venue for MSC Status companies, a boutique hotel, numerous commercial buildings and a community club. The population then was mainly students, with a larger day time population of commuter workers.



From 1997 to 2010

These began as years of development and expansion as more big names in business and technology joined the MSC. While the city boomed during the global recession then, it ironically went into a lull thereafter. Progress was slow and the socio-economic outcomes were not on target. It was however, beginning to develop a Cyber Hub identity quite distinct from any other Malaysian cities.

The National Agenda on Carbon Reduction

In order to achieve a 40% reduction of carbon intensity by the year 2020 (compared to 2005 levels per GDP, as the Prime Minister pledged in Copenhagen in 2009), the Government selected Putrajaya and Cyberjaya as the pilot projects to showcase low carbon initiatives.

In 2011, the Malaysian government through the Ministry of Energy, Green Technology and Water (KeTTHA), unveiled a framework guide and assessment system for Low Carbon Cities. Known as the Low Carbon Cities Framework and Assessment System (LCCF), this was an initiative led by the government that served as a guide for the local authorities, township developers, designers and individuals on how to plan and develop a low carbon city, township or project. LCCF is aimed to reduce carbon emissions in cities, townships and projects.

It was in line with the National Green Technology Policy (NGTP) under KeTTHA in moving towards lowering carbon emissions and simultaneously attaining a sustainable development.



1.2 PRESENT DAYS

2017



Working Towards A Green Transport System

Cyberjaya's transport system is almost completely in place.

The Klang Valley Mass Rapid Transit (KVMRT) project involves the construction of a rail-based public transport network which - together with the existing light rail transit (LRT), monorail, KTM Komuter, KLIA Ekspres and KLIA Transit systems - forms the backbone of the Greater Kuala Lumpur/Klang Valley region. MRT₂ (or the Sungai Buloh-Serdang-Putrajaya Line) will soon connect Cyberjaya to existing and future rail and bus lines in and around KL. The proposed alignment will span 52.2km with an expected end-to-end travel time of 84 minutes. The upcoming Bus Rail Transit (BRT) system will also see greater accessibility for Cyberjaya, with

one of its terminals adjacent to Tamarind Square. The new BRT corridor encircles major cities within the Klang Valley, including Cyberjaya.

Cyberjaya is currently linked to major road networks such as the PLUS, SKVE, ELITE, LDP and most recently the MEX which brings Cyberjaya only 20 minutes away from Kuala Lumpur city centre as well as KLIA and KLIA 2.

While the road networks are excellent, Cyberjaya is emphasizing public mobility. Towards this end, steps such as bus mass transit, smart ticketing, hybrid electric vehicles, specific bicycle lanes can all be taken for carbon reduction.



Pushing Green Building Index Standard

The Green Building Index (GBI) is Malaysia's industry recognised green rating tool for buildings aimed to (1) promote sustainability in the built environment and (2) raise awareness among Developers, Architects, Engineers, Planners, Designers, Contractors and the Public about environmental issues and our responsibility to the future generations.

The GBI rating tool provides an opportunity for developers and building owners to design and construct green, sustainable buildings that can provide energy savings, water savings, healthier indoor environment, better connectivity to public transport and more greenery to reduce negative impacts on the environment. About 4.1% Cyberjaya land is reserved for institutions and public amenities, whilst 9.0% is accounted for open spaces and recreational areas.

Big property names are already operating with ongoing and future residential/commercial projects.

They include companies like SP Setia, OSK, Mah Sing, UEM Land, Emkay and more – a useful indicator that properties in Cyberjaya hold great value and potential for future capital gains. All Cyberjaya developers take heed in planning and developing a master plan to meet the Green Building Index standard. Developers are leaving ample space for green facilities and landscape in their developments, offering residents the nature-inspired lifestyle that they have always desired. With well-designed residential projects in place, it is definitely an area that will grow in years to come. Cyberjaya is not only fast becoming the destination of choice for MNCs, but it is also evolving towards becoming the top 20 most liveable cities in the world by 2020. Many call the city home, with residential developments such as Perdana Lakeview West, Perdana Lakeview East and Persiaran Bestari proving popular, and offering a variety of accommodation.



Community of Innovators

Based on the population census in 2010, the Department of Statistics (DOS) estimated that Sepang district had a total population of 272,400 people as at 2016. Out of this, 232,300 people are staying in Mukim Dengkil whereas the remaining 40,100 people are residing in Mukim Labu and Mukim Sepang. Apart from DOS, the following population related figures were amassed from secondary data provided by stakeholders Setia Haruman Sdn Bhd, Cyberview Sdn Bhd and some analysed data gathered from Sepang Local Plan 2025.

Live-in Population

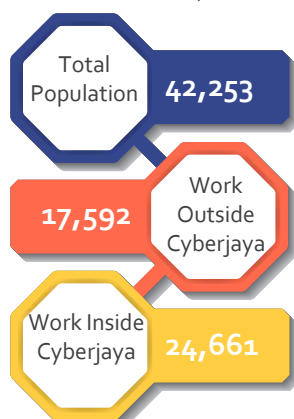
The total population of Cyberjaya (which is in Mukim Dengkil) as at 2016 is estimated to be at 42,253 people. This number is accounted for about 15.5% and 18.2% of total population of Sepang district and of Mukim Dengkil respectively. With the upcoming construction of MRT2 line and two (2) stations, as well as some budget allocation for new development in the

next 5 years (including the development of Cyberjaya City Centre), Cyberjaya's population is expected to increase to 210,000 by 2020. The current population constitutes only 20.1% of Cyberjaya's total planned population.

From the total population of 42,253 people, around 24,661 people work in Cyberjaya while the remaining balance of 17,592 people work outside of Cyberjaya.

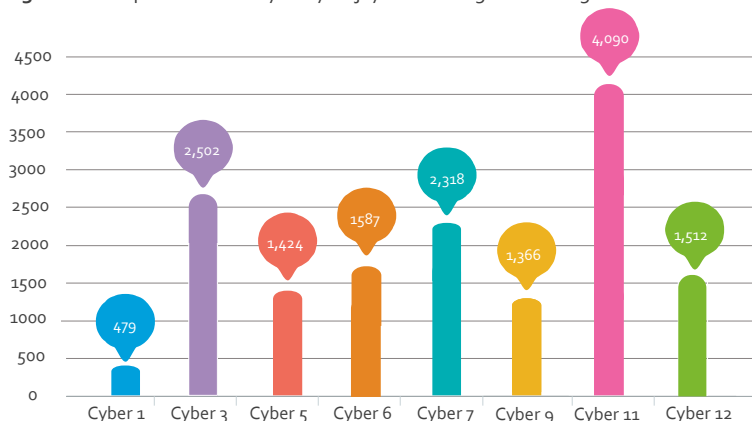
The current universities, colleges and schools in Cyberjaya have attracted a large number of foreign students, which creates an international environment, allowing for more exposure and growth. The latest statistics show that the student population has reached 25,000 in the city and is on the rise. Of these students, 40% are foreign students from 80 countries worldwide.

Figure 1-1 : Breakdown of Population



Source : Setia Haruman Sdn Bhd

Figure 1-2 : Population Density In Cyberjaya According to Planning Blocks



Source : Setia Haruman Sdn Bhd

Global ICT Hub

Its competitiveness as a global ICT hub has made Cyberjaya as one of the top destinations for business support services and outsourcing in the world. It is home to more than 38 multinational corporations (MNCs) including HSBC, DHL, Shell, Motorola, OCBC, IBM, Ericsson, BMW and Fujitsu, as well as another 800 technology-oriented companies.

Cyberjaya, has an excellent fibre optic network infrastructure, to be fully wired with high-speed broadband at 100mb per second. This is in line with Malaysia's aspiration to become a hub for data services and this sector is expected to contribute RM2.4 billion to the country's revenue by 2020. Cyberjaya's unique and independent high-speed carrier network has incentivized many prominent ICT industry players to base their operations in the cyber city.



Established Education Hub

Besides the Multimedia University (MMU), Cyberjaya is also home to two (2) other international standard universities – i.e. Limkokwing University of Creative Technology and Cyberjaya University College of Medical Sciences (CUCMS). Segi University is set to join other local universities like the Islamic University of Malaysia, Open University Malaysia and the University of Computer Science & Engineering to make presence in Cyberjaya.

Cyberjaya is also home to established colleges, international and local schools. This bodes well for the rental market as well as convenience for the next generation of residents seeking world-class educational services.

The youth population from the student market is a bonus for a city with a foundation in ICT, providing ample opportunities for young and eager minds.



Public Facilities & Amenities

The Street Mall has long since been Cyberjaya's hub for convenience, food&beverage and public transportation. In 2007, the Cyberjaya Community Club with indoor and outdoor recreational facilities was launched, adjacent to the 400-acre Cyberjaya Lake Garden. As a prototype city of the future, Cyberjaya also houses state-of-the-art police station, CCTV surveillance, Cyberjaya's state-of-the-art City Command Centre (CCC) and fire station. For the moment, the nearest malls are located in Seri Kembangan, Putrajaya and Puchong.

Cyberjaya is surrounded by highly populated areas such as Putrajaya (Federal Administrative Centre of Malaysia), Puchong, Kajang, Bangi and the whole southern corridor of Klang Valley. The increased offerings of activities, amenities and accessibility are expected to attract crowds from most of the neighbouring areas.

Projects such as OSK's Pangaea are located in the heart of Cyberjaya (Show Village in Cyber 11, across from MMU). It is geared to become one of the biggest mixed development projects offering suites and boutique retail, a shopping mall, a street mall, a boutique hotel and serviced apartments, complete with a 2-hectare central park.

State-of-the-Art Security

The development and architecture in the city follows a Western living-style orientation. Many locals and foreign professionals have affirmed this as their preference. These residences have strict security enforcement to ensure a safe and guarded community under the watchful eyes of the security team. In addition, Cyberjaya has a natural secure surrounding due to its peaceful environment.

Compared to the crime rates in Klang Valley, Cyberjaya is enjoying increasing security, and the township is more than halfway towards achieving its target of being a safe city with a crime rate of zero.

This is largely due to the fully integrated Malaysian Emergency Response System (MERS) 999 CCTV system. Launched in 2009, Cyberjaya's CCTV system is the only system in the country that has been linked to the RM10.0 million MERS 999. The system is designed to be able to operate round the clock, in all types of weather conditions and capture quality daytime and night-time images by utilising Cyberjaya's fibre optic backbone system. The CCTV operation - part of the Cyberjaya Citywide Surveillance System - boasts thirty (30) cameras across the city with a high traffic volume and large population.

According to Cyberview Sdn Bhd, six (6) parties were involved in the planning and design of the MERS 999 CCTV system in Cyberjaya – i.e. Cyberview Sdn Bhd itself, Telekom Malaysia, the Royal Malaysian Police, MP Sepang, Tenaga Nasional Berhad and MDeC.

The objectives of the installation of the system continue to be (1) to ensure the safety of the community at large, which consists of locals and many foreigners, as well as (2) to enhance the township management services of the Cyberjaya Flagship Zone.



1.3 GEARING TOWARDS 2025

Where To Begin

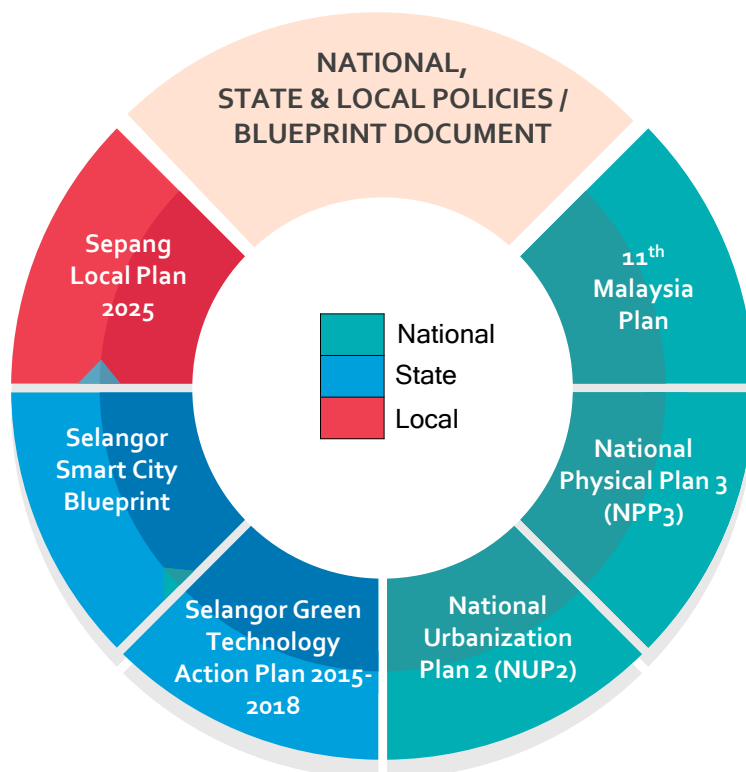
To tap the potential of green growth, it is necessary to exploit the synergies between local and central levels of government. Lessons learnt at local level can be used to modify and fine tune national frameworks to better implement green economy strategies. Likewise, national policy frameworks can empower local governments and accelerate their policy responses on trending policies such as renewable energy, green-tech R&D and greening public services.

Cities are the new engines of green growth, And a truly strong economy is built on environmental and social well-being. Toronto, for instance uses energy efficiency retrofits in over 1000 high rise residential buildings to create jobs and drive community revitalisation.

Rapid urbanization has created challenges between economic growth and conservation of the environment. However, Malaysia's recognition of the concept and necessity of sustainable development and embedding this concept in its policies and development plans both at the national and state level, is a value-added advantage and in fact, the best way to start.

The followings explore some of the policies and plans from the National, State and Local level addressing sustainability and the relevance related to Cyberjaya. Consideration of the various policies and plans discussed in this section is necessary so that holistic, inclusive, integrated and relevant initiatives can be achieved with measurable impact.

Figure 1-3 : Development Plan & Policy Documents Related to Cyberjaya



Local Agenda 21 (LA 21)

For Cyberjaya Smart & Low Carbon City 2025, incorporating Local Agenda 21 (LA 21) into one of its sustainable development programs in the planning process is one way to start.

LA 21 is a global action plan or blueprint for sustainable development at local level, which was adopted at the Earth Summit in Rio de Janeiro in 1992. It is a document which consists of a list of actions agreed by all stakeholders to undertake for the achievement of sustainable development. It serves as an instrument to achieve the community vision as well as to meet the objectives of integrated issues namely social, economic and environmental.

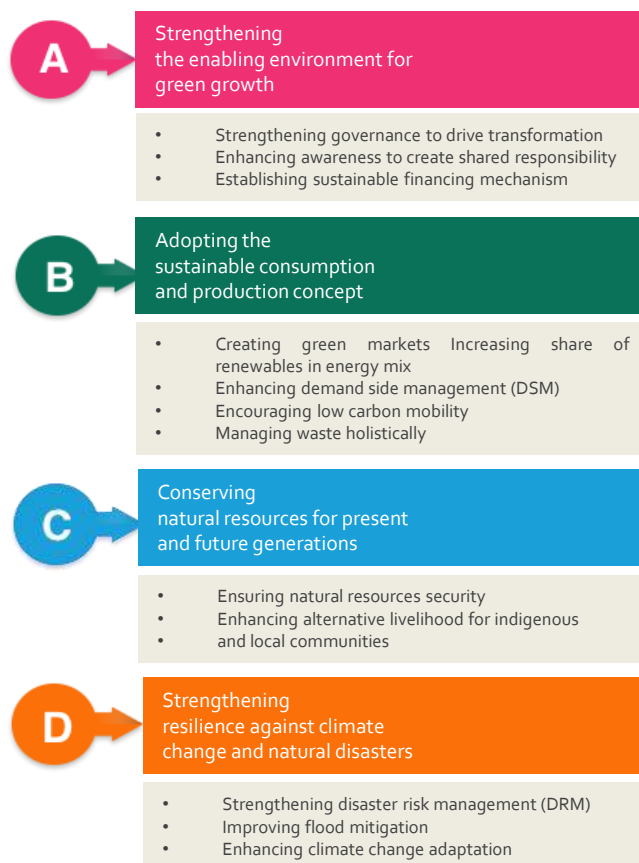
11th Malaysia Plan

Green growth will be the fundamental shift in how Malaysia sees the role of natural resources and the environment in its socio-economic development, protecting both development gains and biodiversity at the same time.

To pursue green growth, the enabling environment will be strengthened, particularly in terms of policy and regulatory framework, human capital, green technology investment and financial instruments.

Green growth will be the game changer in bringing Malaysia towards a sustainable socio-economic development path, whereby improvements in quality of life are in harmony with the sustainability of the environment and natural resources.

Figure 1-4 : Focus Areas of 11th Malaysia Plan

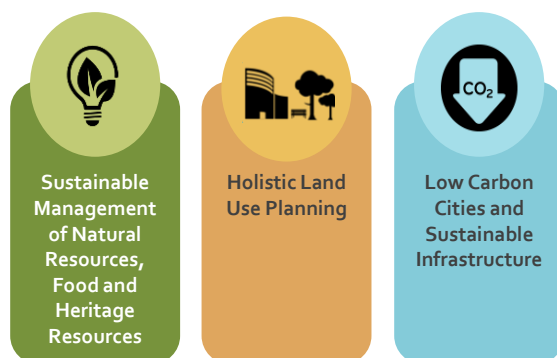


Source : 11th Malaysia Plan

National Physical Plan 3 (NPP3)

Malaysia's Third National Physical Plan 3 (NPP3) provides a long-term strategic framework for national spatial planning and includes strategies as well as measures required to shape the direction and pattern of land use, biodiversity conservation and development in Malaysia.

Figure 1-5 : Three Strategic Directions Under Thrust 2 of NPP3



Source : National Physical Plan 3

Figure 1-6 : Low Carbon Cities and Sustainable Infrastructure Strategies



Source : National Physical Plan 3

National Urbanization Policy 2 (NUP2)

The National Urbanization Policy 2 (NUP2) is a comprehensive plan that will guide and coordinate the planning and urban development of the country to be more efficient and systematic, particularly to handle the increase in the urban population. NUP2 emphasis on balancing the social, economic and physical development within urban areas.

Figure 1-7 : Key Objectives of Principle 5



Source : National Urbanization Policy 2

It will also serve as the foundation to encourage racial integration and solidarity for those who will reside in the urban areas. NUP 2 will be the main thrust for all urban planning and development activities in Peninsular Malaysia including development plans at the state and local level.

In NUP2, under Principle 5, it is noted that the objectives are emphasizing on sustainable and low carbon development as illustrated in the diagram above.

Selangor Green Technology Action Plan 2015-2018

The Selangor Green Technology Action Plan 2015-2018 is aimed at transforming Selangor into a green technology state.

The main focus in the action plan includes having green cities, using electric cars as official state vehicles, building electric vehicle charging stations, using electric buses for the local authorities' free bus programs, installing solar roofing systems for the SelangorKu housing project, energy-efficient State Government buildings and making Industrial Parks more green.

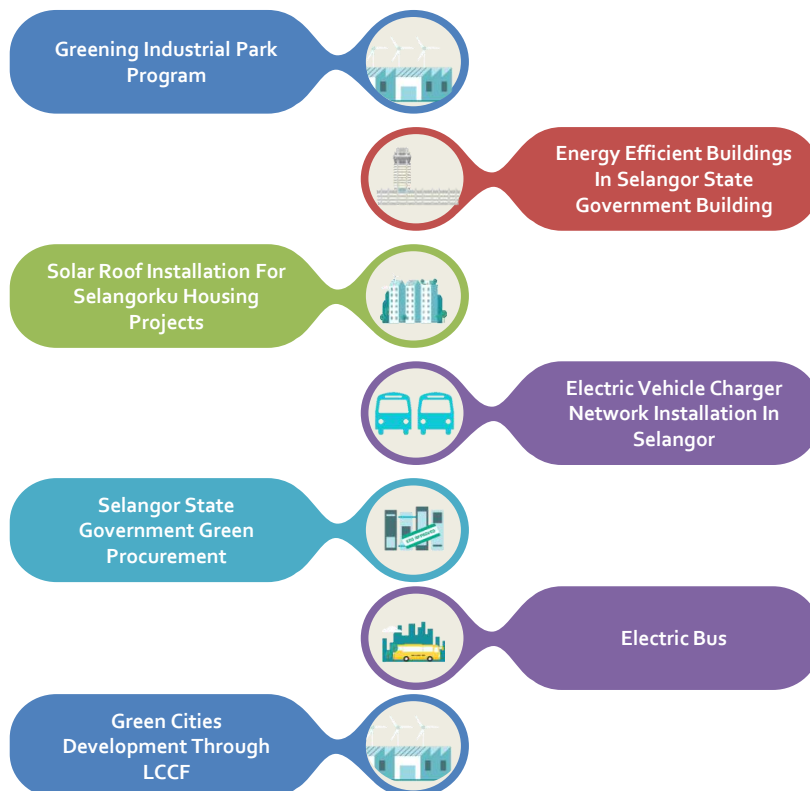
Figure 1-x : KPIs Related to Green Cities Development



Source : Selangor Green Technology Action Plan

The state government is in the midst of incorporating some elements of Low Carbon Cities Framework & Assessment System (LCCF) and Selangor Smart City into the planning and decision-making policies to be used at the municipality level.

Figure 1-8 : Focus Area of Selangor Green Technology Action Plan

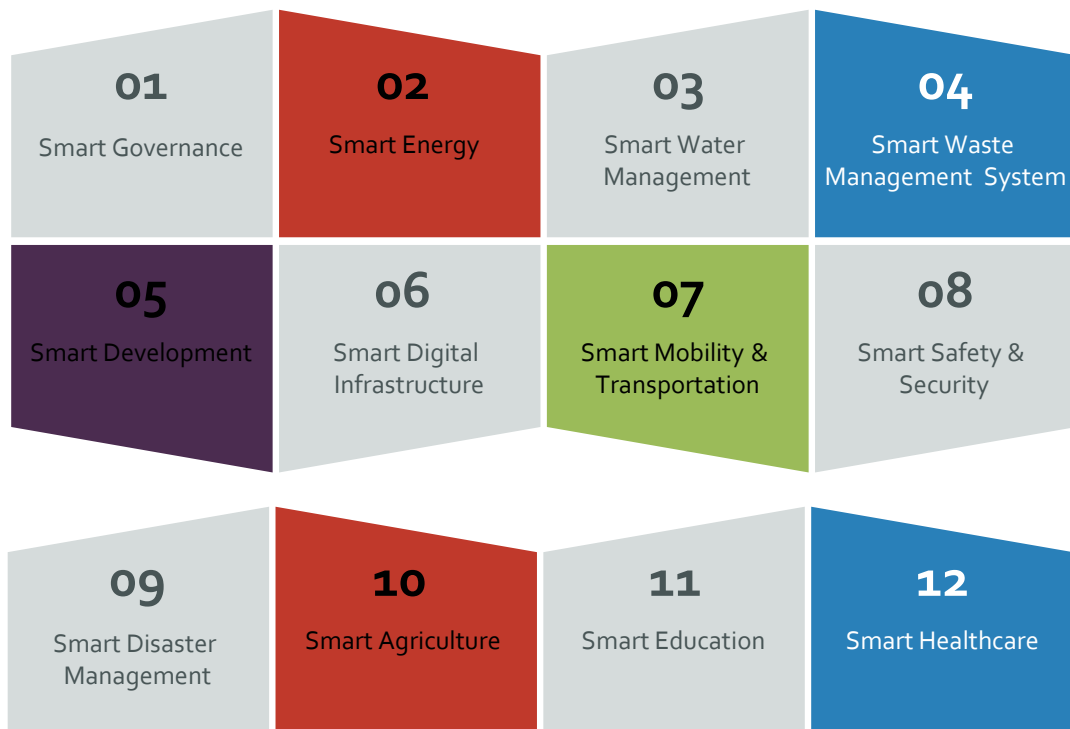


Source : Unit Perancang Ekonomi Negeri Selangor

Selangor Smart City Blueprint

Selangor is set to become a smart state by 2025 with the state government giving priority to developing effective technology infrastructure to improve the quality of life of Selangor folks. The Blueprint focuses on twelve (12) core areas as per Figure below.

Figure 1-9 : Focus Area of Selangor Smart City Blueprint



Source : Selangor Smart City 2016

Figure 1-10 : Key Outcome of Selangor Smart City Blueprint



Selangor Local Plan 2025

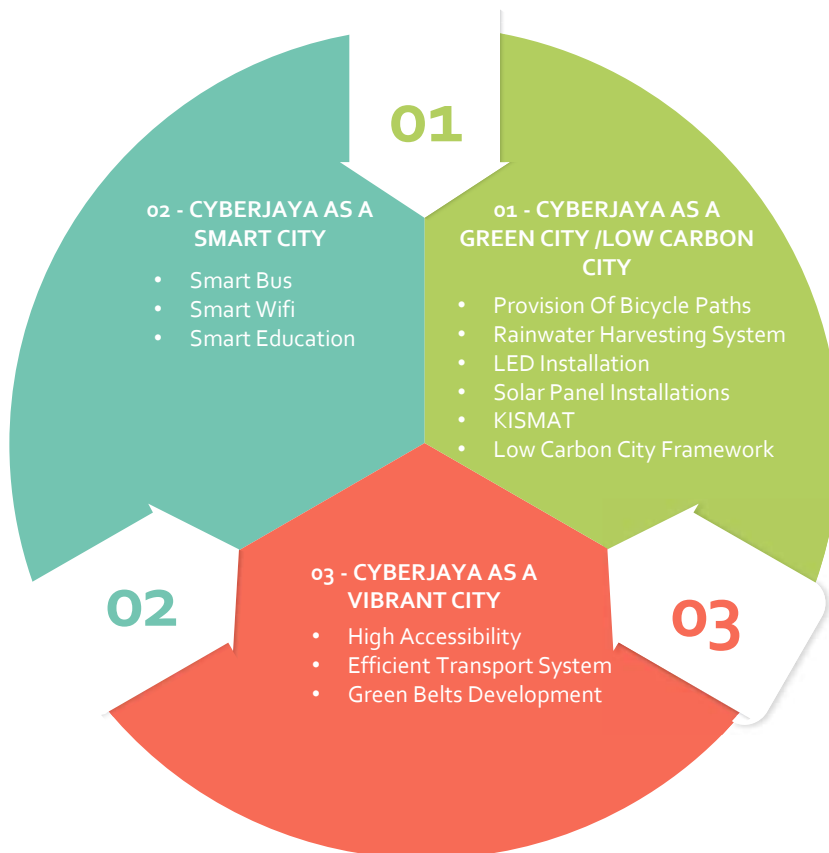
This document is actually a replacement and not an amendment for the MP Sepang Local Plan 2020. The Sepang Local Plan 2025 outlines six key strategies which are World-class Planning, Efficient Land Use, Integrated Public Transport System, World Class Tourism, Competitive Industry and Preservation/Conservation of Environment.

Under the Efficient Land Use strategy, there are fourteen (14) development proposals to support this move which include transforming Cyberjaya into green, smart and vibrant city (Strategy S2-4).

This move is also in line with the Selangor state government's initiatives under the Selangor Smart City Blueprint and Selangor Green Technology Action Plan 2015-2018.

Provision of Sepang Local Plan 2025 is to meet the current and future needs / requirements towards dynamic and vibrant development of Sepang.

Figure 1-11 : Key Recommendations to Support S2-4



Source : Sepang Local Plan 2025

1.4 CONCLUSION

Sustainable urban planning, eco-developments, smart cities, zero carbon cities – all of these represent an aspiration for a better way of life. The technology needed to build a smart and low carbon future for Cyberjaya has to be viable both functionally and financially.

In addition, the community – the people themselves - must truly and honestly believe in a smart and low carbon future, to have any real success. Without commitment and participation from the people themselves, any “token” action with, for instance, the latest green engineering trend from a superficial standpoint is both futile and a waste of precious investment costs and resources.



Palm plantation, 1997



Cyberview Lodge



Residence



Present Day Cyberjaya



Lim Kok Wing University



Multimedia University

CHAPTER

TOWARDS A SMART AND LOW CARBON CITY

2

Introduction

2.1

- 2.1.1 Smart & Low Carbon Framework
- 2.1.2 Vision
- 2.1.3 Guiding Principles
- 2.1.4 Key Focus Areas

Analysis on Spatial Planning & Development

2.2

- 2.2.1 Introduction
- 2.2.2 Land Use
- 2.2.3 Resource Use
- 2.2.4 Mobility
- 2.2.5 Building

2.1 INTRODUCTION

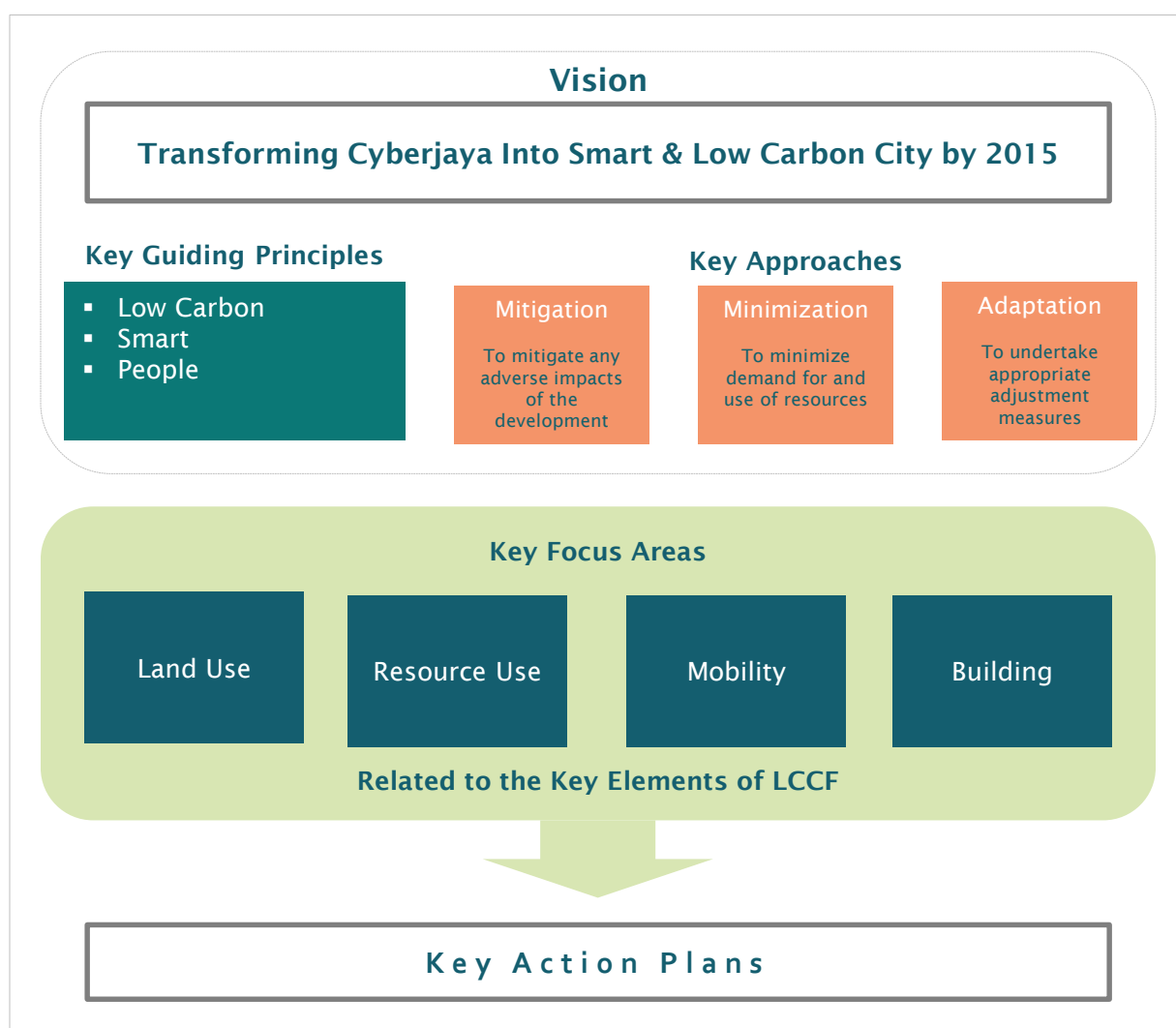
2.1.1 Smart & Low Carbon City Framework

The formulation of Key Action Plans for **Cyberjaya Smart & Low Carbon City 2025** are guided by three (3) Guiding Principles that serve as support and boundaries when it comes to defining relevant measures or set of action plans to achieve the intended vision set forth in this report.

In summary, the formulation of Key Action Plans for **Cyberjaya Smart & Low Carbon City 2025** is illustrated in Figure 2.1.

The Guiding Principles are also used to determine the Key Focus Areas - which are very much related to the spatial planning and key elements of LCCF - for the purpose of accessing and analysing the current conditions of Cyberjaya to derive to the Key Action Plans that would catapult Cyberjaya's aspiration to be Smart & Low Carbon City by 2025.

Figure 2.1 : Smart & Low Carbon City Framework for Cyberjaya



2.1.2 Vision

A vision statement provides strategic direction and describes what to be achieved in the future. Vision is important as it serves as a clear guide for choosing current and future courses of action. A vision statement is intended to clarify the 'why' and 'how' to achieve the vision.

For Cyberjaya, the aspiration is to be a smart and low carbon city by the year 2025, whereby "smart" being defined as leveraging ICT infrastructure to :

- Improve the quality of life of its population
- Improve the well-being of its citizens
- Establish an environmentally responsible and sustainable approach to development

Whilst "low carbon" being referred to lowering the emission of CO₂ amid experiencing rapid urbanization process.

This vision is to help MP Sepang and its strategic partners and/or related stakeholders to prepare, develop and execute a transformation agenda in order to make the shift to a smart and low carbon Cyberjaya by the year 2025. The aims are for everyone to actively work towards a climate smart Cyberjaya that reduces its greenhouse gas emissions and is resilient to the social, economic and environmental effects of climate change.

More often than not, this aspiration is supported by various policies and plans from the National, State, and Local level to address climate challenge that came as an aftermath of rapid urbanization.

To tap the potential of green growth, it is necessary to exploit the synergies between local and central levels of government. Lessons learnt at local level can be used to modify and fine tune national frameworks to better implement green economy strategies. Likewise, national policy frameworks can empower local governments and accelerate their policy responses on trending policies such as renewable energy, green-tech R&D and greening public services.

Imagine a Cyberjaya with a vista of vertical forests. High-rise towers of cascading shrubs and greenery. A vertical forest growing out of the buildings. Regenerating local biodiversity, providing tons of CO₂ absorption and producing kilograms of oxygen per day. Studded with trees, dripping with foliage and with rooftops that are home to verdant forests of plants, shrubs and saplings. But these are not just greenery for decoration. These are fruit trees, herb shrubbery and aromatic leaf gardens. Each building is retrofitted for energy efficiency. Mixed development of soho suites, condominiums, detached residential units, retail centres, a central park and smaller parks everywhere.

People are walking everywhere, because it is so pleasant to do, whether from office to office or in the gated and secure residential communities. LRT, MRT, BRT provide the public mobility necessary for a carbon neutral world. Bicycle lanes add to these smart transport methods. Trees are everywhere, not just from the benefits of beautiful landscaping but projects that work within secondary forest. Excellent air quality, urban cooling of the sidewalks, absorbing CO₂, reducing storm water runoff. Walkability. Habitat parks that promote biodiversity with wetlands for bird and animal life. A university-level youth population with a culture of freedom and creativity and energy. Innovative desire to create outside of norms. Cyberjaya 2025.

**Manifesting the
Vision**

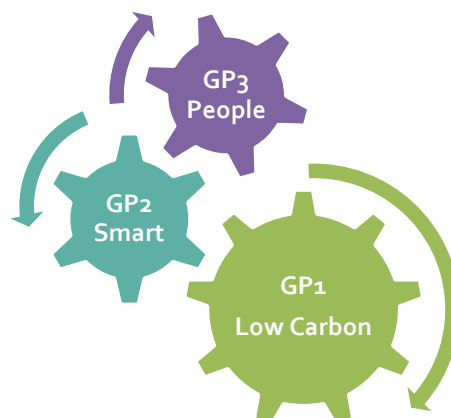
2.1.3 Guiding Principles

It is noted that urbanization boosted economic development, brought about fundamental social change, and helped to raise the living standards of both urban and rural populations. However, this process has also been characterized by intensive resource consumption and an emphasis on speed rather than quality of urbanization, which usually have negative impacts on the environment and people in general. Going forward, Cyberjaya has decided that urban development must adopt a smarter, greener and low-carbon approach that is focused on efficient uses of land, energy, and other resources necessary for city to thrive.

MP Sepang has recognized the need to ensure the quality of urbanization and the urgent needs to take actions. As such, this study has been initiated to provide Cyberjaya with "how to" guides as they undertake the path towards sustainable development.

Before any action plans are being formulated, it is important to define a few fundamental principles that will serve as guidance, boundaries and support towards achieving its vision. **As such, the formulation of key action plans for Cyberjaya embraces three (3) key Guiding Principles**, which are illustrated below :

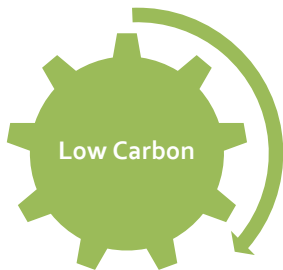
Figure 2.2 : Guiding Principles to Formulating Key Action Plans



Each of the Guiding Principle has the following criteria to ensure that every key action derived from it would be relevant for and has impact after implementation :

- Beneficial - there must be direct economic, environmental, and social benefits compared to business-as-usual practices.
- Measurable - the indicator to be used must be quantitatively defined.
- Practical – to determine actions are feasible and implementable.

(a) Guiding Principle (1) – Low Carbon



The Low Carbon Principle fully supports all the four (4) main elements established in the Low Carbon City Framework & Assessment System (LCCF). LCCF is a documented system developed by Ministry of Energy, Green Technology and Water to guide the implementation of CO₂ reduction measures in cities and townships. The document was launched by the Prime Minister in 2011.

The four (4) main elements, which are a package with no principle predominating, are shown in Figure 2.3 below.

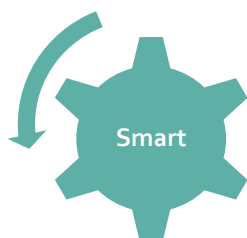
Figure 2.3 : Key Elements of LCCF

Urban Environment	Urban Infrastructure	Urban Transportation	Building
<p>Matters related to the challenges of the growing urban population with the demands for reducing CO₂ emissions at the same time.</p> <p>Performance Criteria</p> <ul style="list-style-type: none">▪ Site Selection▪ Urban Form▪ Urban Greenery & Environmental Quality	<p>Socio-technical systems of facilities and services that are vital to the basic functioning of cities and regions.</p> <p>Performance Criteria</p> <ul style="list-style-type: none">▪ Infrastructure Provision▪ Waste▪ Energy▪ Water	<p>The ability to cope with density (i.e. people, activities and structures) while moving people and goods.</p> <p>Performance Criteria</p> <ul style="list-style-type: none">▪ Shift of Transport Mode▪ Green Transport Infrastructure▪ Clean Vehicles▪ Traffic Management	<p>A relatively permanent enclosed construction over a plot of land, having a roof and used for any of a wide variety of activities (e.g living, manufacturing).</p> <p>Performance Criteria</p> <ul style="list-style-type: none">▪ Low Carbon Building▪ Community Services

In a nutshell, LCCF aims to (1) encourage and promote the concept of low carbon cities and townships in Malaysia, (2) guide cities in making choices/decisions towards greener solutions, (3) assist stakeholders to develop action plans for low carbon development and (4) serve as a tool to calculate the carbon emissions within development.

The Key Action Plans proposed at the end of the chapter are segmented according the four (4) elements of LCCF above.

(b) Guiding Principle (2) - Smart



The term “smart city” was coined towards the end of the 20th century. It is rooted in the implementation of user-friendly information and communication technologies developed by major industries for urban spaces. Its meaning has since been expanded to relate to the future of cities and their development. Smart cities are forward-looking, progressive and resource-efficient while providing at the same time a high quality of life. They promote social and technological innovations and link existing infrastructures. They incorporate new energy, traffic and transport concepts that go easy on the environment.

Their focus is on new forms of governance and public participation. Smart cities forcefully tackle the current global challenges, such as climate change and scarcity of resources while simultaneously maintain their competitiveness and quality of life for the ever-rising urban populations.

In local context, Smart Selangor Blueprint 1.0 (SSB 1.0) was launched by the State of Selangor in December 2016. As the blueprint is still labelled as 1.0, it is implied that there will be more concrete plans added to the domains as it goes along. In a nutshell, SSB 1.0 tries to achieve SUSTAINABILITY, EFFICIENCY and LIVABILITY using a combination of innovative technology and sound urban design to cope with the issues of modern cities. Ultimately, the Selangor Government aspires to become a ‘Smart State’ by 2025. To achieve this aspiration, twelve (12) key dimensions have been identified as priority in order to turn itself into a smart state with the key aim of improving citizen’s quality of life. The key dimensions are visualized in Figure 2.4 below :

Figure 2.4 : Key Dimensions of Smart Selangor Blueprint 1.0



Source : www.smartcitiesasia.com

Further examining of the SSB 1.0 reveals that only five (5) key dimensions have started Pilot Projects – i.e. Smart Governance, Smart Water Management, Smart Waste Management, Smart Transport & Mobility and Smart Education.

It is necessary to note that three (3) key elements of LCCF are also part of the twelve (12) key dimensions of SSB 1.0, which are very much related to spatial planning and development - Smart Energy, Smart Water Management, Smart Waste Management are related to URBAN INFRASTRUCTURE, Smart Building/Development/Infrastructure is related to URBAN ENVIRONMENT, and Smart Transport & Mobility is related to URBAN TRANSPORTATION.

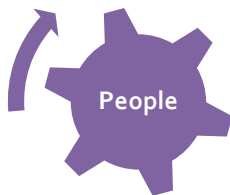
Table below summarizes what the Key Dimensions are all about :

Table 2.1 : Key Dimensions of Smart Selangor Blueprint 1.0

Key Dimensions	What It Is About
Smart Governance	The Smart Selangor initiative will be executed by the 4 governing bodies : <ul style="list-style-type: none"> Smart Selangor Steering Committee – will focus on strategic governance, will set and determine directions Project Execution Committee – will look at methods and controls adopted by implementation team Project Management Committee – will concentrate on working methods and best practices to implement project Project Team Committee – will concentrate on working methods and best practices to implement project
Smart Digital Infrastructure	Looking into Next Generation Networks, IoT Platforms, mobile & wireless access, data centres and disaster recovery centres, ubiquitous connectivity for citizens, government and citizens.
Smart Disaster Management	Integrated crisis management system and early warning system to enable better inter-agency coordination and prepare citizens for calamities.
Smart Building/Development /Infrastructure	Looking into the full cycle of buildings, from the construction methods to the operations of the building. Using a combination of building sciences and technology, the intention is to optimise energy efficiency and improve building quality.
Smart Safety & Security	Looking into implementing a range of integrated safety and security system through collaboration with public in areas related to accidents, crimes, terror incidents, etc..
Smart Food & Agro	Looking into using technological solutions to maximize yield and minimizing agricultural input in order to boost efficiency and enhance food & agricultural ecosystem to meet growing food consumption in Malaysia.
Smart Energy	Looking at a suite of systems that enable Sustainable Energy infrastructure to reduce cost and reinforce energy networks, which also includes solutions for Demand Side Response, smart transmissions, and distribution networks.
Smart Water Management	Looking into minimising NRW, ensuring safe and clean water supply and river cleaning as its core focus.
Smart Transport & Mobility	Looking into fostering seamless multi modal transportation access and efficient connectivity by interacting smart infrastructure, integrating big data and providing smart services that improve user experience.
Smart Waste Management	Looking into minimizing waste by engaging the community. The end goal is to achieve a zero waste society.
Smart Healthcare	The Selangor government intends to invest 6%-8% of its GDP for healthcare digital transformation, which includes investments into Population Health Management, integrating case/disease management, care co-ordination and advanced tools to perform the tasks.
Smart Education	Looking into preparing human capital to capture new economy opportunities, which includes initiatives to set-up a coding academy to equip citizens with the skill to code and develop apps, coupled with the initiatives to create Smart App Development platform with Open API.

Source : www.smartcitiesasia.com

(c) Guiding Principle (3) - People



Sustainable development is a challenging social process. The different objectives of society - social, economic and environmental - need to be integrated where possible, and traded-off where they are incompatible. Institutional and individual roles and responsibilities have to change, so that new patterns of behaviour will foster sustainable development.

Every human activity to a certain extent has some impact on the environment. Within the overall framework of sustainable development, there is an increasing emphasis on the need to promote and enact sustainable development through people/community participation or involvement.

Community participation occurs when a community takes responsibility for managing its problems. Taking responsibility includes identifying the problems, developing actions, putting them into place, and following through. Community participation opens the way for community members to act responsibly. Whether a participatory approach is the primary strategy or a complementary one, it will greatly enrich and strengthen programs/projects/actions and help achieve more sustainable, appropriate, and effective outcomes/impacts.

In the context of formulating key action plans for Cyberjaya, community involvement is been factored in due to the following reasons :

- People organize best around problems they consider most important
- Local people tend to make better economic decisions and judgments in the context of their own environment and circumstances
- Voluntary provision of labour, time, money and materials to a project is a necessary condition for breaking patterns of dependency and passivity
- The local control over the amount, quality and benefits of development activities helps make the process self-sustaining

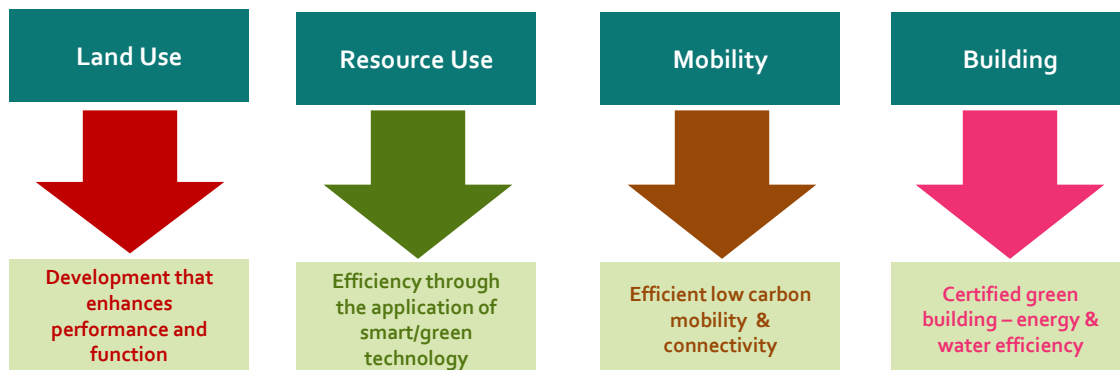


2.1.4 Key Focus Areas

Key Focus Areas are characterised by the Guiding Principles. The establishment of the Key Focus Areas are vital towards getting the right implementable actions to get desired/maximum impacts.

The four (4) Key Focus Areas related to sustainable city are as follows :

Figure 2.5 : Key Elements Related to Sustainable City



All the four (4) elements are directly related to the spatial planning and development, which are also the key elements of sustainable city.

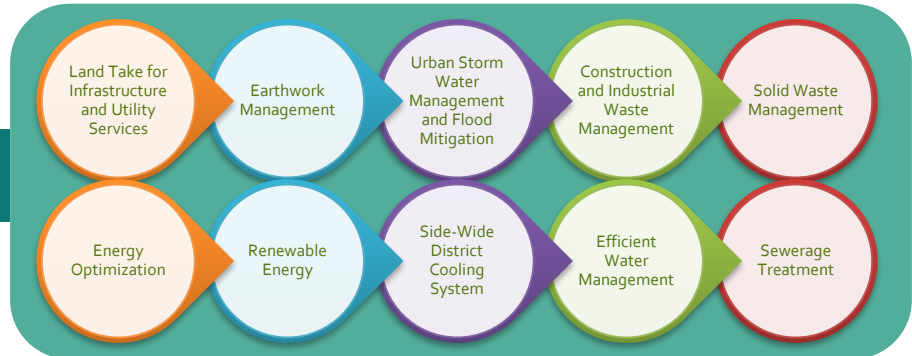
A through analysis and understanding of all the four elements will outline a more credible mitigation measures or low carbon strategies to minimize CO₂ emissions both in resources and consumption. The recommended specific set of actions not only will enhance urban development but at the same time curtail negative environmental impacts. This will inevitably lead towards meeting the requirement of sustainability and enabling built environments to function in a more constructive way than at present.

Inefficient spatial planning and development can undermine liveability, affordability and environmental sustainability. But, holistic interventions or countermeasures can ensure successful desired transformation.

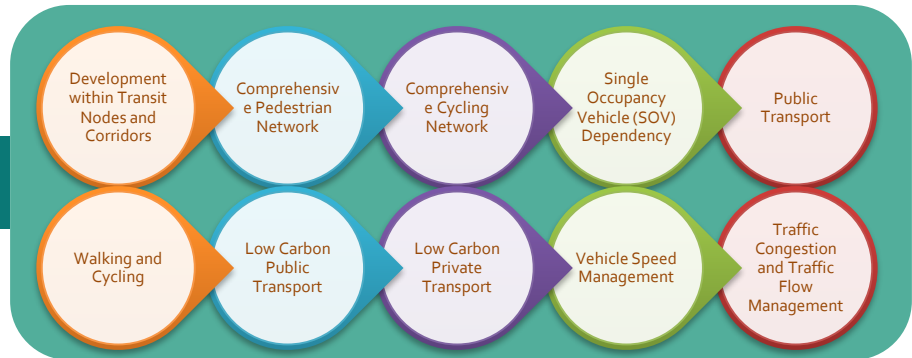
The related corresponding elements in LCCF under each focus area is as follows :



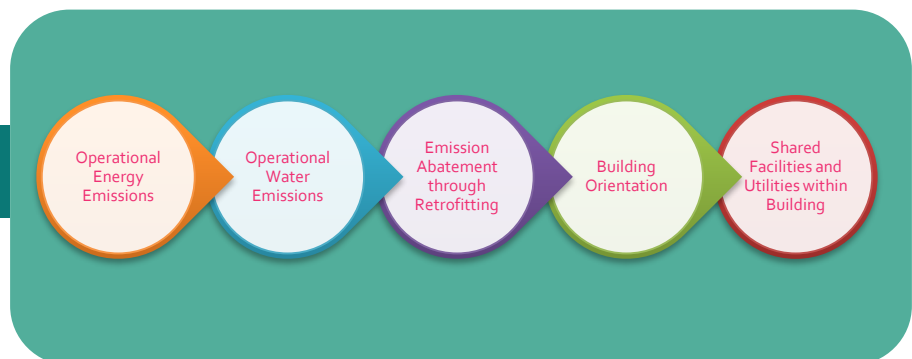
Resource Use



Mobility



Building



2.2 ASSESSMENT ON SPATIAL PLANNING & DEVELOPMENT

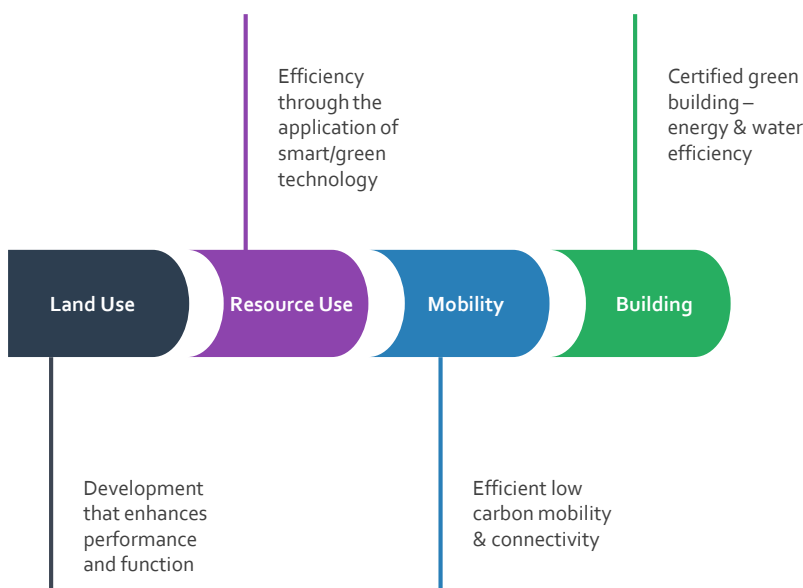
2.2.1 Introduction

The aim of this section is to understand the performance of Cyberjaya’s spatial planning and development, which are the key elements of sustainable city. It is imperative to understand the performance of Cyberjaya’s spatial planning and development with the overall objectives of MP Sepang in transforming Cyberjaya into Smart & Low Carbon City by 2025. The analysis will provide baseline sustainability information on existing and planned development. This information and related additional understanding will assist in the formulating of new mitigation measures and improving the existing countermeasures that will lead to a more effective emission reduction.

The review are centred around the four (4) Key Focus Areas being discussed earlier.

Inefficient spatial planning and development can undermine liveability, affordability and environmental sustainability. But, holistic interventions or countermeasures can ensure successful desired transformation.

Figure 2.6 : Key Focus Areas for Assessment



2.2.2 Land Use

(a) *Development within Define Urban Footprint*

Define urban footprint is to prioritize development and curb urban sprawl by designating the area inside the boundary for urban development. MP Sepang has committed and approved its overall development masterplan in 2012 and revised it in 2015. Provision of Sepang Local Plan 2025 is to meet the current and future needs / requirements towards dynamic and vibrant development of Sepang.

The land use planning of Cyberjaya is based on conventional planning model (i.e. heavy reliant on the prediction of urbanization and population growth as the basis for land-use arrangement). It is recommended for MP Sepang to consider maintaining ecological functions as the prerequisite for land-use layout - which integrate various functions of nature's services, such as water conservation, flood management, biodiversity preservation, local culture protection, leisure, aesthetic experiences, etc. - for future land use planning.

(b) *Greenfield Development / Mixed-Use Development / Compact Development*

Cyberjaya started from a greenfield project with physical limitations over 2 decades ago. However, a lot of development has taken place within that period. As at 2016, about 61.6% of Cyberjaya has been developed, covering an area of 4,294 acres (1,737 hectares).

Figure 3-x shows land use pattern as at 2016. The land use pattern breakdown clearly shows that Single Used dominates the land use pattern of Cyberjaya, accounted for 22.94% of total land use, whilst Compact Development and Mixed Development contributed to only 3.23% and 3.00% respectively.

A review on the land use pattern of Sepang Local Plan 2025 (new masterplan) revealed that Single Used Development made up of 53.30% of land use pattern as compared to Compact Development which accounted for only 3.43%. The Plan however, did not specify percentage of Mixed Development.

Meanwhile, a review on land use pattern of Sepang Local Plan 2020 (old masterplan) shown that Single Used Development made up of 56.89% of land use pattern.

Key Highlights

Land use planning of Cyberjaya is based on conventional planning model.

- Sustainable land use planning should look into maintaining ecological functions as the prerequisite for land-use layout.
- This type of planning is able to integrate various functions of nature's services, such as water conservation, flood management, biodiversity preservation, local culture protection, leisure, aesthetic experiences, etc..

Cyberjaya was a greenfield development.

- As such, a lot of CO₂ had been emitted through earthworks activities and additional infrastructure works.

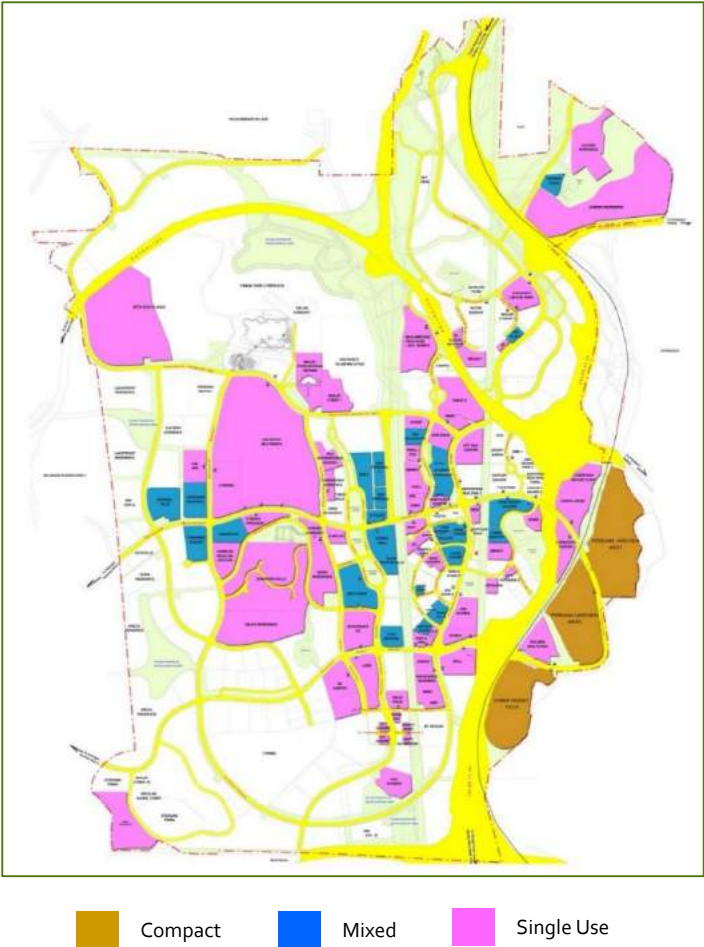
Similar to the new masterplan, the old plan also did not specify percentage of Compact and Mixed Development.

Table 2.2 shows detail comparison of land use pattern for 2020 (old masterplan), 2016 (existing) and 2025 (revised masterplan).

Table 2.2 : Comparison of Land Use Pattern 2020, 2016 and 2025

Land Use	Local Plan 2020		Existing Land Use 2016		Local Plan 2025	
	Area (Acres)	%	Area (Acres)	%	Area (Acres)	%
Compact Development	Not specified	-	224.6	3.23	238.73	3.43
Mixed Development	Not specified	-	208.97	3.00	Not specified	-
Single Used Development	3,959.90	56.89	1,596.93	22.94	3,403.30	53.30

Figure 2.7 : Cyberjaya’s Land Use Pattern as at 2016



Key Highlights

The land use pattern clearly does not promote Mixed Land Uses.

- Mixed land use is one of the contributing factors in achieving sustainable urban form as it allows compatible land uses to locate in close proximity to one another and thereby decrease the travel distances between activities.

It also does not encourage compact development strategy.

- Compactness of urban space can minimize transport of energy, water, materials, products and people.

Single used is generally the dominant style of zoning and is often blamed for encouraging sprawl due to the fact that it splits land up into segregated residential, commercial and industrial zones. As a result, the places where people live, work, shop, and recreate are far from one another, usually to the extent that walking, transit use and bicycling are impractical that it requires the use of private vehicle or automobile to do all these activities.

Land use decisions can have a profound effect on virtually every aspect of the future, from schools to roads to economic development to housing and to the environment. The concept of sustainable land use - that is, managing land use in such a way that the needs of the present are met without compromising the ability of future generations to meet their own needs - is and should be the way forward.

For future development, it is encouraged that city leaders to move away from single-use zoning and look to land-use planning and zoning tools that avoid sprawl and ensure sustainable development.

(c) Preserve Natural Ecology, Water Body and Biodiversity / Green Open Space

Further analysis on the non-built up area reveals that Open Spaces & Recreational Area and Water Bodies accounts for about 9.0 % and 6.5% of total area respectively (totalling about 15.5%).

It can be said that the total percentage (%) of green open space and water bodies in Cyberjaya is small - way below the ideal coverage of 30%. As such, Cyberjaya should be promoting more green open space and water bodies as these have positive effect on microclimate of urban areas. Creating waterfront, water ways and urban parks not only providing vibrant public spaces but also encouraging healthy and active lifestyle to the community.

(d) Number of Trees

Trees in general, offer a number of benefits to the surrounding community such as improving air quality by absorbing CO₂, urban cooling, reducing storm water runoff, increasing property values, improving safety and walkability of streets, providing shade sidewalks and roads as well as offering habitats for urban wildlife that support biological diversity.

Key Highlights

Total percentage of green open space and water bodies is small.

- Increasing the percentage of green spaces in the city would increase carbon sequestration as well as reduce the urban heat island effects. Promoting more water bodies creates vibrant public spaces.

As such, it is imperative to preserve trees and the natural environment. In situation whereby the natural environment has been disturbed, a replacement strategy like tree planting, should be put in place to balance out the damages done.

Since 2006, Setia Haruman Sdn Bhd had organized Tree Planting Programs at various locations within Cyberjaya, in collaboration with other stakeholders such as BOMBA, Cyberview, SHELL, HSBC, LHDN, IBM and Sekolah Seri Puteri. To date, more than 10,000 trees had been planted with Setia Haruman Sdn Bhd bearing most of the cost.

MP Sepang had also organized Tree Planting Programs in collaboration with Malaysian Institute of Planners (MIP) since 2009 (Pledge & Plant A Tree Program).

Under this effort, more than 1,400 trees had been planted in a few location in Cyberjaya. Types of tree that had been planted include Pokok Jelutong, Kapur, Temak Nipis, Brazilian Ironwood, Merawan Siput Jantan, Dwarf Geometry Tree, African Mahagony, Geronggang, Pulai and Jati.

Tree planting is also one of the most cost-effective means of mitigating urban heat islands. Vegetation canopies can cool paving by direct shading of the ground surface. They also cool parking areas indirectly through transpiration of water through leaves. Approximately 1°F of temperature reduction is associated with each additional 10% of tree canopy cover (Simpson, et al. 1994). Nevertheless, it is noted that shaded/canopied trees along most main street and service roads in Cyberjaya are still lacking.

In general, tree planting efforts in Cyberjaya are implemented on an ad hoc basis. There is no certain figure how many trees have been planted and how these are being monitored.

Because recent studies in urban environmental science reported undeniable evidence that trees in cities improve the environment in many ways (such as reduction in CO₂ emission, improvement in air quality, helping in energy conservation, etc.), a more strategic approach and monitoring on tree planting programs are recommended for Cyberjaya. It is also recommended that holistic and strategic tree planting program be collectively integrated with open space, green parks, landscaping and road/parking component, as part of replacement policy to maximize carbon sequestration and absorption.

Key Highlights

Tree planting efforts in Cyberjaya are implemented on an ad hoc basis and not holistically strategized.

- Increasing the number of trees in cities or development would ensue quantifiable benefits such as reduction in atmospheric carbon dioxide, storm water control, improvement in air quality and helps in energy conservation.

(e) Road and Parking

Road and parking are also part of main component of a development. Roofing and pavement generally cover large percentages of land in urban and highly developed suburban areas. Not surprisingly, as cities grow and expand their land base, the natural tree and vegetation cover is replaced by urban infrastructure.

In Cyberjaya, road and parking constitute approximately 14.67% of total land use. The LCCF has highlighted that the provision of road and parking should not exceed 20% of overall land use component. Reducing road and parking surfaces will definitely reduce the amount of CO₂ being released into the atmosphere.

All the roads use conventional paving i.e. asphalt material whilst its parking surfaces use environmental-friendly permeable material i.e. grass crete. Using permeable paving in parking and pedestrian areas helps reduce the temperature, volume and velocity of storm water runoff, filters and removes pollutants and creates more sustainable communities.

Scientific study has revealed that parking lots have many environmental effects. One eminent effect is that acres of pavement can contribute to urban heat island, among other things. The introduction of shared parking concept might be able to minimize the percentage of land attributed to parking. Shared parking concept allows existing parking spaces to serve two or more individual land uses or buildings without conflict or encroachment. However, based on observation, shared parking facility is non existent in Cyberjaya. Most of the buildings have their own parking spaces either at the basement or open space.

To be sustainable, an approach towards 'green parking lot design' should be considered. This could include measurable consideration of any of these elements - pavement shading and cooling, vehicle screening, pedestrian management, habitat protection, irrigation management and tree preservation, as well as on-site storm water management practices (such as permeable paving, micro-detention of water and pollution interception).

Key Highlights

2.2.3 Resource Use

(a) Land Take for Infrastructure and Utility Services

The provision of infrastructure and utility services in cities requires land in take for the purpose of placing the utilities (such as water pipes, electric cables, telecommunication lines, etc.) or housing the services (such as sub stations, pump houses, etc.).

Cyberjaya was a planned city since its inception day. Even though it used a conventional land use planning, factors such as land resources, land suitability and demands of economic and social development have been factored in.

Land use for infrastructure and utility services takes up only 10.17% of total development area. Based on Table 2.3, about 89.5% of its infrastructure had been laid down following conventional road reserve method.

Table 2.3 : Comparison of Land Use Take

Land Use Take for Infrastructure & Utility Services	Size (Acres)	Size (Hectares)	% of Total Area
Existing (2016)	634.2	256.7	9.1
Planned (2025)	708.15	286.58	10.17

Current infrastructure does not support Common Utility Trench (CUT) that allows utilities to share common reserves, nor does it has future plan to install one. Implementation of CUT can bring a few benefits such as provision of easy access to utility companies for maintenance and upgrade works, as well as minimizing maintenance and operational cost through the automation of mechanical and electrical systems.

(b) Urban Storm Water Management and Flood Mitigation

Efficient management of urban storm water runoff can reduce localised flooding impact. Localized flooding happens when rainfall overwhelms the capacity of urban drainage systems. All the roads in Cyberjaya use conventional paving i.e. asphalt material whilst its parking surfaces use environmental-friendly permeable material i.e. grass crete. Sustainable material such as pervious pavement able to capture, slow, filter and possibly infiltrate storm water runoff into the ground, and indirectly prevent water from overwhelming pipe networks and pooling in streets or basements.

Key Highlights

Current infrastructure does not support Common Utility Trench (CUT).

- Benefits of having CUT include reduction of disruption to services and facilitate maintenance and upgrading works.

Recent studies show that implementing green storm water management techniques, such as porous pavement and green roofs, is more cost-effective compared to traditional gray storm water measures like pipes, sewers, and manholes.

Other green technology application that enhance infiltration, that can also be adopted includes rain gardens, green roofs, regional storm water pond, constructed wetlands and bio swales.

Clearly, effective urban storm water management should extend beyond centralized municipal storm water infrastructure to also include on-site catchment, treatment and usage. Single-purpose gray storm water infrastructure is largely designed to move urban storm water away from the built environment, while green infrastructure reduces and treats storm water at its source while delivering other environmental, social, and economic benefits. Introducing green infrastructure to supplement the existing gray infrastructure can promote urban livability and add to communities' bottom line.

(c) Household Solid Waste Management

Solid waste management generally comprise the following elements of the system - Waste Prevention (e.g. 3R), Self-Treatment (e.g. food digester, composting, anaerobic digestion), Source Segregation (e.g. different waste types), Collection and transportation, Pre-Treatment (material recovery facility (MRF) – separation of recyclable material through size reduction, density separation, magnetic separation and densification) and Final Treatment (e.g. thermal treatment, landfill).

Cyberjaya has initiated Waste Prevention program to nurture and encourage recycling habits amongst Cyberjaya community. One of the initiatives is the cash conversion program whereby community is given a platform to convert their recycling materials into cash. The current estimated recycling rate in Cyberjaya was not being able to be established.

Cyberjaya does not enforce segregation of waste at source to its community. The benefit of Source Segregation is that it would save energy, time and money. In most western countries, disposal of waste is done in a planned manner in such a way that reusable or recyclable materials cannot be found in their landfill sites.

Key Highlights

Cyberjaya uses conventional method for managing urban storm water.

- Other green technology applications to manage urban storm water includes rain gardens, green roofs, regional storm water pond, constructed wetlands and bio swales.

Potential smart and low carbon application :

- Convert storm water to demineralized water for industrial usage.

Cyberjaya's recycling rate is unknown.

- To establish community-level recycling centres.
- Private sector investment in recycling system – reactivate composting.

The main focus of solid waste management system in Cyberjaya is sole dependency on landfill (100% landfill). It is recorded that in 2016, about 4,445.05 MT of waste were sent to Tanjung 12 landfill (Source : Unit Perkhidmatan Bandar, MP Sepang) and the average amount of waste collected was between 600 MT and 700 MT per month. The CO₂ emissions come from the transportation of waste to landfill (32km from Cyberjaya) and the landfill waste itself. Landfill has shown to be not the best technology in dealing with organic waste.

To reduce the amount of waste sent to landfills, Cyberjaya did attempt to provide three Compostech machines for the community's use, located at the SME Technopreneur Centre 1, MaGIC, and the Cyberjaya Community Clubhouse. These Compostech machines recycled organic kitchen and garden waste into compost within a speedy 24 hours, which is then used as nutrient-rich fertiliser for landscaping purposes around Cyberjaya. Nonetheless, the activity of composting has stopped due to the breakdown of the machines. Currently composting rate in Cyberjaya is 0%.

Cyberjaya also directly benefitted from state of Selangor's new policies on restriction of using non-recyclable packaging (i.e. polystyrene packages) and plastic bag tax system in an effort to reduce the generation of non-recyclable waste from Selangor community.

However, looking at the current rate of 100% landfill (i.e. zero diversion from landfill), 0% composting rate and X% recycling rate, an approach towards sustainable waste management is crucial for Cyberjaya.

(d) Energy Optimization

Energy, in the form of electricity plays a vital role in supporting the operation of a building (residential or business - either to light, cool or heat). Residential buildings consume nearly one third of Total National Energy Consumption (Source : ScienceDirect Journal). Studies show that a significant part of energy use can be optimized through occupants' awareness about energy consumption. Optimising the energy usage/consumption will subsequently reduce carbon emissions over time. A commitment towards continual efficiency upgrading impacts our electrical energy use.

Key Highlights

100% dependency on landfill.

- Landfill has shown to be not the best technology in dealing with organic waste

Cyberjaya composting rate is 0%.

- Composting is nature's process of recycling decomposed organic materials into a rich soil known as compost.
- Composting is the basis of sustainable urban farming, which promotes a closed loop system where all components of a farm add to and support each other.

Potential smart and low carbon application :

- Conversion of plastic to diesel for public transport usage.
- Bio-chilled water generation using landscape waste.

As being reported in the 'Energy Audit Report for MP Sepang HQ Building' prepared by GreenTech Malaysia in February 2017, the annual energy (i.e. electricity) consumption by MP Sepang HQ building (with Gross Floor Area (GFA) of approximately 13,135m²) for 2015 and 2016 is 1,689,062kWh and 1,734,912kWh respectively. The corresponding energy costs were RM859,377 and RM882,715 per year respectively. As part of the mitigation plan, the Audit recommended ten (10) energy saving measures that would enable potential total energy saving of 17.5% or 304,464kWh per year which is equivalent to potential annual cost saving of RM144,564, from a total investment of RM340,025 (hence, giving a payback period of 2.4 years). It is estimated that the amount of CO₂ mitigated is 225.6 ton CO₂ based on GHG emission factor of 0.741 kgCO₂.

Data received from TNB with regards to total annual energy consumption and total annual energy consumption from streetlights in Cyberjaya for year 2011 and 2016 are illustrated in Table 2.4.

Table 2.4 : Comparison of Total Annual Energy Consumption in Cyberjaya

Energy Consumption	2011 (kWh)	2016 (kWh)	% Increase / (Reduction)
Total Annual Energy Consumption	65,278,906	131,681,384	101.72%
Total Annual Energy Consumption from Streetlights	1,517,868	5,475,352	260.73%

Source : ICT Division, TNB

It is apparent that Cyberjaya had experienced a glaring percentage of increase in both total annual energy consumption and total annual energy consumption from streetlights from 2011 to 2016.

From the data gathered, it is found that only 3% of streetlights in Cyberjaya is LED lights. LED is one of today's most energy-efficient and rapidly-developing lighting technologies. LED lights are up to 80% more efficient than traditional lighting such as fluorescent and incandescent lights. About 95% of the energy in LEDs is converted into light and only 5% is wasted as heat. Less energy use reduces the demand from power plants and decreases greenhouse gas emissions. Hence, widespread use of LED lighting has great potential in reducing energy consumption from streetlights in Cyberjaya.

Key Highlights

Energy Audit Report for MP Sepang HQ Building.

- Implementation of Sustainable Energy Management System (SEMS) that would provide a systematic manner to monitor and control the power and energy consumption in MP Sepang.

Only 3% LED lightings usage in streetlights.

- Widespread use of LED lighting has great potential in reducing energy consumption since LEDs are energy efficient – 95% of the energy is converted into light.

About 101.72% increase in energy consumption from 2011 to 2016.

- Studies show that a significant part of energy use can be optimized through occupants' awareness about energy consumption.

In general, energy consumption in buildings is dependent on building characteristics and occupants' behaviour. As such, programs or initiatives on behavioural change and awareness related to energy efficiency should be implemented/intensified. The programs are recommended to involve the participation of communities as community-based initiatives could lead to long-term behaviour change because they facilitate the introduction of new, pro-environmental social norms (examples include groups sharing information to facilitate behaviour change).

Another energy efficient measure that is recommended is through smart technology interventions (or ICT-based solutions). However, this will equally have to rely on people adjusting their energy consumption behaviour to make it work successfully. The challenge is to ensure that ICT-based solutions can contribute to saving energy by motivating and supporting behavioural change of energy end-users.

With regards to energy consumption by private entities, no data is available. However, energy consumption pattern can be viewed from different perspective i.e. by looking at the green certified buildings as these buildings had already been integrated with energy efficiency practices into the building design, operation and maintenance prior to being certified. Some of the energy efficiency practices which have an effect on energy savings/consumption include building façade and orientation as well as energy saving appliances and fixtures (e.g. inverter A/C, energy saving hybrid water heater, centralized vacuum system). Currently, there are only 12 green certified buildings (either LEEDS or GBI Certified) in Cyberjaya.

In summary, efforts towards looking into energy management system as well as implementing more energy efficiency programs and promoting green building certification are highly recommended since consumption patterns do have direct impacts on global warming and carbon emissions in particular.

(e) Renewable Energy

Renewable Energy (RE) is energy which comes from natural resources such as sunlight, wind, rain, tides and geothermal heat, which is replenish-able. About 16% of global final energy consumption comes from renewables, with 10% coming from traditional biomass (which is mainly used for heating) and 3.4% from hydroelectricity.

Key Highlights

Energy consumption in Cyberjaya is found to be on the high side.

- Some measures that can be undertaken include the followings : Energy Audit, Energy Efficiency Programs, Green Building Certification, Community-based Initiatives, Public Engagement Campaigns, Financing Schemes & Subsidies and Eco Design.

Potential smart and low carbon application :

- Supply side - CoGen to meet chilled water and electricity.
- Bulk sale of chilled water from waste heat recovered from TNB power plant.

New renewables (such as small hydro, modern biomass, wind, solar, geothermal, and biofuels) accounted for another 2.6% and are growing very rapidly.

However, the most common form of RE in Malaysia is solar photovoltaic (PV). It is reported that the cumulative installed solar PV as at September 2015 is only at 321.29 MWp (Source : SEDA, 2016) as compared to national target of 1,250 MWp by 2020 (Source : SEDA, 2012). Malaysia has implemented net energy metering (NEM) last year, which allows self-consumption of electricity generated by solar photovoltaic system while selling the excess energy to utility companies. The Sustainable Energy Development Authority Malaysia (SEDA) had said the country would be implementing its 500MW of capacity for NEM starting 2016 until 2020 with 100MW capacity limit a year in Peninsular Malaysia and Sabah. Clearly, the potential of this type of RE is yet to be fully tapped and explored.

The application of RE in Cyberjaya is only limited to the installation of solar PV. Currently, five (5) bus shelters, two (2) Green Nomad Kiosks and several rooftops, including Cyberjaya Community Recycling Collection Centre (CCRCC) have been installed with solar panels. For solar panels installed on the bus shelters, the energy stored is turned into electricity at night, lighting up the bus stand. In addition, the Cyberjaya Mosque has also been equipped with a Building-Integrated Photovoltaic (BIPV) System to harvest energy from the sun, making it the world's first mosque equipped with BIPV.

Given the low GHG emissions from solar power, increasing its adoption can be part of an essential strategy for Cyberjaya to reduce CO₂ emissions and transform itself into low carbon city. Solar PV is energy efficient since most solar panels could convert around 15% of the sun's energy into electricity. Energy generated by solar PV can be stored in a battery or thermal and used for space heating, space cooling, lighting and operation of various equipment and machinery.

(f) Side-Wide District Cooling System

District Cooling System (DCS) is the distribution of cooling energy from one or more sources to multiple buildings within a district in the form of chilled water through underground insulated pipeline, mainly for air conditioning purposes. DCS reduces energy consumption and adverse energy related to environmental effects.

Key Highlights

Potential smart and low carbon application :

- Floating solar panel from retained water bodies.
- Energy from bio-digesters.

Not only that DCS is the most convenient method for the production and distribution of cooling for commercial purposes, it also provides both economic and environmental benefits. DCS offers operating flexibility, since each building can use as much or as little cooling as needed, without worrying about chiller size or capacity – and the system produces no noise or vibrations. Hotels, shopping centres, industrial buildings, office buildings, residential buildings, sports centres and hospitals are examples of facilities that can benefit from the use of district cooling.

At the moment, there are two (2) plants of DCS in Cyberjaya, located at Cyber 6 (DCP 1) and Cyber 8 (DCP 2), with a 15km underground network supplying chilled water for the air-conditioning needs to 40 multi-storey buildings within Cyberjaya's flagship zone, including Wisma Shell, Malaysia Digital Economy Corporation (MDeC) and various government agencies. The system utilises off-peak electricity at night to chill water for the buildings' air-conditioning use during the day. The technique of using chill water for air conditioning reduces electricity usage by more than 65% as compared to traditional air-conditioning systems.

Recently, Megajana has collaborated with ENGIE Group (French energy company) to expand the capacity of existing facilities to supply round-the-clock chilled water for air conditioning to Cyberjaya township's data centres, malls and office towers.

This 2017 facilities expansion, enabling a 5% energy efficiency gain, represents a reduction of 2.3 GWh(e) of power consumption or 1,160 tons of CO₂ per year (Source : Cyberview Sdn Bhd).

Installation of DCS in Cyberjaya is definitely among the most important green features to materialise the sustainability vision of Cyberjaya due to its high energy efficiency. However, since the current DCSs are running on fossil fuel, it is recommended that Cyberjaya to look into the performance and progress of DCS integrated with sustainable energy technologies including systems integrated with RE, combined cooling, heating and power systems, and thermal storage systems.

Key Highlights

DCSs are currently running on electricity.

- To look into the optimization of DCS integrated with sustainable energy technologies including systems integrated with RE, combined cooling, heating and power systems, and thermal storage systems.

Potential smart and low carbon application :

- Industrial water for cooling towers and landscape use – to be recovered from storm water and waste water.
- Supply of grey water to DCS.
- Bio-chilled water generation using landscape waste.
- Supply side - CoGen to meet chilled water and electricity.
- Bulk sale of chilled water from waste heat recovered from TNB power plant.

(g) *Efficient Water Management*

Efficient water management refers to the optimization of treated water consumption through awareness of wastage and wasteful practices as well as finding alternative source of water (such as through recycle water or the use of rainwater harvesting) for non-human contact purposes.

Total water consumption in Cyberjaya could not be found at the moment. As such, the equivalent amount to Ringgit Malaysia payable to utility company also could not be established. However, the main source of water supply in Cyberjaya came from the water treatment plant in Sungai Semenyih area. This water treatment plant gets 100% supply of water from catchment area i.e. from five (5) identified reservoirs within Cyberjaya. Clearly, surface water stored in reservoirs is the main source of potable water supply in Cyberjaya.

The estimated per capita water consumption in Cyberjaya as at 2016 is yet to be ascertained. Malaysia's per capita water consumption is unsustainable, with household consumption of 211 litres per capita per day (Source : www.export.gov), which exceeded the benchmark recommended by the United Nations of 165 litres per day.

In general, only 30% of water usage is used for actual consumption such as cooking and drinking, while the remaining 70% of it is just for non-potable uses like washing and flushing for household and cooling and landscaping for industry. In the past, it was concluded that the water shortage crisis in many parts of the country occurred due to the inefficient management of the authorities as well as Malaysians' own habit of wasting the water.

Water savings can be achieved in residential and industry through a combination of changing behaviour, modifying and/or replacing equipment with water saving equipment to reduce overall water consumption as well as increase internal reuse of treated water.

With predictions of water shortages in the future, reclaimed water is being touted as something that MP Sepang should consider, alongside other options such as groundwater and storm water. Diversifying water sources helps ensure water security.

Key Highlights

100% potable water supply from surface water stored in reservoirs.

- In general, only 30% of water usage is used for actual consumption while the remaining 70% of it is just for non-potable uses.

Recycle water usage in Cyberjaya is 0%.

- With predictions of water shortages in the future, reclaimed water along with groundwater and storm water are options for diversification.

Potential smart and low carbon application :

- Industrial water for cooling towers and landscape use – to be recovered from storm water and waste water.
- Supply of grey water to DCS.

(h) Sewerage Treatment

Cyberjaya owns two (2) main sewerage treatment plants (STP), which are located at Persiaran Sepang (STP A) and Persiaran APEC (STP B). These main STPs are supported by seventeen (17) pump stations that use gravity flow method to transfer the sewerage to either STP A or B for processing.

These STPs are centralized STP, which represent the conventional approach to managing wastewater. It is characterized by the collection and removal of urban wastewater by a centralized sewerage to a centralized intensive treatment plant where the wastewater and sludge are treated and disposed of under controlled conditions.

The overall advantages of this management concept are perceived to be the lower investment and operational costs, incurred by a single large treatment plant as compared to several small-scale plants, as well as a more effective control of quality standards and plant operation procedures.

However, a number of disadvantages entailed especially when it comes to less densely populated areas - the costs/benefits ratio of central systems may be less favourable if the high and long-term construction and maintenance costs of the sewerage system are taken into account. If not adequately maintained, an extensive sewerage system may leak and cause contamination of soil and groundwater. Centralized treatment systems require (multiple) pumping stations (as in the case of Cyberjaya – 17 pump stations) which must be properly operated and maintained as well. And this require vast amounts of electricity which make them not very sustainable. And lastly, centralized municipal treatment plants reduce opportunities for water, nutrients and sludge re-use in local cycles, due to their high load of harmful substances, such as chemicals, heavy metals and pathogens (especially when industrial wastewater is also collected in combined sewer).

In recent years, increasing attention has been given to modern onsite, decentralized or semi-centralized wastewater management concepts that are already applied in many developed countries. These concepts comprise collection, treatment and disposal/re-use of wastewater from small communities (from individual homes to portions of existing communities) integrated in settlement/village/town development projects.

Key Highlights

Centralized STP in Cyberjaya – conventional and not sustainable (100% usage of conventional STP).

- A paradigm shift from centralized conventional wastewater systems to decentralized wastewater systems.
- Sewage as a valuable resource as opposed to a problem to be treated.

Such approaches consist of many small sanitation/wastewater treatment facilities designed and built locally. Decentralized systems maintain both the solid and liquid fractions of the wastewater at or near the point of origin and, hence, minimize the wastewater collection network. This approach offers a high degree of flexibility, allowing modifying the design and operation of the system to fit to various site conditions and scenarios. Decentralized wastewater treatment can be a smart alternative for communities, particularly small ones as it can avoid large capital costs, use energy and land wisely and protect communities' health.

One interesting note is that although sewage contains contaminants, it also holds nutrients that can be used to improve soil fertility, along with the ability to produce natural gas. Technologies such as biogas plants that maximise sewage as an energy and nutrient source had already been implemented in developed countries. Sewage should be viewed as a valuable resource, and not just a problem to be treated.

It is recommended that Cyberjaya to look into 'Green STP' and start realising the full potential of sewage as a resource.

Figure 2.8 : ORGANICA Wastewater Treatment Plant in Le Lude, France



Key Highlights

Currently in Cyberjaya, energy generated from biogas is 0%.

- Sewage should be viewed as a valuable resource, and not just a problem to be treated.

Potential smart and low carbon application :

- Energy generation via co-digestion between STP waste water and food/garden waste.
- Supply of grey water to DCS.

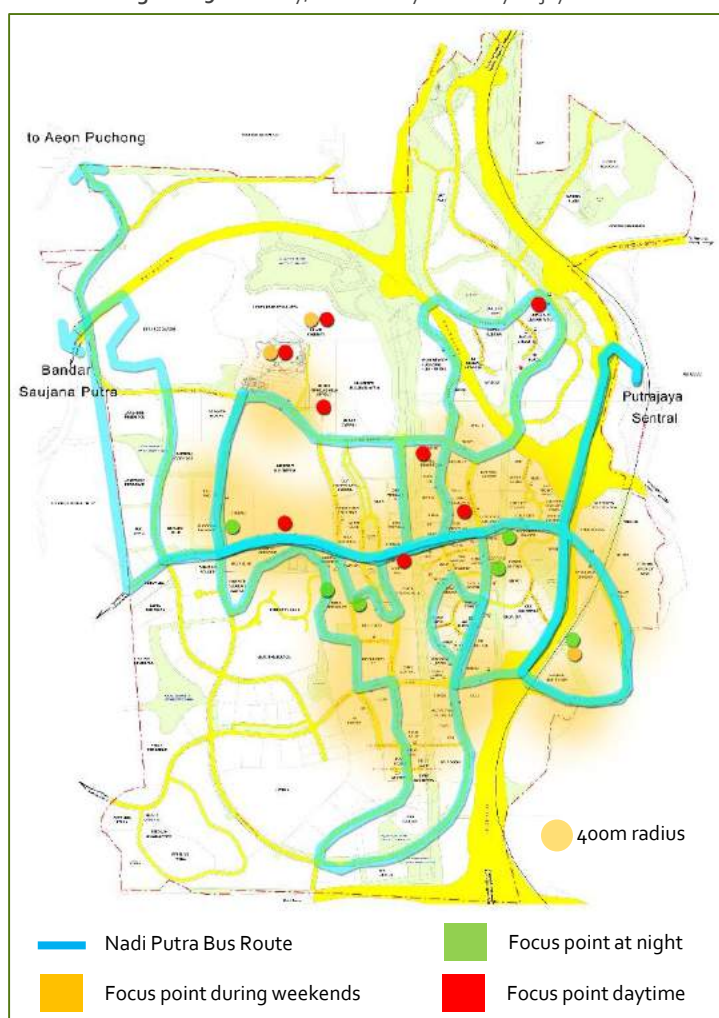
2.2.4 Mobility

(a) Development within Transit Nodes and Corridors

Transit nodes and corridors refer to the major routes of public transport services such as rail and buses. The nodes are generally the stops, stations or terminals. These nodes are designed to be within a radius of 400m, to encourage people to walk to these facilities (Source : Draft Residential Design Guideline, Federal Department of Town & Country Planning, Malaysia).

Figure 2.9 shows mobility/connectivity within Cyberjaya. In general, connectivity within Cyberjaya is quite well or well served. Most bus stops are within 400m or walking distance from activity centres. As such, activity centres should be developed as vibrant places by focusing on mixed-use activity, main streets and public realm improvements.

Figure 2.9 : Mobility/Connectivity Within Cyberjaya



Key Highlights

Potential smart and low carbon application :

- Develop activity centres as vibrant places by focusing on mixed-use activity, main streets and public realm improvements.

Creating high quality public spaces and improving the appearance of an area are not just going to make people feel good when they visit, shop, work or live there, but it would make the area more attractive, healthier, safer and cleaner, and therefore prompting more people to go there. It also means that businesses will be more likely to invest money, to build or to trade there, which improves the economy and creates jobs.

Budget 2016 had seen the Prime Minister allocated RM11 billion plan to build the multi-year mega projects in Cyberjaya called Cyberjaya City Centre (CCC), and a RM7 billion airport township, dubbed as Aeropolis, around Kuala Lumpur International Airport. A new line, called MRT II, has been built from Sungai Buloh in the north-west of KL, to Putrajaya in the south, spanning 52km and costing another RM28 billion, with two MRT stations (S34 and S35) located in Cyberjaya. The development of CCC will be undertaken by Cyberview Sdn Bhd and MRCB Land Sdn Bhd, spanning 53 hectares of land located between Putrajaya Sentral and Lim Kok Wing University and would be developed in two phases over the period of 15 years.

Looking at this new occurrence, synergy and integration of plans between key stakeholders are vital to ensure that the overall development objectives are met.

(b) Comprehensive Pedestrian/Cycling Network

Not only that walking and cycling are the most basic and traditional form of transportation, they are also the most efficient form of transport for short distances. Both aspects are crucial when looking at the relevance of non-motorized transport (NMT) in developing environments.

Walking is sustainable because it does not emit any carbon. Individuals are more likely to choose to walk if they see the environment as walkable – convenient, safe and pleasant. Pedestrian network for a development has to be planned at the design stage and should also be planned to be integrated with cycle and public transport network.

Similar to walking, cycling is also a sustainable way to travel. It is simple, cost effective and the most efficient way of reducing emissions. A comprehensive and continuous network of cycle lanes will encourage more people to cycle for their daily activities.

Key Highlights

Integration with the development of Cyberjaya City Centre (CCC).

- CCC is the catalyst of anchoring Cyberjaya into a global technology hub.

With regards to pedestrian network, Sepang Local Plan 2025 indicates pedestrian lane for all roads in Cyberjaya. As at 2016, it is estimated that about 30% of pedestrian routes have been developed, excluding the pedestrian routes within development area.

With regards to cycling network, Sepang Local Plan 2025 does not have provision for dedicated cycling network in Cyberjaya. However, in 2015, MP Sepang has started marking road for bicycle lane in major population area in Cyberjaya in 2 phases :

- Phase 1 – completed :
 - ✓ Persiaran Semarak Api (P1) - 4 km/2 way and Persiaran Flora (P2) - 1.8km/2 way. Total length of 5.8 km / 2 way.
- Phase 2 – proposed :
 - ✓ Persiaran Bestari (P1) (2.8km/2 way), Persiaran Multimedia (P2), Persiaran Tasik (P7), Lingkaran Cyberpoint Timur, Lingkaran Cyberpoint Barat and Persiaran Cyberpoint Selatan (P5). Total length is estimated at 13.4 km.

As shown in Figure 2.8, major focus areas are connected by pedestrian lane from bus stations. Nonetheless, the dedicated cycling lane was out of the way from major focus areas. It can be said that the cycling activity in Cyberjaya is more towards recreational/leisure/health purposes rather than as an alternative for motorized urban transport or as a feeder to public transport systems. Currently, there is no data to indicate the percentage rate of cycling in Cyberjaya. However, it is foreseen that cycling activities will pick up as more infrastructure and supporting facilities to provide for safe and convenient cycling are set in place.

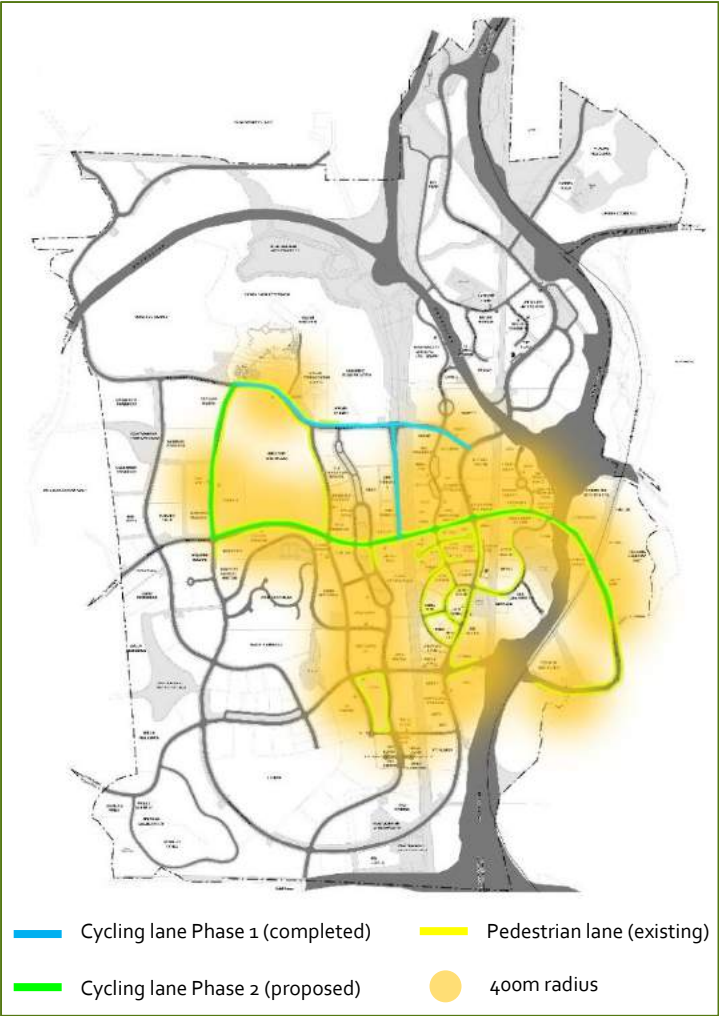
The CCC Masterplan prepared by Cyberview Sdn Bhd promoted pedestrian and cycling as one of its key features in its development. An effort to integrate the pedestrian and cycling network between Sepang Local Plan 2025 and the CCC Masterplan should not be overlooked in order to create potential demand, promote walking and cycling on short to medium trips to residents/communities and to make central business district (CBD) area a TOD zone with perhaps 100% walkable and accessible to pedestrian.

Key Highlights

Cycling activity is more towards recreational/leisure/health purposes.

- Currently, road marking for bicycle spanned only 5.8km.

Figure 2.10 : Walking and Cycling Network Within Cyberjaya



Key Highlights

(c) Public / Private Transportation

The usage of public transport reduces energy consumption and harmful carbon dioxide (CO₂) greenhouse gas emissions that damage the environment. Travelling by public transport uses less energy and produces less pollution than comparable travel in private vehicles.

Studies conducted by United States Department of Transportation shows that public transportation produces significantly less GHG emissions per passenger mile per distance travelled compared to private vehicles. Heavy rail transit such as subways and metros produce on average 76% lower greenhouse gas emissions per passenger mile than an average single-occupancy vehicle (SOV). Light rail systems produce 62% less and bus transit produces 33% less.

Unfortunately, public transit has not been the dominate transportation mode in Cyberjaya. According to 'Traffic Impact Assessment for the Feasibility Study for the Development of Transport Terminal in Cyberjaya 2013' (TIA Report 2013) produced by Cyberview Sdn Bhd, the public transportation modal split was estimated at 7% as at 2016. Table 2.5 shows the modal split between public and private transportation based on TIA Report 2013 :

Table 2.5 : Public / Private Transportation Modal Split

Public	Private	Basis	Year
5%	95%	Baseline	2013
7%	93%	Projection	2016
10%	90%	Projection	2020
15%	85%	Projection	2033

Buses and cabs remain the only form of public transportation here in Cyberjaya at the moment. Current bus services are being provided by Nadi Putra and Cyberjaya Dedicated Transportation System (DTS). Nadi Putra is a public bus services whilst DTS is a semi public bus transportation, which only make trips when requested by passengers. Nonetheless, it can be noted that the current public transportation route and bus stops in Cyberjaya do support most of the activity centres or focus areas (refer to Figure 2-9).

Key Highlights

Public transportation modal split was estimated at 7% as at 2016.

- Travelling by public transport uses less energy and produces less pollution than comparable travel in private vehicles.
- Buses and cabs remain the only form of public transportation in Cyberjaya.

In general, Cyberjaya has adequate public transportation system. The busses are popular among students and the general population who live inside this city.

Almost 75% of the bus fleet under Nadi Putra is powered by natural gas while the remaining is still using diesel. The provision of a public bus service using natural gas is an important step in providing low carbon transport services in Cyberjaya. This is because GHG emission using natural gases is 20% to 30% less compared to diesel (Source : <http://www.ngvc.org>).

In 2016, the total number of buses and the frequency of trips per year made by these buses have shown an increased of 42.9% and 23.5% respectively from the previous year (Table 2.6). It is calculated that the average trip per hour is 2 trips, with a 30 minute waiting time.

Table 2.6 : Number of Buses and Frequency of Trips of Nadi Putra Fleet

Year	No of Buses	%	Total Trips Per Day	Total Trips Per Year	%
2016	20	42.9	151	55,115	23.5
2015	14	-	125	44,625	-
2014	14	-	125	44,625	-
2013	14	-	125	44,625	-

As Table 2-7 indicated, the number of ridership for services under Nadi Putra experiencing an increase pattern for the past 3 years since 2014 with significant increase of 20.96% in 2015. Meanwhile, DTS ridership recorded an increase of 7.81% only in 2016 (Table 2-8).

Coming back to Table 2-5 shown earlier, the public transportation modal split was estimated at 7% as at 2016. Thus, it can be assumed that total combination of average per day ridership of 2,511 (i.e. Nadi Putra 2,446 + DTS 65) represents the 7% public transportation modal split. To obtain a 15% public transportation modal split in 2033, the average per day ridership would need to be raised to about 5,381 which is equivalent to 1,937,160 ridership per year or an average of 161,430 ridership per month.

Key Highlights

Table 2.7 : Ridership for Nadi Putra Bus Services in Cyberjaya

Year	Nadi Putra			
	# of Ridership per Year	%	Avg Per Month	Avg Per Day
2016	880,604	6.14	73,384	2,446
2015	826,503	20.96	68,875	2,296
2014	653,253	0.42	54,438	1,815
2013	650,441	-	54,203	1,807

Table 2.8 : Ridership for DTS Bus Services in Cyberjaya

Year	DTS			
	# of Ridership per Year	%	Avg Per Month	Avg Per Day
2016	23,287	7.81	1,941	65
2015	21,468	-11.71	1,789	60
2014	23,981	-7.95	1,998	67
2013	25,888	-	2,157	72

The high percentage of usage of private transport in Cyberjaya can be attributed to the following factors :

- Cyberjaya is generally a low density development as evidenced by the current population density of 6 persons per acre or 24 persons per hectare. Most of low density areas are extremely automobile dependent as it means more travel and commuting to the activity centres to meet everyday needs.
- Cyberjaya is predominantly a job centre since its employment ratio is higher than its population ratio. This means higher mobility into and within Cyberjaya and this also contributes to the high percentage usage of private vehicle in Cyberjaya.

Sustainable mobility requires the need to promote travelling through an accessible and reliable public transportation system. However, public transportation would not be viable if there is no or too few ridership. As such, Cyberjaya should find ways to increase the number of ridership for public transport services as well as formulate innovative approaches to low-density transit system so that the percentage of its public transportation modal split can be increased. Gearing towards green public and private vehicles are also recommended.

Key Highlights

Cyberjaya is a low density development - population density of 6 persons per acre or 24 persons per hectare.

- Most of low density areas are extremely automobile dependent.
- The need to formulate innovative approaches to low-density transit system.
- The need to increase density to increase number of public transport ridership.

Cyberjaya is predominantly a job centre - its employment ratio is higher than its population ratio.

- This means higher mobility into and within Cyberjaya - contributes to the high percentage usage of private vehicle.

(d) Traffic Flow Management

An efficient traffic management in the city will results to less congestion. An efficient traffic flow will bring smooth movement of vehicles in the city, thereby enabling less carbon emissions. Speed management is about maintaining a pre-determined speed for optimum consumption, compared to excessive speeds that consume more fuel and subsequently emit more carbon. Traffic in cities can be managed by various means through combination of mainly physical measures. A common method in this country is the road hump.

According to TIA Report 2013, the traffic flow in Cyberjaya seemed smooth and satisfactory during both morning and evening except for the following :

- Morning peak hour – Persiaran APEC north of Persiaran Semarak Api and Jalan Teknokrat 4
- Evening peak hour – Jalan Teknokrat 2 south of Jalan Teknokrat 1, Jalan Impact and Jalan Teknokrat 7.

April last year, Cyberview and Intelsec Sdn Bhd (a wholly-owned subsidiary of Telekom Malaysia Berhad), funded the installation of smart traffic management system project in collaboration with MP Sepang and MdeC. Mounted above the traffic lights are LTE-equipped controllers that run video cameras with analytic capabilities. The cameras analyse the traffic situation and intelligently direct traffic at the intersection to reduce waiting time at traffic lights.

The smart traffic management system project covered eight (8) junctions starting from from junction 1 at SK Cyberjaya / MMU to junction 8 at Shaftsbury Square along Persiaran Multimedia, covering about 3.7km. The system has improved the movement for both point from junction 1 to junction 8 and back. Travel time was previously around 30 minutes and after implementation it was reduced to between 10 to 15 minutes.

The deployment of the smart traffic system not only would smoother the traffic flow, but also would improve the management between the various authorities, agencies, transport service providers and related parties to have a better understanding of traffic in Cyberjaya.

Key Highlights

Cyberjaya has installed smart traffic management system in 2016.

- The cameras analyse the traffic situation and intelligently direct traffic at the intersection to reduce waiting time at traffic lights.
- Travel time has been reduced to between 10 to 15 minutes from 30 minutes previously.

To deal with transport problems, it is not sufficient to just look at the provision of infrastructure alone. Instead, other aspect like Traffic Flow Management seems to be an effective strategy to deal with the problems and contributes to achieve sustainable development.

Based on the principle of traffic management and international experience in ensuring sustainable transport, below are ten potential approaches towards traffic management sustainability (Source : www.sciencedirect.com) :

- **Control transport demand** – via land use control. Integrate transit and land use planning. One of the most effective strategy is TOD.
- **Control modal choice** - making the modes with lower preference less attractive and the preferred modes more attractive.
- **Use mobility pricing instruments to control demand** – e.g. vehicle and fuel taxes, city tolls, parking fees, public transport tariffs, public transport commuter pass for students and employees, road pricing scheme, etc..
- **Operate transport infrastructure dynamically and situation-responsive** – e.g. tidal-flow systems, traffic-actuated signal control, dynamic speed limits, dynamic route signs, on-demand public transport services, etc..
- **Promote new concepts of mobility** – e.g. UBER.
- **Promote the applications of Intelligent Transport Systems** - new technologies allow changes in mobility behaviour and support safe, efficient and environmentally compatible operations of traffic and transport systems. Intelligent Transport Systems (ITS) and its applications play an important role in transport as it can help improve traffic flow, road safety, security and crime reduction, public transport, freight efficiency and environmental impacts. Applications of ITS in urban public transport include : (1) pre-trip and in-trip information services via Internet and smart phone; (2) electronic displays on the remaining time that a vehicle will arrive at stop/station; (3) ticket vending machines; (4) electronic tickets; (5) security cameras; (6) electronic information signs; and (7) other passenger information services such as displaying vehicle location, walking distances between stops and parking information.

Key Highlights

- **Pay a due attention to traffic safety and environmental impacts** – e.g. measures such as heavy vehicle bans, environmental zones and speed limits.
- **Make the quality of traffic transparent and improve it continuously** – established a comprehensive set of traffic performance measurements for the purposes of monitoring, evaluating and improving the performance of transport and traffic systems.
- **Provide sufficient and sustainable financing of transport** – stronger investment and new approaches to funding transport projects.
- **Create the right institutional framework for intermodal transport** – the needs for integrated traffic management authority that brings together the competences in public transport and road network operations on a regional level.

Key Highlights

2.2.5 Building

(a) Operational Energy Emissions / Operational Water Emissions

Operational energy and water emissions are very much related/associated to the efficiency of energy and water consumption of a building or structure. The way we design, build, renovate and operate buildings has repercussions on the environment and our planet. Sustainable buildings or green buildings are designed in such a way to reduce overall impact on environment and human health by efficiently using energy, water and other resources.

Currently, there are 19 completed green buildings in Cyberjaya whilst another 6 buildings are still under construction. The list of the buildings are shown in Table 2.9 and Table 2.10 :

Table 2.9 : List of Completed Green Buildings in Cyberjaya

Completed			
Integrated DC Builders Sdn Bhd	Joyful Gateway Sdn Bhd	MyTelehaus Sdn Bhd	NTT Communications – Phase 1
NTT Communications – Phase 2	Quill Land Properties	Kompleks Terminal KLIA 2	Hotel Tune KLIA 2
Measat Broadcast Network Systems Sdn Bhd	Masjid Cyber 1	Centrus Mall @ CBD 3	Shaftbury Square – Block D
Shaftbury Square – Block E	TS Global	The Place – Tower 1	The Place – Tower 2
The Place – Retail Podium	Demi Murni – Cyber Square (SOHO)	Airasia - REDQ	

Table 2.10 : List of Green Buildings Under Construction in Cyberjaya

Under Construction			
Lembaga Tabung Haji	Tujuan Gemilang Sdn Bhd – Tamarind Square (Phase 3)	Setia Haruman Sdn Bhd – Westlink (1 Block Office Suite Phase 1D)	Setia Haruman Sdn Bhd – Westlink (1 Block Office Suite Phase 1A)
Roppongi Development Sdn Bhd – CUCMS	Kenwingston – Phase 1		

Key Highlights

There are 19 completed green buildings in Cyberjaya whilst another 6 buildings are still under construction.

- Sustainable buildings or green buildings are designed in such a way to reduce overall impact on environment and human health by efficiently using energy, water and other resources.
- Conducting energy audit for buildings is recommended for discovering ways to make buildings much more energy efficient.

These green buildings in Cyberjaya are being certified by either Green Building Index (GBI) Malaysia or Leadership in Energy and Environmental Design (LEED) USA. GBI and LEED-certified buildings are resource efficient. They use less water and energy and reduce greenhouse gas emissions.

GBI and LEED are criteria-based rating tools. They are based upon a points system. The more points you earn, the higher your rating is. However, they do not measure the actual performance of energy consumption or efficiency of the building.

Conducting energy audit for buildings is recommended for discovering ways to make buildings much more energy efficient. Energy audit is a professional audit that is performed by utility company or other outside consultant to determine energy saving opportunities for one building. Since every building is unique, it is important to have an audit to assess each building unique needs.

As discussed earlier, MP Sepang has done an energy audit for its HQ building in February 2017 being undertaken by GreenTech Malaysia.

An energy audit will begin with an inspection of lighting, air conditioning, heating and ventilation, refrigeration, water-consuming equipment, controls, and anything else that uses energy.

- The building will then be provided with an energy report outlining the existing energy-consuming equipment and the energy balance. In addition, a presentation of energy conservation measures (ECM), which outlines the expected annual savings, the expected cost to implement the ECM, and the return on investment for your business, will also be provided.
- Efficiency in operational water emissions is attributed to water consumption. Practical measures to manage water consumption include :
- Water metering - the argument for water metering is that measurement facilitates water management and encourages consumers to save water.

Key Highlights

- Low-consumption sanitary fittings and controls – such as low flush toilets (compared with standard toilets, they reduce water use through flushing by 35%), low-water or waterless urinals (operated with sensors, flushes can be reduced by 50%), water conservation fittings (e.g. spray taps, low-flow shower head).
- Sustainable urban drainage systems (SUDS) - sustainable urban drainage systems provide plenty of opportunities for rainwater capture and storage, as well as mitigating storm water run-off.
- Rainwater harvesting system - rainwater harvesting involves using some or all of a scheme's catchment for the capture and storage of rainwater for reuse.
- Greywater recycling - greywater recycling is concerned with the capture, treatment, storage and reuse of waste water. Only lightly contaminated water can be used in greywater systems, typically sourced from baths, showers and basins.

It is recommended that the energy audit exercise to be expanded to other government or public buildings in Cyberjaya in discovering ways to make buildings much more energy/resource efficient.

(b) Emission Abatement through Retrofitting

Retrofitting is the process of modifying something after it has been manufactured. For buildings, this means making changes to the systems inside the building or even the structure itself at some point after its initial construction and occupation.

Typically, this is done with the expectation of improving amenities for the building's occupants and/or improving the performance of the building. The development of new technologies mean that building retrofits can allow for significant reductions in energy and water usage.

Undertaking a green retrofit of a building is the sustainable way of retrofitting. It brings about both tangible and intangible benefits to the owner and tenants. It can reduce the energy consumption, utilities and water consumption. It also improves the building's indoor environment quality and reduces the negative impacts of buildings on occupants, especially work-environment related illnesses or 'sick building' syndrome.

Retrofitting can reduce emissions from buildings by extending the life cycle of existing building stock and enhancing the building performance.

Key Highlights

(c) Building Orientation

Building orientation affects air conditioning and heating energy requirements through solar radiation (heating effects on walls and rooms) and ventilation (associated with the direction of prevailing winds and building orientation). In hot humid climates, the solar influence on energy consumption in buildings is significant; therefore design strategies are focused on reducing heat gain.

Well-orientated buildings maximise day lighting through building facades, reducing the need for artificial lighting. Some typologies especially housing can be zoned to ensure different functional uses receive sunlight at different times of the day. Buildings that maximise sunlight are ideal for the incorporation of passive solar techniques that can reduce carbon use and enhance user comfort. Careful strategies can also mitigate overheating and glare when sunlight is excessive.

Optimise passive and active design strategies to reduce heat gain in buildings.

(d) Shared Facilities and Utilities Within Building

This sub-criteria is about sharing and integrating community service centers with other building uses. The main idea is to save green area and ensure sustainable land uses. Common practice in Malaysia using the traditional way through land take which results to dispersion of development and single zoning – residential, commercial, industrial, institutional, etc.

Instead of using the traditional land uses, sharing and integrating should be applied. Facilities and community services such as kindergartens, post office and town hall should be integrated with other building uses such as offices. By doing this, it is not only a sustainable choice of land use planning, instead, it helps reduce inappropriate land take as well as reduce Co2 emissions.

Reduce land take for community services and encourage flexibility of use of buildings and simultaneously reduce carbon emissions due to sprawl and change of land uses.

Key Highlights

SMART & GREEN KEY ACTION PLANS

3

Introduction	3.1	3.1.1 Project Brief Outline 3.1.2 Implementation Timeline 3.1.3 Summary of Project Identification Briefs
Urban Environment	3.2	3.2.1 Smart Urban Growth 3.2.2 Protect and Enhance the Nature-Urban Landscape
Urban Infrastructure	3.3	3.3.1 Solid Waste Management System 3.3.2 Energy Optimization 3.3.3 Water Management & Sewerage Treatment
Urban Transportation	3.4	3.4.1 Non Motorized Transport 3.4.2 Public Transportation & Private Vehicle 3.4.3 Integrated Transit Oriented
Building	3.5	3.5.1 Existing and New Buildings 3.5.2 People and Behaviours
Summary of Key Actions	3.6	

3.1 INTRODUCTION

3.1.1 Project Brief Outline

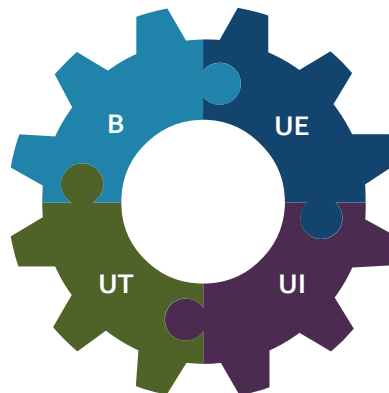
As being discussed in the previous chapter, the formulation of Key Action Plans for Cyberjaya Smart & Low Carbon City 2025 are guided by three (3) Guiding Principles – Low Carbon, Smart and People. These Guiding Principles are also used to determine the Key Focus Areas for accessing current spatial conditions of Cyberjaya to draw relevant Key Action Plans needed for the

transformation of Cyberjaya to become Smart & Low Carbon City by 2025.

For the purpose of measuring the performance of the proposed key actions in terms of CO₂ emission, the key actions have been grouped together into four (4) themes according to the key elements of LCCF as visualized in the diagram below :

Building
A relatively permanent enclosed construction over a plot of land, having a roof and used for any of a wide variety of activities (e.g living, manufacturing).

Urban Transportation
The ability to cope with density (i.e. people, activities and structures) while moving people and goods.



Urban Environment
Matters related to the challenges of the growing urban population with the demands for reducing CO₂ emissions at the same time.

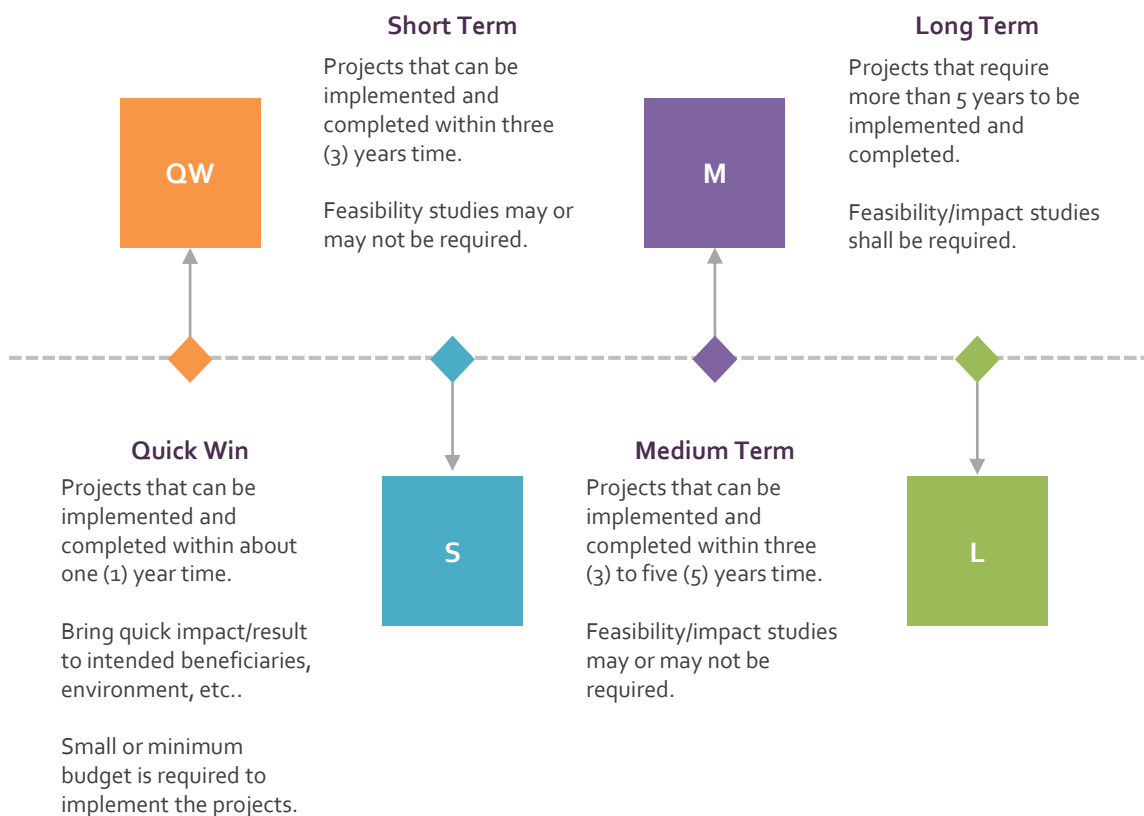
Urban Infrastructure
Socio-technical systems of facilities and services that are vital to the basic functioning of cities and regions.

For each Key Action Plan that has been identified, a Project Identification Brief (PIB) is prepared to (1) describe about the key action, (2) the rationale for proposing the key action based on the current assessment/situation, (3) xxx, (4) proposed delivery timeline or type of delivery timeline and (5) proposed target so that measure on the performance can be monitored.

In short, the PIB is a documented action plan for MP Sepang to prepare project papers, feasibility studies, budgetary for official approval as well as collaboration papers before action plan is to be implemented.

3.1.2 Implementation and Delivery Timeline

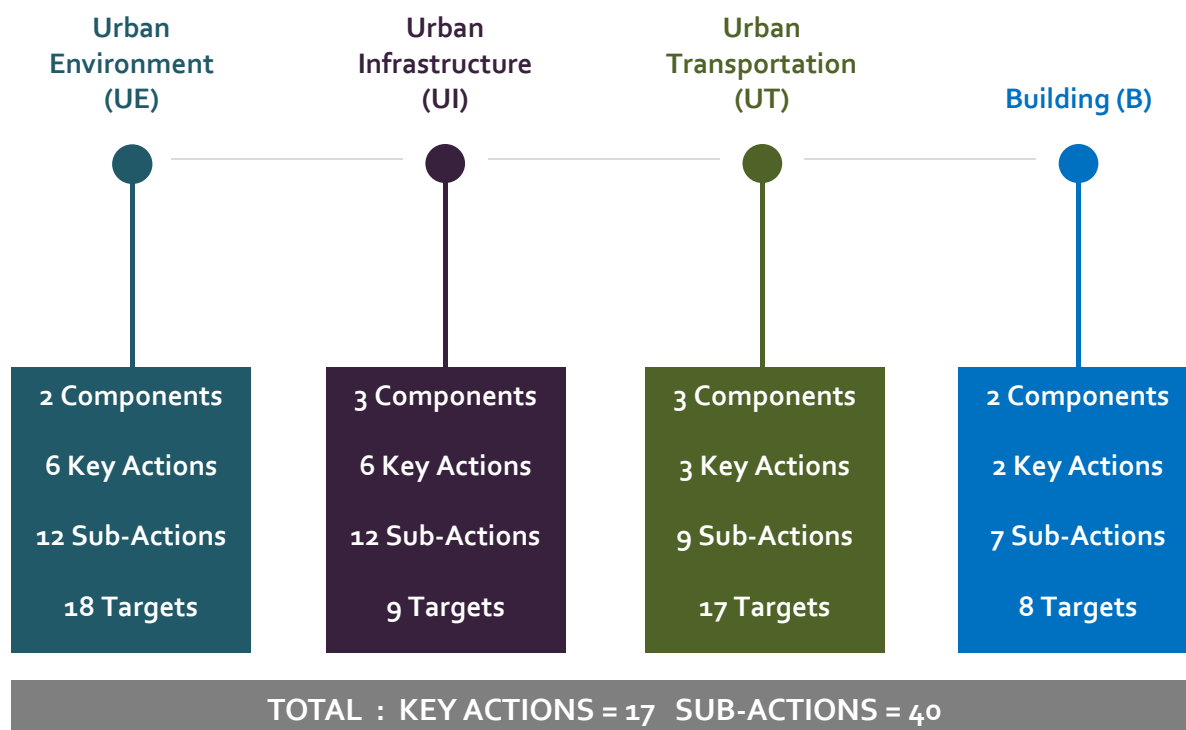
The implementation and delivery timeline is given for each key action to indicate the priority of project delivery and the timing. There are four (4) categories of projects based on the implementation and delivery timeline namely (1) quick win project or QW, (2) short-term project or S, (3) medium-term project or M and (4) long-term project or L. The description of the categories are as follows :



3.1.3 Summary of Project Identification Briefs

The identified key action plans are listed under the four (4) themes according to the key elements of LCCF as being discussed earlier – i.e. Urban Environment (UE), Urban Infrastructure (UI), Urban Transportation (UT) and Building (B). Not only that key actions are grouped under different themes, but they are also being sub-grouped into related key components that reflected key issues identified during the assessment process discussed in the previous chapter.

A total of **17 key actions and 40 sub-actions** have been identified under these four (4) themes and the number of key actions and targets according to each theme are listed as per diagram below :



URBAN ENVIRONMENT

3.2 URBAN ENVIRONMENT



3.2.1 Smart Urban Growth



Current urban planning scenario in Cyberjaya

- **22.9%** Single Used Zoning
- **3.23%** Mixed Development
- **3.00%** Compact Development

3

Key Actions

7

Sub-Actions

9

Targets

Key Actions		Sub-Actions		Targets
KA1	Promote compact and mixed-use development	KA1-1	Increasing mixed-use development by introducing MXR, MXC and allowing residential activity within Enterprise	<ul style="list-style-type: none"> ▪ Achieve basic needs of residents within 20 minutes ▪ Bringing Job and commercial closer to 60 % Residents of Cyberjaya ▪ Reduce door to door journey time within Cyberjaya that reduce carbon emission
		KA1-2	Create neighbourhood scale commercial activity closer to homes in vacant land at Cyber 1,2,10 and 11	
		KA1-3	Integrated Public amenities every radius 1 Km	
KA2	Promote Transit Oriented Development Planning	KA2-1	Increase density in Cyber 4,5,6 as the TOD zone	<ul style="list-style-type: none"> ▪ Reduce parking provision at TOD areas by 50% at 250 radius from transit stop ▪ maximum 5 minutes walk to public transport stops (380m) ▪ 90% public transport coverage
		KA2-2	Increase permeability by efficient blocks size, pedestrian and cycling network within 250m distance from TOD / Nodes	
KA3	Create vibrant streets through place making	KA3-1	Create pedestrian vibrancy along Persiaran APEC, Jln. Teknokrat 3 & 4 & city parks with parklets & public arts	<ul style="list-style-type: none"> ▪ 40% street edges with active activities along the main street in Cyberjaya ▪ Increase 60% willingness to walk in Cyberjaya Residents ▪ Increase 50% Public Participation on community gardens
		KA3-2	Activate Transitions Line and Every Neighbourhood by Community Gardens	

KA1 - Promote Compact And Mixed-Use Development

KA 1-1

Increasing mixed-use development by introducing MXR, MXC and allowing residential activity within Enterprise

(iii) Key Driver

- Jabatan Perancangan, MPSepang

Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- MIP

(i) Project Description

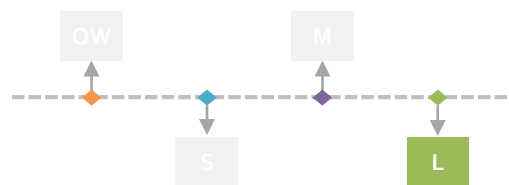
Spatial growth pattern describe long tem carbon use in a city where define city growth and urban shape. To avoid city growth to be urban sprawl, compact city concept is solution where A compact city is provides convenience to its dwellers, reduces unnecessary travels with high concentration of people, goods and services can reduce land take and greenhouse gas (GHG) emissions, minimise carbon footprint, create economies of scale, facilitate exchange of information and contribute to the vibrancy of the city.

Mix landuse denotes the diversity and integration of land uses at a given scale. Horizontal and vertical mixed uses are prevalent in the built-up areas of Cyberjaya, especially along mass transit lines. An adequate threshold population is required to support sufficient and diverse commercial and community facilities. A business node needs a critical mass of commercial floorspace and a mix of commercial and supporting uses for efficient operation and synergy.

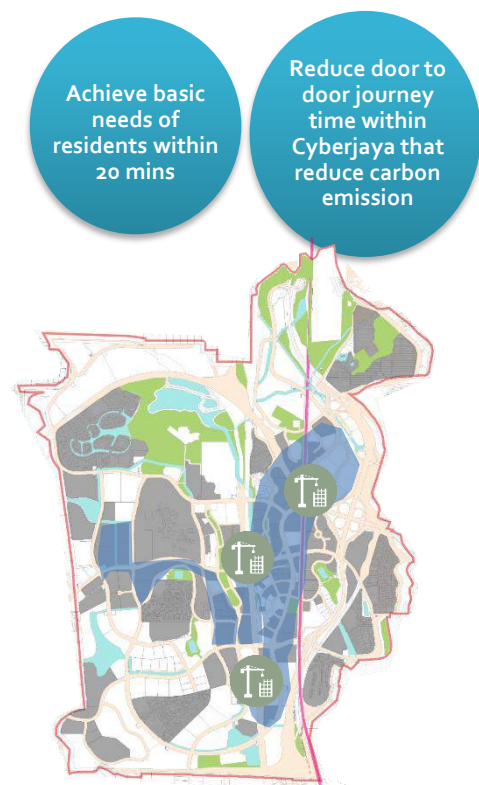
(ii) Rationale

- Currently there is no centralisation or focus of critical mass in Cyberjaya where 23% of land use is still single used zoning and Enterprise is the highest land use

(iv) Timeline



(v) Target



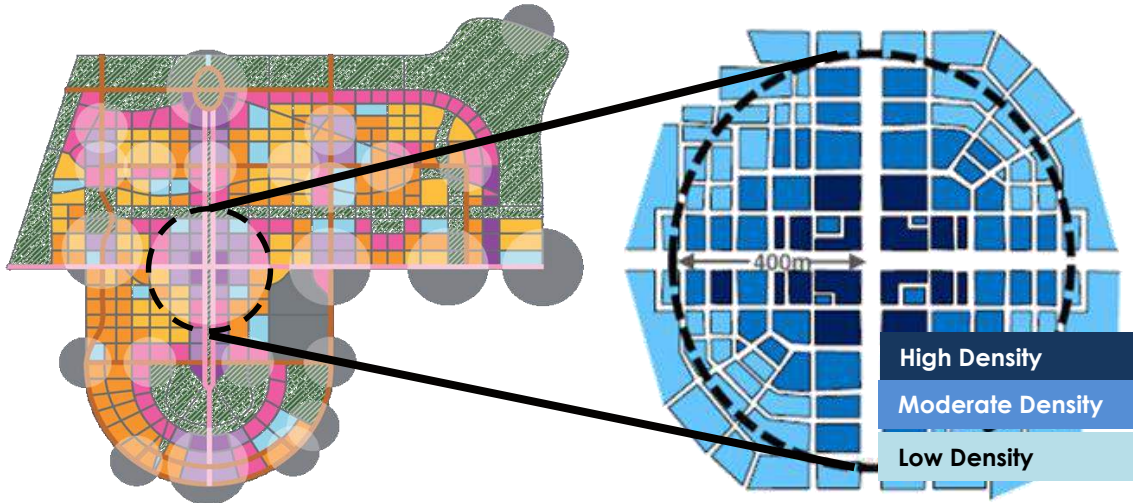
Case Study

Punggol, Singapore
- Optimum and Livable Density

Palo Alto, California, USA
- Mix Activity Enterprise

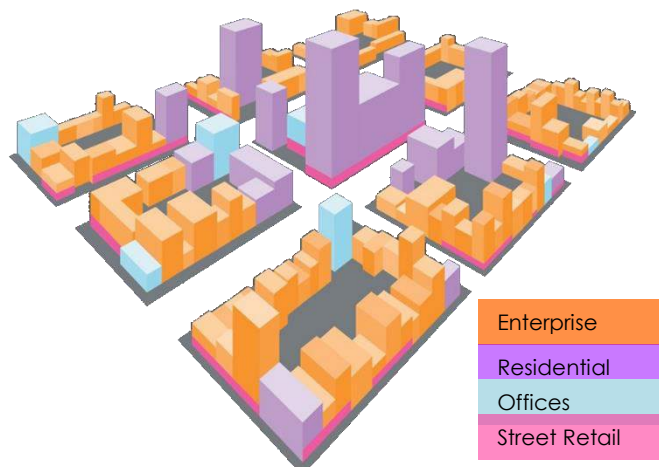
Mixed Use Small Blocks Replace Super Blocks

Critical Mass Within Compact City

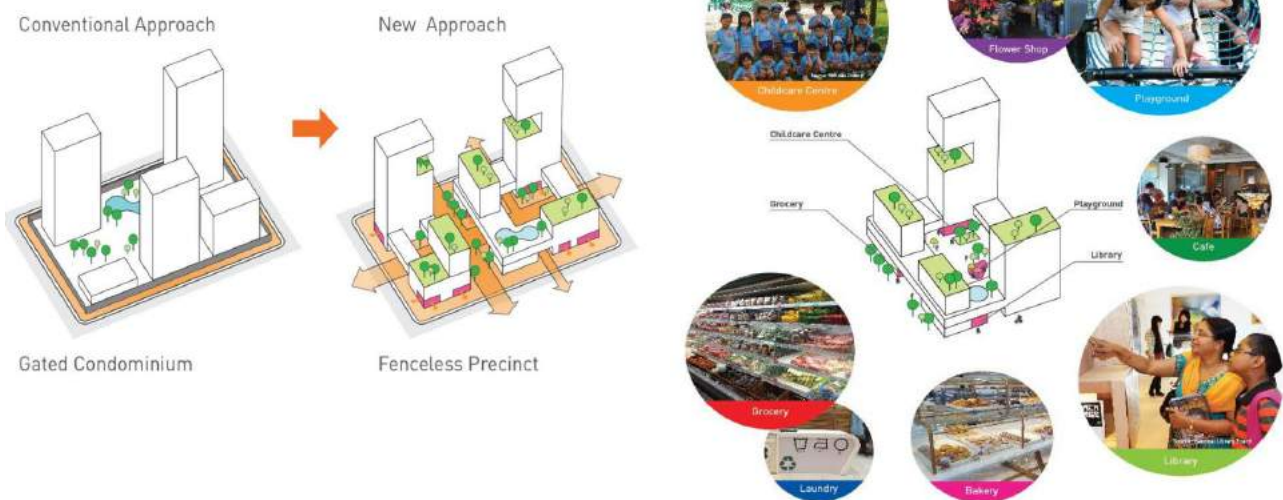


- to promote compatible land use mix through compact and optimum dense development that reduce GHG emissions
- Compact and mixed use development will reduce longer commutes, lower living space per-person and optimum used of infrastructure

Different Activities Horizontally & Vertically



Mixed Use And Compact Development Within Plot



KA1 - Promote Compact And Mixed-Use Development

KA 1-2

Create neighbourhood scale commercial activity closer to homes in vacant land at Cyber 1,2,10 and 11

(iii) Key Driver

- Jabatan Perancangan, MPSepang

Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- REDHA

(i) Project Description

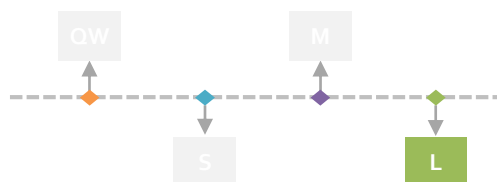
One of our key planning strategies is indeed to create commercial clusters outside the city centre to provide job opportunities closer to homes, and reduce congestion and travelling times to and from the city centre.

Decentralized the commercials and different scale of job centers will support economic development and strengthen resilience of a city where is not depend solely on one central business district to drive commerce.

(ii) Rationale

- Most Area in Western side of Cyberjaya is residential and lack of commercial or enterprise land use and still has a lot of vacant land
- The effort bring these commercial and enterprise closer to home will allow more flexibility to configure future work-life requirements and will be an important contributor to quality of life.

(iv) Timeline

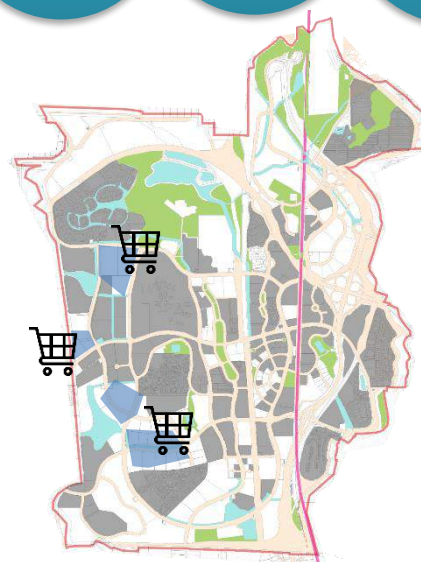


(v) Target

Bring job & neighbourhood scale commercial activity closer to homes in Cyber 1,2,10 and 11

Achieve basic needs of residents within 20 mins

Reduce door to door journey time within Cyberjaya that reduce carbon emission



Case Study

Tampines Regional Centre, Singapore
- Bringing job closer to home by land-use distribution to reduce dependency to core CBD area



KA1 - Promote Compact And Mixed-Use Development

KA 1-3 Integrated Public amenities every radius 1 Km

(iii) Key Driver

- Jabatan Perancangan, MPSepang

Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- REDHA

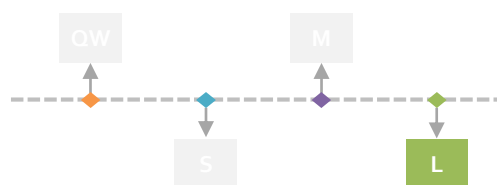
(i) Project Description

A comfortable living environment is one in which residents can meet their day-to-day needs conveniently. Forward-thinking, creative town planning provides for a wide range of amenities including retail shops, hawker centres, childcare centres, places of worship, healthcare facilities and community clubs, and distributes these amenities throughout the estate for the easy access of residents.

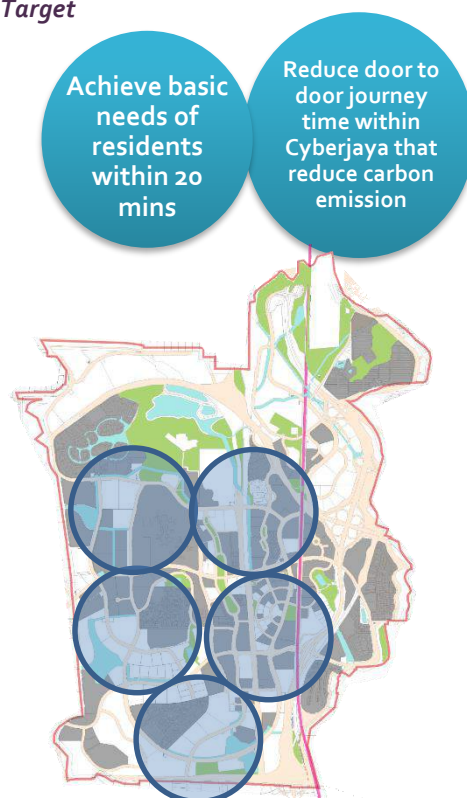
(ii) Rationale

- To create a 20-minute neighbourhood, though, we need not only grocery stores and other commercial options, but we need to ensure safe pedestrian, cyclist access and public transportation.

(iv) Timeline



(v) Target



20 Minutes Neighborhood



Case Study

Melbourne, Australia
- Public Facilities within walking & short transit distance



KA2 - Promote Transit Oriented Development Planning

KA 2-1 Increase density in Cyber 4,5,6 as the TOD zone

(iii) Key Driver

- Jabatan Perancangan, MP Sepang
- SPAD

Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- MIP

(i) Project Description

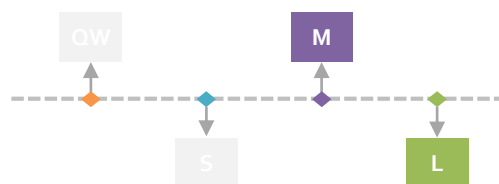
Existing Bus Rapid Transit (BRT), and up-coming Mass Rapid Transit (MRT₂) will be the backbone of integrated public transportation in Cyberjaya. Area around stations of public transit network is designated as Transit Oriented Development (TOD) where is planned to be integrated with the transit stations that brings compact, mixed-use development within walking distance to and from the transit stations.

higher population densities, especially coupled with better home-job balance, are strongly correlated with lower GHG emissions due to lesser travel needs and increased transport efficiency. Contrarily, lower densities increases the average travel distances

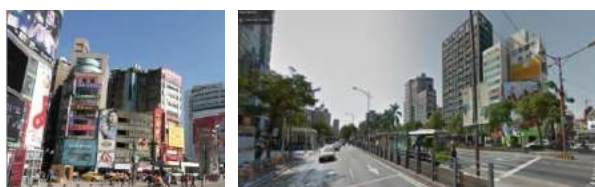
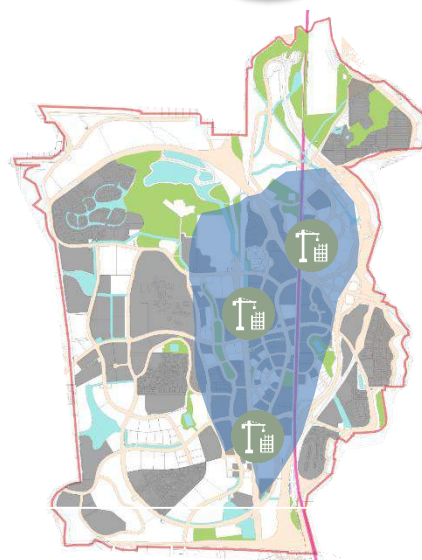
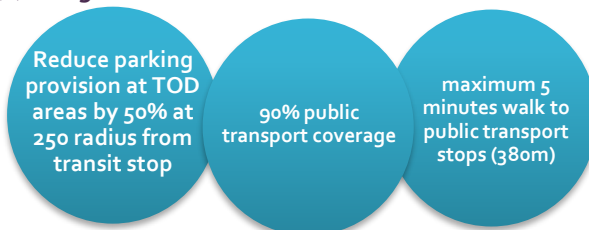
(ii) Rationale

- TOD is essentially a residential complex in an existing urban area that is within easy access to various transportation options. thereby enabling much shorter commutes with reliable access to public transport.
- higher population densities can create necessary threshold for mass transit alternatives to enable compact transit-oriented development (TOD);

(iv) Timeline



(v) Target



Case Study

Taipei Metro Network , Taiwan

Integration BRT and MRT with surrounding area that has higher density development in Xinmen area

TOD Area

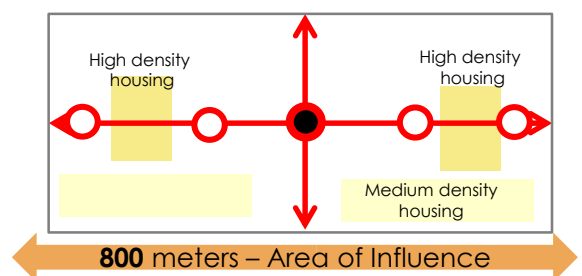
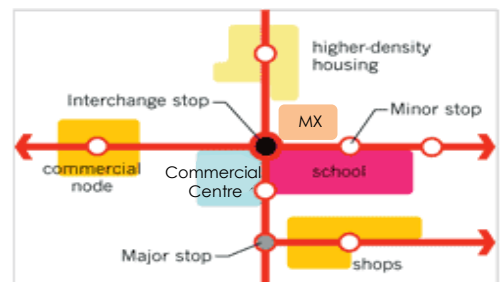
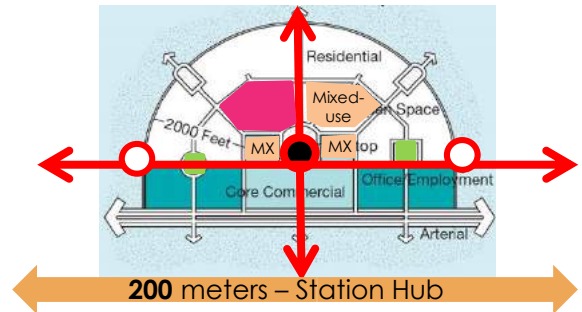


Areas with high level of transit services such as the crossing of two BRT lines and MRT line have higher density, more commercial development and greater mix of uses

Transit Station such as MRT, ERL and BRT that is part of a transportation network allows residents to access the region's neighborhood, destinations, and centers, thereby promoting transit use

Open spaces include transit plaza, small parks or regional open spaces

Features of TOD



KA2 - Promote Transit Oriented Development Planning

KA 2-2

Increase permeability by efficient blocks size, pedestrian and cycling network within 250m distance from TOD / Nodes

(i) Project Description

A walkable city is a city that has much lower carbon emissions. This is because walking does not emit any carbon. Increase permeability is one of the strategies to make a city walkable. The street must be designed intimate, not really wide, prioritizing pedestrian and cycling with through block connectors that enhance permeability of the urban fabric and promote human-scale and fine-grain street grids.

Pedestrian network for a development has to be planned at the design stage. It should also be planned to be integrated with cycle and public transport networks.

(ii) Rationale

- Permeability and connectivity must be designed with walking comfort in mind. Thus, maximum street block dimensions of 100-150 m
- With a more comprehensive cycling and pedestrian network, can be a healthy, convenient and affordable mode of transport for short commuting trips.

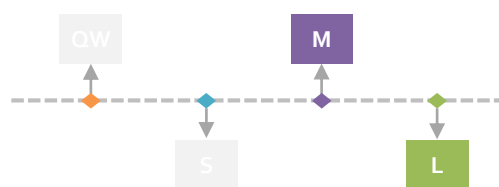
(iii) Key Driver

- Jabatan Perancangan, MP Sepang
- SPAD

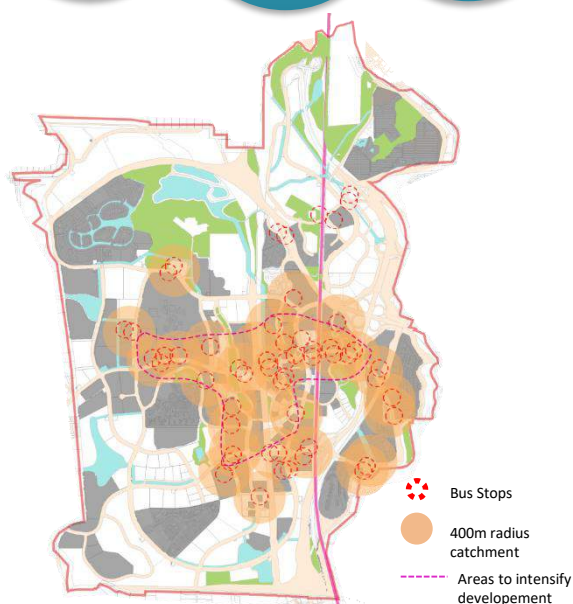
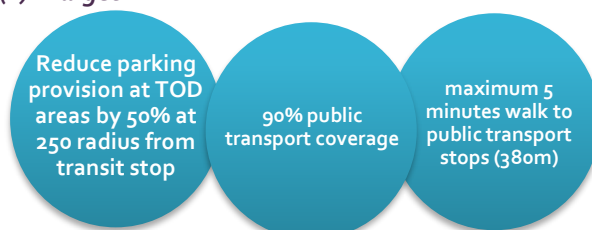
Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- Jabatan Landskap MP Sepang

(iv) Timeline



(v) Target



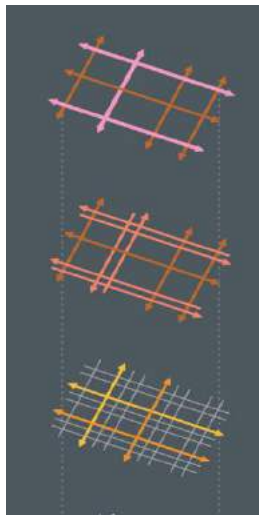
Case Study

Xinmending Area (TOD Zone), Taipei, Taiwan

Seamless pedestrian, cycling and efficient block size that make people convenient to take public transport (BRT and MRT)



Strategy To Improve Permeability By Block Sizes



Superblocks with wide arterials
before modification

enhance permeability of the urban fabric and promote human-scale and **fine-grain street grids** (optimum 150 m block size)

Activate the street level with commercial frontages & **through block connectivity**



Street Pattern with **low permeability**



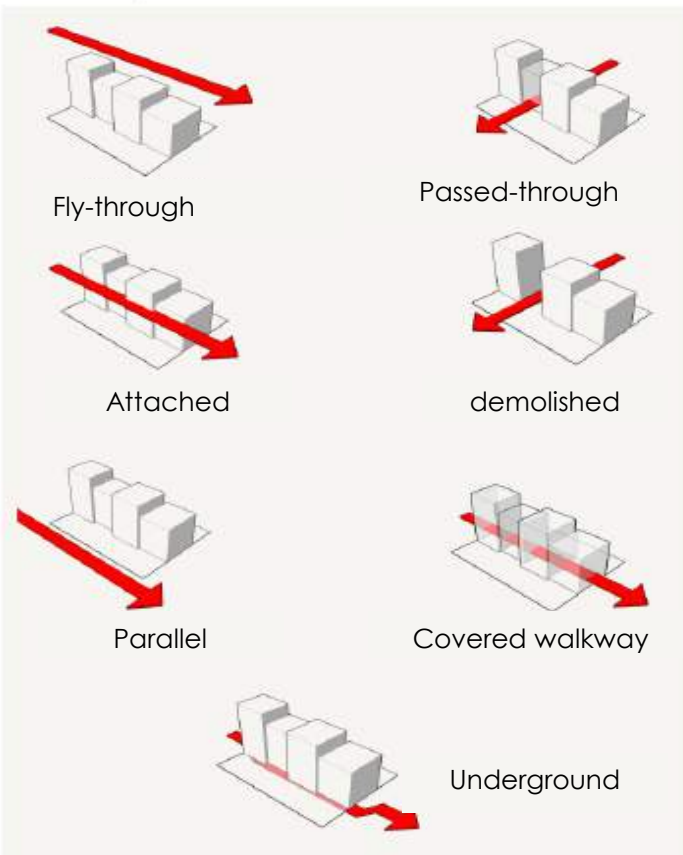
Street Pattern with **High permeability**

Inter Block Connection



The inter-block connection is the pedestrian connection in between plot. Inter-block connection is more intimate and closer to building but people will shade with trees or covered walkway.

Example of Through Block Connectivity



KA3 - Create Vibrant Streets Through Place Making

KA 3.1

Create pedestrian vibrancy along Persiaran APEC, Jln. Teknokrat 3 & 4 & city parks with parklets & public arts

(i) Project Description

Great public spaces are those places where celebrations are held, Collaboration of social and economic exchanges occur, friends run into each other, and cultures mix. They are the “front porches” of our public institutions – libraries, field houses, schools – where we interact with each other and when these spaces work well, they serve as the stage for our public lives.

Our city is a diversity of economic and social activities. It is our home to live, work and enjoy life cityscape is not only compact and vibrant, but also embraces cultural identity, whilst revealing our aesthetic values, social beliefs, traditions, ideas and cultures that create city identity.

city identity has become paramount in distinguishing world cities from one another and in city branding and marketing. The search for city uniqueness has coincided with the call for place-making to define and promote the distinctiveness of places.

(ii) Rationale

- Community spaces are one of the basic building blocks of society where people gather and participate in activities together. Through these shared spaces, collective memories are made, creating a sense of home.
- Malaysia is rich of cultural diversity that we should be embraced in public area
- Placemaking increase community involvement, unique character to urban environment and overall enhance community liveability

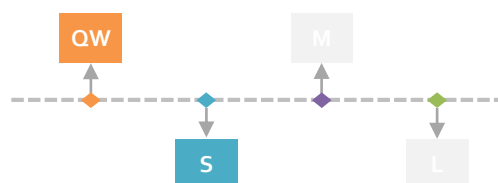
(iii) Key Driver

- Jabatan Perancangan, MPSepang
- Jabatan Landskap MPS

Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- Cyberview
- REDHA

(iv) Timeline



(v) Target



Case Study

Park-ing Day, Singapore



Monthly event where URA & community converting street to be parklets and event-spaces

Placemaking, Taipei



Car park that that converted to be public art that can be used for children playground

Elements Of Place-Makings



Activate The Main Street (Persiaran APEC-Cyberview) With Place-Makings



KA3 - Create Vibrant Streets Through Place Making

KA 3.2

Activate Transitions Line and Every Neighbourhood by Community Gardens

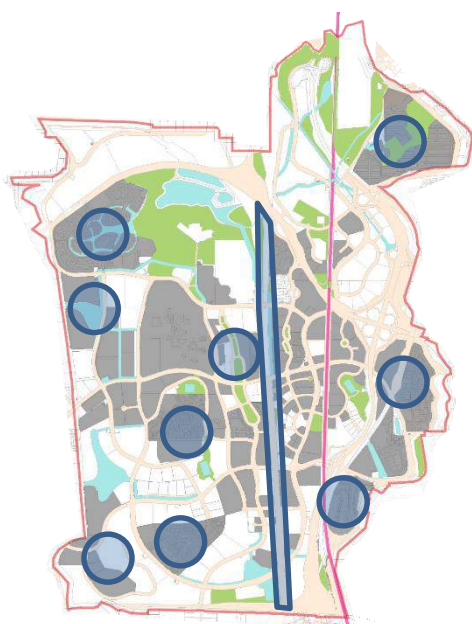
(i) Project Description

Community Centre is must be integrate with activity that benefits to community its self and creating bonding in between. The gardening experience is open to anyone. Some people grow plants indoors, and others join community gardening groups where people can recapture some of the simple pleasures of kampong life;

Our Community Gardens design to re-create the own local food system. People will take a part and participate to maintain the gardens.

(ii) Rationale

- Community will get benefit from the products for their own food source & also funding to maintain the gardens from the income to sell the products



(iii) Key Driver

- Jabatan Perancangan, MPSepang
- Jabatan Landskap MPS

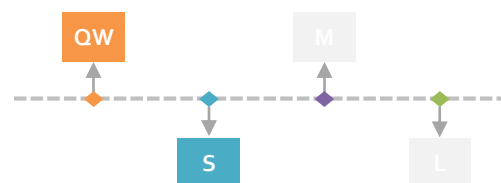
Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- Cyberview
- REDHA

(iii) Collaborating Partner(s)

- Local Authority
- NGOs
- Developers

(iv) Timeline



(v) Target

Increase 50%
Public
Participation on
community
gardens

Case Study

HDB Program, Singapore

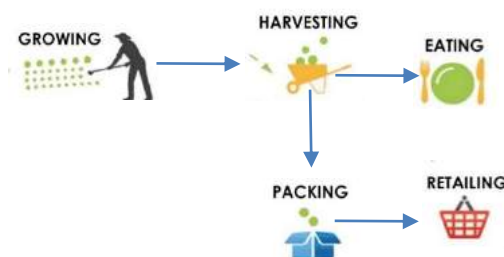


Located in every neighbourhood centres within 500 groups, Singapore community gardens produce total 5% of total national foods

Putrajaya Community Gardens



8 Community gardens in Putrajaya located on public lands grabs 200 gardeners & actively make their gardens a delight for all



3.2.2 Protect and Enhance the Nature-Urban Landscape



3

Key Actions

5

Sub-Actions

9

Targets

Key Actions		Sub-Actions		Targets
KA1	Protect peat swamp ecosystem for environmental stability	KA1-1	Protect the peat swamp area by gazetting to be open space and rehabilitate it	<ul style="list-style-type: none"> ▪ Gazetting at least 50% of the area that indicates as peat swamp area to be Environmental Sensitive Area ▪ Doubled the nos of collaborative eco-projects with society & private sector compared to the 2016 level.
KA2	Land use planning for green open spaces	KA2-1	Increase the green open space and connect it.	<ul style="list-style-type: none"> ▪ 2 Hectares of Open spaces and parks per 1,000 populations ▪ Parks, green spaces or water body at least 800 sqm within 400 m walking distance
		KA2-2	Bringing the greenery vertically	<ul style="list-style-type: none"> ▪ Green Replacement for Compact Development (Plot Greenery Replacement) min. 30% buildings Applied
KA3	Enhancing Urban Ecology	KA3-1	Integrate naturalized blue and green by landscape treatment.	<ul style="list-style-type: none"> ▪ Improve River Water Quality to Class 1 and Class 2 by treatment of stormwater run-off before discharge to regional ponds & rivers
		KA3-2	Tree Planting Programs	<ul style="list-style-type: none"> ▪ Reduce UHI Effect by Street sidewalks/ pedestrian walkways shaded over 50% ▪ Adopt native plant strategies must >70 % of the trees and shrubs ▪ Increase the carbon sequestration more than current baseline by planting 1000 trees/year

KA1 - Protect Peat Swamp Ecosystem For Environmental Stability

KA 1-1

Protect the peat swamp area by gazetting to be open space and rehabilitate it

(i) Project Description

Some of Cyberjaya area was peat swamp that connected with Paya Indah Wetland ecosystem, currently only a few of these peat swamp wetland that still remain specially that located near the Taman Tasik Cyberjaya. The benefit of these natural ecology and waterbody can benefits our environment with its ecological services that improving urban biodiversity .

The other importance of green open space which promotes wild life conservation and biodiversity includes forest reserves, woodlands, urban forestry, grasslands, wetlands, open and running water and wastelands. Natural ecology provides many benefits to society. The natural ecology and water bodies provide natural restoration of CO₂. Altering the natural ecology for development purposes will release CO₂ into the atmosphere.

(ii) Rationale

- Protecting of Biodiversity is important, especially since it is disappearing at an unprecedented rate. Cyberjaya can be good study in illustrating how economic development and biodiversity conservation can be mutually re-inforcing

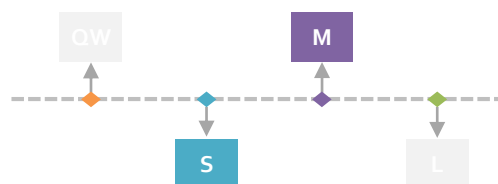
(iii) Key Driver

- Jabatan Perancangan Landskap, Alam Sekitar MPSepang

Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- ILAM
- FRIM

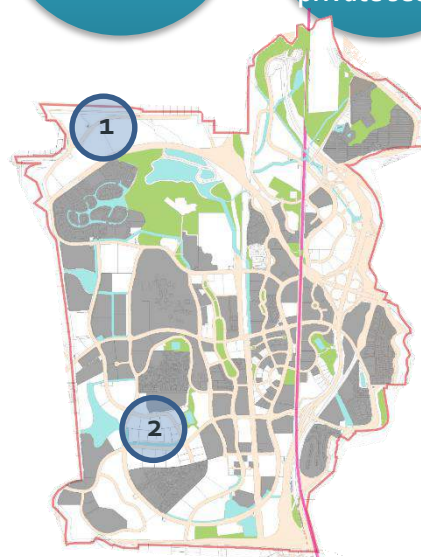
(iv) Timeline



(v) Target

Gazetting at least 50% of the area that indicates as peat swamp area to be ESA

Doubled the nos of collaborative eco-projects with society & private sector

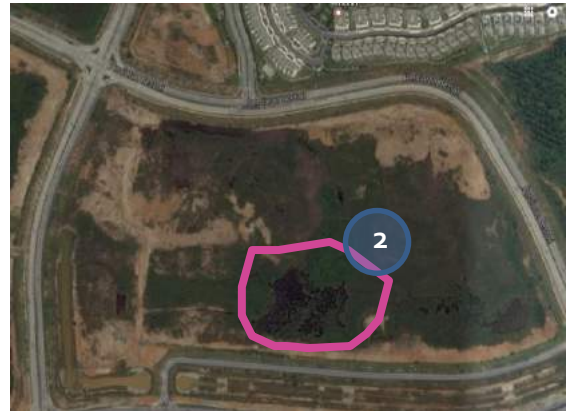
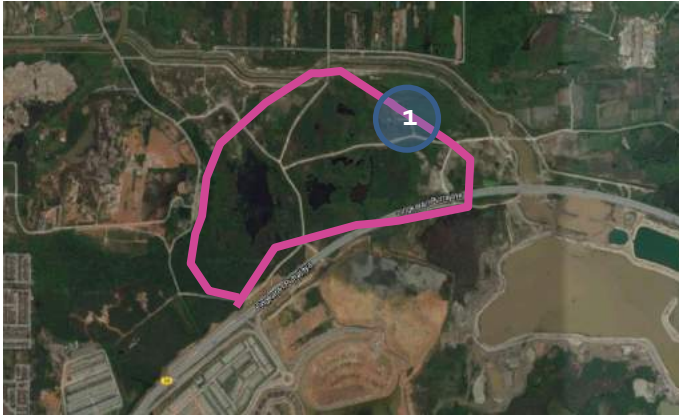


Case Study

Gaomei Wetland Park, Taiwan

Gaomei Wetland is excellent example of wetland that being preserved elegant boardwalk 800 meters long to preserve the delicate environment of the sedge grassland. The boardwalk also makes easy for everybody to access the wetlands, to experience the water and see directly the fauna of wetlands

Protecting Natural Area And Waterbodies



Minimizing human impact, establishing habitat corridors and creating riparian buffers to
restores degraded wetlands



Preservation of
**ecological
systems**

KA2 - Land Use Planning For Green Open Spaces

KA 2-1

Increase the green open space and connect it

(i) Project Description

Open spaces is important to reduce the GHG, recreational area for the city dwellers to relax and play, as place for community bonding and climate proofing our environment.

Current Open Space compare to the existing population is more than sufficient but With the upcoming construction of MRT2 line and two (2) stations, as well as some new development in the next 5 years Cyberjaya's population is expected to increase to 210,000 by 2020. To anticipate the upcoming population Cyberjaya has to increase the number of open spaces including parks, community gardens and its connector

(ii) Rationale

- Wide range of recreation spaces and activities to meet the needs of an active, discerning population. Park not only for human well-being but also to regulate the urban ecosystem
- Beautiful waterways and its adjacent linear parks used for recreational activities bring life through residential estates and commercial districts.
- Better connections are planned to make these recreational spaces more easily accessible,
- diverse calendar of cultural festivals and sporting events will inspire and excite the people.

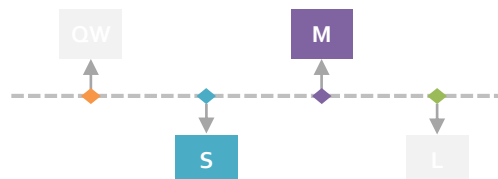
(iii) Key Driver

- Jabatan Perancangan Landskap, MPSepang

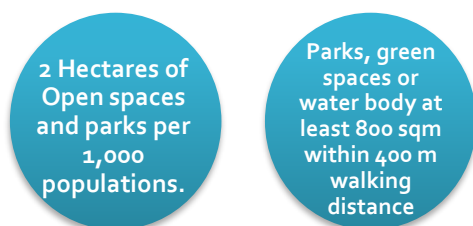
Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- ILAM
- JLN

(iv) Timeline



(v) Target



Case Study

Park Connector Network, Singapore

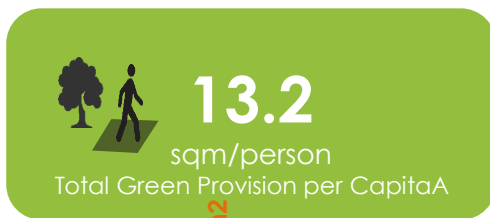
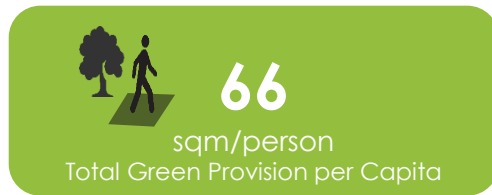


Dongfeng Greenway, Tainan, Taiwan



Connecting the green nodes (major parks) with linear greenway and pedestrian-cycling network

Public Green and Blue Spaces Ratio



Pop. 42,253 (2016)



Pop. 210,000 (2020)

Pop.
42,253
(2016)
279 Ha

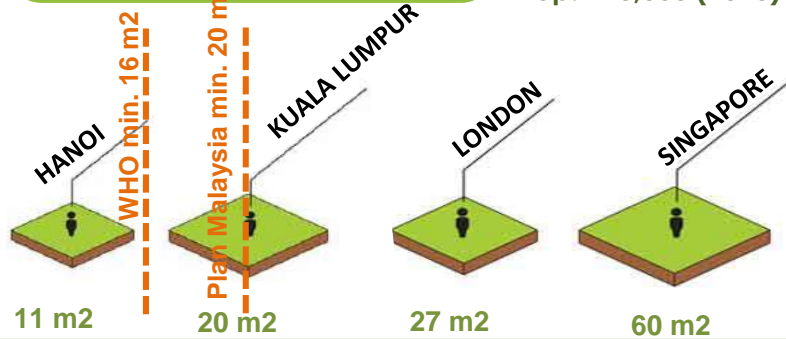
65 m2/capita

Pop.
210,000
(2020)
279 Ha

13 m2/capita

Pop.
210,000
(2020)
420 Ha

20 m2/capita

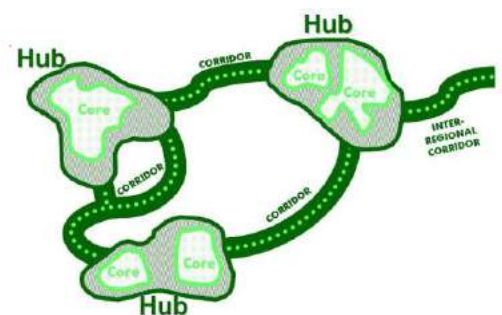


Green Ratio per-capita in world's city

To Achieve target
Increase 141 Ha or 50%

Public Green and Blue Spaces Ratio

Create Ecological Continuum by connecting the open spaces



KA2 - Land Use Planning For Green Open Spaces

KA 2-2 Bringing the greenery vertically

(i) Project Description

Package of green initiatives to improve the greenery in plot level as the target to achieve Cyberjaya Smart and Low Carbon City, MPS is encouraging the plot developer to do Landscape Replacement Area where these sky-rise buildings are providing landscaped areas equivalent in size to its development site area.

The replacement is including the greenery on buildings such as rooftop gardens, vertical wall, green roof and green balconies

We will extend this policy to more mixed-use areas and guide new developments to introduce more greenery into the urban environment.

(ii) Rationale

- When space for greenery is limited at ground level, we need to showing the creativity that increasing the total number of urban greenery vertically.
- Vertical greenery helps reduce the heat island effect that act as heat insulator that reducing energy consumption
- Vertical greenery beautify the buildings
- Vertical and sky-rise greenery creates small scale habitat creations for insects and small birds

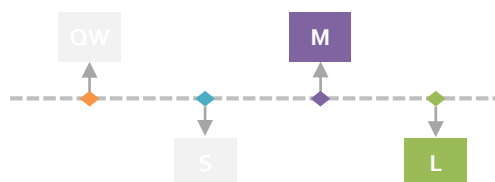
(iii) Key Driver

- Jabatan Perancangan Landskap, and Bangunan MPSepang

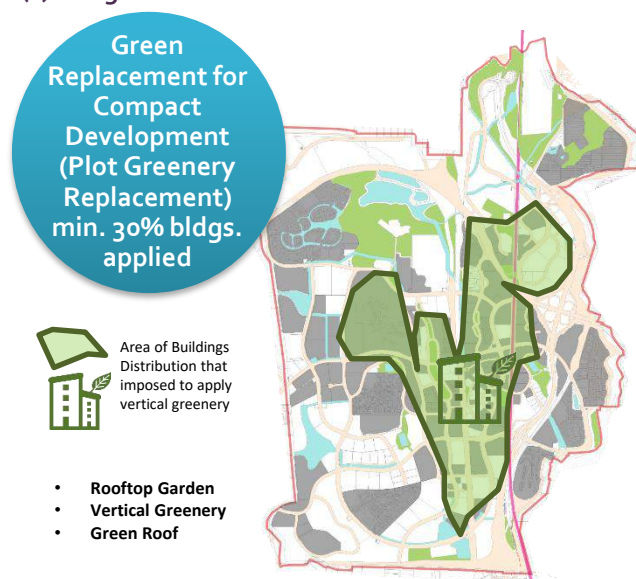
Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- ILAM
- JLN
- PAM

(iv) Timeline



(v) Target



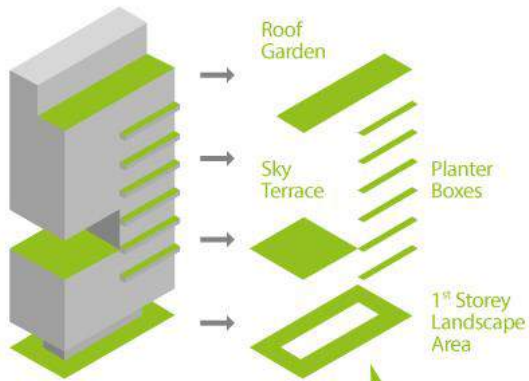
Case Study

Landscaping for Urban Spaces & High-rises (LUSH) Program, Singapore



JEM buildings in Jurong is a mixed-use development that implemented 100% green replacement LUSH program

Vertical and Sky-Rise Greenery Diagram



Application of Vertical Vertical and Sky-Rise Greenery in Buildings



KA3 - Enhancing Urban Ecology

KA 3-1 Integrate naturalized blue and green open spaces by landscape treatment.

(i) Project Description

Integrating naturalized blue and green open space is a system combine with landscaping treatment also known as water sensitive urban design by planting the aquatic or wetland plants that can help to improve the quality of water naturally and increase infiltration by evapotranspiration process. The stormwater is treated from the plot development to encourage capture & re-use it and clean through the WSUD systems.

The naturalised blue and green open spaces is creting Ecological corridors help maintain a degree of connectivity between natural areas across Cyberjaya. By providing conditions within which birds and smaller creatures can live and move from one habitat to another

(ii) Rationale

- Reduces flow velocities and settles coarse sediments
- Encourages habitat creation and promotes biodiversity
- Beautifies surrounding landscape
- Filters and cleans water naturally without the use of any chemicals
- Easy maintenance compare to grass-swale (part of landscaping)

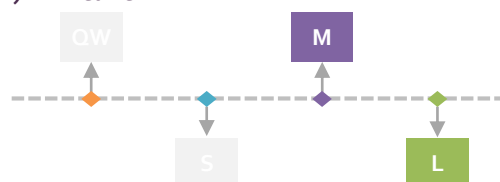
(iii) Key Driver

- JPS and Jabatan Landskap MPSepang

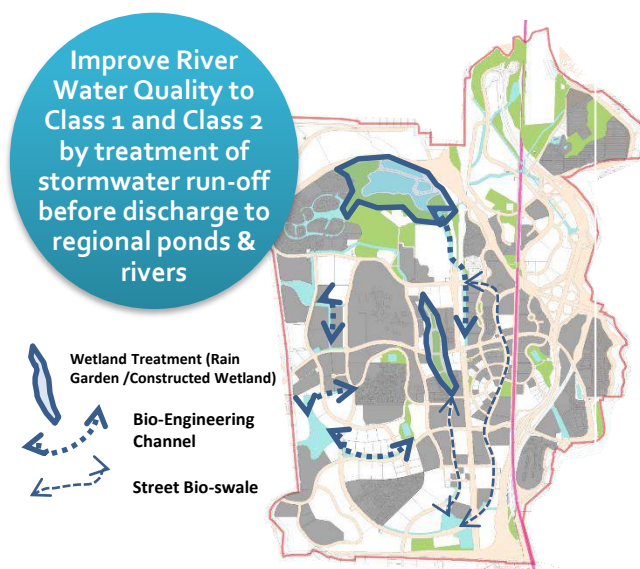
Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- ILAM
- JLN

(iv) Timeline



(v) Target



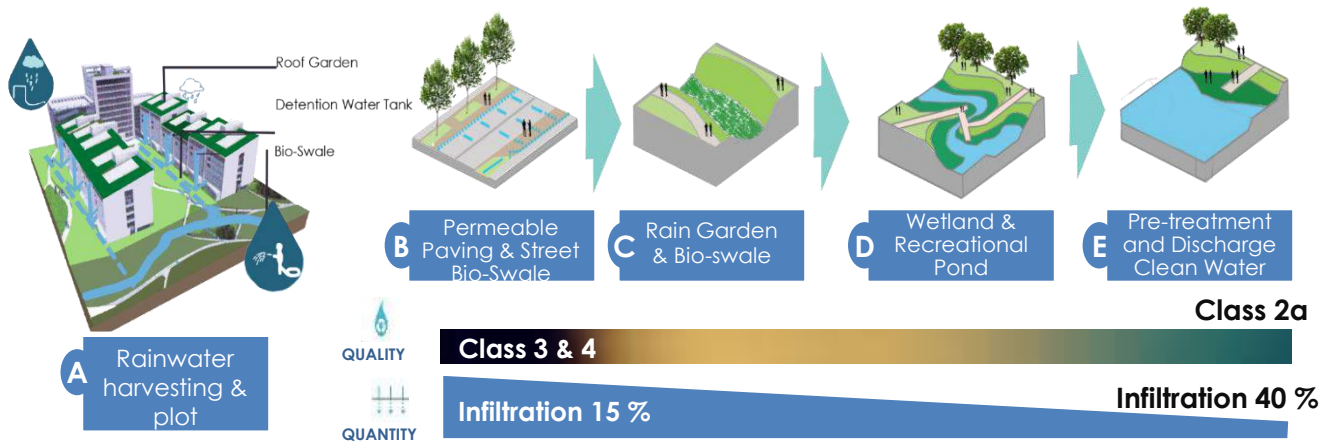
Case Study

ABC Program,
Punggol, Singapore



The "waterfront housing estate" in Punggol is a good example to illustrate the integration of residential, recreational, water supply and stormwater management in the design of public housing, waterway, reservoir, parks and promenades.

Water Sensitive Urban Design (WSUD) System



How WSUD System Can Increase The Biodiversity



KA3 - Enhancing Urban Ecology

KA 3-2 Tree Planting Programs

(i) Project Description

One aspect of trees that has received significant attention in view of climate change and global warming is the trees are natural carbon sinks. Trees fix carbon dioxide from air through photosynthesis process and store the excess as biomass in wood tissues. It has been estimated that forest store about 40% of world's terrestrial carbon stock and sequestration. Carbon sequestration analysis is emphasized on the tree biomass and the carbon content estimation which are significant for carbon reduction in urban areas.

From a planning point of view, the estimation of tree biomass is necessary to estimate the percentage of carbon reduction in the The rate of carbon sequestration depends on the growth characteristics of the tree species, by biomass (woody tissues in trunk, branches, and foliage).

The existing parks are intensifying with annual tree planting program and make it more dense with large coverage of trees canopy.

(ii) Rationale

- Trees provide shades for people and building, mitigate heat island effects which in turn reduces air conditioning use, filter pollutants as part of their transpiration process and lower the temperature.
- 1 hectare covered by matured trees (8 years old) capture 200 tCO₂/year that equivalent to 733.3 tCO₂/year – Pilot Project Carbon Sequestration Design Guideline, Pasir Gudang 2014

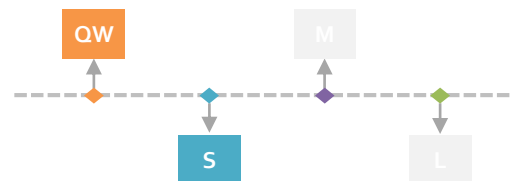
(iii) Key Driver

- Jabatan Perancangan Landskap, Alam Sekitar MPSepang

Collaborating Partner(s)

- SetiaHaruman
- Sub-Developers
- ILAM
- FRIM

(iv) Timeline



(v) Target



Case Study

Makati City, Philippines

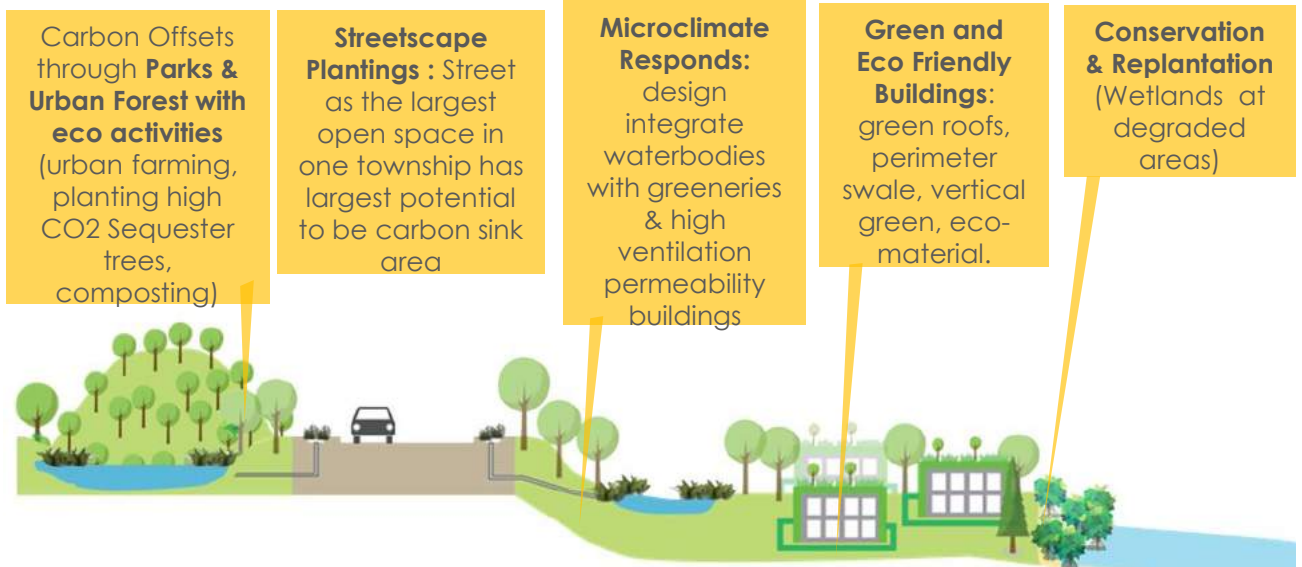


Sequesters approximately **25 t CO₂/year** in GHG emissions

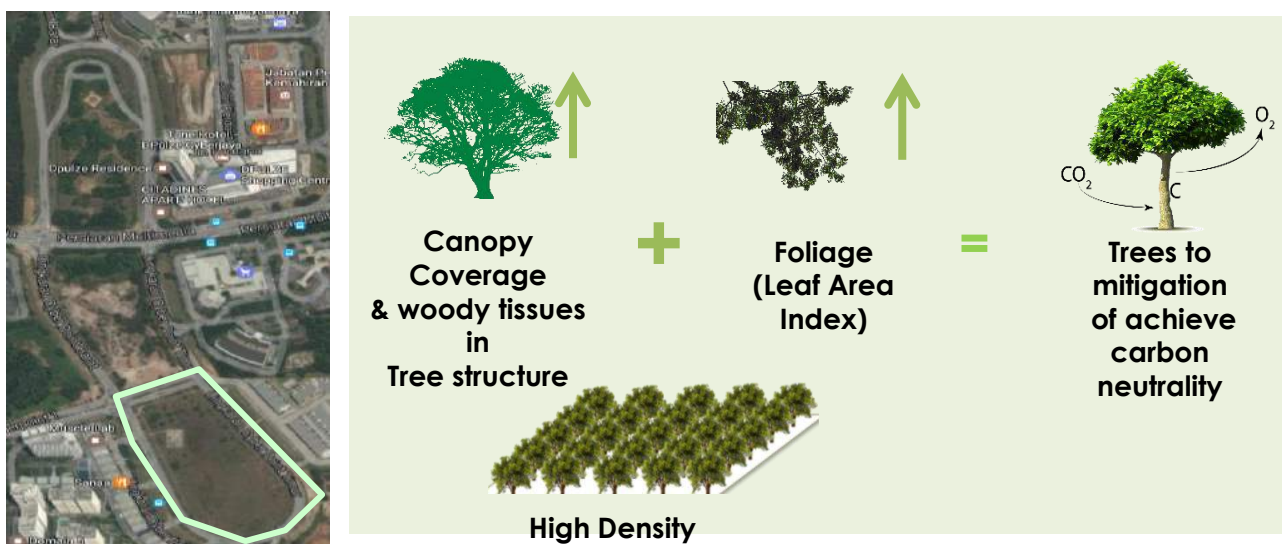
Supported and Founded by **World Bank**

Introduced a major citywide tree-planting program, where 3,000 trees are planted each year

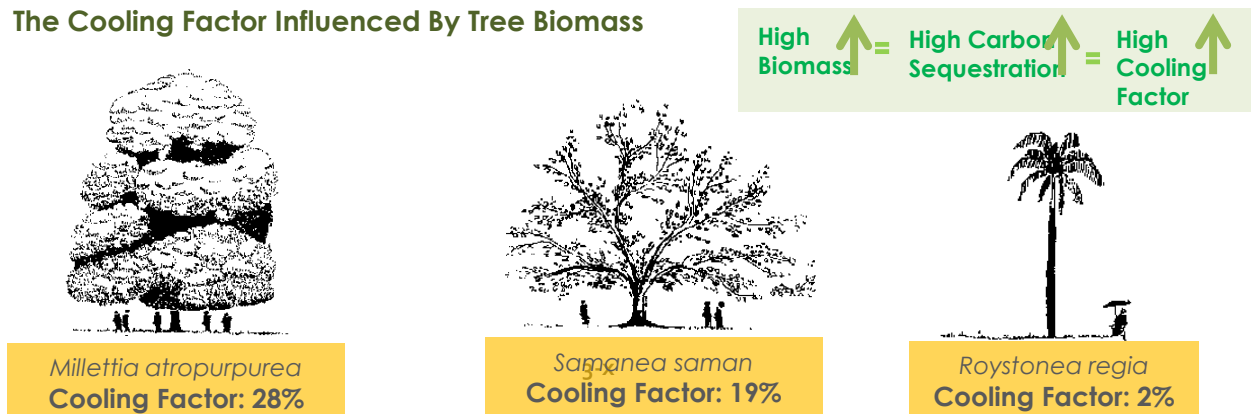
Landscape as The Sources of Carbon Sequestration



Influence Of Carbon Sequestration By Trees



The Cooling Factor Influenced By Tree Biomass

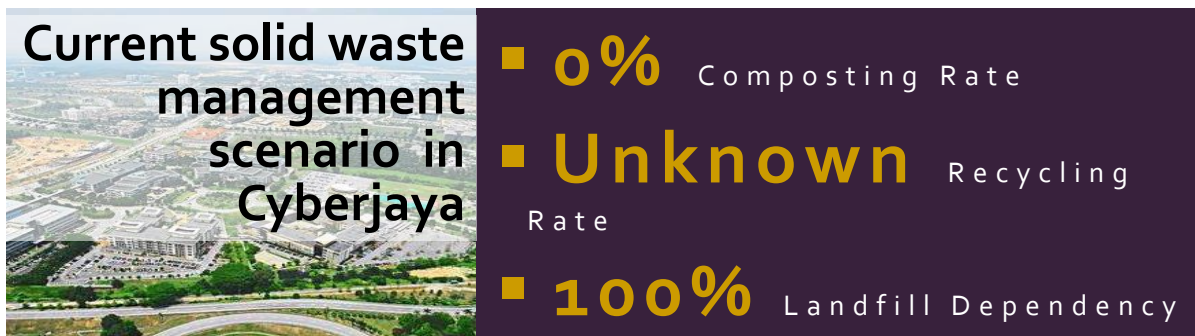


URBAN INFRASTRUCTURE

3.3 URBAN INFRASTRUCTURE



3.3.1 Solid Waste Management System



3

Key Actions

7

Sub-Actions

5

Targets

Key Actions		Sub-Actions		Targets
KA1	Improving Recycling	KA1-1	Set up Community Recycle Centre at every neighbourhood.	<ul style="list-style-type: none"> ▪ Increase recycling rate by 10% ▪ Divert waste from landfill by 50%
		KA1-2	Introduce 2 bin system at residential areas for separating organic waste and recycle materials (enforce separation at source).	
		KA1-3	Set up and support reuse programs e.g. furniture, electronics and office materials.	
		KA1-4	Construct private sector recycling of 30 metric tonne per day system to convert plastic to fuel (diesel).	<ul style="list-style-type: none"> ▪ Generate source of income from recycling by 10%
KA2	Improving Composting	KA2-1	Set up small scale community composting activities at neighbourhood Recycle Centres.	<ul style="list-style-type: none"> ▪ Increase composting rate by 30%
		KA2-2	Initiate urban farming activities at composting areas or neighbourhood recycle centres.	
KA3	Improving Awareness	KA3-1	Produce info materials such as the annual calendar and waste information guide to be distributed at community recycle centres.	<ul style="list-style-type: none"> ▪ Increase community participation by 10%

KA1 Improving Recycling.

(i) Project Description

This initiative is about improving recycling activities among the community of Cyberjaya. Looking at the current recycling rate of Cyberjaya, efforts need to be intensified to promote waste reduction and recycling to the people.

Specific sub-actions for this initiative are as follows :

- **KA1-1 : Set up Community Recycle Centre at every neighbourhood.**

This initiative is about providing a facility where residents can drop off unwanted items and materials for reuse and repurposing. It offers a convenience solution to the community by providing collection outlets for recyclable waste at the neighbourhood level to encourage people to recycle. It is recommended that the centres to be operated by NGOs with strong ties with local residents' groups.

Implementation Timeline : QUICK WIN

- **KA1-2 : Introduce 2 bin system at residential areas for separating organic waste and recycle materials (enforce separation at source).**

Xxxxxx

Implementation Timeline : SHORT TERM

- **KA1-3 : Set up and support reuse programs e.g. furniture, electronics and office materials.**

Xxxxxxx

Implementation Timeline : SHORT TERM

- **KA1-4 : Construct private sector recycling of 30 metric tonne per day system to convert plastic to fuel (diesel).**

This initiative is about establishing a modern facility that converts plastic waste into synthetic fuel oil (i.e. diesel) using a conversion technology that involves heating the waste under controlled conditions to produce oil - similar to industrial diesel oil and heavy fuel oil used in power plants, industrial furnaces and boilers.

This process is not only excellent for ordinary plastics but also excellent for difficult to recycle PP and PE plastics like bottle caps, appliance plastics, nursery planters and dirty plastics such as meat wrappings. However, this process is not suitable for PVC or polystyrene (styrofoam).

The setting up of this proposed facility would be able to divert 30 metric tonnes of plastic from landfill each day.

Timeline : MEDIUM TERM

(ii) Rationale

- Towards sustainable path : recycling more, landfilling less.
- Recycling benefits the environment by diverting waste away from landfills and by providing raw materials for new products.
- Recycling can also encourage innovation and create jobs.

iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- Environmental related NGOs
- Local Resident Associations

(v) Target


Increase recycling rate by 10%

Divert waste from landfill by 50%

Generate source of income from recycling by 10%

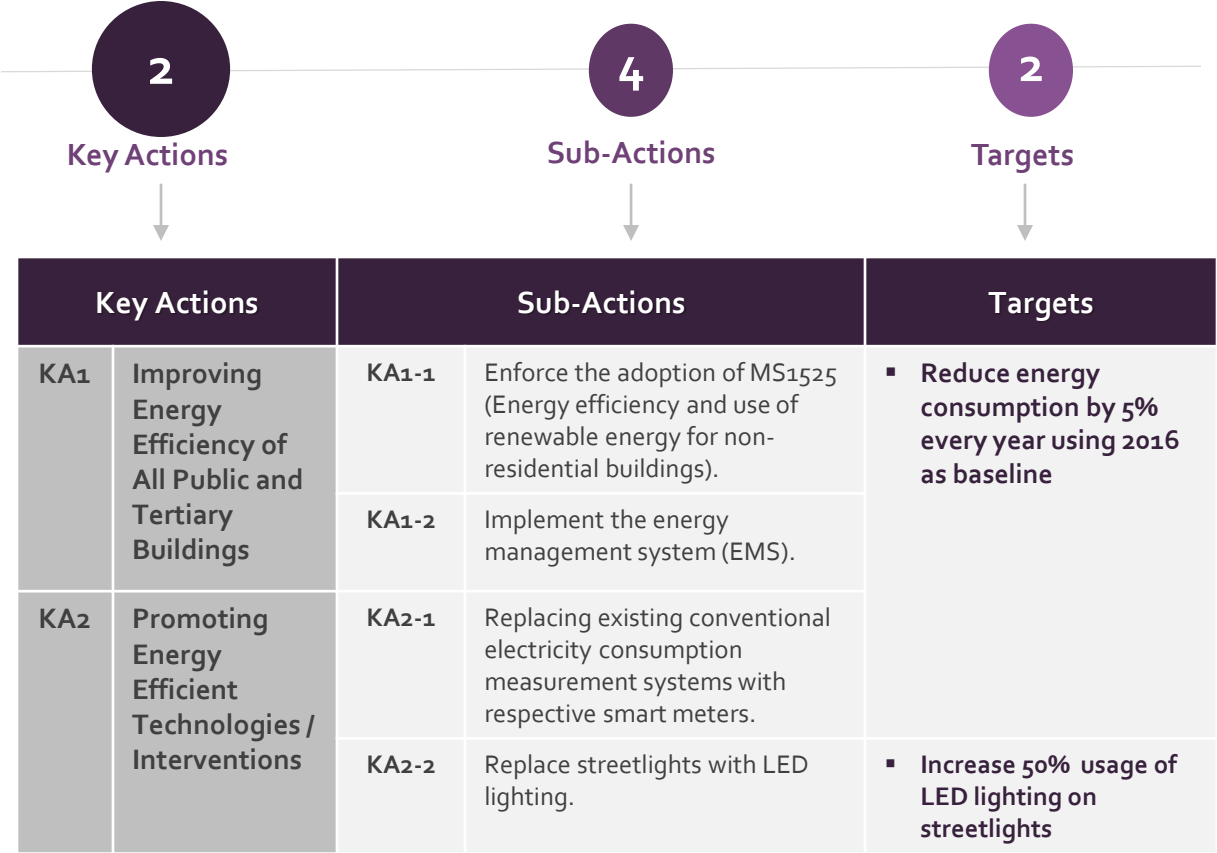


3.3.2 Energy Optimization



Current energy optimization scenario in Cyberjaya

- **3 %** Usage Of LED Lightings In Streetlights.
- **101.72 %** Increase In Energy Consumption From 2011 To 2016.
- **260.00 %** Increase In Energy Consumption From Streetlights From 2011 To 2016.



KA1

Improving Energy Efficiency of All Public and Tertiary Buildings.

(i) Project Description

This initiative is about reducing energy consumption in Cyberjaya by focusing on energy usage by public and tertiary buildings. In general, buildings are the dominant energy consumers in today's cities, accounting for 30% to 40% of total energy consumption and 70% of total electricity consumption. Typical energy consumption in buildings include equipment (24%), lighting (12%) and air-conditioning (64%). The building sector therefore presents immense opportunities for reduction in energy consumption through the adoption of energy efficient practices.

Specific sub-actions for this initiative are as follows :

- **KA1-1 : Enforce the adoption of MS1525 (Energy efficiency and use of renewable energy for non-residential buildings).**

MS:1525 is the Malaysian code of practice for energy efficiency and use of renewable energy for non-residential buildings. It provides guidelines for the design and construction of buildings in the Malaysian context, keeping climate factors and comfort conditions in mind. Making it mandatory to conform to this standard would help to establish a minimum threshold for green buildings in Malaysia. MS1525:2007 provides the baseline minimum standard for the GBI rating tools for energy efficient design.

Implementation Timeline : SHORT TERM

- **KA1-2 : Conduct energy audit as the first step in identifying opportunities to reduce energy expense and carbon footprints.**

Energy audit is an exercise to gauge on the energy performance of existing buildings and at the completion of the exercise, it recommends energy saving measures (ESMs) that can be undertaken. An audit is designed to determine where, when, why and how energy is being used. This information can then be used to identify opportunities to improve efficiency, decrease energy costs and reduce greenhouse gas emissions that contribute to climate change. Conducting an energy audit will not only provide basis to embark on energy management program, but also provide significant savings.

Implementation Timeline : SHORT TERM

(ii) Rationale

- Towards sustainable path : when it comes to energy use, more is not better.
- Energy efficiency saves money – e.g. buying ENERGY STAR appliances saves up to 30% on electricity bills.
- Energy efficiency is good for the environment- saving energy resources and avoiding pollution.

iii) Key Driver(s)

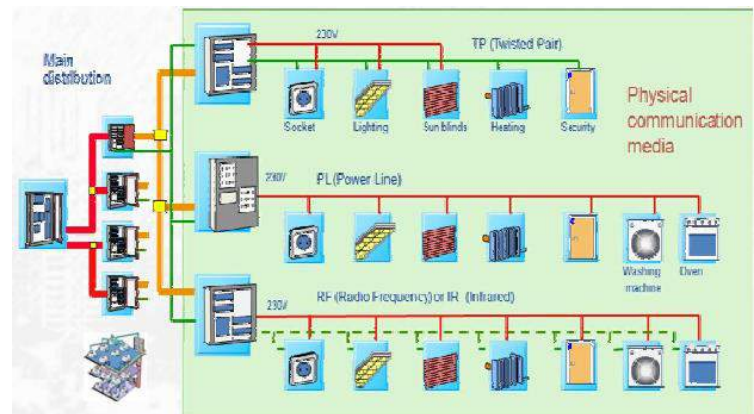
- MP Sepang – Jabatan Kawalan Bangunan

(iv) Collaborating Partner(s)

- SIRIM
- SEDA
- GreenTech Malaysia

(v) Target

Reduce energy consumption by 5% every year using 2016 as baseline



Energy Management System

The Malaysian government has undertaken numerous initiatives in various sectors to encourage energy efficient practices across the country. In order to incentivize energy-efficient construction and promote sustainable development, it has developed a suite of related policies, including the Development of Malaysian standard MS:1525 (2001), Energy Audit on Government Buildings (2002), Energy Efficient Building demonstration Projects (2004), Green Building Index (2009), and the Energy Audit and Retrofit in selected government buildings (2014) (Umar 2011).



Indoor Lighting

Case Study

Green buildings, also known as sustainable buildings, are structures that are environmentally responsible and resource-efficient throughout their life cycle. An efficiently designed green building can produce energy savings of between 30 percent and 60 percent of the energy that is consumed by a conventional building - i.e., one that does not apply and follow green building parameters during its design, construction, and operation phases (www.worldgbc.org).

KA2

Promoting Energy Efficient Technologies / Interventions.

(i) Project Description

This initiative is also about reducing energy consumption in Cyberjaya but by focusing on using smart technology/interventions to increase savings and efficiency.

Specific sub-actions for this initiative are as follows :

- **KA2-1 : Replacing existing conventional electricity consumption measurement systems with respective smart meters.**

Smart meters help in efficiently managing load and enable utilities identify real time energy consumption patterns of users in intervals of an hour or less, and thereby, formulate demand and supply dynamics. Deployment of smart meters in Cyberjaya would enable remote recording of meter readings using wireless and communication technologies for monitoring and billing. TNB has initiated a pilot project on this in 2014 in two areas in Malaysia involving 1,000 households. According to an online report dated 17 February 2015, TNB had announced that it plans to install 8.5 million residential smart meters within the next 10 years (Source : www.metering.com).

Implementation Timeline : SHORT TERM

- **KA2-2 : Replace streetlights with LED lighting.**

This project is about replacing the ordinary and conventional orange colour streetlights to an integrated lights that use light emitting diodes (LED) as its light source.

When choosing the lighting technology such as LED streetlights, it is also prudent to take future development in the field of lighting into consideration. Some of the most promising developments are as follows :

- Intelligent lights – either with motion sensors or those capable of varying their output according to the ambient light levels to maintain uniform illumination. Similarly it is possible to develop control technologies that will allow sensors to match light output to ambient light levels – using small amounts of electricity to produce small amounts of light early in the evening and near daybreak.
- Use of solar panels integrated with light poles to ensure distributed generation of electricity and further reduce the environmental impact of lighting.
- Use of manual control of lights through power cables.

Implementation Timeline : SHORT TERM

(ii) Rationale

- Towards sustainable path : use less, conserve more.
- Although these energy-efficient alternatives sometimes have a higher upfront cost, their long lifespan and low energy use can save consumers a considerable amount of money
- Existing buildings are responsible for over 40% of the world's total primary energy consumption. As such, an impressive amount of energy could be saved simply by applying energy-efficient technologies.

iii) Key Driver(s)

- MP Sepang – Jabatan Kawalan Bangunan

(iv) Collaborating Partner(s)

- TNB
- SEDA

(v) Target

Reduce energy consumption by 5% every year using 2016 as baseline

Increase 50% usage of LED lighting on streetlights

Energy Efficient LED lighting: deliver up to 70% cost savings



Smart meters for home



Philips: creating efficient and livable cities through open systems for evolving smart cities.

Transform your city, **your way**

Philips CityTouch: the leading lighting management system that provides an open platform adapting to the changing needs of smarter cities.

The Smart City evolution is gathering pace. Cities are connecting multiple management systems to get a clearer picture of asset performance, improve efficiency, and enhance city life. CityTouch has been developed for this new world of openness, integration and connectivity.



Freedom of choice

CityTouch connects all Luminaire, regardless of vendor, brand or type, so you always have the freedom to choose those that best suit your needs.

Learn more about how we work with third party luminaire vendors.
(CityTouch Ready Partner Program)



Open APIs

CityTouch integrates with any asset management system, so you're never locked-in to one vendor. It is perfectly suited to the new smart city built on open application programming interfaces (APIs), that link any city vertical or horizontal.




No proprietary networks

CityTouch connects via existing mobile networks, so you don't need to invest in proprietary technology.

4.3.3 Water Management & Sewerage Treatment

Current water and sewerage treatment scenario in Cyberjaya



- **100%** Potable Water Supply From Surface Water Stored In Reservoirs.
- **0%** Usage of Recycle Water.
- **100%** Usage of Conventional STP.
- **0%** Energy Generated from Biogas.

1

Key Actions

1

Sub-Actions

2

Targets

Key Actions		Sub-Actions		Targets
KA1	Greening the Sewage Treatment System	KA1-1	Set up integrated and decentralized wastewater system.	<ul style="list-style-type: none"> ▪ Increase usage of recycle water by 10% ▪ Increase production of energy generated from biogas by 5%

KA1 Greening the Sewage Treatment System.

(i) Project Description

This initiative is about reducing energy consumption in Cyberjaya by focusing on energy usage by public and tertiary buildings, using smart technology interventions to increase savings and installing system to ensure continuous monitoring on performance and savings.

Specific sub-actions for this initiative are as follows :

- **KA1-1 : Set up integrated and decentralized wastewater system.**

This initiative is about moving away from the conventional centralized approaches to wastewater management to address the needs of communities for the collection and disposal of domestic wastewater.

Traditional sewer typically collect and convey wastewater collected from relatively long distances to large centralized treatment plants. By contrast, decentralized systems are smaller wastewater and storm water systems located in close proximity to the source of water being managed. Treating water near its source reduces the energy demand associated with conveyance and promotes localized reclamation, reuse of treated water and resource recovery in terms of energy. When used to recharge local aquifers, decentralized systems help keep local water cycles in balance.

Implementation Timeline : MEDIUM TERM

(ii) Rationale

- Decentralized systems often include water reuse, using such strategies as rainwater harvesting, storm water bio retention and wastewater reclamation. Reclaimed water from decentralized systems can be used for irrigation, toilet flushing and other non potable uses, reducing the consumption of valuable potable water for these uses.
- In addition to water reuse, decentralized wastewater technologies also can be used for the efficient recovery of energy and nutrients.

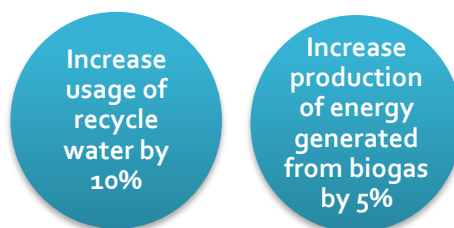
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

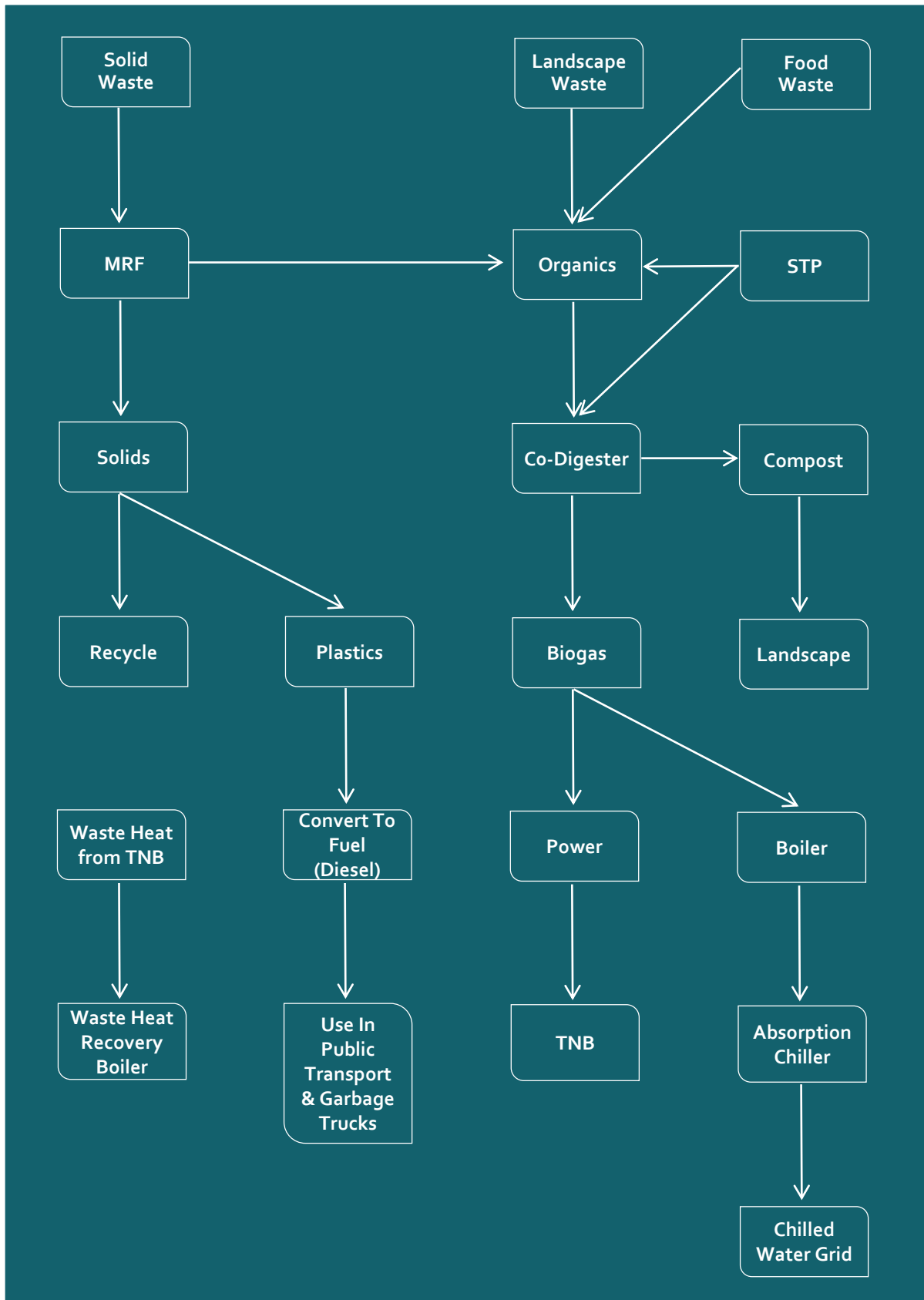
(iv) Collaborating Partner(s)

- Technology Providers
- Developers / Private Investors

(v) Target



Integrated Waste to Wealth Project



URBAN TRANSPORTATION

3.4 URBAN TRANSPORTATION



3.4.1 Non Motorized Transport



Current urban transportation scenario in Cyberjaya

- **5.8 km** Road Marking for Bicycle
- **30%** Pedestrian Route Developed

3 Key Actions		3 Sub- Actions		6 Targets
Key Actions		Sub-Actions		Targets
KA1	Safe, Convenient and Enjoyable for all ages & abilities	KA1-1	More connected bike routes from existing and establish bike share programs.	<ul style="list-style-type: none">▪ Make the majority (over 50%) of trips by foot, bicycle and public transit.▪ Reduce average distance driven per resident by 20% from current levels.▪ Lowering speed limits, reduce 20% of CO2 emmission▪ Cleaner air by 40% by 2030▪ Cycling route at 20km by 2020.▪ Increase parking rate at CBD area by 50%
		KA1-2	Prioritize pedestrian safety by developing study and action plan.	
		KA1-3	Provide traffic restraint and calming design infrastructure.	

KA1-1

More connected bike routes from existing and establish bike share programs.

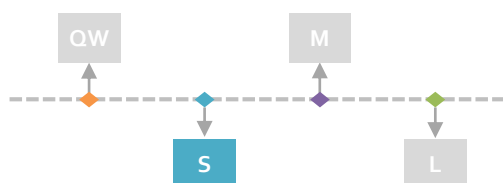
(i) Project Description

To build and continue to expand on- street and off- street cycling infrastructure from existing bike routes. The cycling routes must integrate with land use activity to ensure more riders. Bike share program for Cyberjaya will allow more ridership with multiple bike stations around the town and it shall provide easy access to affordable rental bikes for short trips around the city.

(ii) Rationale

- A smooth connected bike paths will increase transportation choices in Cyberjaya where people will choose to cycle and walk.
- With more programs to do with cycling such as enhancing the bicycle routes and establishing the bike share programs, we can create build a long term vision for cycling.
- It also supports active, accessible and healthy lifestyle options as Cyberjaya invites more pedestrian and cycling friendly movements.

(iv) Timeline

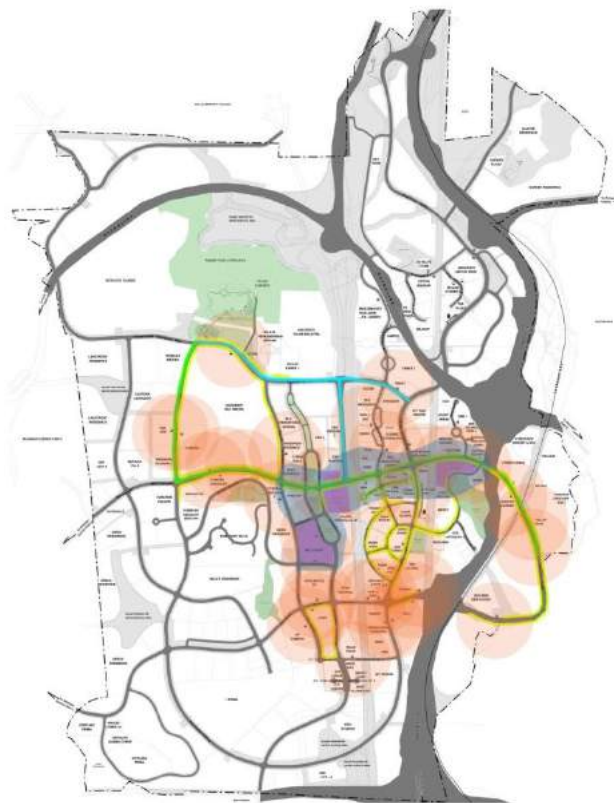


iii) Key Driver(s)

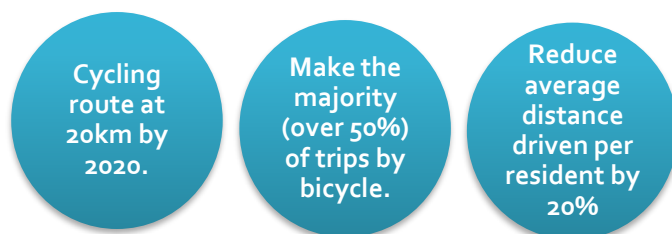
- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- Developer of Cyberjaya
- Bicycle Program Provider



(v) Target



Case Study

Penang, Malaysia has advocate for bike sharing programs called Link Bike where there are 25 stations throughout George Town, Queensbay and Straits Quay.

1. Continuously engage with the community as part of a transparent process to develop the Pedestrian and Cycling Strategies, and to implement the initiatives identified within the Strategies.



2. Continuing to Expand On- Street and Off-Street Cycling Infrastructure from Existing and connecting people to social activities & economic opportunities.



Existing cycling path in Cyberjaya



3. Walking and cycling as attractive, convenient and accessible transportation choices for people of all ages and abilities.



Bike Rack/ Sitting



In Georgetown Penang on Link bike: Bikes shall be durable, attractive and practical with a front basket to carry bags, packages or groceries.



Attractive bicycles with bicycle paths that are friendly and convenient



Eco Caddy, a green taxi or trishaw in Adelaide for the trip too far to walk and too short to cab.

KA1-2

Prioritize pedestrian safety by developing study and action plan.

(i) Project Description

To ensure the safety of pedestrians in Cyberjaya, firstly is to plan and ensure existing pedestrian paths are still connected through zebra crossings and working pedestrian lights with traffic calming measures. Additional connected pedestrian paths must be taken into consideration by highlighting on dedicated pedestrian priority spaces, streets and sidewalks. The action plan shall include planning for mixed-use areas with pedestrian oriented public spaces so that goods and services are within a safe and enjoyable 10 minute walk from where people live.

(ii) Rationale

- With comprehensive study on Cyberjaya's existing pedestrian movement and improving from it, it will hopefully encourage more people on street therefore Cyberjaya is more safe.
- It is important for the people of Cyberjaya to portray themselves as a healthier residents and more active citizens.
- If private vehicles driving in Cyberjaya can be substitute to pedestrians, Cyberjaya will be able to obtain cleaner air and reduced accident risk.

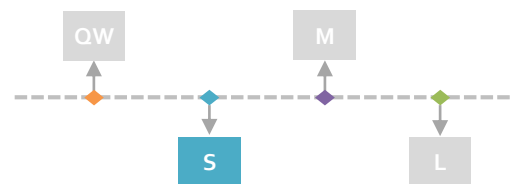
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

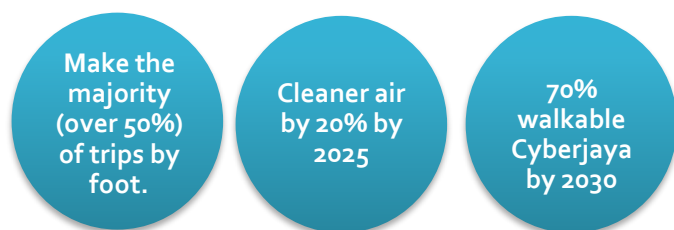
(iv) Collaborating Partner(s)

- Developer of Cyberjaya
- Local Residents Association

(v) Timeline



(vi) Target



Case Study

Thornton Place, Seattle Washington is a walkable neighbourhood and is unique as it integrates pedestrian paths with green infrastructures for example, bioswales, raingardens and open spaces to create a safer pedestrian journey or route.

1. Walking and cycling facilities are strategically integrated with land use to foster walkable and bicycle friendly communities in existing and new neighbourhoods.



2. Universally designed paths will ensure inclusivity and easy mobility for people with all abilities



Universally designed pedestrian path



Pedestrian Sidewalk

3. Thornton Place, Seattle presents a safe pedestrian route where it involves passive surveillance and CPTED (Crime Prevention Through Environmental Design).



KA1-3

Provide traffic restraint and calming design infrastructure.

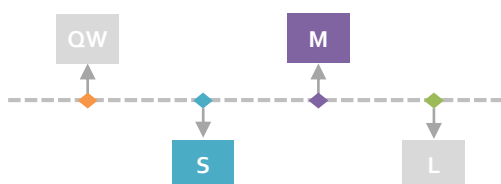
(i) Project Description

Cyberjaya needs to accommodate traffic in a safe and efficient way to reduce or eliminate accidents, as well as providing safe walking and cycling paths. Devices often used include speed bumps, barricades, turning prohibitions, stop signs and raised pavement markers. Lower speed limits, wider sidewalks and bike lanes contribute to slowing down vehicle movement. It is important for the existing roads in Cyberjaya to reduce the car lanes and make it less wide and more narrow as it slows traffic and increase in neighbourhood safety. Moreover, planting trees closer together makes drivers feel as if they are going faster therefore they will slow down.

(ii) Rationale

- The implementation of traffic calming roads can increase bicycle and pedestrian traffic which does not cause congestions to roads.
- With slower traffic resulted from establishing traffic calming devices, it will create fewer accidents in Cyberjaya.

(v) Timeline



iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- Developer of Cyberjaya
- Local Residents Association



(vi) Target

Lowering speed limits, reduce 20% of CO₂ emission

Reduce average distance driven per resident by 20%

Make the majority (over 50%) of trips by green trips.

Case Study

A retrofit study in restraining traffic in Ponyton, England. What used to be a scary and unpleasant environment for drivers, cyclists and pedestrians alike now looks and works a lot better with the intervention of their intersections.

1. Case study in Ponyton, Engalnd transformed intersections by removing traffic lights, kerbs, road surface markings and letting pedestrians and cyclists move freely as they were afraid to before. This intersection substantially reduced car speeds and is known as “shared space”



Before



After



2. Several studies suggested that walking and biking activity increases in neighbourhoods that have traffic calming measures in place.

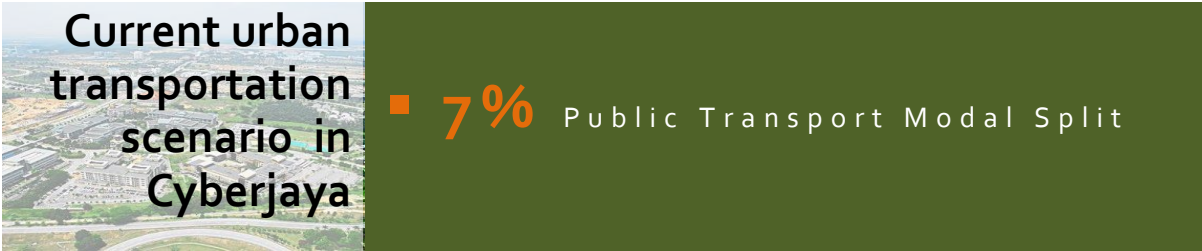


In Cedar Park Baltimore, by turning a section of the street that cars didn’t regularly use, over to pedestrians, the intersection became far more pleasant.



“BoulevART” street mural on the pavement at the intersection of Highland Park Neighborhood with tactile pavements for pedestrian crossings.

3.4.2 Public Transportation & Private Vehicle



3 Key Actions		3 Sub- Actions		6 Targets
Key Actions		Sub-Actions		Targets
KA2	Fast, Frequent, Reliable and Accessible to Support Transit Improvements	KA2-1	Improve service and reduce door to door journey time by public transport.	<ul style="list-style-type: none">With park and ride facilities near transit stations give 40% increase in green trips.Reduce door to door journey time by public transport to 15 minutes.Lowering speed limits, reduce 20% of CO2 emission24 hours monitoring of traffic flowLess than 30 seconds waiting time at traffic light70% usage in mobile apps for transport system100% integrated with all ticketing and fare system for public transport.
		KA2-2	To support electric vehicles with charging stations around Cyberjaya.	
		KA2-3	To have more smart traffic management system to control congestion during peak hour.	
		KA2-4	Increase usage of mobile apps for Bike Sharing, public transport system and parking availability.	

KA2-1

Improve service and reduce door to door journey time by public transport.

(i) Project Description

It is important for people to know that their bus will be there when and where they need it. As public transportation modal split in Cyberjaya is currently at 7% and there have been a lot of complaints from bus users regarding Nadi Putra's tardiness, Cyberjaya needs to look at improving its service and reduce the door to door journey time by working with Nadi Putra and the province to advocate for high capacity, fast, frequent and reliable rapid transit. In addition, there is a need to improve the transit experience through better design of waiting areas and expanding measures to improve the reliability of transit services.

(ii) Rationale

- Improving the bus services can increase the amount people use transit services therefore will create less private vehicles on the road and provide for the people..

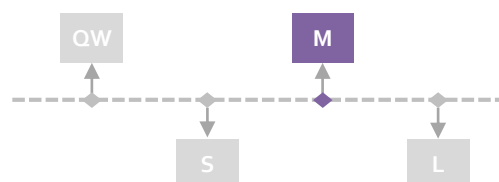
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

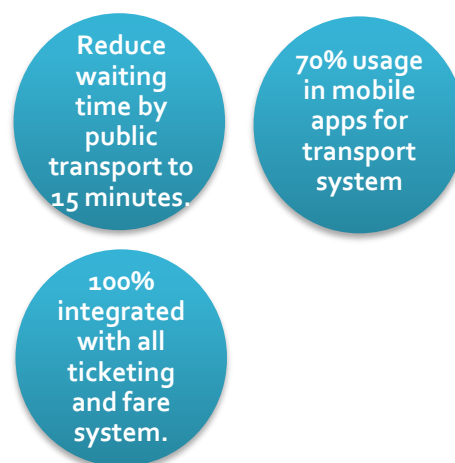
(iv) Collaborating Partner(s)

- Nadi Putra
- Community

(iv) Timeline



(v) Target



Case Study

MRT Feeder Bus has established bus stops for pick up and has so far been arriving on time between 15 to 20 minutes between bus stops. This creates more ridership as passengers are satisfied with the service.

1. Investment Priority Given to Public Transport Modes that is Dynamically Integrated with Land Use



Tech Infused Bus Stop with books, swins, smart boards in Singapore



Integrated Modes of Transport Station. BRT and Tram station in Munich



Adelaide creates world's first solar- powered public transport system



Bus Shelter in Curitiba, Brazil

1. More bus users can increase the efficiency and service of the bus therefore providing incentives to these people can reduce single occupant vehicles. This is again to imply awareness and enforcements.



Incentives being given in the UK.

KA2-2

To support electric vehicles with charging stations around Cyberjaya.

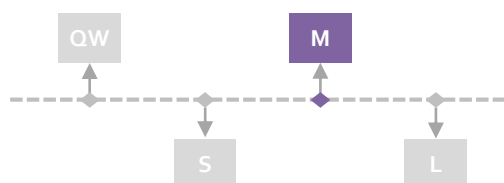
(i) Project Description

Cyberjaya shall accelerate the shift to low and zero carbon emission vehicles. It is important to support technologies and infrastructure that reduce the environmental impact of private and public vehicles. Therefore Cyberjaya shall support electric vehicles with charging stations and furthermore integrate electric vehicle use into Cyberjaya's town operation. The charging stations shall be at the park and ride areas as well as the centre where most vibrant to showcase the low carbon feature.

(ii) Rationale

- Sustainable transportation choices help clean the air, therefore establishing EV Stations are essential to encourage use of electric vehicles.
- Cyberjaya targets to reduce carbon emission and carbon footprint therefore this is one of the alternatives in mitigating transport's emissions.
- With this in mind, Cyberjaya can lead towards a stable climate future.
- It can maximises the benefits of air quality and affordability for residents to no consumption of fossil fuels.

(iv) Timeline

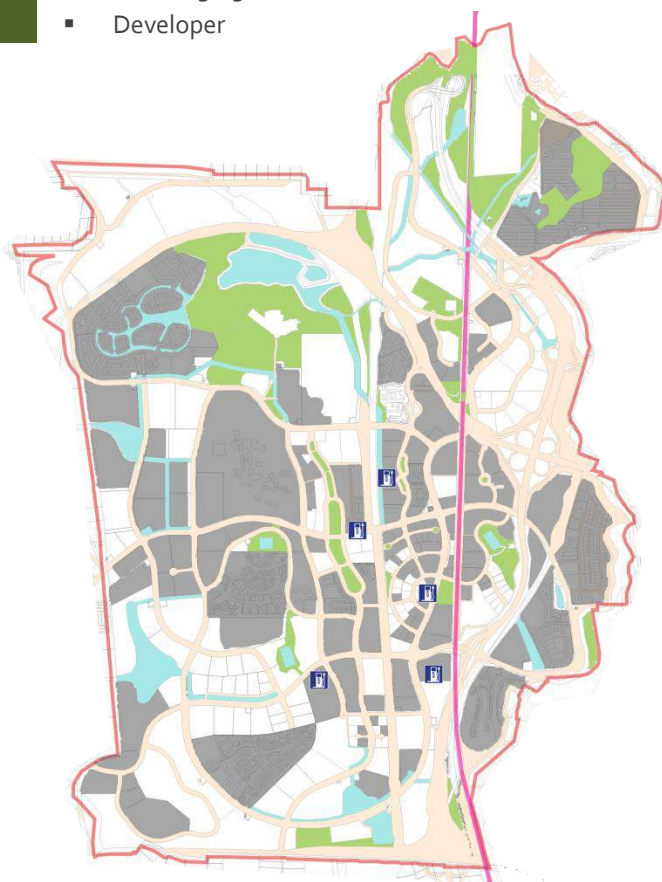


iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- EV charging stations Provider
- Developer



(v) Target

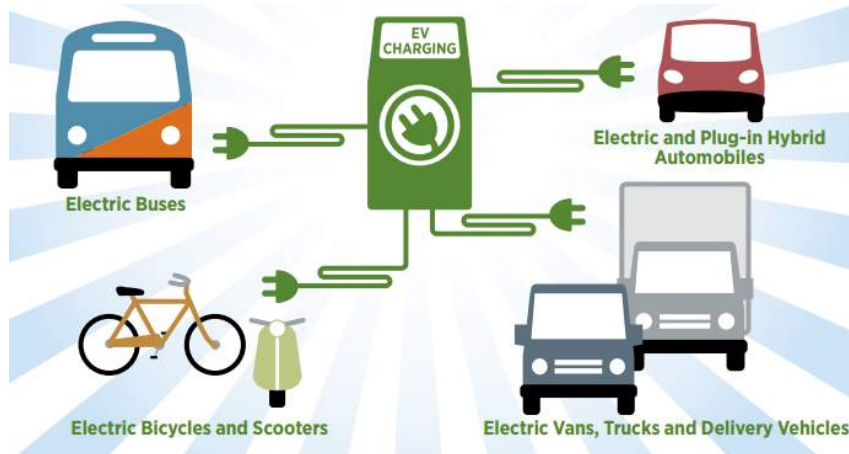
Cleaner air
by 40% by
2030

60%
reduction
CO₂
emission

30% shared
electric
vehicles by
2025

Case Study

Portland Oregon has more electric car fast charging sites per person than Germany.



The term electric vehicle includes: electric bikes, electric scooters, electric and plug in hybrid cars, trucks, buses and freight vehicles.

Case Study

Portland, Oregon

Portland is a leading electric vehicle market where at least 240 volt charges are easy to find within the city. EcoCab which is an electric vehicle appeals to the eco- friendly consumer in Portland encouraging more green vehicles in the city.



Priority Electric Vehicle Charging Areas

The City prioritizes charging infrastructure in areas of Portland that have:

- Fewer existing public charging stations.
- Limited access to frequent transit and bike routes.
- Higher proportions of multifamily housing and garage-free homes.
- Large businesses with employees commuting long distances.
- Residents with higher average vehicle miles traveled.
- Destinations (recreation sites, event venues, etc.) people tend to travel longer distances to access.

KA2-3

To have more smart traffic management system to control congestion during peak hour.

(i) Project Description

As Cyberjaya is becoming more congested during peak hours from having cars from outside Cyberjaya coming in, it is highly recommendable to suggest more smart traffic devices. One of the suggestions is to add more Smart Traffic Analytic and Recognition System to ensure smooth traffic during peak hours as Cyberjaya has becoming more congested due to more transients entering the city during the day. Currently there are 8 intersections with this system.

(ii) Rationale

- This addresses traffic congestions in a smart way and Cyberjaya is able to advocate for its Tech Hub features.
- This can achieve reduced travel and waiting time especially for those riding public transports.
- With less congestion, private vehicle can reduce fuel consumption.
- This leads to reducing air pollution and increase in health benefits.
- Furthermore, as Cyberjaya wants to go for low carbon city, this can reduce carbon emission from vehicles in a smart method.

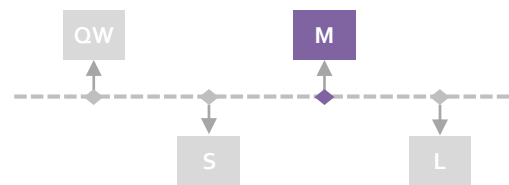
(iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat
- Cyberview

(iv) Collaborating Partner(s)

- Telekom Malaysia

(iv) Timeline



(v) Target



Case Study

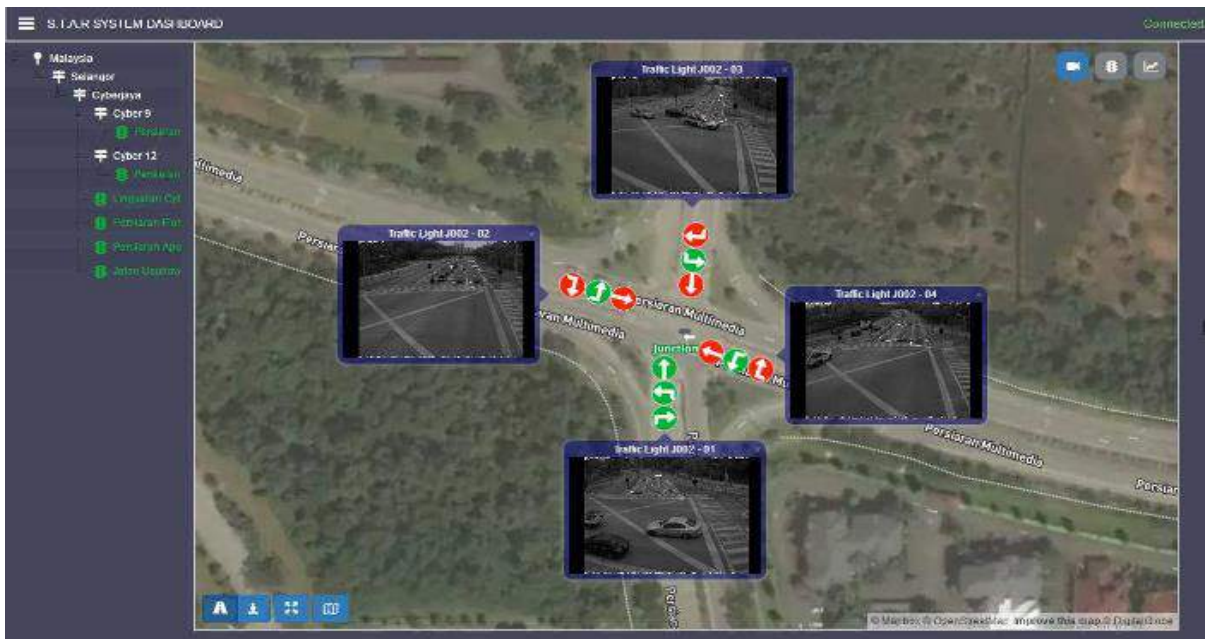
Montreal, Canada where they implement smart traffic and toll systems, solutions designed by Indra Company.

Case Study on Chicago on how its turning street lights into a smart sensory network. The collection of Big Data is highly essential in the city to represent a smart city where multiple sensors placed across the city gathering huge amounts of data.



Street lights could be turned on and off according to the traffic and business of the road, saving a lot of energy.

Current Smart Traffic Management System in Cyberjaya which can be enhanced.



KA2-4

Increase usage of mobile apps for Bike Sharing, public transport system and parking availability.

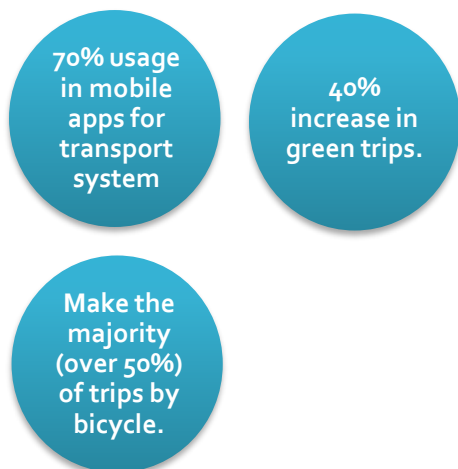
(i) Project Description

To have bike sharing program that work through mobile applications. This can be showcase as one of the smart features Cyberjaya has to support its Tech Hub. For residents living in the core centres, there is no need to own a bike when they can use their mobile phones to scan a QR code and unlock the bike nearby that is in good condition. This can also lead to branding the bike share program to create an identity for Cyberjaya.

(ii) Rationale

- By having the mobile app on bike share program in Cyberjaya, it is more convenient for the people to commute in short distances within the city.
- Cyberjaya will create affordable and practical schemes for the bike sharing program to ease users in riding the bicycles.

(v) Target



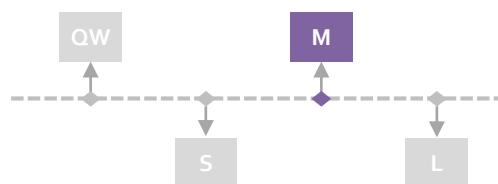
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat
- Startup Company for mobile application

(iv) Collaborating Partner(s)

- Developer
- Community

(iv) Timeline



Case Study


Bike- share program in Taiwan top world frequency as it is growing rapidly due to its efficient mobile app and locations of bike-sharing stations.

Case Study

Penang is currently linked with bicycle lanes with LinkBike BSS operated by Fast Rent Bike Sdn Bhd. Penang is working closely with the operator to set up 25 strategic locations in George Town, Queensbay and Straits Quay. Anyone can pick up a bike from any of the 25 stations and return it to another station. It is as simple as a scan on the QR Code to release the bicycle.


HOW TO USE LINKBIKE

1 SIGNUP




Join us by signup via website or our **LinkBike** App and purchase credit/package

2 UNLOCK




Pick a bike from any of **LinkBike**. Docking and unlock it by scanning the QR Code using **LinkBike** App or via **LinkBike** Card.

3 RIDE






Enjoy the heritage sites within Georgetown or ride to your destination.

4 RETURN



Return the bike to nearest **LinkBike** dock station. Slot the bike to the dock and await acknowledgement from system.



3.4.3 Integrated Transit Oriented



1

Key Actions

↓

2

Sub- Actions

↓

4

Targets

↓

Key Actions		Sub-Actions		Targets
KA3	Vibrant Transit Places	KA3-1	To intensify development within transit nodes and corridors for more public transport users	<ul style="list-style-type: none">Living in Cyberjaya is more affordable and low carbon by 40% by 2025.100% integrated with all ticketing and fare system for public transport60% reduction CO2 emissionCleaner air by 40% by 2030
		KA3-2	To have integrated public transport system that is seamless and connected	

KA3-1

To intensify development within transit nodes and corridors for more public transport users

(i) Project Description

For future developments near bus stops or transit stations, it is important to intensify the density to encourage more public transport users. Planning for a mixed use areas with pedestrian oriented public spaces is highly recommended.

(ii) Rationale

- By having mixed use of activities near the transits or bus stations, it will create an affordable lifestyle where everything is within reach for the people of Cyberjaya.
- This supports low carbon lifestyle as everything is near and reachable.
- It supports active, accessible and healthy lifestyle options.

(v) Target

Living in Cyberjaya is more affordable by 40% by 2025.

100% integrated with all ticketing and fare system for public transport

60% reduction CO₂ emission

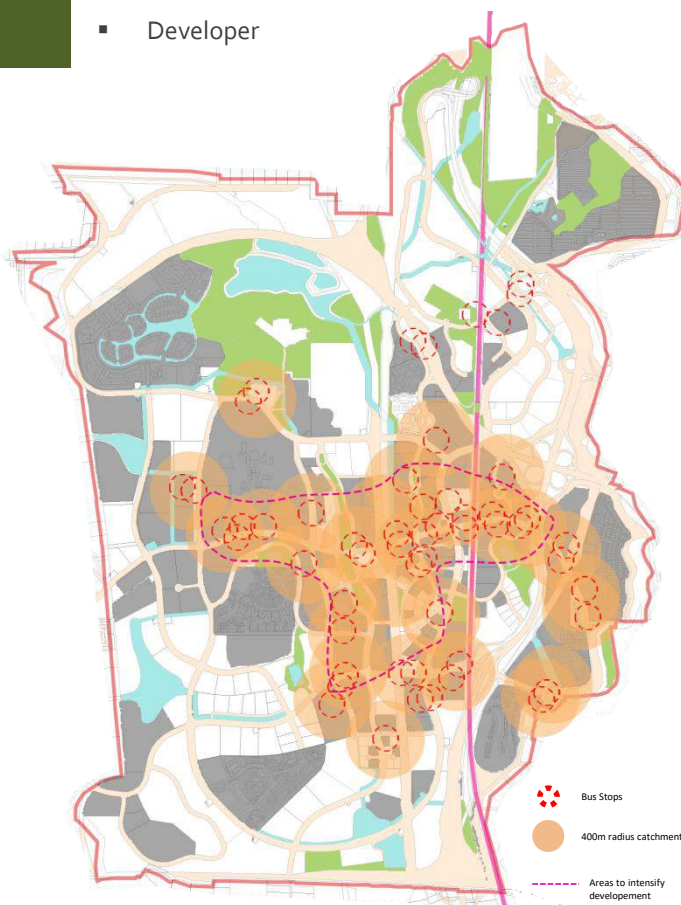
Cleaner air by 40% by 2030

iii) Key Driver(s)

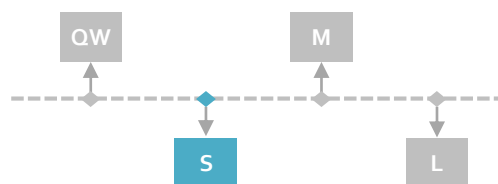
- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- Developer



(iv) Timeline



Case Study

Paseo Verde of North Philadelphia, Pennsylvania. The SEPTA Regional Rail Station is immediately behind the properties.

1. Improve existing buildings' pedestrian paths and ensuring that new development contributes to the pedestrian environment by developing a pedestrian friendly city guideline.

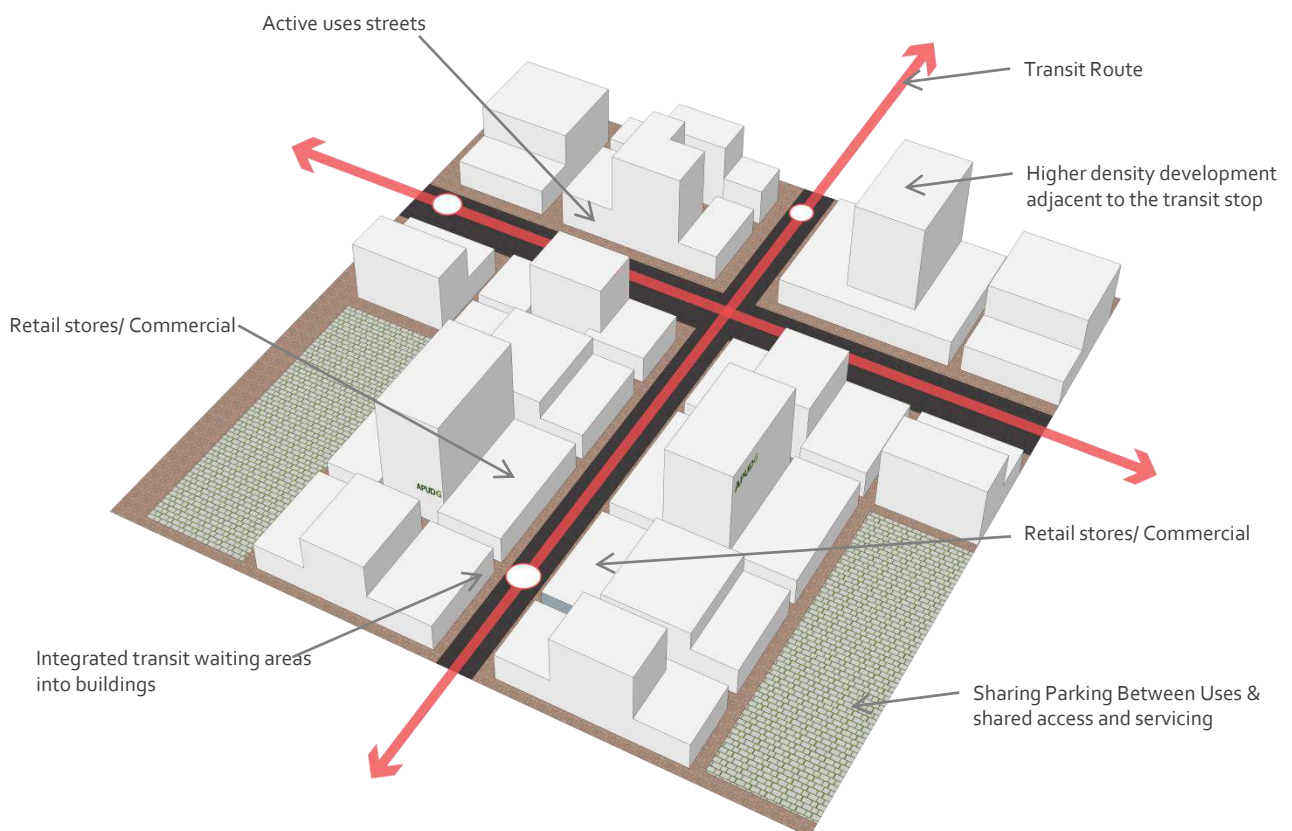


In Colorado



In Chicago

2. Determine successful major transit centres through locations of commercial shopping centres, university campuses, mixed use areas and transit stations.



KA3-2 To have integrated public transport system that is seamless and connected

(i) Project Description

Where most bus stops or LRT/MRT Stations are integrated with bike sharing programs and park and ride systems. This is to encourage the last mile journey with the usage of green transport. In order to make them more connected is to improve existing buildings' pedestrian paths. It is also to ensure that new development contributes to the pedestrian environment by developing a pedestrian friendly city guideline for the developers.

(ii) Rationale

- With seamless and ease of way to ride a public transport, it will create affordable lifestyle to the people working and living in Cyberjaya where everything is within reach.
- It also supports active, accessible and healthy lifestyle options.

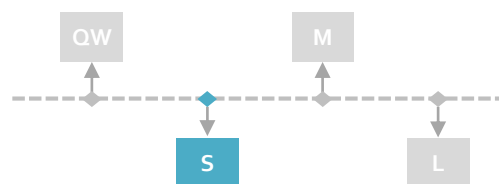
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

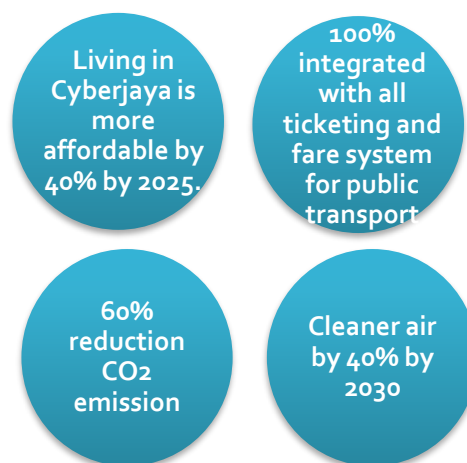
(iv) Collaborating Partner(s)

- Bike Sharing Provider

(v) Timeline



(vi) Target



Case Study

Taiwan provides bicycle stations in Metro Stations as well as bus stations making it more convenient and easy for people to use public transport.

Case Study

Taiwan added rental bike stations near metro stations and bus stops. The main objective is to have convenience to the people in order to build a loyal ridership which was at first a challenge to Taiwan.

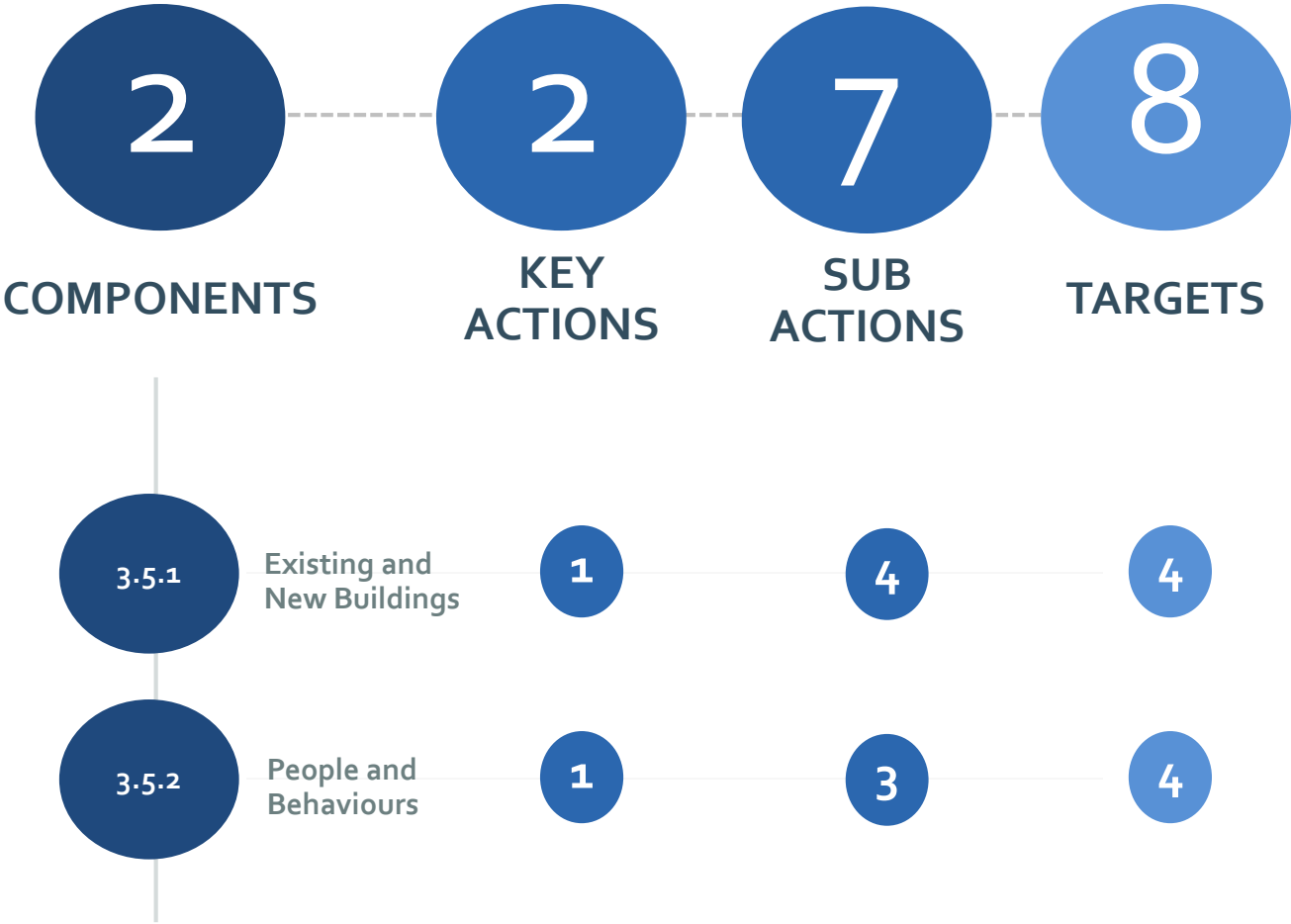


Phoenix, United States of America called a central station where bus stop is integrated with bicycle racks, good amenities of benches to make for a more functional and aesthetically pleasing station.



BUILDINGS

3.5 BUILDINGS



3.5.1 Existing and New Buildings



1 Key Actions		4 Sub- Actions		4 Targets
Key Actions		Sub-Actions		Targets
KA1	Sustainable and Low Carbon Buildings.	KA1-1	Future buildings in Cyberjaya to implement passive design first then active.	<ul style="list-style-type: none">Require all buildings constructed from 2020 onwards to be carbon neutral in operations.Reduce energy use and greenhouse gas emissions in existing buildings by 20% over current levels.Increase the pace of change towards green developments and retrofits by 40% by 202550% green roof coverage on 1 building
		KA1-2	Existing buildings to improve environmental performance	
		KA1-3	Treating parking podium façade to avoid being an eye sore	
		KA1-4	Buildings in Cyberjaya must consider water sensitive urban design (WSUD)	

Ka1-1

Future buildings in Cyberjaya to implement passive design first then active.

(i) Project Description

For new upcoming developments, a guideline shall be established to consider passive design first and then active. It is important to apply for Green Building Index and especially to design for microclimate optimization for example, designing the building for high ventilation permeability.

(ii) Rationale

- By going for passive design, it can reduce operating cost as the embodied carbon is less.
- Improve occupants productivity as the building's indoor environment is naturally lighted and naturally ventilated giving good vibes to the people.
- This in turn enhances occupant health and comfort.
- Improve indoor air quality as there are no unsustainable materials being used to contribute to the embodied carbon.

(v) Target

Reduce GHG emissions in existing buildings by 20% over current levels.

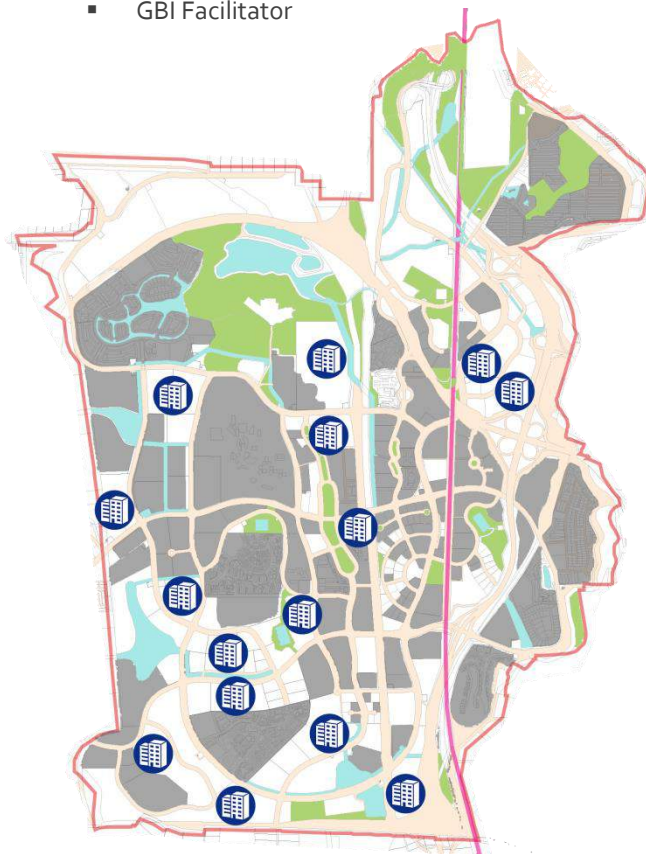
New buildings in 2020 onwards to be carbon neutral in operations.

iii) Key Driver(s)

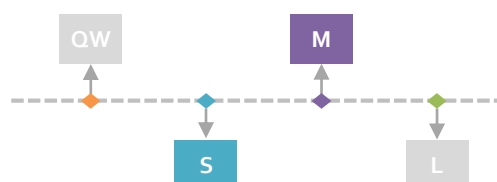
- MP Sepang – Jabatan Pembangunan Masyarakat
- Developer

(iv) Collaborating Partner(s)

- Architect
- GBI Facilitator



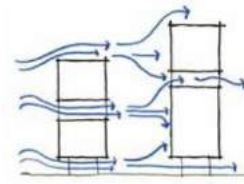
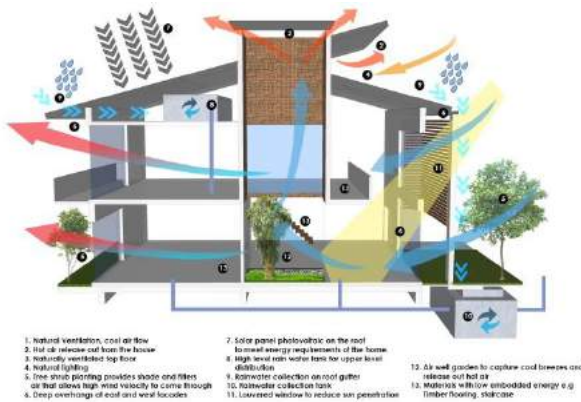
(iv) Timeline



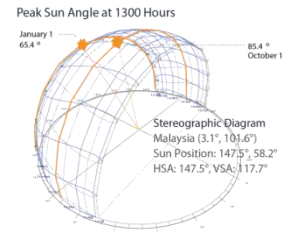
Case Study

Buildings in Hong Kong interlinked open spaces for breezeway paths and are oriented to capture prevailing wind direction routes.

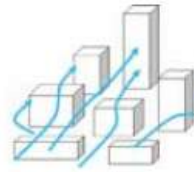
Microclimatic responsive building.



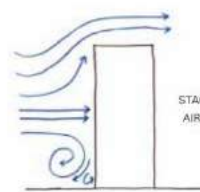
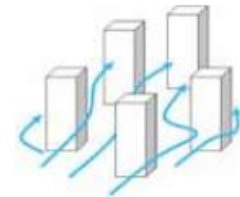
Multiple Block Configuration:
Stagger building heights and void
decks for better air flow



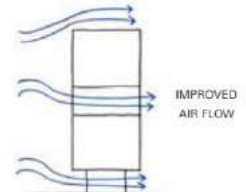
Best orientation



Increase heights in buildings to allow variety capture of wind



Typical Building Solid Massing



Improved Air Flow

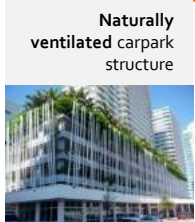
Multiple block configuration by staggering building heights and voids for better air flow



Increasing height of the building behind to allow wind to reach blocks behind.



Integrated parking structure to be located behind medium rise building in order to have a smooth entry and exit of cars as not to disturb the commercial and public spaces.



Naturally ventilated carpark structure

Natural lighted windows to accommodate livable home space with a green courtyard view.



Through block courtyard creating a breeze way between narrowed blocks.

Sky gardens to increase permeability of block

An emphasis on human scale and on creating a great ground floor is essential to good urbanism.



The ground floor of the building works symbiotically with the surrounding sidewalks and public spaces, which provides a continuous network of pathways that is active, safe, comfortable and engaging.



KA1-2

Existing buildings to improve environmental performance

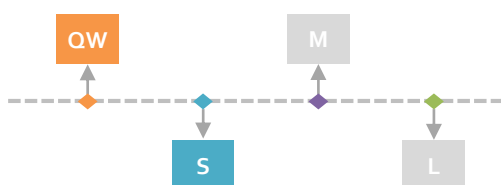
(i) Project Description

Existing buildings in Cyberjaya shall relook into energy and water consumption and improve through greener initiatives such as changing lighting fixtures to LED lighting and rainwater harvesting. This shall be monitored by transparent data as to encourage and maintain sustainability. Local Authority shall suggest on how to improve the existing building environmental performance and appoint a professional to assist the residents or commercial owners.

(ii) Rationale

- Simply by changing the light fixtures to LED can reduce operating cost.
- With more greeneries, vertically and horizontally surrounding the building, it can Improve occupants productivity and a sense of a biophilic environment.
- This can enhance and protect biodiversity and ecosystems.
- Enhance occupant health and comfort
- Improve indoor air quality.

(iv) Timeline

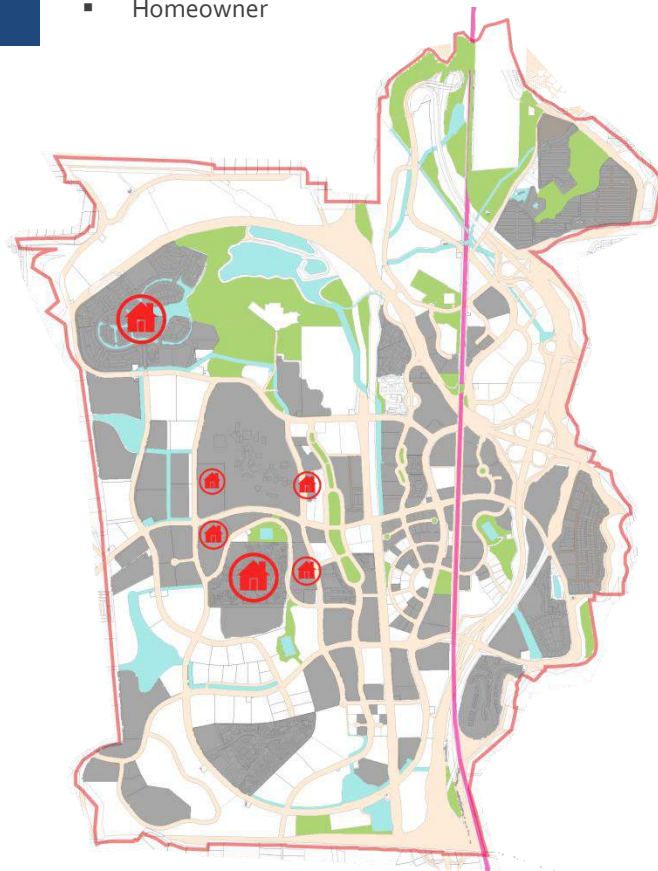


iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- Homeowner



(v) Target

Reduce GHG emissions in existing buildings by 20% over current levels.

Increase the pace of change towards green developments and retrofits by 40% by 2025

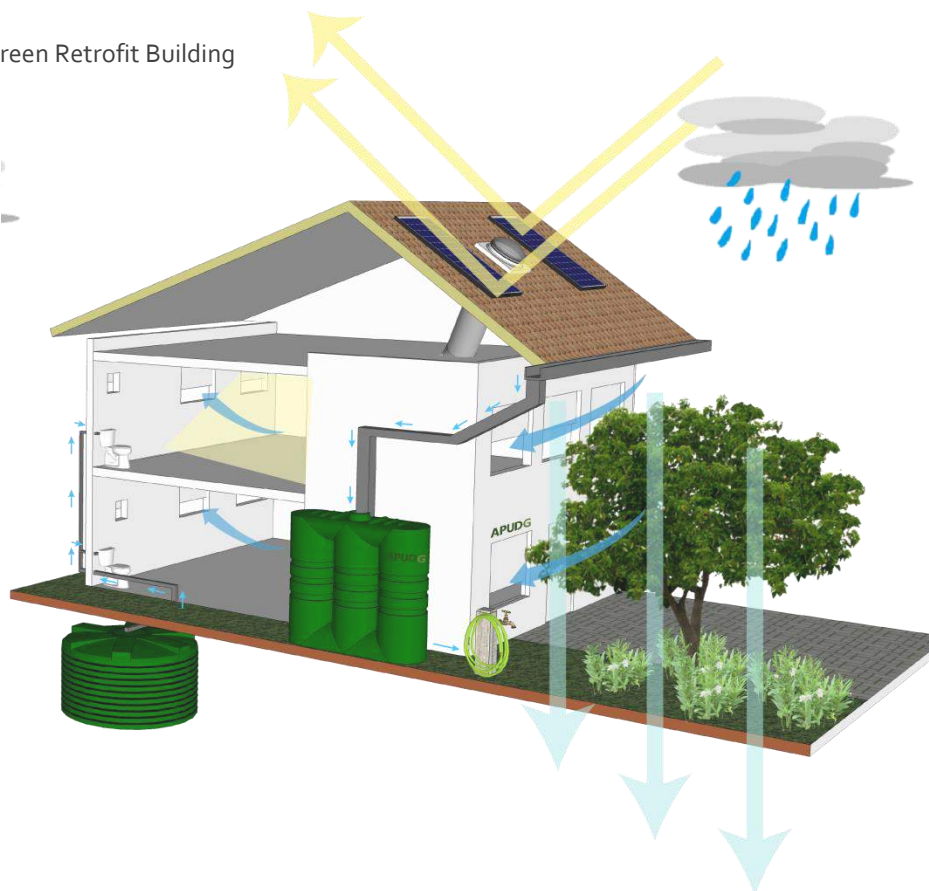
50% green roof coverage on 1 building

Conventional building



To turn into this:

Green Retrofit Building



KA1-3

Treating parking podium façade to avoid being an eye sore

(i) Project Description

To maintain Cyberjaya as an attractive city, all new and existing parking podium must minimize the visual impact of parking podium on the street. Exposed parking podium should be mitigated with buffers such as plantings, water features, architectural detailing, articulation or integrated public art pieces to minimize visual impact. Architects or developers shall design the building to seamlessly blend the podium. Most importantly, the ground floor of the building for all future and existing buildings must be as commercial retail to avoid having parking podium starting from ground floor.

(ii) Rationale

- Cyberjaya to maintain as an attractive and creative tech hub.
- Aesthetically pleasing building
- With green planting treatment, it can reduce the heat island effect on street.

(v) Target

50% of parking podiums in Cyberjaya are green planted or attractive.

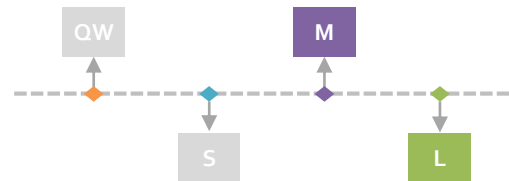
(iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- Developer
- Architect

(iv) Timeline



Case Study

Point92, Damansara Perdana
Architect: ZLG Design,



Screen structure for podium parking



Screens with crawling green vegetation used to treat parking screening



TTDI Ascencia
Architect: GDP Architects



Point92, Damansara Perdana
Architect: ZLG Design

KA1-4 Buildings in Cyberjaya must consider water sensitive urban design (WSUD)

(i) Project Description

Cyberjaya must treat its run off water to have a clean discharge as well as slowing down the water flow to avoid flooding. Therefore, all existing and new buildings must implement such solution through rainwater harvesting, raigarden, perimeter swale, functional spaces that can retain water as well as sustainable materials that can allow water to seep through.

(ii) Rationale

- Save in potable water for irrigation therefore affordable living
- Cooler environment as the environment is greener.
- Aesthetically pleasing to create a natural ambience that is less 'concretized'

(v) Target

Increase 50% in harvesting water for irrigation by 2025

70% buildings harvest water by 2025

Water features in Cyberjaya is cleaner

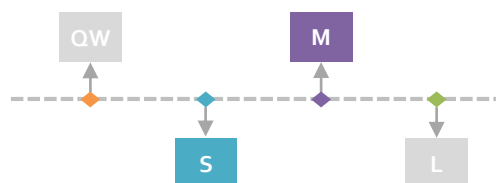
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- Developer
- Landscape Architect

(iv) Timeline



Case Study

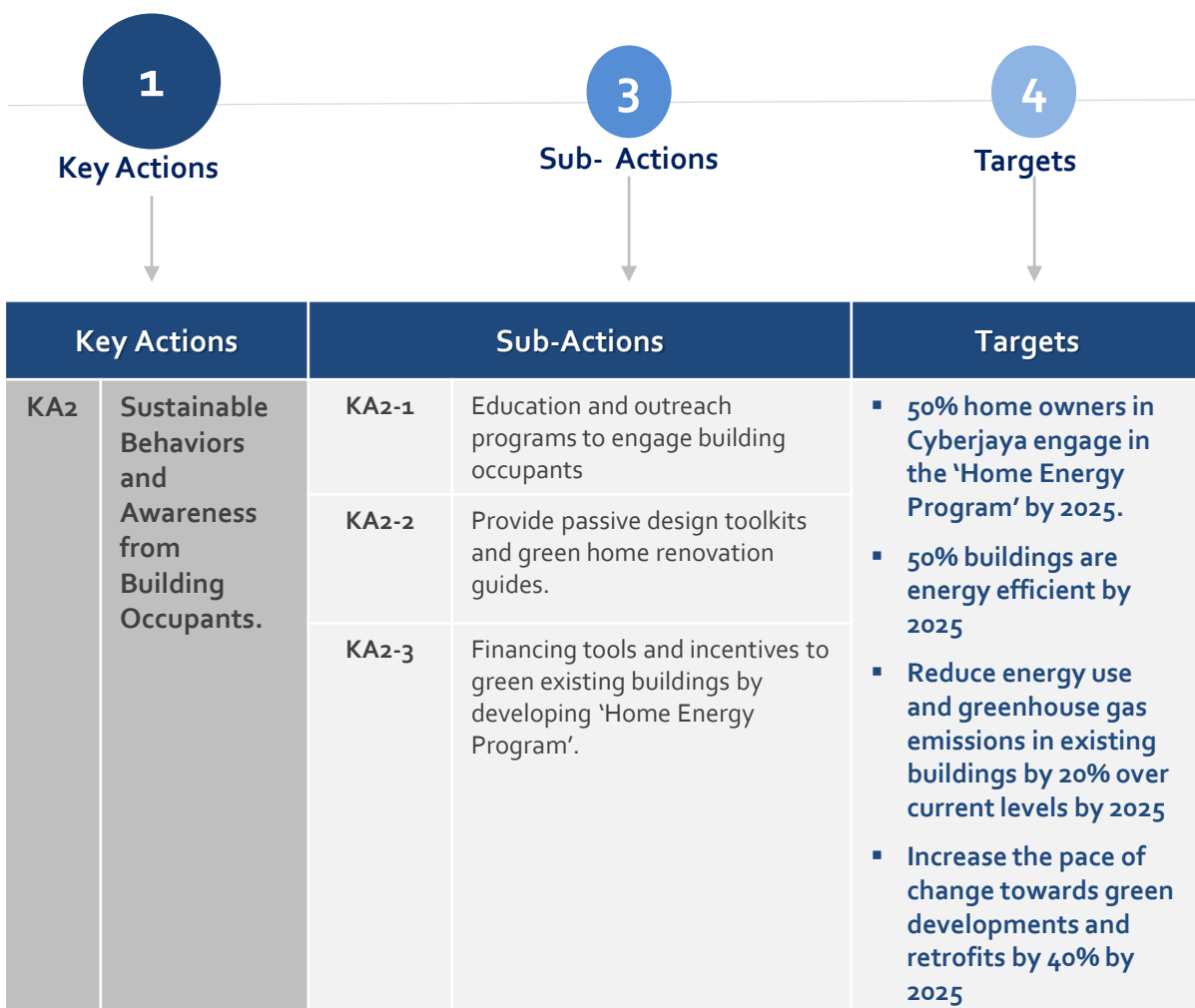
Housing in Denmark adopts water sensitive strategies such as green roofs, rain gardens and more.

3.5.2 People and Behaviour



Current buildings scenario in Cyberjaya

- **2010** the year initiated “No Plastic Bag” CAMPAIGN
- **30% - 50%** drop in the sale of plastic bags since the ban.



KA2-1

Education and outreach programs to engage with building occupants

(i) Project Description

Technology and building science can take Cyberjaya to its target towards a carbon neutral city. However, the people who live and work inside buildings are just as important to be engaged with. Their choices make a big difference in the amount of electricity and water consumed, the waste produced and the effective operation of green building technologies such as natural ventilation systems. It is important for the local authority to get involved in organizing education programs for the community on living green.

(ii) Rationale

- For people to have a sense of ownership in their own homes or buildings by conserving resources.
- Making the lives of the residents more affordable as it reduces cost of living without having to pay a large amount of electric bill.
- Saving the environment collectively as a community through education is essential to transfer to younger generations on the importance of saving the environment.
- Individually, each resident can improve their indoor air quality and enhance their wellbeing.

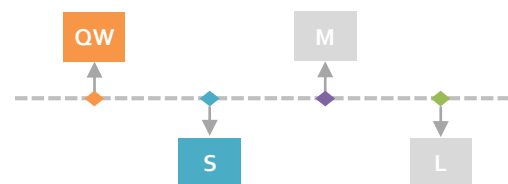
(iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

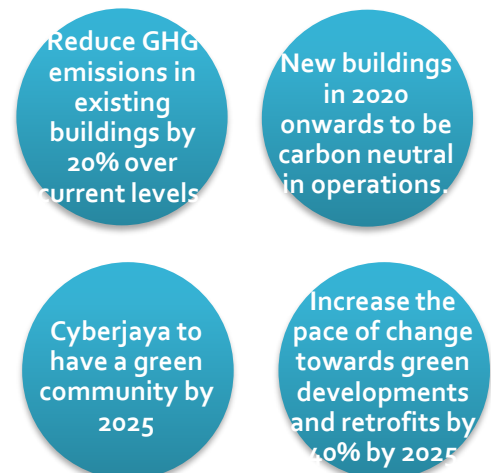
(iv) Collaborating Partner(s)

- NGOs
- Community

(iv) Timeline



(v) Target



Case Study

Eco Knights based in Kuala Lumpur educated the community on living sustainably.

EcoKnights, based in Kuala Lumpur, engages with the community on living sustainably



Workshops on how to compost in homes.



Aquaphonic project for homeowners

MBSA to associate with community's request of having green back lanes and urban farming area.



KA2-2

Provide passive design toolkits and green home renovation guides.

(i) Project Description

A project between the local authority and the community to prepare toolkits or guideline for homeowners of Cyberjaya in living more sustainably. This can be a collaborative effort between the local authority, NGOs and community before establishing a document for the whole residents of Cyberjaya.

(ii) Rationale

- With toolkits and guidelines, it can help advice and direct the residents on living greener.

(v) Target

Reduce GHG emissions in existing buildings by 20% over current levels.

New buildings in 2020 onwards to be carbon neutral in operations.

Cyberjaya to have a green community by 2025

Increase the pace of change towards green developments and retrofits by 40% by 2025

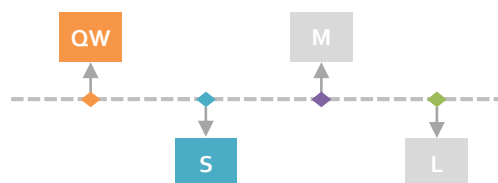
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

(iv) Collaborating Partner(s)

- NGOs
- Community

(iv) Timeline



Case Study

Chicago created a Green Resident Engagement Toolkit to raise awareness on sustainable living.

Canada Green Building Council has established an interactive toolkit to guide organizations and governments in implementing green building policies and programs.



Chicago created a Green Resident Engagement Toolkit to raise awareness on sustainable living.



KA2-3 Financing tools and incentives to green existing buildings by developing 'Home Energy Program'.

(i) Project Description

For Cyberjaya, financing tools and incentives provide ways to address concerns of affordability and fairness, and increase the pace of change towards green developments and retrofits. Cyberjaya shall have a strategy in developing a Home Energy Program which provides homeowners with affordable financing for energy efficiency upgrades. By providing free service for first times with the engagement of energy auditors for residential and commercial buildings, this will transfer some transparent data to the local authority that they can set a baseline for measure as well as encourage more residents to use this service.

(ii) Rationale

- Encourages the residents of Cyberjaya in reducing operating cost with free first consultation from the energy auditor.
- This program gives hope to resource and energy conservation in Cyberjaya creating a low carbon lifestyle.

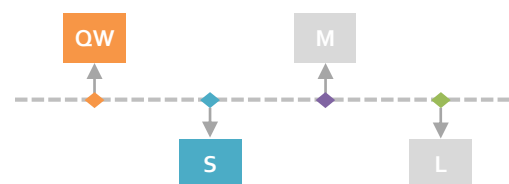
iii) Key Driver(s)

- MP Sepang – Jabatan Pembangunan Masyarakat

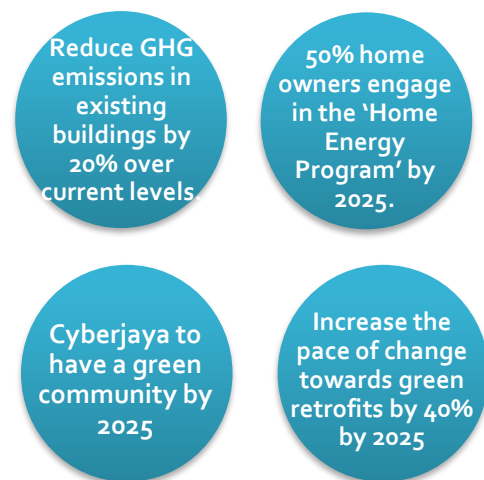
(iv) Collaborating Partner(s)

- GreenTech Malaysia
- SEDA Energy Auditor
- Community

(iv) Timeline



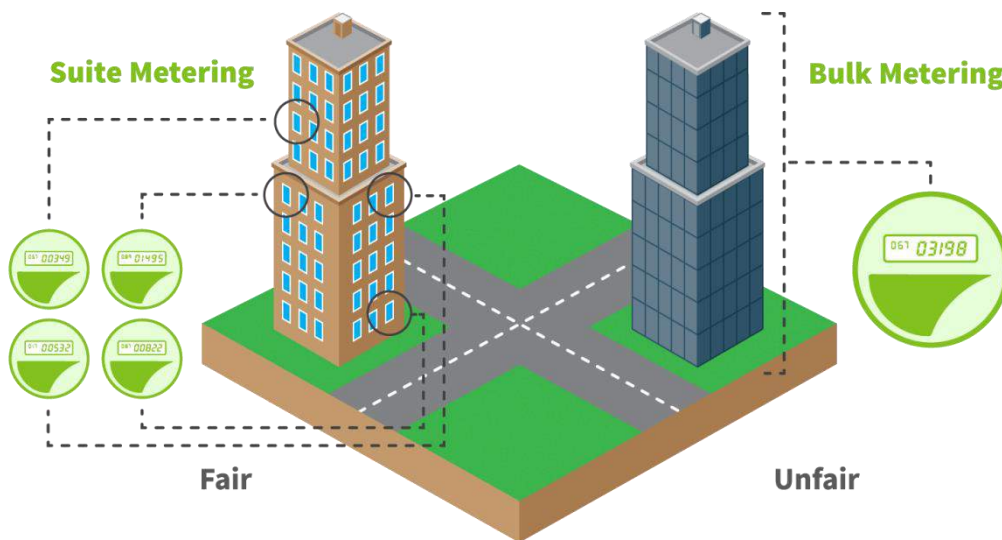
(v) Target



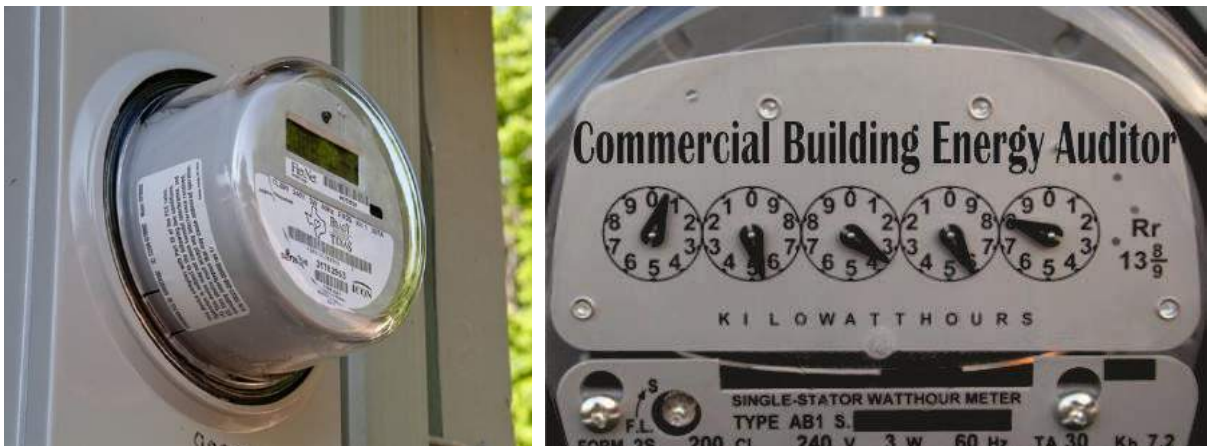
Case Study

MBSA provides free consultation from SEDA Energy Auditor to home owners for their first time energy audit to improve their energy consumption.

The 'Home Energy Program' can advise the home owners on the best way to save energy.



For apartment buildings in Cyberjaya, it is advisable to use a suite metering rather than bulk metering to monitor energy efficiency.



Knowledge can help people save water through exposed data of the water meter

3.6 SUMMARY

A total of **17 key actions** have been identified under four (4) themes and the summary of all key actions is as per table below :

No	Components	Key Actions
Urban Environment (2 Components + 6 Key Actions)		
1	Smart Urban Growth	Promote Compact And Mixed-use Development
2		Promote Transit Oriented Development Planning
3		Create Vibrant Streets Through Place Making
4	Protect Peat Swamp Ecosystem For Environmental Stability	Protect Peat Swamp Ecosystem For Environmental Stability
5		Land Use Planning For Green Open Spaces
6		Enhancing Urban Ecology
Urban Infrastructure (3 Components + 6 Key Actions)		
7	Solid Waste Management System	Improving Recycling
8		Improving Composting
9		Improving Awareness
10	Energy Optimization	Improving Energy Efficiency Of All Public And Tertiary Buildings
11		Promoting Energy Efficient Technologies / Interventions
12	Water Management & Sewerage Treatment	Greening The Sewage Treatment System
Urban Transportation (3 Components + 3 Key Actions)		
13	Non Motorized Transport	Safe, Convenient and Enjoyable For All Ages & Abilities
14	Public Transportation & Private Vehicle	Fast, Frequent, Reliable and Accessible to Support Transit Improvements
15	Integrated Transit Oriented	Vibrant Transit Places
Buildings (2 Components + 2 Key Actions)		
16	Existing and New Buildings	Sustainable and Low Carbon Buildings
17	People and Behaviours	Sustainable Behaviours and Awareness from Building Occupants

A total of **40 sub-actions** have been identified under four (4) themes and the summary of all the sub-actions is as per the following tables below :

No	Key Actions	Sub-Actions
Urban Environment (6 Key Actions + 12 Sub-Actions)		
1	Promote Compact And Mixed-Use Development	Increasing Mixed-use Development By Introducing MXR, MXC And Allowing Residential Activity Within Enterprise
2		Create Neighbourhood Scale Commercial Activity Closer To Homes In Vacant Land At Cyber 1,2,10 And 11
3		Integrated Public Amenities Every Radius 1 Km
4	Promote Transit Oriented Development Planning	Increase Density In Cyber 4,5,6 As The TOD Zone
5		Increase Permeability By Efficient Blocks Size, Pedestrian And Cycling Network Within 250m Distance From TOD / Nodes
6	Create Vibrant Streets Through Place Making	Create Pedestrian Vibrancy Along Persiaran APEC, Jln. Teknokrat 3 & 4 & City Parks With Parklets & Public Arts
7		Activate Transitions Line And Every Neighbourhood By Community Gardens
8	Protect Peat Swamp Ecosystem For Environmental Stability	Protect The Peat Swamp Area By Gazetting To Be Open Space And Rehabilitate It
9	Land Use Planning For Green Open Spaces	Increase The Green Open Space And Connect It
10		Bringing The Greenery Vertically
11	Enhancing Urban Ecology	Integrate Naturalized Blue And Green By Landscape Treatment
12		Tree Planting Programs

No	Key Actions	Sub-Actions
Urban Infrastructure (6 Key Actions + 12 Sub-Actions)		
13	Improving Recycling	Set Up Community Recycle Centre At Every Neighbourhood
14		Introduce 2 Bin System At Residential Areas For Separating Organic Waste And Recycle Materials (Enforce Separation At Source)
15		Set Up And Support Reuse Programs E.G. Furniture, Electronics And Office Materials
16		Construct Private Sector Recycling Of 30 Metric Tonne Per Day System To Convert Plastic To Fuel (Diesel)
17	Improving Composting	Set Up Small Scale Community Composting Activities At Neighbourhood Recycle Centres
18		Initiate Urban Farming Activities At Composting Areas Or Neighbourhood Recycle Centres
19	Improving Awareness	Produce Info Materials Such As The Annual Calendar And Waste Information Guide To Be Distributed At Community Recycle Centres
20	Improving Energy Efficiency Of All Public And Tertiary Buildings	Enforce The Adoption Of MS1525 (Energy Efficiency And Use Of Renewable Energy For Non-residential Buildings)
21		Implement The Energy Management System (EMS)
22	Promoting Energy Efficient Technologies / Interventions	Replacing Existing Conventional Electricity Consumption Measurement Systems With Respective Smart Meters
23		Replace Streetlights With LED Lighting
24	Greening The Sewage Treatment System	Set Up Integrated And Decentralized Wastewater System

No	Key Actions	Sub-Actions
Urban Transportation (3 Key Actions + 9 Sub-Actions)		
25	Safe, Convenient and Enjoyable For All Ages & Abilities	More Connected Bike Routes From Existing And Establish Bike Share Programs
26		Prioritize Pedestrian Safety By Developing Study And Action Plan
27		Provide Traffic Restraint And Calming Design Infrastructure
28	Fast, Frequent, Reliable and Accessible to Support Transit Improvements	Improve Service And Reduce Door To Door Journey Time By Public Transport
29		To Support Electric Vehicles With Charging Stations Around Cyberjaya
30		To Have More Smart Traffic Management System To Control Congestion During Peak Hour
31		Increase Usage Of Mobile Apps For Bike Sharing, Public Transport System And Parking Availability
32	Vibrant Transit Places	To Intensify Development Within Transit Nodes And Corridors For More Public Transport Users
33		To Have Integrated Public Transport System That Is Seamless And Connected

No	Key Actions	Sub-Actions
Buildings		
34	Sustainable and Low Carbon Buildings	Future Buildings In Cyberjaya To Implement Passive Design First Then Active
35		Existing Buildings To Improve Environmental Performance
36		Treating Parking Podium Façade To Avoid Being An Eye Sore
37		Buildings In Cyberjaya Must Consider Water Sensitive Urban Design (WSUD)
38	Sustainable Behaviours and Awareness from Building Occupants	Education And Outreach Programs To Engage Building Occupants
39		Provide Passive Design Toolkits And Green Home Renovation Guides
40		Financing Tools And Incentives To Green Existing Buildings By Developing 'Home Energy Program'

