Final Report for Commissioned Projects FY2019,

MOEJ City-to-City Collaboration for Low-Carbon Society project

"Developing a policy framework for building energy efficiency through city to city collaboration between Kuala Lumpur Government and Tokyo Metropolitan Government"

2 March 2020

Institute for Global Environmental Strategies(IGES）

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1. Project name

Project to support Kuala Lumpur City, Malaysia set up an institutional foundation for low carbon development through energy savings in buildings (Kuala Lumpur City Government (DBKL) - Tokyo Metropolitan Government (TMG))

2. Project outline

The project is a city to city collaboration between TMG and DBKL to strengthen DBKL's institutional foundation for low carbon city development by sharing TMG's policies, experience in implementation, and the technology required to achieve energy efficiency.

More specifically, the project sought to transfer and study the feasibility of TMG's experience in developing and operating a system for energy efficiency and CO2 savings in buildings in KL City, Malaysia where there is strong demand for an institutional foundation in energy efficiency.

Delegations on both sides were to travel to and from KL city, and during such missions TMG shared their experience and knowledge on energy efficiency and CO2 saving policies that had been identified to be of interest to DBKL from hearings conducted initially to assess their needs. Through the course of such exchange DBKL's capacity for policy development and implementation were enhanced, and TMG's experience and policies were transferred.

Separate from activities involving TMG, IGES sought to identify possible projects that could be implemented if/once Malaysia becomes a signatory to the JCM.

Participants to this project and their respective roles

Institute for Global Environmental Strategies（IGES）	Overall project management
Tokyo Metropolitan Government, Bureau of Environment (TMG)	Knowledge transfer of building related policies for energy efficiency and CO2 reduction
Kuala Lumpur City Government (DBKL)	Adopt energy efficiency and renewable measures for their public buildings
Sustainable Energy Development Authority（SEDA）	Offer support in building inventory and data analysis
Universiti Teknologi Malaysia (UTM）	Scenario analysis and coordination of the project members on the KL side

3. Project procedures

3.1 Support for establishing an institutional foundation

（1）TMG's experience in developing and operating a system to reduce energy consumption and CO2 emissions in buildings was shared to enhance DBKL's capacity for policy development and implementation.

1） Background

Malaysia is currently experiencing a rapid increase in electricity consumption due to the growing economy and development of the ICT infrastructure. Legislations for renewable energy development have already been developed and those for energy savings should also be drafted shortly. Net zero buildings should be realized by using monitoring equipment, and renewable energy generated from biogas, small hydro, or biomass.

Japan has a long history of collaboration with Malaysia, and has a ZEB system well known for its rating system for low carbon buildings which takes a qualitative approach and Malaysia thinks can be more appropriate than Europe which takes a quantitative approach. Malaysia rates low carbon buildings depending on their carbon neutral achievement levels. They are ranked Ready to Go if they achieve above 50 percent and below 70 percent of the full mark, Near Zero if they achieve over 70 percent and under 100 percent, Net Zero when they reach full marks.

The Sustainable Energy Development Agency (SEDA) offers online training for monitoring and energy assessment to national and local government officials that would help promote net zero buildings, and is also developing Malaysia's own energy saving audit and rating systems (eg. GreenPass).

In 2019, KL city announced its low carbon blueprint, an action plan that contributes to Malaysia's NDC target (45 percent GHG emission reduction by 2030) as the capital and the leader of other municipalities. The blue print's target is to reduce GHG emissions by 43 percent in 2020, and 70 percent in 2030.

The blue print consists of 245 programs to promote low carbon development and are connected to the Kuala Lumpur's spatial planning (Kuala Lumpur Structural Plan 2020, Kaula Lumpur City Plan 2020), the 2030 Agenda, and the New Urban Agenda.

Figure 1: The Kuala Lumpur Low Carbon Society Blueprint 2030 (KLLCSBP 2030)

1 Kuala Lumpur Low-Carbon Society Blue Print 2030

The KLLCSBP 2030 was completed in 18 months with the final draft submitted timely to DBKL in November 2017. The Blueprint was subsequently launched at the UNFCCC's 23rd Session of the Conference of the Parties (COP 23) in December 2017 in Bonn, Germany at an official Side Event co-organised by the Institute for Global Environmental Strategies (IGES) and UTM-LCARC, and was officially adopted by DBKL in April 2018. The Blueprint proposes 10 Actions, 37 Sub-actions, 82 Measures and 245 Programs for implementation by DBKL and relevant stakeholders. The KLLCSBP 2030 is at present in the process of being mainstreamed into the Kuala Lumpur Local Plan 2040 (PTKL 2040) which is prepared under the provision of the Federal Territory (Planning) Act 1982 (Act 267) and will be used as the primary development control tool in the city.

The preparation of the KLLCSBP 2030 followed a science to action (S2A) approach using the Asia-Pacific Integrated Model (AIM) developed by the Japan AIM team which comprises among others the National Institute for Environmental Studies (NIES) and Kyoto University. The modelling results, the proposed Actions, Measures and Programs have been subject to reviews by key stakeholders in the Kuala Lumpur's development through a series of focus group discussions (FGDs).

The model projects that GHG emissions in Kuala Lumpur would increase from 25,427 ktCO2eq in 2010 to 54,609 ktCO2eq under the 2020 business as usual (BaU) scenario and to 84,314 ktCO2eq under the 2030 BaU scenario (see Figure 2). In this, the building sector (comprising the commercial and residential sub-sectors) has been found to be the biggest GHG emitter in Kuala Lumpur, accounting for 49% of the city's total GHG emissions in 2010, and the sector's share in Kuala Lumpur's GHG emissions is expected to increase to 66% by 2030 if no mitigation actions are taken.

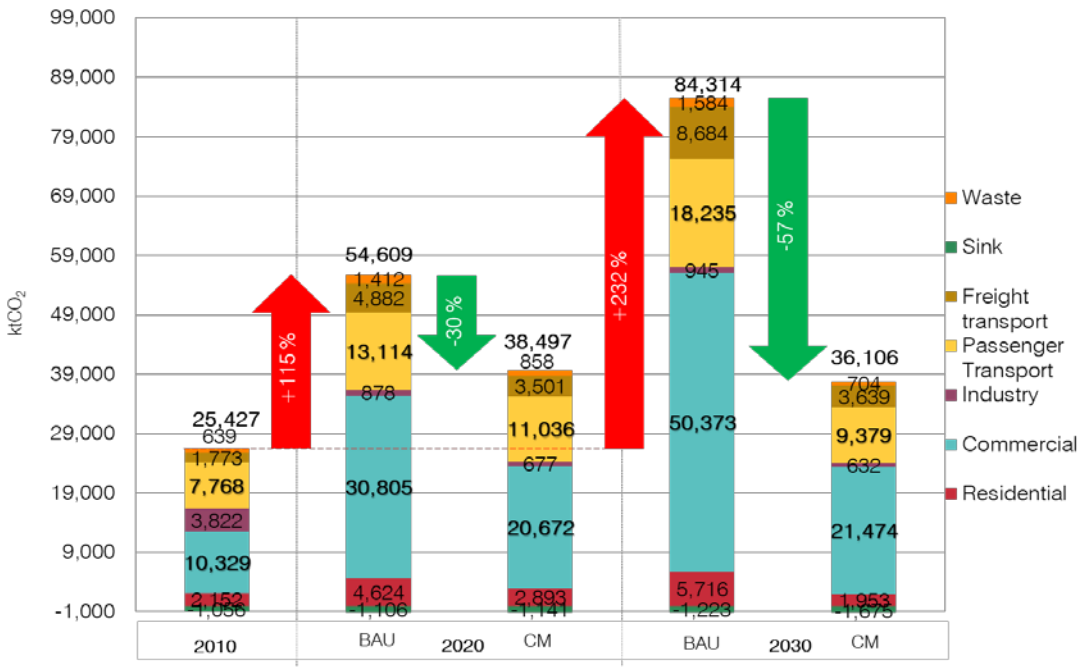


Figure 2: GHG emissions by end-use sector for Kuala Lumpur in 2010 baseline, 2020 and 2030 BaU (business as usual) and CM (countermeasure) scenarios (Source: KLLCSBP 2030, 2018, p.0-13)

The model further shows Kuala Lumpur can potentially reduce its GHG emission intensity by up to 70% by 2030 (compared to the 2010 level), which is equivalent to a reduction of 48,206 ktCO2eq in volume from the BaU scenario. Within this, the building sector, through the KLLCSBP 2030's Action 6 – Low Carbon Green Building, potentially contributes to 9,763 ktCO2eq or up to 20.1% of the total emission reductions in the Blueprint (see Figure 3).

As buildings (especially commercial buildings) account for almost half and two-thirds the GHG emissions in Kuala Lumpur respectively in 2010 and 2030, the KLLCSBP 2030, through *Action 6 – Low Carbon Green Building*, sets out a series of measures and programs to increase the percentage of green buildings in the city from about 1% in 2010 to 60% by 2030. Key measures include implementation of sustainable design strategies; use of energy efficient (EE) and renewable energy (RE) technologies; and monitoring and management of green buildings in Kuala Lumpur.

Furthermore, towards effectively accelerating Kuala Lumpur's progression towards becoming a low carbon city, the KLLCSBP 2030 also emphasises the importance of DBKL to serve as a "low carbon leader" in *Action 10 – Green Urban Governance*. Under Measure *10.2.2 – Demonstration Project on Low Carbon Emission Technologies*, programs have been outlined so that DBKL undertakes projects to utilise low emissions technologies in the city hall's buildings towards achieving improvement in energy efficiency by 20% by 2030. DBKL's achievement in reducing energy consumption and GHG emissions in relation to the operation of their buildings and assets is highly crucial as demonstration of feasibility as well as inspiration to other buildings to act along the same pathway.

Reading the above paragraphs together, the direction becomes clear that an effective strategy to contribute to impactful GHG emissions reduction in Kuala Lumpur by 2030 is to focus on energy savings and renewable energy strategies and measures on public buildings in Kuala Lumpur, and DBKL needs to lead the way through exploring energy savings strategies on the city hall buildings and assets.

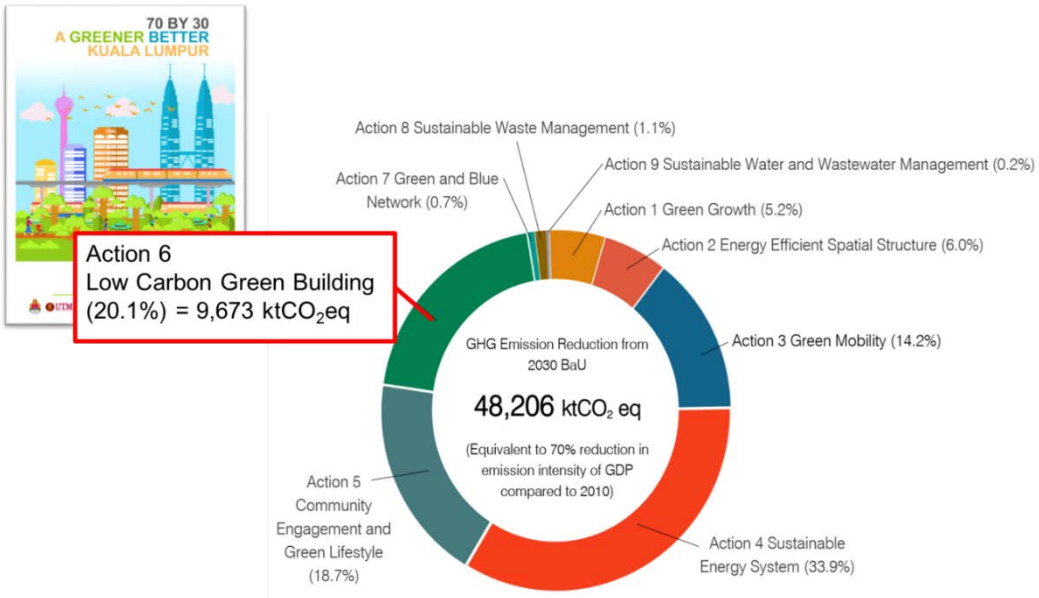


Figure 3: Kuala Lumpur's total GHG emission reduction potential by 2030 and potential reduction contribution by 10 Actions

To that end, reference to TMG's energy efficiency and CO2 reduction measures for public buildings and CO2 reduction measures for private buildings hence the Tokyo to Kuala Lumpur Low Carbon System (T2KLLCS) has been proposed.

Furthermore, TMG recently announced its vision to become a Zero Carbon City by 2050 and DBKL also aspires to be Carbon Neutral-ready by 2040 towards becoming carbon neutral by 2050. T2KLLCS will potentially become a landmark case of Japan-Malaysia partnership and collaboration in combating climate change towards contributing to limiting global temperature rise to below 1.5° Celcius.

2. First exchange and site visit at KL City

1. First exchange

TMG's climate change policies, particularly those on energy saving measures for government owned buildings and assets were identified for knowledge transfer as Malaysia is currently promoting energy savings in net zero buildings. On June 28th, 2019, the overall outline for Tokyo's measures on buildings, and Tokyo's multiple practices (operation and maintenance procedures, upgrading equipment, installation of renewables etc.) for public buildings that differ according to the building category (which is defined by a combination of energy consumption volume, and whether it is new or existing), were introduced by TMG to DBKL. Acting on TMG's suggestion for collecting basic information on the buildings, DBKL decided to develop an inventory with the address, floor size, year of construction, installed equipment, year of installation etc. for DBKL owned 1955 buildings and assets, and calculate the emission reduction potential. SEDA's online energy monitoring system GreenPass was considered for developing the inventory because it is a local existing system in Malaysia. TMG will offer suggestions when and where required based on their practices for their databases, and good practices that would enable reductions.

Participants：

Datuk Mahadi Bin C. Ngah, Special Advisor to the Mayor, DBKL

Ms. Norzaini binti Noordin, Deputy Director, Project Implementation and Building Maintenance Department, DBKL

Mr. Steve Anthony Lojuntin, Sustainable Energy Development Authority (SEDA)

Dr. Ho Chin Siong, Universiti Teknologi Malaysia (UTM)

Mr. Chau Loon Wai, Universiti Teknologi Malaysia (UTM)

Ms. Toshiko Chiba, Deputy Director of Carbon Policy Planning section, TMG

Ms. Kumiko Sugawara, Deputy Director of Tokyo Cap-and-Trade Program, TMG

Mr. Akinori Masuda, International Relations Team, Bureau of Environment, TMG

Dr. Junichi Fujino, Program Director, Principle Researcher, City Taskforce, IGES

Ms. Ryoko Nakano, Senior Researcher, City Taskforce, IGES

Mr. Hirotaka Koike, Researcher, City Taskforce, IGES

Figure 4：Discussions at the first exchange between DBKL and TMG

Figure 5：DBKL and TMG

2. First site visit in KL city

On July 29th, 2019, the delegated visited DBKL's public buildings and assets to which the lessons learnt will be actually conducted. KL city and its neighbouring cities are international, culturally diverse, with a concentration of modern high-rise apartment buildings and shopping malls, hence where further infrastructure development can be foreseen. One of the locations for the site visits, Kapung Bharu (Tamu Hotel) stands near KLCC, the business hub for KL city, and is known for its concentration of old and low-rise buildings, as well as the site for future real estate development. The plans to change this area into a model district with a mixture of commercial and residential compounds that would win back residents to the city center are being developed by the Kapung Bharu Agency which coordinates between the estate owners and the real estate developers. The development is facing difficulties for the past 10 years because of the difficulties for promoting land relocation caused by the segmentalized situation of the property rights. (Kapung Bharu was not selected as the location to showcase the lessons learnt from this project) TMG officials also visited the government owned research facility Institut Latihan Dewan Bandaraya (IDB)) and public park (Pudu Ulu Recreational Park), and learnt about their green

initiatives.

Figure 6：Site visit to Kapung Bahru

Figure 7：Site visit to public park (Pudu Ulu Recreational Park)

3 First webinar

On July 9th, 2019, TMG shared the tools used for energy management of their public buildings and assets to SEDA and UTM who support DBKL, as a capacity that could be useful for DBKL as it develops its inventory for its own 1955 public buildings and assets.

Participants：

Mr. Steve Anthony Lojuntin, Sustainable Energy Development Authority (SEDA)

Dr. Ho Chin Siong, Universiti Teknologi Malaysia (UTM)

Mr. Chau Loon Wai, Universiti Teknologi Malaysia (UTM)

Ms. Toshiko Chiba, Deputy Director of Carbon Policy Planning section, TMG

Ms. Kumiko Sugawara, Deputy Director of Tokyo Cap-and-Trade Program, TMG

Mr. Akinori Masuda, International Relations Team, Bureau of Environment, TMG

Dr. Junichi Fujino, Program Director, Principle Researcher, City Taskforce, IGES

Ms. Ryoko Nakano, Senior Researcher, City Taskforce, IGES

Mr. Hirotaka Koike, Researcher, City Taskforce, IGES

Table 1：Energy management tool

Tool	Description
Tokyo Metropolitan Government's technical specification for energy saving equipment and renewable energy	Specifies in detail what new and existing buildings need to observe in terms of building envelop, building facilities, renewable energy. The details apply to TMG owned buildings and assets.
Calculations for rough estimations of reduction potential	Calculations make rough estimations of the energy reduction potential for building equipment. Used when information on the equipment is insufficient.
Energy saving medical record	The data analysis is offered by TMG to buildings using data submitted according to the ordinance for the Tokyo Cap-and-Trade Program for large energy consumers. A comparison is offered on the CO2 emissions levels of buildings for the same intended use and located in Tokyo.

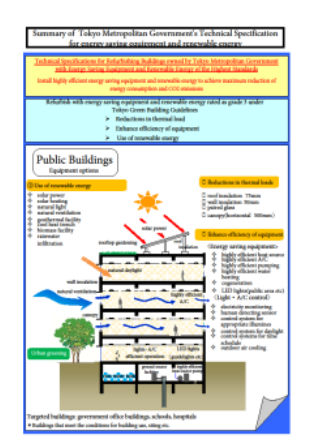


Figure 8：TMG's technical specification for energy saving equipment and renewable energy

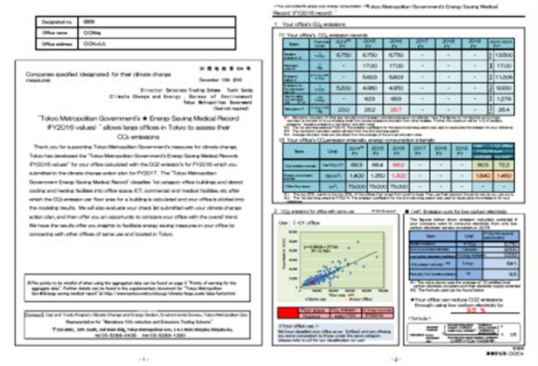


Figure 9: TMG energy saving medical record

4 First workshop in Tokyo and site visits to leading facilities with good practices

The DBKL mission to Japan was conducted between July 29th-August 1st, 2019, and according to the agreement at the first exchange in June a workshop to introduce the energy saving measures used in TMG buildings and assets and a site visit to a leading energy saving practice by Mori Building CO., Ltd's ARK Hills Sengokuyama Mori Tower, was conducted. DBKL officials, SEDA and UTM representatives were participants to the workshop.

Participants:

Datuk Mahadi Che Ngah, Executive Director Planning, DBKL

Ms. Norzaini binti Noordin, Deputy Director, Project Implementation and Building Maintenance Department, DBKL

Mr. Zulkifli Bin Nordin, Deputy Director, Mechanical and Electrical Department, DBKL

Ms. Wan Nurazlin Binti Wan Mustaffa, Senior Electrical Engineer, Mechanical and Electrical Dept, DBKL

Ir. Dr. Sanjayan Velautham, CEO, SEDA

Ts. Steve Anthony Lojuntin, Director for Energy Management, SEDA

Prof TPr Dr HO Chin Siong, Director, LCA UTM

TPr CHAU Loon Wai, Co-Director, LCA, UTM

Ms. Toshiko Chiba, Deputy Director of Carbon Policy Planning section, TMG

Ms. Kumiko Sugawara, Deputy Director of Tokyo Cap-and-Trade Program, TMG

Mr. Akinori Masuda, International Relations Team, Bureau of Environment, TMG

Dr. Junichi Fujino, Program Director, Principle Researcher, City Taskforce, IGES

Ms. Ryoko Nakano, Senior Researcher, City Taskforce, IGES

Mr. Hirotaka Koike, Researcher, City Taskforce, IGES

Courtesy call to TMG Bureau of Environment Head, Mr. Yoshimura by Datuk Mahadi

Datuk Mahadi' call to Mr. Morishita, Vice Minister for Global Environmental Affairs

1. Workshop in Tokyo：introducing case studies

The Tokyo Cap-and-Trade Program that covers buildings with large energy consumption was implemented through an ordinance, to urge them to investment in building equipment and choose better operation and maintenance practices. The program ranks energy saving measures into three levels according to their effectiveness derived from reduction potential calculations. TMG advises building owners participating in the cap-and-trade program to prioritize energy saving measures using the rankings as a criteria.

TMG shared their experience on good practices for energy saving measures of buildings (operation and maintenance), that include investment in equipment of high energy efficiency; and low cost or no cost measures possible with cooperation (in energy efficiency) between the building management company, the tenant and the users of the building facilities. TMG's advised DBKL to apply such measures, since good operation and maintenance practices are critical for energy efficiency.（Table 2）

To make this happen in DBKL's public buildings, the energy efficiency target decided by DBKL should be shared with the building management company, and a brochure on operation and maintenance should be distributed to extend practices over a long period. A brochure with energy efficiency pointers in relation to daily practices should also be distributed to tenants and users of the building facilities to enhance understanding of energy efficiency, as well as placing awareness raising labels on the walls, and offering information of the results of their energy saving actions, to facilitate continued efforts. Cooperation between building management companies and facility users was also explained as an important factor.

Table 2: Operation and maintenance measures（practices possible with low or at no cost）

Case study	Details of measures
Lightings	Measure①：Switch off lights when and where not required, and restrain from over use of lights (control illuminance) Measure②：Place the location map of the lights beside the switch
Air conditioning	Measure③：Make sure to check and clean the filters and the outdoor units regularly Measure④：Reduce uneven room temperature using circulators Measures⑤：Use blinds and darkening films to reduce the use of lights and cut down solar radiation heat to reduce the air conditioning loads
Water facilities（tap water）	Measure⑥：Use water saving pieces for taps and shower heads
Office equipment	Measure⑦：Utilizing energy saving mode Measure⑧：Switch the power off when the equipment is not used or use the sleep mode function
Feedback	Measure⑨：Place awareness raising posters for tenants and event participants Measure⑩：Inform tenants on their status by showing the reduction in electricity consumption and cost reductions from the previous year.

2. Site visit to a leading facility：ARK Hills Sengokuyama Mori Tower

On July 29th, 2019, thanks to the cooperation of Mori Building Co., Ltd. the DBKL delegation from the garden city visited the elevated garden city in Tokyo "ARK Hills Sengokuyama Mori Tower". Mori Building introduced the delegation to the area energy management system of Roppongi Hills and Midland Square, the thermal storage tank which is the heat source used in Sengokuyama Mori Tower to store electricity during the night leading to energy savings. The importance of communicating the actual benefits of Tokyo's relaxation of floor-space ratio were shared together with the reality that negotiations with local stakeholders could in some cases last 30 years.

Figure 10：Mori Building's projects in the vicinity of ARK Hills

Figure 11；Solar power at the Sengokuyama Mori Tower

3. Promoting the city to city collaboration

On July 30th, 2019, the collaboration between the two cities was introduced at ISAP (International Forum for Sustainable Asia and the Pacific) hosted by IGES.

Figure 12：DBKL Deputy Mayor Mahadi at ISAP (center)

5 The Launching Ceremony of Tokyo-Kuala Lumpur Low Carbon System（T2KLLCS）and the second workshop in KL city

A ceremony that would officially announce the launch of the TMG and DBKL's Low Carbon System to the KL Mayor and the Ministry of Federal Territory and was hosted on August 23rd, 2019 by DBKl and UTM in KL city. The ceremony was a good opportunity to showcase the project to the diverse stakeholders of KL city and representatives of municipalities from various parts of Malaysia who attended the event.

1. The Launching Ceremony of Tokyo-Kuala Lumpur Low Carbon System（T2KLLCS）

Name：HIGH-LEVEL LAUNCHING CEREMONY OF TOKYO-KUALA LUMPUR LOW CARBON SYSTEM

Date：August 23rd, 2019

Number of participants：approximately 100

Venue：Biro Pelancongan Kuala Lumpur

Participants from Malaysia：

KL Mayor YBhg. Dato' Nor Hisham bin A Dahlan

KL Deputy Mayor Datuk HJ. Mahadi Bin C. Ngah

Representative of the Ministry of Federal Territories

Ir. Dr. Sanjayan Velautham, CEO, SEDA

Ts. Steve Anthony Lojuntin, Director for Energy Management, SEDA

Prof TPr Dr HO Chin Siong, Director, LCA UTM

TPr CHAU Loon Wai, Co-Director, LCA, UTM

DBKL officials

Representatives from other municipalities

Participants from Japan：

Mr. Nakajima, Councillor, Embassy of Japan Malaysia

Mr. Kenji Ogawa, Senior Director for Climate Change & Energy Division, TMG

Ms. Toshiko Chiba, Deputy Director of Carbon Policy Planning section, TMG

Ms. Kumiko Sugawara, Deputy Director of Tokyo Cap-and-Trade Program, TMG

Mr. Fukazawa, JICA Malaysian Office

Mr. Kitae, Japan Chamber of Trade and Industry, Malaysia（JACTIM）

Dr. Junichi Fujino, Program Director, Principle Researcher, City Taskforce, IGES

Ms. Ryoko Nakano, Senior Researcher, City Taskforce, IGES

Ceremony outline

Opening speech

KL Mayor YBhg. Dato' Nor Hisham bin A Dahlan

Mr. Nakajima, Councillor, Embassy of Japan Malaysia

Mr. Kenji Ogawa, Senior Director for Climate Change & Energy Division, TMG

Photo session and coffee break （press conference and exhibition）

Panel session

① TMG - Towards Zero Energy and Zero Carbon Buildings - Tokyo Best Practice

Ms. Toshiko Chiba, Deputy Director of Carbon Policy Planning section, TMG

② DBKL - Kuala Lumpur City Hall Building Energy Reduction Potential

KL Deputy Mayor Datuk HJ. Mahadi Bin C. Ngah

③ Promotion, Facilitation and Development of Sustainable Energy in Malaysia

Ts. Steve Anthony Lojuntin, Director for Energy Management, SEDA

④ Science to Action (S2A) for Accelerating Climate Actions in Malaysian Cities

Prof TPr Dr HO Chin Siong, Director, LCA UTM

Panel Discussion

Speech and presentation summary

Mayor Hisham

I announce the launch of the Tokyo-Kuala Lumpur Low Carbon System（T2KLLCS）which will seek to reflect TMG's experience for energy savings and renewable energy in new and existing buildings into DBKL's policy designing process.

DBKL has been facilitating replacing streetlights with LED, reinstalling public buildings

with energy saving equipment, planting trees, developing a walkable and biker friendly infrastructure. We will now move ahead to urging private buildings to become green by refurbishing the equipment in existing buildings, to materialize the KLLCSBP 2030.

Mr. Kenji Ogawa, Senior Director for Climate Change & Energy Division, TMG

TMG makes sure to have everyone, officials in charge of managing the building equipment as well as those who work inside the buildings, collaborate with each other in their daily operation to pursue the energy efficiency target.

Through the Tokyo to KL Low Carbon System, a collaboration between Tokyo and Kuala Lumpur, we Tokyo Metropolitan Government hope to share our experiences both successful and unsuccessful, as well as our intentions to keep meeting the challenges we face to achieve a decarbonized society.

KL Deputy Mayor Datuk HJ. Mahadi Bin C. Ngah

The electricity bills for 1955 public buildings and assets is 60 million ringits (1.5 billion yen) per year, out of which only 405 buildings account for 70%.

The CO2 emission reduction target for the moderate scenario 1 is 35 % and cost reduction is 7 million ringets (175 million yen) . The CO2 emission reduction target for the ambitious scenario 2 is 47% and cost reduction is 9 million ringets (225 million yen)

TMG is trying to half their emissions by 2050. DBKL should also try.

Prof TPr Dr HO Chin Siong, Director, LCA UTM

We should be looking at energy efficiency and renewable as a policy for job creation, poverty reduction, environmental measures, economic policies. DBKL's blueprint calculated the emission reduction potential for seven areas. Waste, carbon sink, transport, industry, commercial, residential areas. We should take a different approach in our research since it was heavily focused on the environment, and look more into the balance between economic, environmental, and social aspects when developing and implementing policies. Low carbon policies will contribute to improving the status of those who are not affluent.

We have developed an inventory, drafted a low carbon action plan, implemented the actions, and introduced monitoring. Next we need to track the fruits of our implementation.

Figure 13：Mayor Hisham and Mr. Ogawa

Figure 14： Briefing the press.

The results of the launching ceremony

The high level of interest for the collaboration between the two cities showed from the number of reporters (approximately 10) that were present at the ceremony. TMG showed their energy consumption levels had dropped by approximately 23 % compared to 2000, and they were implementing two types of energy saving measures. First, replacing equipments such as air conditioners and lightings with those of higher efficiency levels. And second, by having everyone, officials in charge of managing the building equipment as well as those who work inside the buildings, collaborate with each other in in their daily operation to pursue energy efficiency. The details of the policies were shared with DBKL at a workshop in Tokyo.

Appropriate illuminance control
Appropriate operation of air conditioning
Using energy saving and sleep mode functions for appliances
Place the location map of the lights beside the switch
Awareness raising for the facility users
Regular inspection and cleaning of the filters and outdoor units
Inform tenants on their status by showing the reduction in electricity consumption and cost reductions from the previous year.

6 The city to city collaboration is shared at the Asia Pacific Urban Forum（APUF）

Date：October 13th-18th, 2019

Venue：Penang, Malaysia

The forum： The Asia Pacific Urban Forum was co-hosted by UNESCAP, UN-HABITAT, the Malaysian ministry for housing and regional administration, and Penang. It is held once in 4-5 years and is the largest urban event in the Asia Pacific. Close to 8000 participants were present, to discuss and share best practices, technologies, tools, policies that are relevant for sustainable city development.

Oct 14th The cooperation is shared at the plenary（IGES President Dr. Takeuchi）

Oct 15th The cooperation is shared at High Level Seminar（IGES President Dr. Takeuchi）

Oct 16th Press interview: Reuters

（TMG Deputy Director of Tokyo Cap-and-Trade Program, Ms. Sugawara）

The cooperation is shared at the Leaders Dialogue 3: Smart Cities（TMG Ms. Sugawara）

The cooperation is shared at the Deep Dive Session: Sustainable Building（IGES Dr. Fujino）

Figure 15： TMG Deputy Director Ms. Sugawara

7 Second workshop in Tokyo

On January 15th, 2019, the second workshop was held in Tokyo at which DBKL's status on building a database for its 1955 public buildings and assets was shared. TMG shared their practice for energy savings, "effective ways to promote operation and maintenance of equipment" and "rough calculation of energy saving potential for heat source and lighting equipment". Discussions were also held on next year's collaboration as well as the LoI on the collaboration between the two cities.

Participants from DBKL：

Datuk Mahadi Bin C. Ngah, Special Advisor to the Mayor, DBKL

Mr. Nik Mohammed Faizal Nik Ali, Project Implementation and Building Maintenance Department, DBKL

Mrs. Nor Hashida Binti Harun, City Planning Department, DBKL

Mr. Mohd Shazni, Bin Saringat, Mechanical and Electrical Engineering Department, DBKL

Mr. Muhamad Amirul Khirudin, Legal & Prosecution Department, DBKL

Mr. Steve Anthony Lojuntin, Sustainable Energy Development Authority (SEDA)

Dr. Ho Chin Siong, Universiti Teknologi Malaysia (UTM)

Mr. Chau Loon Wai, Universiti Teknologi Malaysia (UTM)

Ms. Toshiko Chiba, Deputy Director of Carbon Policy Planning section, TMG

Ms. Kumiko Sugawara, Deputy Director of Tokyo Cap-and-Trade Program, TMG

Mr. Akinori Masuda, International Relations Team, Bureau of Environment, TMG

Dr. Junichi Fujino, Program Director, Principle Researcher, City Taskforce, IGES

Ms. Ryoko Nakano, Senior Researcher, City Taskforce, IGES

Mr. Hirotaka Koike, Researcher, City Taskforce, IGES

Figure 16： Second workshop

Figure 17：Discussions on collaborations for the next year

1. Presentation by DBKL：Status of building inventory

A data collection committee, chaired by Datuk Mahadi was established to develop strategies for this initiative. Electricity bills were collected for 3076 accounts (DBKL assets only) with the support of the power utility TNB (National Energy Limited). The parameters are: account no, department name, monthly kw/h, types of tariff according to usage (eg. commercial, industrial, street lighting). The inventory revealed that air conditioning accounts for 63%, the largest share of energy consumption for DBKL's buildings and lighting followed.

Out of the 3076 accounts, 4 accounts were selected for further studies and their monthly consumption data were made available online using SEDA's BeDOS (building Energy Data Online Monitoring System). The four accounts cover DBKL Towers 1, 2, 3 and the DBKL Training Centre (IDB). Once the data are inserted for the four buildings, the time trend for the monthly carbon index (carbon emission based) and building energy index (energy consumption based) for each respective building will be available online. TMG suggested more parameters to be added to utilize the system when calculating reduction potentials. The parameters included inventories of equipment (volume, installation year, number of appliances) using large amounts of electricity (such as air conditioners).

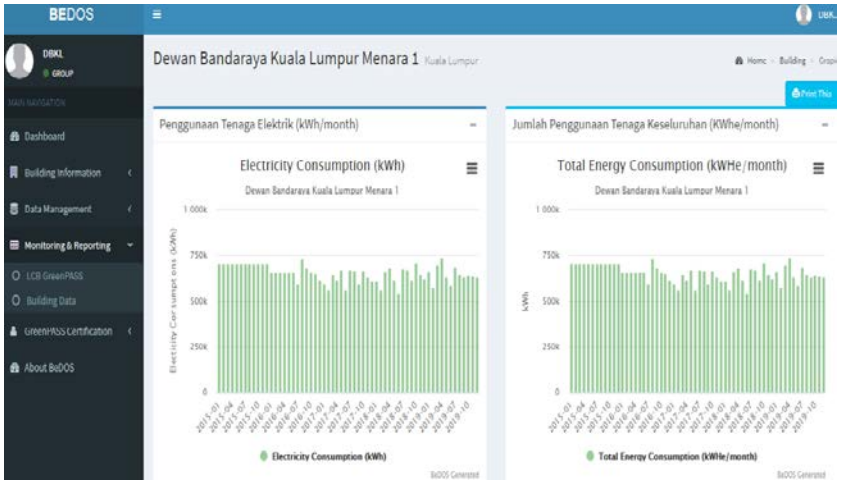


Figure 18：BeDOS showing energy consumption for DBKL's Menara1

2. SED's presentation: Building certification system "GreenPass" and online monitoring system "BeDOS"

GreenPASS was initially developed by UNEP using their common carbon metric which SEDA is using for Malaysia. GreenPASS – is a voluntary certification system based on carbon reduction. It uses the time trend analysis of the reduction in energy consumption from the baseline for each building in BeDOS. If the data in BeDOS is updated a GreenPass certificate for energy efficiency actions is issued each year. SEDA has experience working with municipalities of Putrajaya and Melaka for which more than 60 buildings are certified and they envision using a similar methodology for DBKL that will be developed based on the experience from the predecessors.

Figure 19：GreenPass

3. TMG's presentation①：Rough calculation of the reduction potential of heat source and lights

TMG suggested replacing equipment with large energy consumption volume first, and introduced how to make a rough estimate on the cost benefits of replacing heat source and lights with highly energy efficient alternatives by calculating their energy reduction potentials.

Detailed calculations would require the actual COP and energy consumption value for the existing equipment when calculating the energy saving potential for replacement with the newest alternative. Meanwhile, rough calculation can be done using the year of installation to derive the average COP for models used at the same time in Malaysia. The operating hours as well as floor size can be used to estimate the electricity consumption levels of the existing models. It is possible to calculate the reduction potentials roughly by using such proxy figures

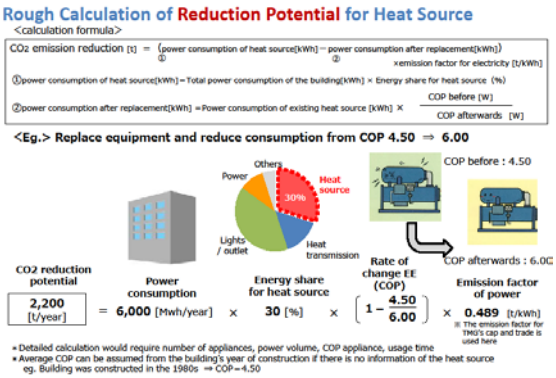


Figure 20：Rough calculation of reduction potential

4. TMG's presentation ②：Effective procedures for introducing good operation and maintenance measures

TMG stressed the importance of operation and maintenance measures that require collaboration

between the users of the building facilities and the building management company when promoting effective and sustainable energy savings.

Furthermore, TMG explained their experience immediately after the Great East Japan Earthquake. Then there was an urgent need to drastically reduce the peak load. The illuminance of the lights were controlled (some of the bulbs in the office space were removed to reduce the illuminance to below 500 lux) in both public and privately owned buildings. All of the power cables for the TMG owned buildings and assets were unplugged from the power sockets during the weekends, they said. In the case of PCs, TMG suggested making it an institutional rule to keep their default setting as energy saving modes.

Further energy savings could be realized from a system that uses a PDCA cycle and consists of institutionalizing energy savings, using manuals and checklists, promoting company divisions to self-check their actions and report the results to the secretariat.

In terms of institutionalizing energy savings, TMG shared their own system in which a senior official (executive manager) with the rights to oversee budget use has transferred power to a secretariat dedicated to ensuring energy savings in the institution, and officers in charge of conducting energy saving activities in their respective sections are reporting to the secretariat regularly. The secretariat evaluates each section based on their reported actions. The framework is currently being conducted by the private sector located in Tokyo.

Energy saving actions are classified into three levels, those that should be implemented "immediately", and those should be implemented "actively when the situation requires", and those that "require continued improvements using a PDCA cycle". Since electricity is the only power used in DBKL's buildings, TMG strong suggested changing the default setting for electric appliances to energy saving modes, which is classified as an action for "immediate implementation", and prioritizing it over other policies. According to DBKL, PC's are set energy saving mode before they are distributed to the officials. TMG added from security reasons the default safe mode is now set to turn off the displays after 15 minutes of no activity, but unfortunately some officials would remove the default setting.

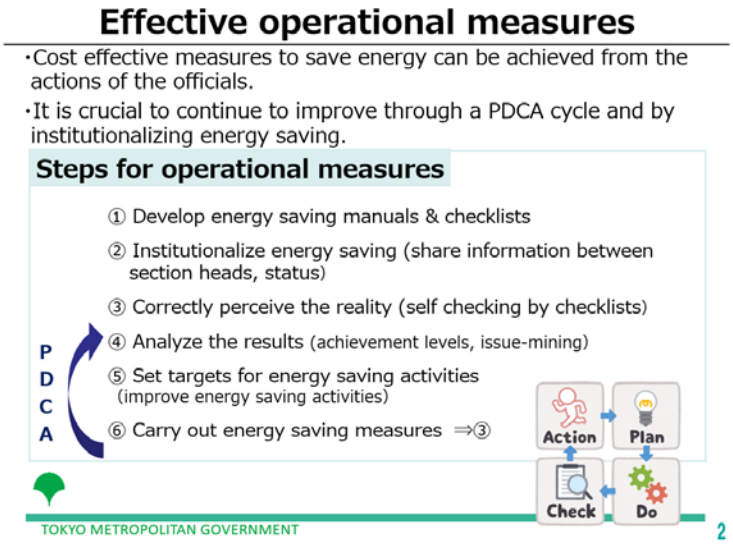


Figure 21: Training material on good operational and maintenance measures

（2）Calculations on the effects if once the institutional foundation is secured

1） The results of studies on possible projects conducted with the support of DBKL (collecting data to calculate reduction potential, costs)

DBKL shared the status of the inventory. According to DBKL, public buildings / assets, totalled 1,955 units, cut across diverse functions (ranging from offices to staff quarters, markets, halls to parks etc.); scales (ranging from a public toilet to an apartment unit to an office complex etc.). The electricity bills to DBKL were aggregated.

Based on the available aggregated data, preliminary analysis of the data which produced quite promising results for reduction of energy consumption and GHG emissions for 13 (out of 35) office buildings and 14 (out of 16) parks. The analysis covered two possible scenarios, which are moderately ambitious (Scenario 1) and more ambitious (Scenario 2) in terms of use of technology and total investments (see below).

	Scenario 1					Scenario 2				
	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO_2 Reduction ($kgCO_2e/yr$)	% CO_2 Reduction	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO_2 Reduction ($kgCO_2e/yr$)	% CO_2 Reduction
Offices (13/35 buildings)	15,870,384	3,808,892	1,587,038	3,744,776	35	15,870,384	4,761,115	1,587,038	4,405,619	47
Parks (14/16 parks)	36,005,220	5,400,783	7,201,044	8,745,668		36,005,220	10,801,566	7,201,044	12,493,811	
Total	51,875,604	9,209,675	8,788,082	12,490,444		51,875,604	15,562,681	8,788,082	16,899,430	
Assumptions (Offices)	❑ CO_2 Conversion is based on 2014: Baseline CO_2 for Peninsular - 0.694 tCO_2/ MWh ❑ Building Energy Index (BEI) for Offices is based on BEI and Common Carbon Metric Study in Putrajaya (2010) ❑ Estimated 10% of Contribution from Renewable Energy is based on estimated roof space of the building									
	❑ Estimated 24% potential reduction is based on potential average energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan					❑ Estimated 30% potential reduction is based on average of highest range energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan				
Assumptions (Parks)	❑ CO2 Conversion is based on 2014: Baseline CO_2 for Peninsular - 0.694 tCO_2/ MWh									
	❑ Estimated 15% potential reduction is based on conservative assumption ❑ Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway					❑ Estimated 30% potential reduction is based on stretch value of possibility with the consideration of best technology available (higher effort and higher investment) ❑ Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway				

Figure 22: DBKL buildings/assets by type

No	Type of Building	No. of Buildings	Data Given
1	Quarters	1,063	0
2	Offices	35	13
3	Clinic for Pregnant Women & Children	15	0
4	Library	8	0
5	Building under *NADI*	13	0
6	Building under *Jabatan Penilaian & Pengurusan Harta*	592	0
7	Guesthouse	23	0
8	Public Toilet	34	0
9	Market	38	0
10	Hawker Centre	45	0
11	Kiosk	26	0
12	Community Centre & Multipurpose Hall	30	0
13	Stadium & Sport Complex	15	0
14	Park	16	14
15	Others	2	0
	Total	**1,955**	

Figure 23: Preliminary results for energy consumption and GHG emissions of selected DBKL office buildings and parks under two scenarios

Towards reducing energy consumption of DBKL buildings, a list of possible technology solutions from the technological options menu was provided by TMG for consideration. DBKL selected the menu suitable when considering the constraints under the organization and the available budget.

As data collection progressed, it turned out clearly that data availability and clarity with respect to electricity consumption and bills for DBKL buildings/assets were not as straightforward as imagined early on. Even after overcoming the barrier of collecting monthly electricity bills from TNB, it turned out that there were a total of 3,076 bills which covered the 1,955 buildings/assets.

As such, intensive data cleaning was needed (which is still ongoing as this reporting progresses) in order to specifically assign bills (as such electricity consumption) to their corresponding buildings/assets.

As the electricity bills data are being "cleaned", an interim analysis results for 405 buildings (out of the total of 1,955 buildings) was conducted. For the 405 buildings analysed, the total energy consumption was 111.8 million kWh/year, accounting for 77% of DBKL's total electricity bills and emitting a total of 77.6 million kg of CO2e/year. It was further found that 63% of power consumption by DBKL buildings was attributable to the buildings' air conditioning system with another 14% from lighting. This pointed to the significant potential for energy consumption reduction and savings from improvement made to the air conditioning system.

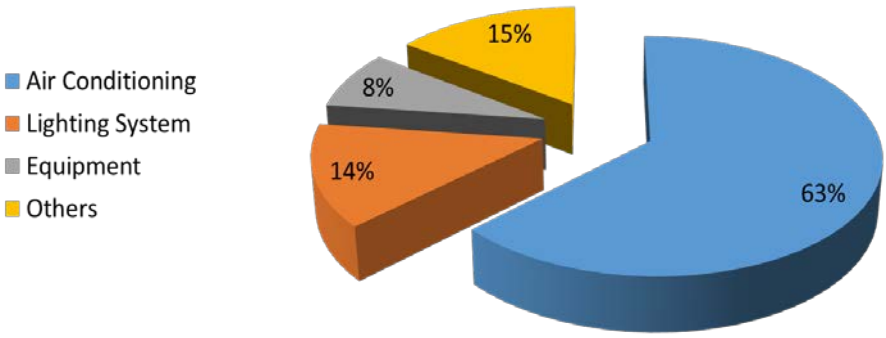


Figure 24: Energy consumption profile for 405 DBKL buildings pointing to buildings' air conditioning system being the largest contributor DBKL's annual electricity bills

Table 3 : Possible technological solutions for reduction of energy consumption in DBKL buildings

Building Envelope	1	Infiltration - Airtight Building Envelope
	2	Reduce Direct Sunlight - Shading, Window Blind
	3	Insulation - Green Roof, Roof Insulation, Wall Insulation, Window Tinted, Window Glass
Air-Conditioning System	4	Outdoor Air Ventilation Control
	5	Zoning & Control of Air Distribution System - VAV, Temperature & Humidity Control, Setback & Shut-off Control, Off-hour control
	6	High Efficiency Fan System
	7	High Efficiency Air Filtration
	8	Effective Piping & Ducting Insulation
	9	High Efficiency Unitary Air Conditioning System - Single Split, Package, Multi Split, VRF
	10	High Efficiency Centralized Air Conditioning System - Chiller, Hydronic System, Cooling Tower
	11	Control of Centralized Air Conditioning System - Automation & Optimization
Lighting	12	Lighting Control - Daylight Control, luminance Control, Zoning Control, Motion Control, Off-hour Control
	13	High Efficiency Lighting System - Indoor & Outdoor
Energy Management Control System	14	Control of Equipment, Monitoring of Equipment, Integration of Equipment and Other Sub-systems, Energy related Data Collection and Analyses
Renewable Energy	15	Solar PV

Considering budgetary and resources constraints faced by DBKL, two scenarios were considered related to level of use of technological solutions and amount of investment needed by the KL city participants. Scenario 1 assumed the adoption of a moderately ambitious approach, involving mostly no-cost and/or low-cost measures that potentially yielded a 35% reduction in GHG emissions amounting to 12.5 million kgCO2e/year and generated a monetary saving of RM7 million/year. Scenario 2 assumed a more aggressive approach which adopted medium- to high-cost technological solutions, producing a 47% reduction in GHG emissions which is equivalent to a cut of 16.9 million kgCO2e/year and saving DBKL some RM9 million in electricity a year.

	Scenario 1	Scenario 2
CO_2 EMISSION IMPROVEMENT	35%	47%
Approach	Moderate	Aggressive
CO_2 EMISSION REDUCTION	12.5 million kgCO2e/year	16.9 million kgCO2e/year
Monetary saving	MYR 7 million/year	MYR 9 million/year

Figure 25： Potential CO2 emission reduction and monetary savings generated from reduction in energy consumption in 405 DBKL buildings based on moderately ambitious and more ambitious scenarios

Table 4: DBKL's scenario for decarbonisation

Scenario 1	Scenario 2
Switch off unnecessary electrical loads during lunch	Building automation system
Setting temperature to 24 Celsius	Using green technology building envelope
Zoning of lighting areas	Using energy efficient chillers
Retrofitting existing light to LED lights	Using solar as alternative energy
Assumptions: CO_2 Conversion is based on 2014: Baseline CO_2 for Peninsular - 0.694 tCO_2/ MWh Building Energy Index (BEI) for Offices is based on BEI and Common Carbon Metric Study in Putrajaya (2010) Estimated 24% potential reduction is based on potential average energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan	Assumptions: CO_2 Conversion is based on 2014: Baseline CO_2 for Peninsular - 0.694 tCO_2/ MWh Building Energy Index (BEI) for Offices is based on BEI and Common Carbon Metric Study in Putrajaya (2010) Estimated 30% potential reduction is based on average of highest range energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan Estimated 20% of Contribution from Renewable Energy is based on estimated roof space of the building

3.2 Introducing energy efficient technology and the feasibility

（1） Studies on potential sites selected by DBKL（DBKL's public buildings and assets）

Four buildings（Menara 1、Menara 2、Menara 3, IDB（Institut Latihan Dewan Bandaraya））were selected as model projects based on the collected data, and analysed by SEDA using SEDA's building energy demand online system BeDOS for their energy consumption. Calculations for investment costs are based on energy consumption and reduction potentials and are show in a table below.

Figure 26： Time trend of energy consumption for the four model buildings（2016/6～2019/11）

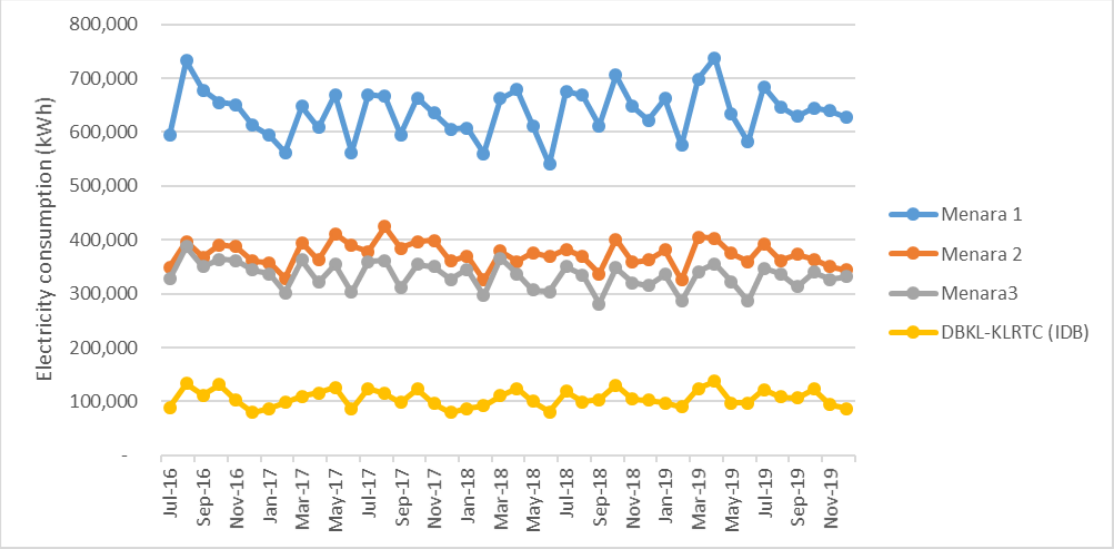


Table 5：Possible operational measures and energy efficiency technology for the four model buildings

Building information	Scenario 1 (no cost, low cost)	Scenario 2 (medium, high cost)
DBKL 1 Tower	Switch off unnecessary electrical loads during lunch Setting temperature to 24 Celsius Zoning of lighting areas Retrofitting existing light to LED lights	Installation of power meter on floors to identify floor usage Using solar as alternative energy
DBKL 2 Tower	Switch off unnecessary electrical loads during lunch Setting temperature to 24 Celsius Zoning of lighting areas Retrofitting existing light to LED lights	Installation of power meter on floors to identify floor usage Building automation system Using solar as alternative energy
DBKL 3 Tower	Switch off unnecessary electrical loads during lunch Setting temperature to 24 Celsius Zoning of lighting areas Retrofitting existing light to LED lights	Installation of power meter on floors to identify floor usage To update building automation system Using green technology building envelope Using solar as alternative energy
IDB DBKL	Switch off unnecessary electrical loads during lunch Setting temperature to 24 Celsius Zoning of lighting areas Retrofitting existing light to LED lights	Installation of power meter on floors to identify floor usage To update building automation system Using energy efficient chillers Using solar as alternative energy

Table 6：Energy consumption reduction potential calculated using cost-cutting technology and actions

	Menara 1	Menara2	Menara 3	IDB	TOTAL
Usage (kWh/year)	7,761,095	3,922,623	4,433,750	1,283,350	17,400,818
Savings [kWh]	3,647,715	1,843,632	2,083,863	603,175	8,178,384
Energy efficiency	2,328,329	1,176,786	1,330,125	385,005	5,220,245
Renewables	1,319,386	666,845	753,738	218,170	2,958,139
Cost Energy Efficiency	10,943,144	5,530,898	6,251,588	1,809,524	24,535,153
Cost Renewables	9,235,703	4,667,921	5,276,163	1,527,187	20,706,973
Total cost [RM]	7,761,095	10,198,819	11,527,750	3,336,710	45,242,127

With respect to funding that would be needed for investment in possible technologies, DBKL has not pointed to any specific funding sources but would use internal funds that would be available and seek additional external funding as necessary. DBKL is open to receiving any kind of external funding, technical assistance as well as international crediting mechanisms that are sanctioned by the Malaysian Government. DBKL would remain open to any local and/or international joint venture (JV), public-private partnerships (PPP), private financing initiatives (PFIs) arrangements that would be agreeable in terms and conditions and sanctioned by the Malaysian Government towards meeting its commitment to reducing GHG emissions as outlined in the KLLCSBP 2030.

It eventually became apparent that the entire process of studying and analysing in detail all 1,955 buildings/assets would take too long and the team agreed to prioritize the four main buildings of DBKL, viz. Menara (Tower) 1, Menara 2, Menara 3 and IDB (Institut Latihan Dewan Bandaraya, the training institute of the City Hall). The four buildings were estimated to account for 10% of total electricity consumption of DBKL. Detailed data as outlined above would only be collected for the four main buildings for the purpose of detailed analysis and reporting, while data cleaning for the 3,000 over bills would continue as DBKL is committed, with strong support from and mutual learning with TMG and SEDA, to completing the exercise.

It was agreed that detailed study and analysis of the four main buildings, since they collectively accounted for a large percentage of DBKL's energy consumption, would provide good lessons to learn from, and produce significant reduction and savings results if the relevant energy savings proposals were to be put in place and implemented. This would provide a good basis for further exploration of energy savings strategies for the remaining 1,951 buildings/assets. It was hoped that this would be completed in the second phase (FY2020) of the project. And from this, it was further hoped that a phase three (FY2021) could be continued into in which the entire experiences that resulted from strong DBKL-TMG collaboration would lead to the extension of energy savings policies, strategies, measures and technologies to be applied to all buildings within the DBKL's jurisdiction.

DBKL recognises the importance and urgency of the global climate agenda and is committed to contributing to mitigating climate change, including towards effectively limiting global temperature rise to below 1.5° Celsius. DBKL is seriously considering more ambitious and aggressive targets and actions towards achieving carbon neutrality by 2050, and looks forward to long-term collaboration and partnership with TMG. In the interim, DBKL is mainstreaming the KLLCSBP 2030 into and may potentially revise its carbon reduction target for 2040 towards becoming carbon neutral ready,

（2）Potential technology introduced at workshops held at DBKL

The public botanical garden (Botani Tamari）is where people gather to enjoy their evenings. TMG suggested using a power generator that uses the vibration generated by human movement to light up the facility during the night.

The operation and maintenance measures and the list of possible technology solutions were used during the walkthrough surveys of the model buildings, Menara1, 2, 3 and IDB, to identify appropriate solutions.

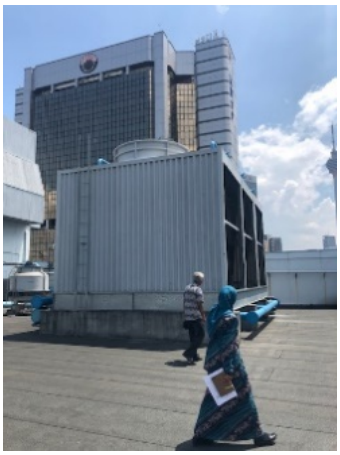


Figure 27 Menara 2

Figure 28 IDB

（3）Meetings with companies of the building construction area and site visits

KL city is on the path for economic growth and a rise in population, leading to the urge for swift implementation of its development plans. The essence for sustainable city planning was learnt from Mori Building's experience in garden city development, and a site visit of the technologies they apply. (please refer to previous section "2. Site visit to a leading facility：ARK Hills Sengokuyama Mori Tower" for more details)

3.3 Studies on possible projects and team structure for a JCM

IGES sought to identify the feasibility of a JCM project if/once Malaysia becomes a JCM signatory through an information exchange with the Japan Chamber of Commerce representative in Malaysia. This was independent from but utilizes the learnings from TMG affiliated activities of transferring TMG's experience and knowledge to introduce energy efficiency and CO2 emissions reduction in buildings through meetings. Walkthrough surveys were conducted on June 28th, August 24th 2019 for public parks, city hall buildings, as well as DBKL's research centre. Model buildings were selected as a result of the walkthrough survey and the building inventories, and the energy reduction potential was calculated with SEDA's support for DBKL. The simulation results gave a clearer picture of what technology is suitable for a JCM project and is the fruit of this year's project.

Discussions with DBKL in August 2019 were held on possible technologies, and whether it could be reflected into the budgeting process for 2020. The data to allow for such a decision was not available at the time, and discussions were postponed for the following year.

If DBKL's budgets are allocated, discussions with the Japan Chamber of Commerce revealed the JCM would serve to enhance chance for Japanese technology to be chosen over models manufactured in other countries and are normally cheaper. The possibility for new market possibilities was discussed. In that case, information and experience on how best to design a tender with a JCM in mind must be shared.

The team structure if a JCM is implemented will be for IGES to stand as leading coordinator, UTM to coordinate among the local stakeholders, with SEDA acting as the expert for energy efficiency and renewable energy, where a project with a Japanese company already located in KL city would be promoted.

3.4 Items

（1） Overseas mission

※ Refer to the list of events in 3.5 that includes overseas missions

（2） Others

1） Monthly reports to the MOEJ（via emails）

Implemented when anything relevant for reporting came up

2） Meeting with the MOEJ on updates

Twice for an official meeting set up specifically for this subject. There were occasions when the reporting occurred during meetings on other topics.

3） Meetings by the project participants or between the cities

※ Refer to the list of events in 3.5 that includes overseas missions

3.5 List of events

June 28th, 2019	First meeting between the cities and a site visit
July 10th, 2019	First webinar between the project participants
July 28th, 2019	First workshop in Tokyo and site visit
August 1st, 2019	International Forum for Sustainble Asia and the Pacific
August 23rd, 2019	Tokyo - DBKL low carbon system（T2KLLCS）launching ceremony
September 5th, 2019	First interim reporting meeting with MOEJ
October 13th-17th, 2019	Exchange at the venue of the Asia Pacific Urban Forum（APUF）
December 19th, 2019	Second interim reporting meeting with the MOEJ
January 14th-15th, 2020	Second workshop in Tokyo and discussions for the next year
February, 2020	Drafting the final report
February 20th, 2020	Final meeting with the MOEJ

マレーシア工科大学低炭素アジア研究センター発表資料
2019年8月23日（ローンチングセレモニー）
科学的で実践的なアプローチによるマレーシアの都市の低炭素行動

Science to Action (S2A) for Accelerating Climate Actions in Malaysian Cities

Launching of the Tokyo-Kuala Lumpur Low Carbon System (ToKL$_2$CS)

23 August 2019

DBKL Tourism Bureau, Jalan Tangsi, Kuala Lumpur

Prof. TPr. Dr. HO Chin Siong

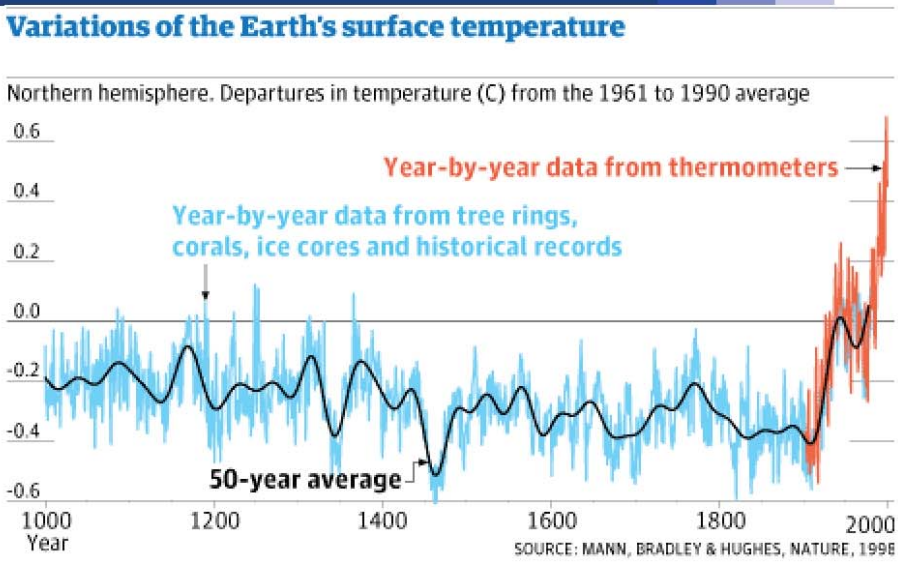
TPr. CHAU Loon Wai

UTM-Low Carbon Asia Research Centre
Faculty of Built Environment and Surveying
Universiti Teknologi Malaysia
Johor Bahru, Malaysia

地球温暖化のホッケースティック曲線

It's Climate Emergency! It's Science!

THE CLIMATE HOCKEY STICK

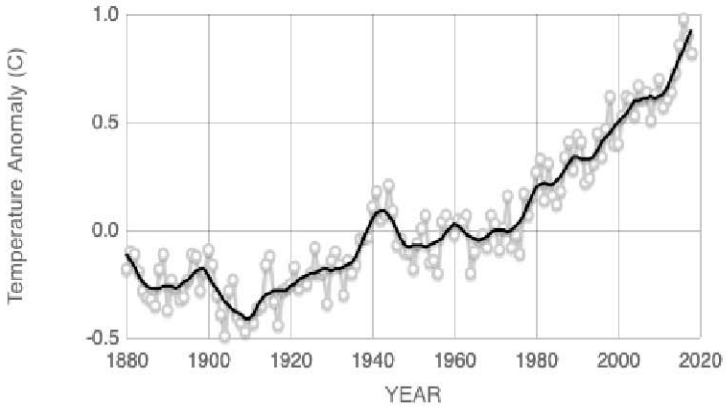


Credit: *Remitti, GCoM, 2019*

地表面と海面の温度変化

It's Climate Emergency! It's Science!

LAND-OCEAN TEMPERATURE INDEX



Source: climate.nasa.gov

The change in **global surface temperature** relative to 1951-1980 average temperatures shows that eighteen of the 19 warmest years all have occurred since 2001, with the exception of 1998.

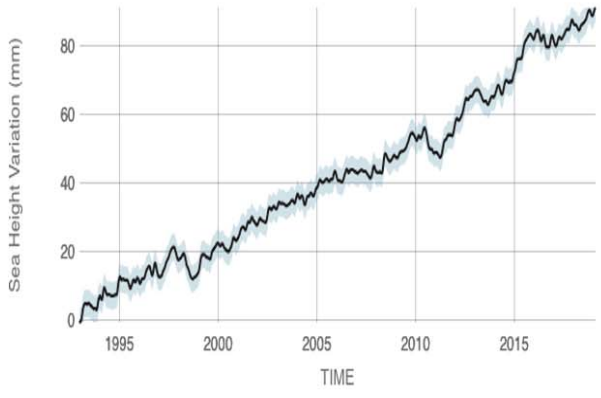
The year 2016 ranks as the warmest on record. **The latest annual average anomaly for 2018: + 0.8 °C**

Credit: *Remitti, GCoM, 2019*

地球温暖化による海面上昇

It's Climate Emergency! It's Science!

SEA LEVEL



Source: climate.nasa.gov

Sea level rise is caused primarily by two factors related to global warming: the added water from melting ice sheets and glaciers and the expansion of seawater as it warms. The change in sea level since 1993 as observed by satellites shows as latest measurement for February 2019 a **sea height variation on the long term average of 91 (± 4) mm**, with a **annual rate of change of + 3.3 mm.**

Credit: *Remitti, GCoM, 2019*

地球温暖化対策になぜ都市の取組みが重要か？
2030年にはマレーシアの人口の80%が都市部に集中する可能性がある

WHY CITIES?

UTM－LCARCが選ぶ優れた低炭素行動計画づくりで知られる都市

Selected City Climate Actions by UTM-LCARC

Iskandar Malaysia
MBJB
MBIP (then MPJBT)
MPPG
MPKu
MDP
(2009-2018, ongoing)

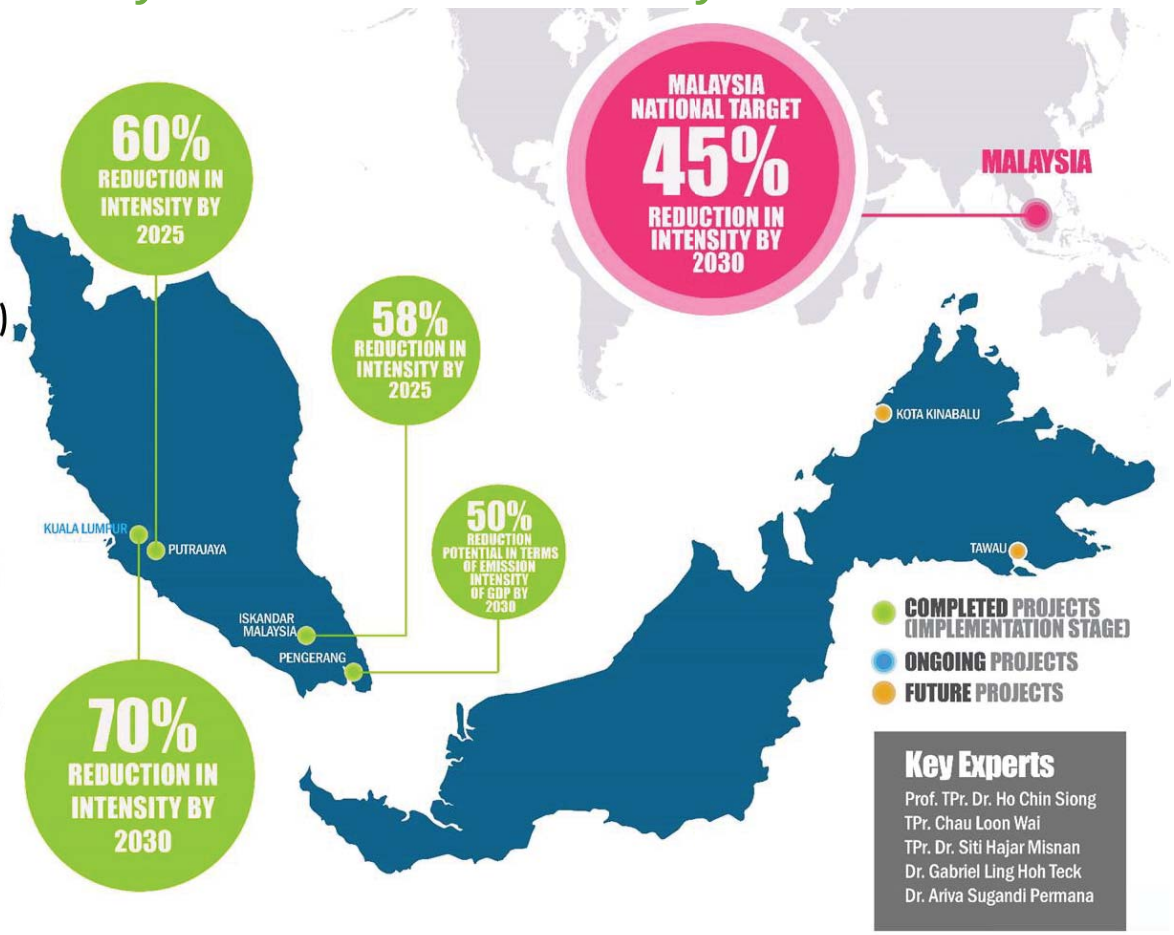
Putrajaya
(2011-2013, ongoing)

Kuala Lumpur
(2016-2017, ongoing)

Pengerang
(2017-2018, ongoing)

Kota Kinabalu
Tawau

(Coming soon?)



Key Experts
Prof. TPr. Dr. Ho Chin Siong
TPr. Chau Loon Wai
TPr. Dr. Siti Hajar Misnan
Dr. Gabriel Ling Hoh Teck
Dr. Ariva Sugandi Permana

UTM-LCARCが支援した低炭素行動計画

Selected Climate Action Plans by UTM-LCARC

2009-2018

UTM－LCARCが目指すのは科学的で実践的な低炭素都市計画づくりの進め方

UTM-LCARC Research Approach

S2A

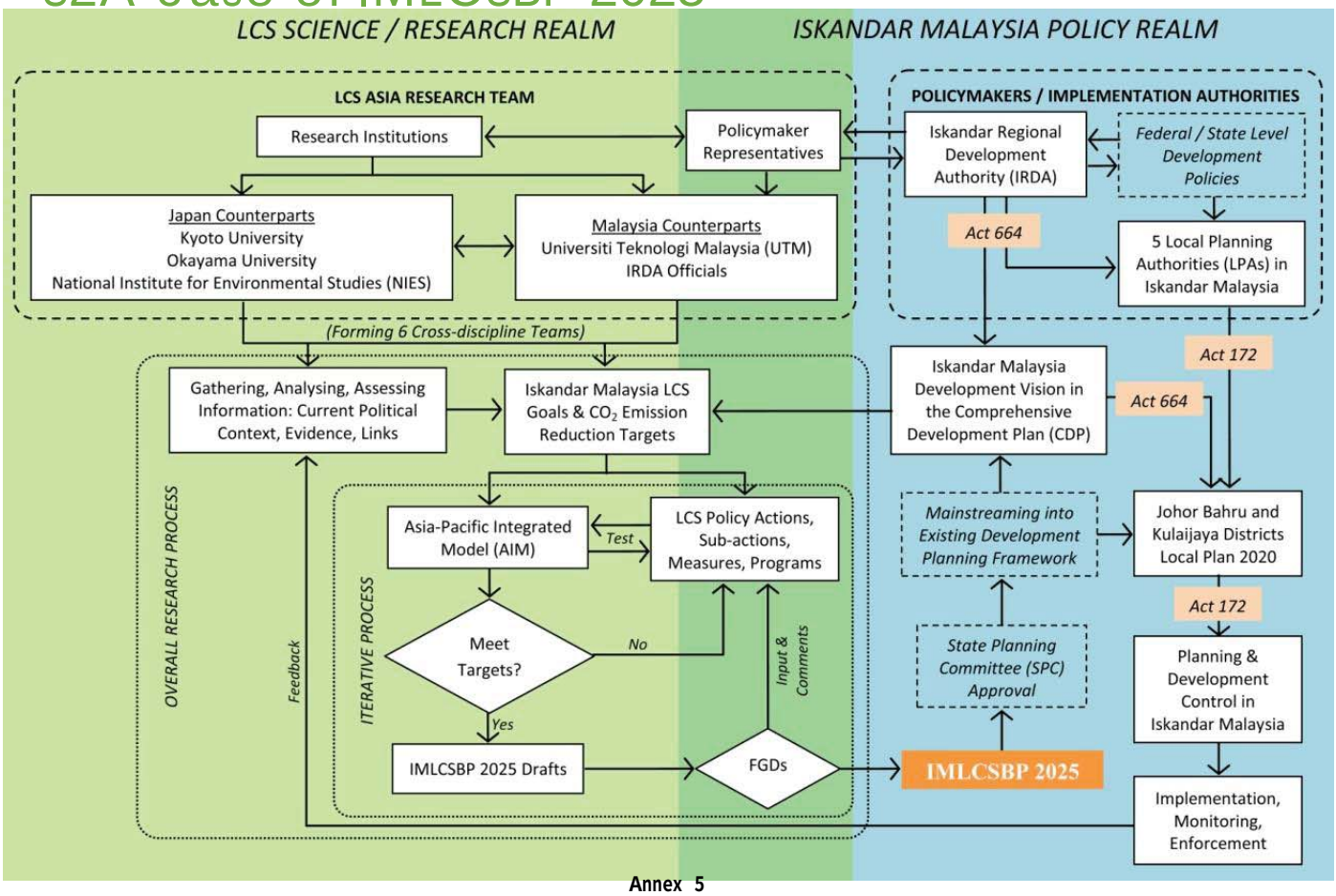
We believe in Science to Action in making Low Carbon Society a Reality

UTM-LCARCの科学的で実践的なアプローチの概観図

UTM-LCARC S2A Approach

政策策定の事例：マレーシア・イスカンダル開発地区における2025年の低炭素社会に向けたブループリント

Policymaking with Implementation in Mind: The S2A case of IMLCSBP 2025



マレーシア・イスカンダル開発地区のCO２排出量の削減ポテンシャル

Iskandar Malaysia – Potential CO^2 Reduction

Table 1: Projected main socio-economic variables

	2005	2025	2025 /2005
Population (1000)	1,353	3,000	2.22
Household (1000)	303	706	2.33
GDP (Bill. RM)	35.7	141.4	3.96
Gross output (Bill. RM)	121.4	438.9	3.61
Primary industry	1.5	2.4	1.59
Secondary industry	86.2	274.0	3.18
Tertiary industry	33.7	162.5	4.82
Passenger transport de-mand (Mill. passenger-km)	9,565	59,524	6.22
Freight transport demand (Mill. ton-km)	8,269	26,054	3.15

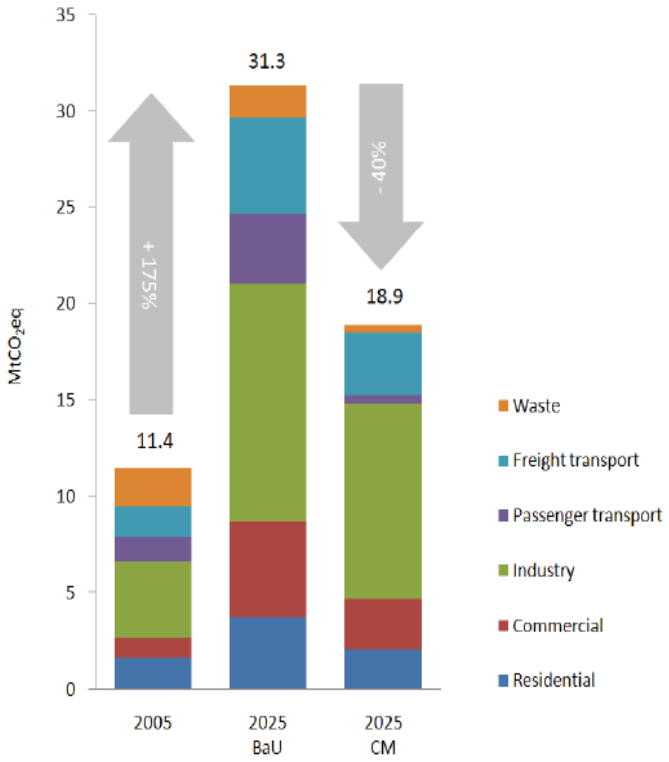
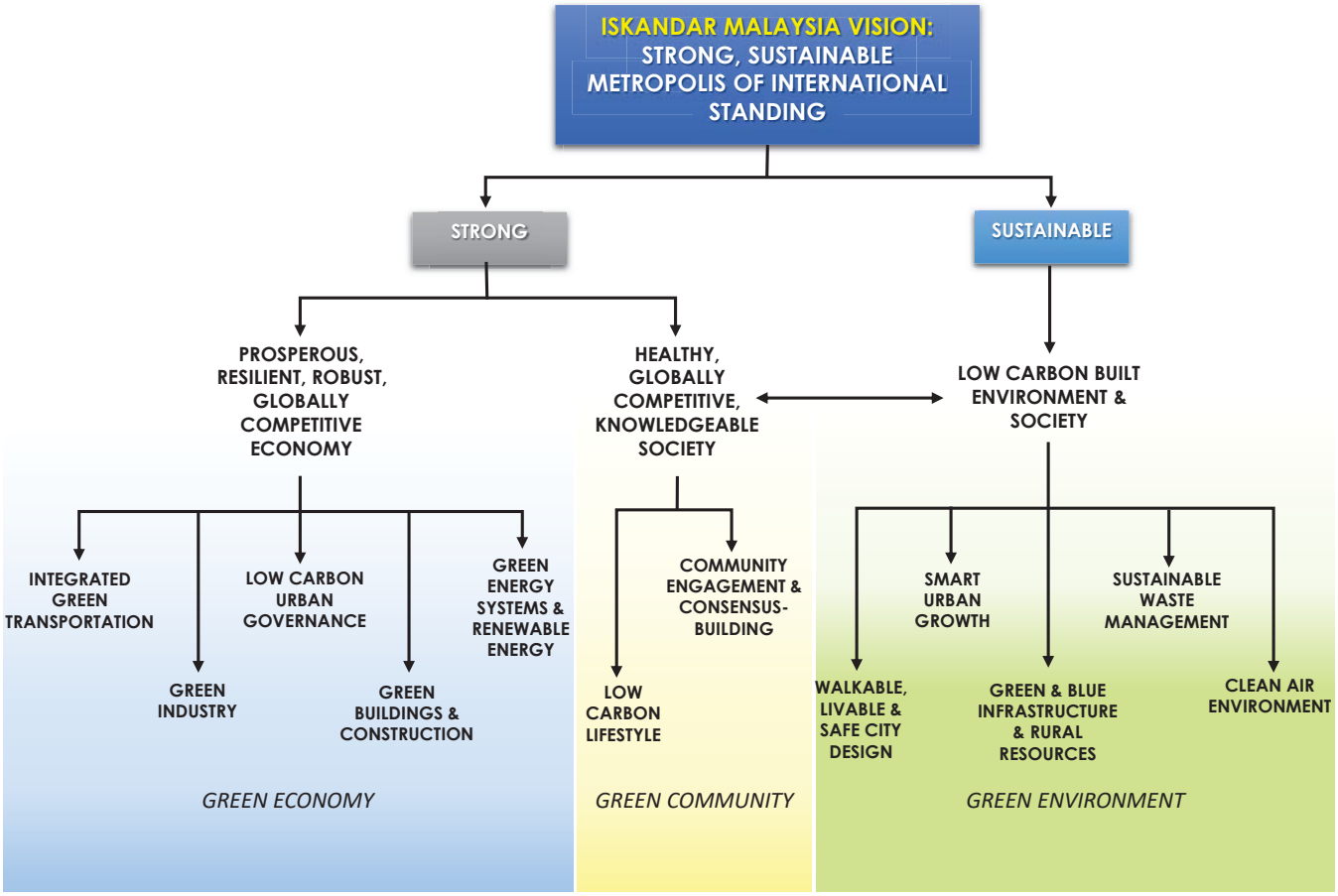


Figure 1: GHG emissions by sectors

Source: *Low Carbon Society Blueprint for Iskandar Malaysia 2025 – Summary for Policymakers (2nd Ed.), 2013, p.1*

政策オプションの例：マレーシア・イスカンダル開発地区における2025年の低炭素社会に向けたブループリント

Policy Scoping for IMLCSBP 2025



マレーシア・イスカンダル開発地区の低炭素対策の３つのテーマ

LCS Actions for IM by Three Main Themes

	Action Names	Themes
1	Integrated Green Transportation	GREEN ECONOMY
2	Green Industry	
3	Low Carbon Urban Governance	
4	Green Buildings & Construction	
5	Green Energy System & Renewable Energy	
6	Low Carbon Lifestyle	GREEN COMMUNITY
7	Community Engagement & Consensus Building	
8	Walkable, Safe, Livable City Design	GREEN ENVIRONMENT
9	Smart Urban Growth	
10	Green and Blue Infrastructure & Rural Resources	
11	Sustainable Waste Management	
12	Clean Air Environment	

マレーシア・イスカンダル開発地区の低炭素対策のCO2排出量削減ポテンシャル

LCS Actions for IM – Potential CO_2 Reduction

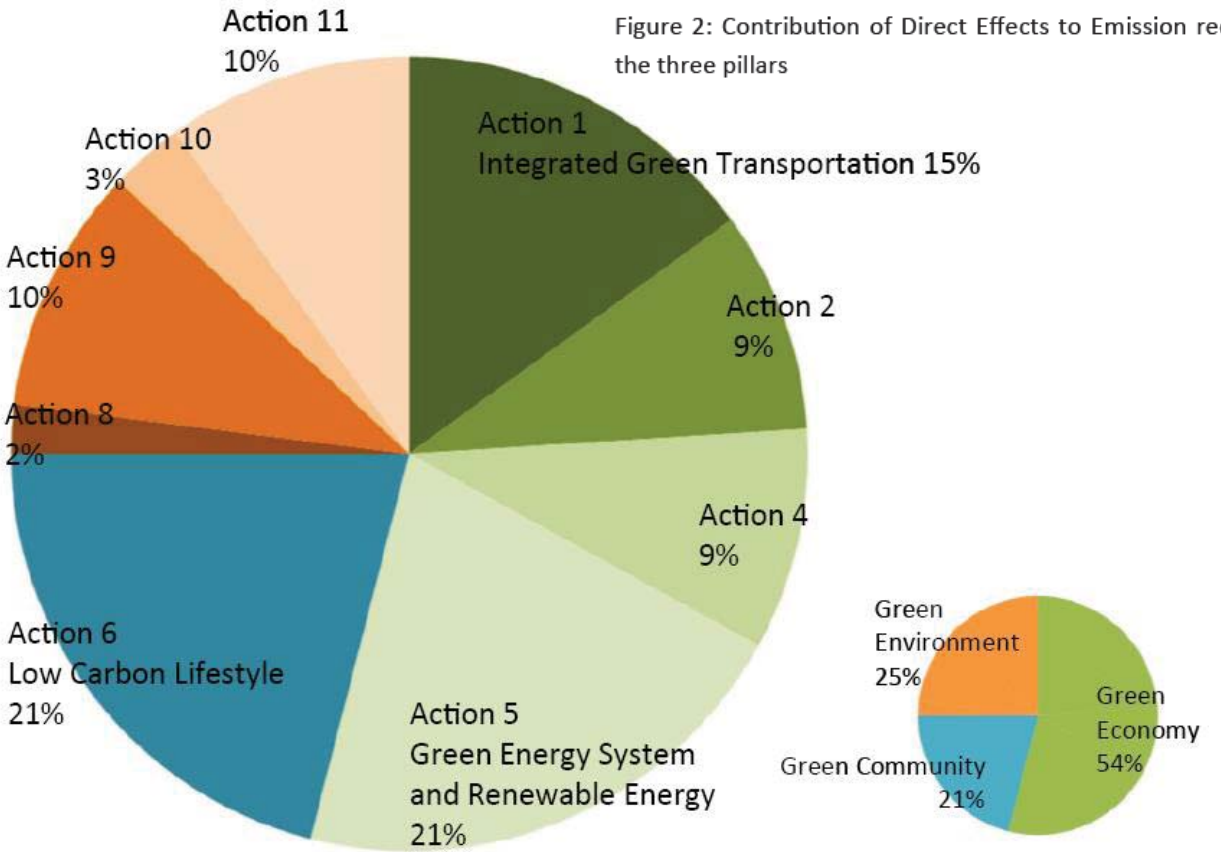
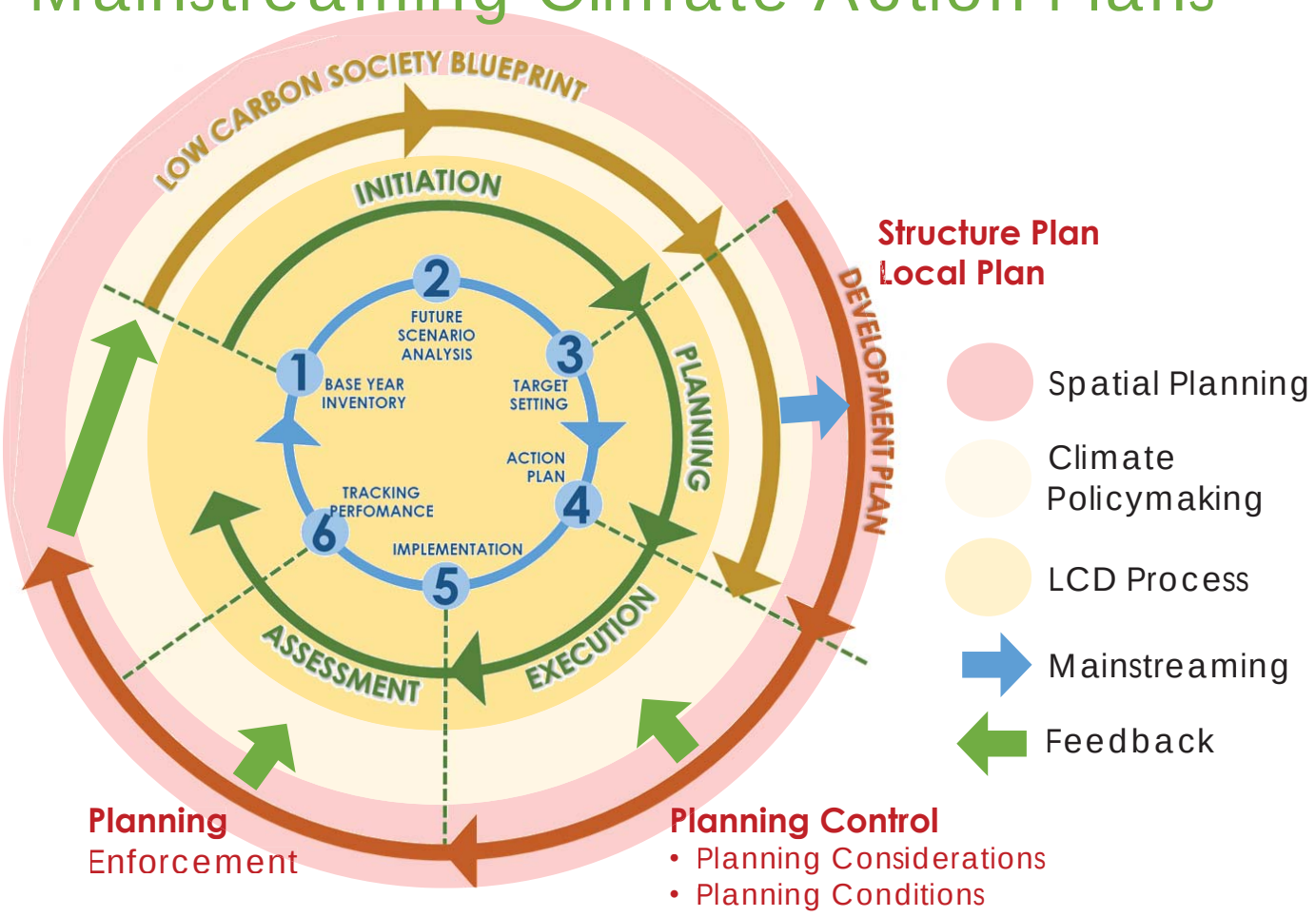


Figure 2: Contribution of Direct Effects to Emission reduction by the three pillars

Source: *Low Carbon Society Blueprint for Iskandar Malaysia 2025 – Summary for Policymakers (2nd Ed.), 2013, p.2*

気候変動対策の主流化のプロセス

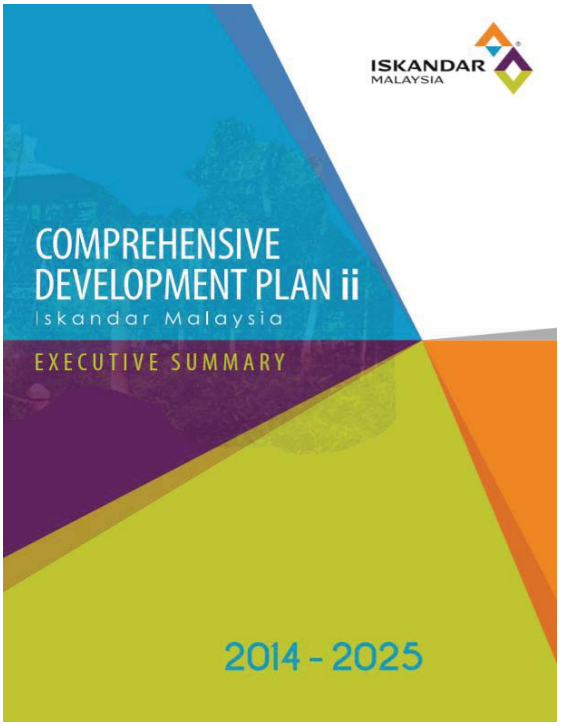
Mainstreaming Climate Action Plans



マレーシア・イスカンダル開発地区の総合計画に低炭素対策を反映

LCS Mainstreamed into the Iskandar Malaysia Comprehensive Development Plan-2 (CDP-ii)

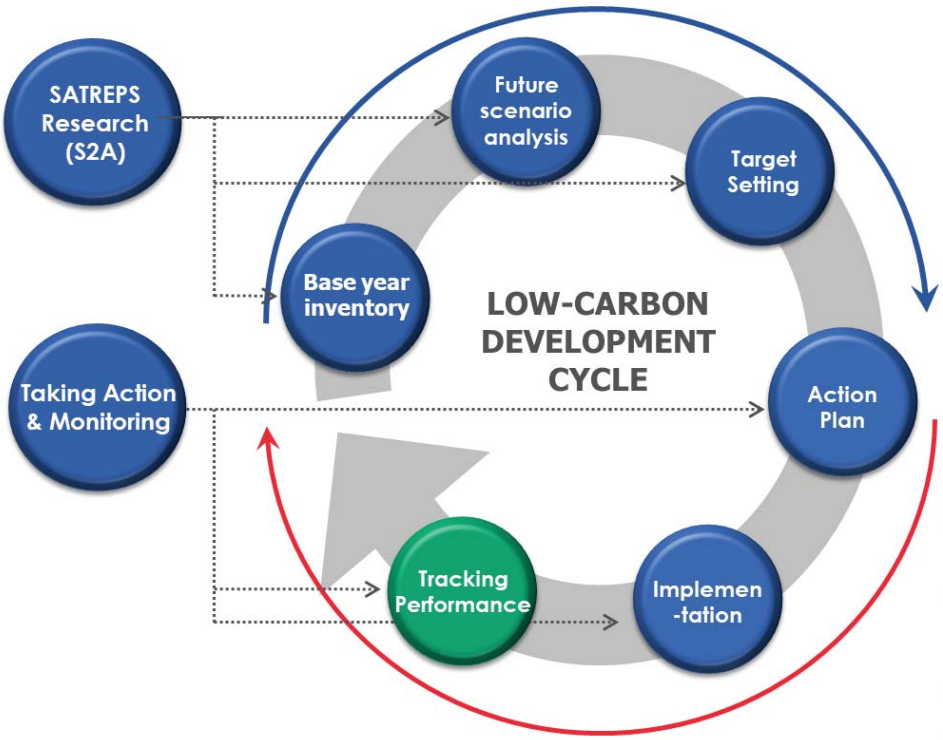
Iskandar Malaysia CDP-ii is a statutory plan prepared under Parliamentary Act No. 664



Iskandar Malaysia Circle of Sustainability: LCS as one of the CDP-ii's three main pillars

マレーシア・イスカンダル開発地区における2025年の低炭素社会に向けたブループリントの策定が一段落

Iskandar Malaysia LCSBP Comes Full Cycle



2011-2016

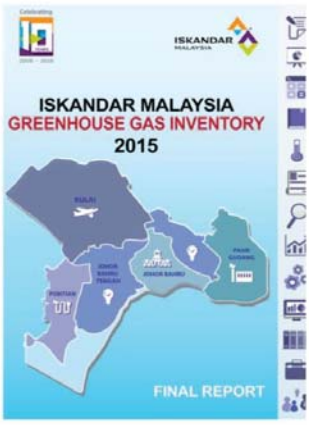
- LCS baseline study
- LCS scenario development
- GHG modelling
- LCS policy design
- IM (regional) level action plan

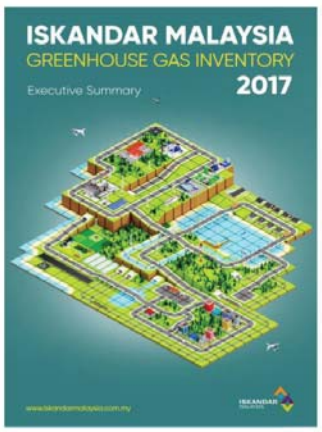
2016-2021

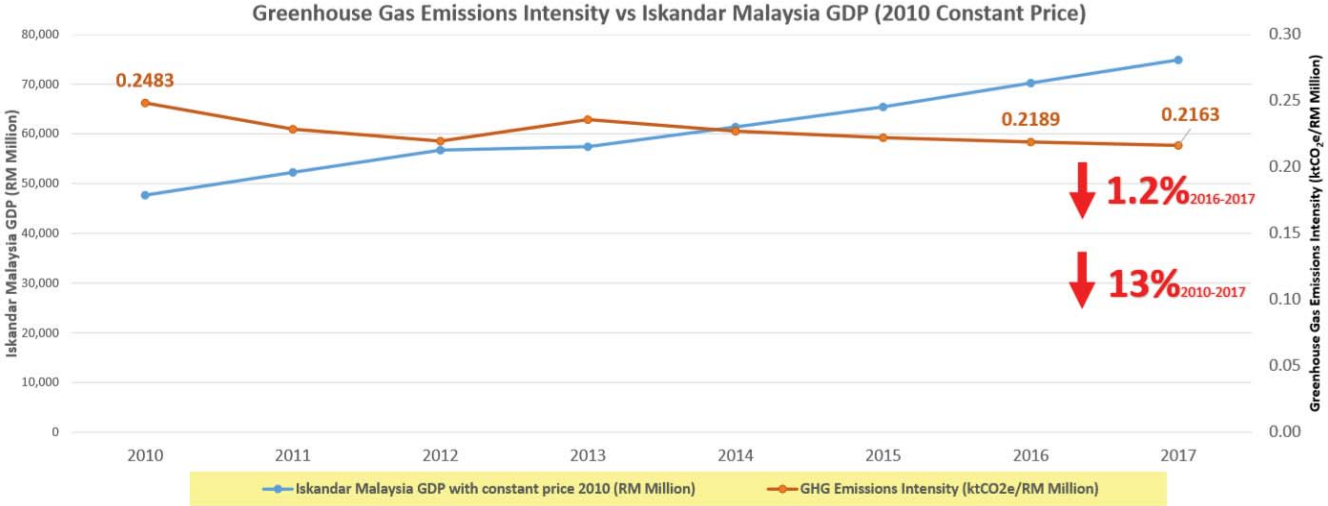
- City level detailed action plan
- Implementation of LCS programs
- Performance tracking
- GHG monitoring
- Review & refinement

マレーシア・イスカンダル開発地区における2025年の低炭素社会に向けたブループリントの策定から実施まで

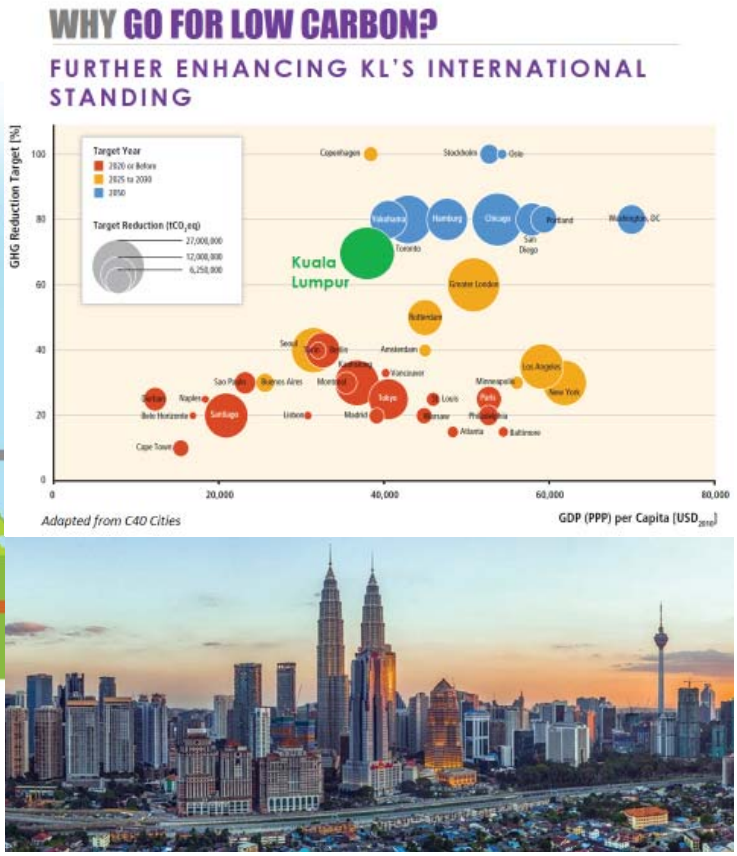
Iskandar Malaysia LCSBP Comes Full Cycle





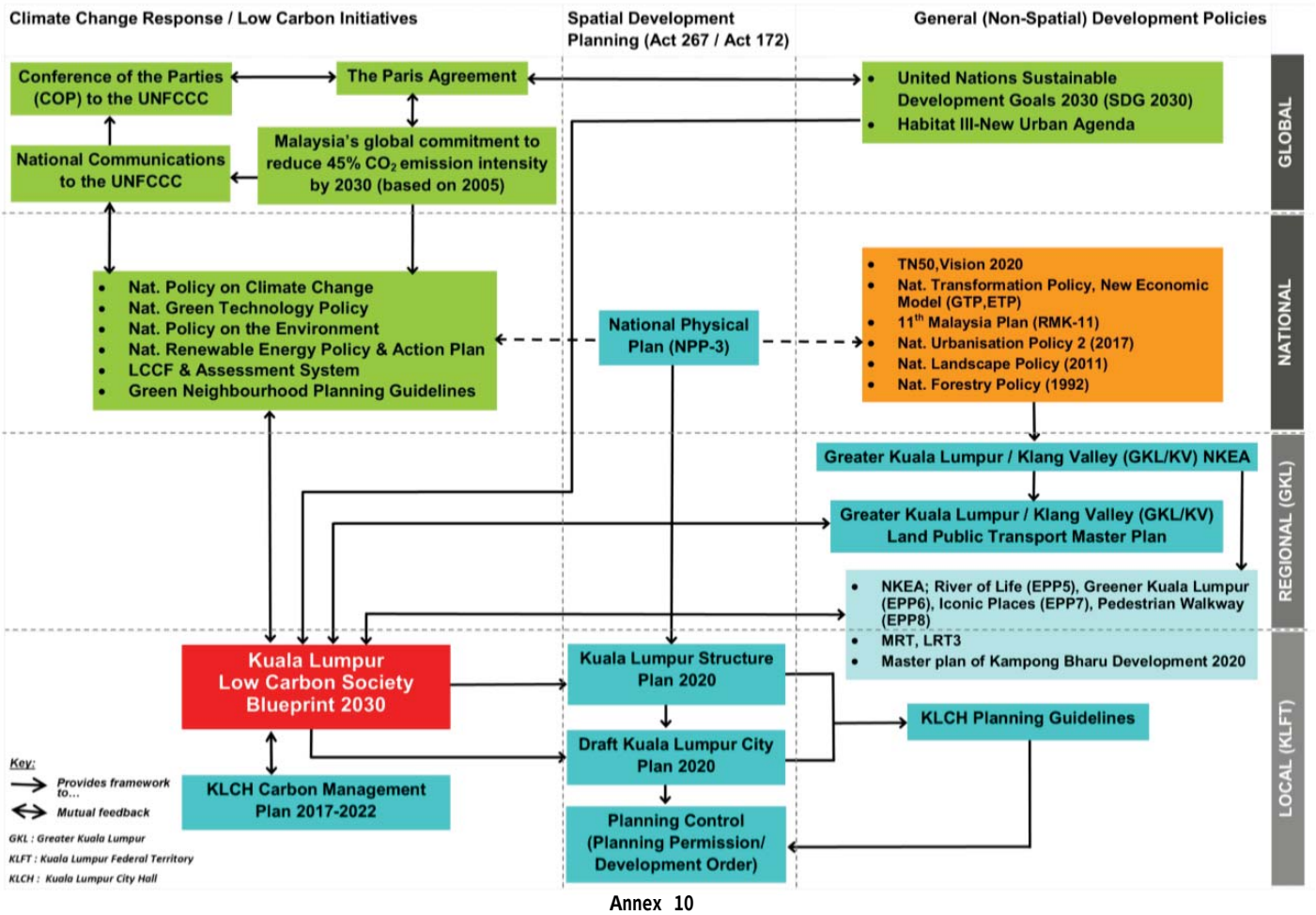


Extending IM's Experiences – KL LCSBP 2030



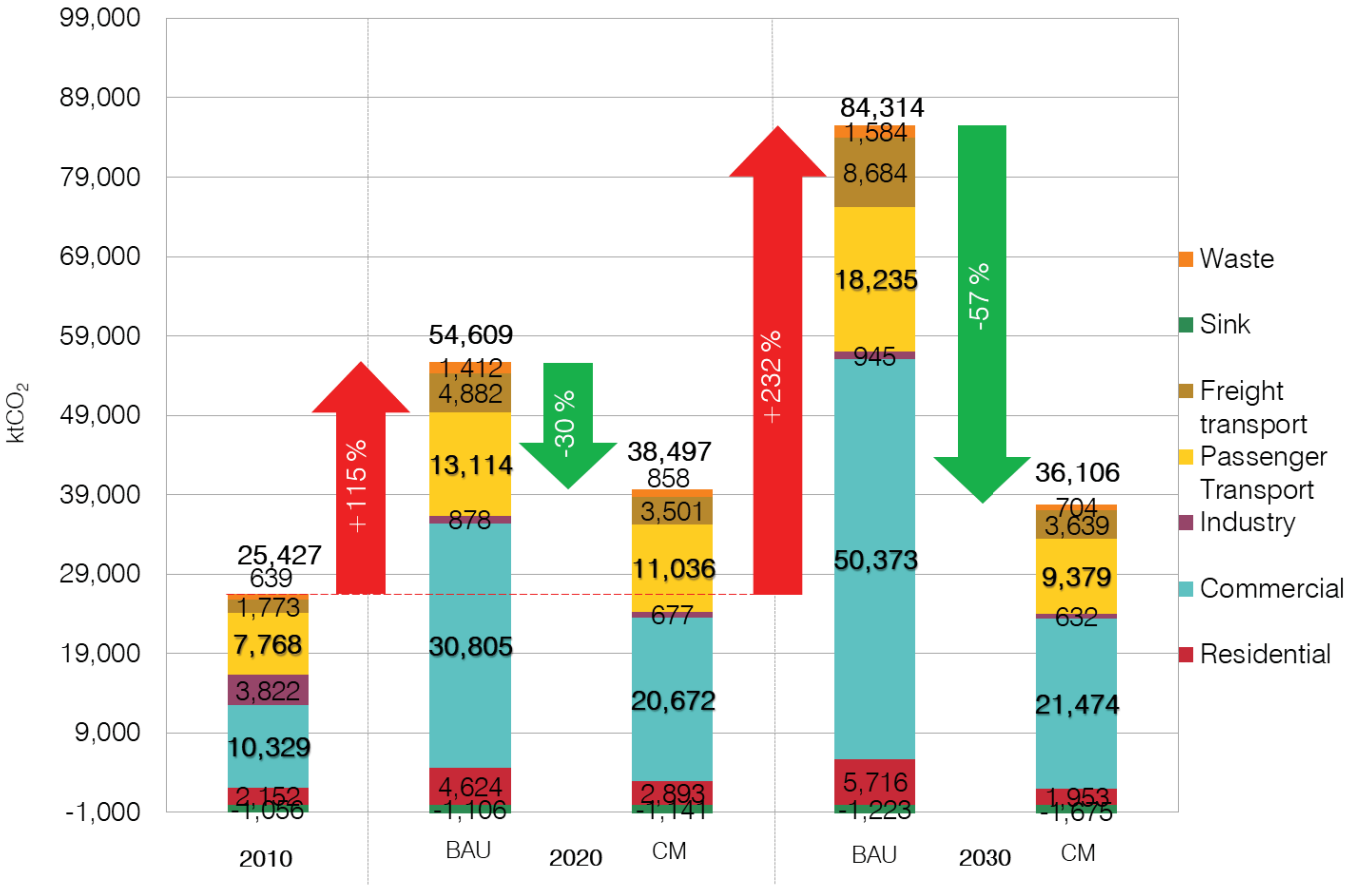
クアラルンプール市における2030年の低炭素社会に向けたブループリントの関連計画

Policy Positioning: Raison D'être of KL LCSBP 2030



クアラルンプール市（KL市）の温室効果ガス排出量削減ポテンシャル

Kuala Lumpur GHG Emissions Reduction Potential



クアラルンプール市における2030年の低炭素社会に向けたブループリントの政策オプションと枠組み

Policy Scoping & Framework for KL LCSBP 2030

Current Vision KLSP 2020 Draft KLCP 2020	WORLD CLASS CITY 2020		
LCS Vision for Kuala Lumpur	WORLD CLASS SUSTAINABLE CITY 2030 70 by 30: A Greener Better Kuala Lumpur		
Triple Bottom line of sustainability	Economy	Social	Environment
Thrusts	Thrust 1 Prosperous, Robust and Globally Competitive Economy	Thrust 2 Healthy, Creative Knowledgeable and Inclusive Community	Thrust 3 Ecologically Friendly Liveable and Resilient Built Environment
Sustainable Development Goals 2030	Goals: 1,2,7,8,9,11,12,13,17	Goals: 3,4,5,10,11,12,13,16,17	Goals: 6,11,13,14,15,17
New Urban Agenda Transformative Commitments	Sustainable and Inclusive urban prosperity and opportunities for all	Sustainable urban development for social inclusion and ending poverty	Environmentally sustainable and resilient urban development
Key Principles Draft KL City Plan 2020	World-class Business Environment	World-class Working Environment	World-class Living Environment
	World-class Governance		
KL Low Carbon Society Actions	Green Growth Energy Efficient Spatial Planning Green Mobility Sustainable Energy System	Community Engagement and Green Lifestyle	Low Carbon Green Buildings Green and Blue Network Sustainable Waste Management Sustainable Water and Wastewater Management
	Green Urban Governance		

クアラルンプール市における2030年の低炭素社会に向けたブループリントの温室効果ガスの排出量削減ポテンシャル

KL LCSBP 2030 GHG Emissions Reduction Potential

Thrusts	Actions	Reduction ($ktCO_2eq$)	Share (%)*
Economy (59%)	Action 1 Green Growth (GG)	2,502	5.2
	Action 2 Energy Efficient Spatial Structure (SS)	2,872	6.0
	Action 3 Green Mobility (GM)	6,868	14.2
	Action 4 Sustainable Energy System (SE)	16,327	33.9
Social (19%)	Action 5 Community Engagement and Green Lifestyle (CE)	9,015	18.7
Environment (22%)	Action 6 Low Carbon Green Building (GB)	9,673	20.1
	Action 7 Green and Blue Network (BG)	316	0.7
	Action 8 Sustainable Waste Management (WM)	527	1.1
	Action 9 Sustainable Water and Wastewater Management (WW)	105	0.2
Enabler	Action 10 Green Urban Governance (UG)	0	-
	Total	48,206	100

クアラルンプール市における2030年の低炭素社会に向けたブループリントの実施ロードマップ

KL LCSBP 2030 Implementation Roadmap

Action 5 COMMUNITY ENGAGEMENT AND GREEN LIFESTYLE

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 5.1.1 Foster Sustainable Consumption Behaviour						
CE 1 Survey sustainable consumption practice	━━	━━	━━	Health & Environment Dept.	KLCH (Branch Services Dept., Information Management Dept.),JPWPKL, HEIs	KLCH (Housing Management & Community Development Dept.), Local research and higher learning institutions, NGOs, Resident's assoc.
CE 2 Stimulate sustainable consumption practice	━━	━━	━━	Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., Branch Services Dept.)	LA21KL, NGOs, Resident's assoc.

KL LCSBP 2030 Implementation Roadmap

Responsible KLCH Dept. :

KLCH department with primary **responsibility for initiating, coordinating, liaising** with relevant external agencies, **monitoring, and/or approving** implementation of programs

Key Partners:

Technology providers, funding agencies or entities, and relevant government agencies with **approving authority** for, and/or statutory duty of regulating, facilitating and overseeing implementation of programs

Implementers:

Agencies, entities and/or parties that implement, or are needed to implement, programs due to their statutory duty, ownership rights, institutional responsibility, and/or effective serving of communal interests

City Climate Action Impacts
(some KL examples)

COP２４のマレーシアの展示スペース

Malaysian LCS at COP 24

COP２４のマレーシアの展示スペース

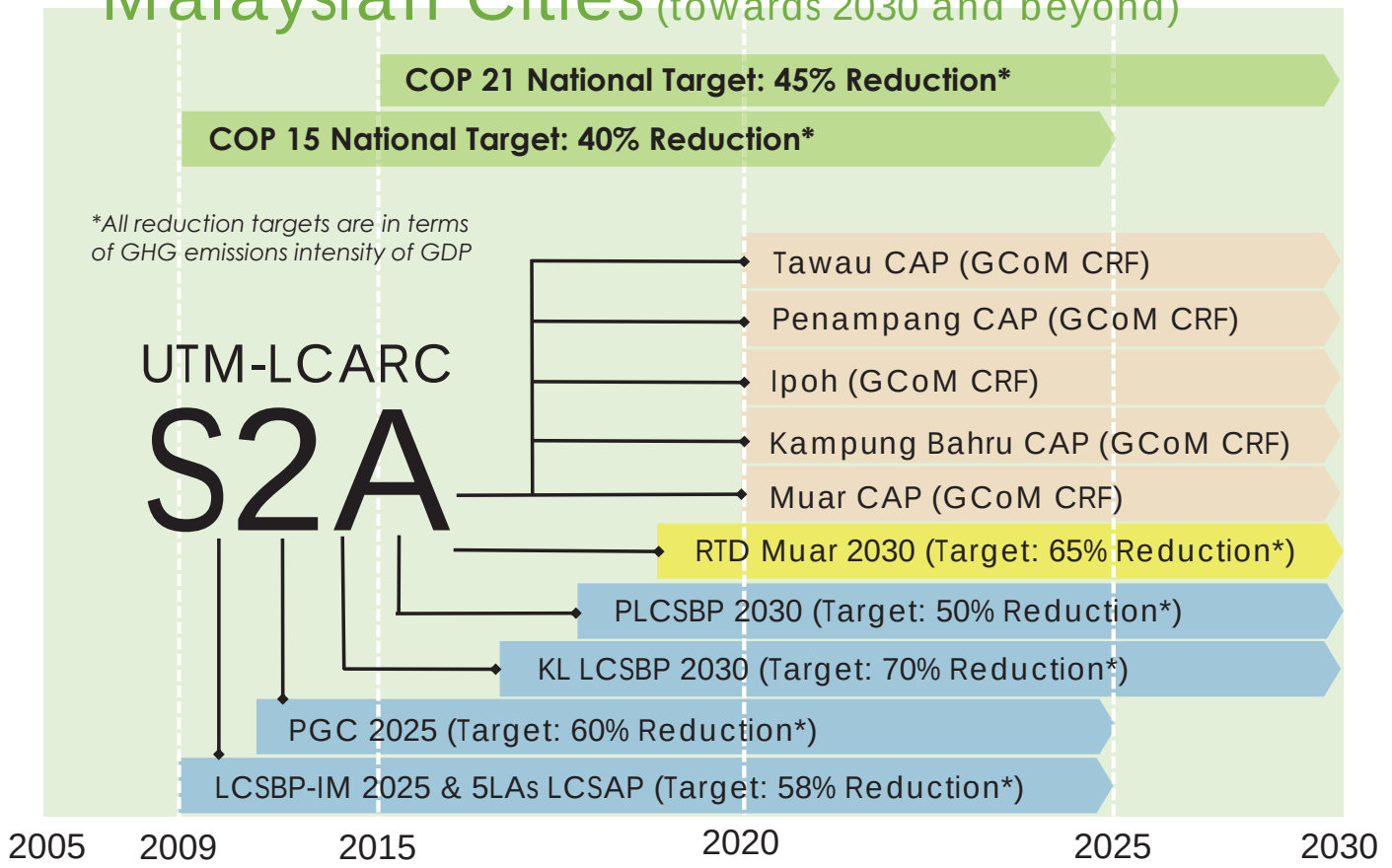
Malaysian LCS at COP 24

COP２４のマレーシアの低炭素社会の発表

Malaysian LCS at COP 24

マレーシアの都市の気候変動対策の概観図

Accelerating Climate Actions in Malaysian Cities (towards 2030 and beyond)



CONCLUSION

City Climate Actions MUST be taken!

The time is NOW!

Good News: It CAN be done!

Because it HAS been done!

When If we ALL WORK TOGETHER!

THANK YOU!

UTM-Low Carbon Asia Research Centre
Block B12, 02-04-01
Faculty of Built Environment & Surveying
Universiti Teknologi Malaysia
81310 UTM Johor Bahru
Johor, MALAYSIA

T: +60-7-5557359
M: +60-12-2986302
E: lwchau@utm.my
W: www.utm.my/satreps-lcs

クアラルンプール市（KL市）の発表資料
2019年8月23日（ローンチングセレモニー）
発表者：副市長マハディ氏

A GREENER, BETTER KUALA LUMPUR

By:
Datuk Haji Mahadi Bin Che Ngah
Executive Director (Planning)
Kuala Lumpur City Hall

KL市の基礎情報

1.0 KUALA LUMPUR

The Capital and the largest city in Malaysia

LAND AREA

243km² (24,221 hectares)

POPULATION (2018)

1.87 million people

POPULATION DENSITY

7407 person/sq.km

VISION

“A World Class Sustainable City For All”

1.0

KL市の経済成長の要因

KUALA LUMPUR'S DRIVING FORCE

マレーシアで最も人口が多い

The city has the highest number of population in Malaysia:
1,674,621 (2010)
2,198,400 (2020)
2,488,399 (2030)

国内総生産

Gross Domestic Products (GDP) (Mil.(RM)
84,852 (2010)
227,621 (2020)
399,013 (2030)

最も経済成長が甚だしい国際都市

Fastest Growing Region / Global City:
With growth rate of 9.2% pa in 2010, KL is home to several national and multinational companies

2.0

目標値：2030年には炭素強度を70%削減（2010年比）

Kuala Lumpur aims to reduce the City's carbon emissions intensity of GDP by **70% by 2030**, (based on the 2010 level) without compromising its vision and economic growth targets.

KL市の１０の主要な対策：クアラルンプール市における2030年に向けた低炭素社会ブループリント

3.0 KL LCSBP 2030 PROGRAMMES IMPLEMENTATION STATUS

電光掲示板を使った市の取組みの市民との共有

3.1 ENHANCE THE USE OF EFFECTIVE VARIABLE MESSAGE SIGNS; ON DELIVERING GREEN INFORMATION TO PUBLIC

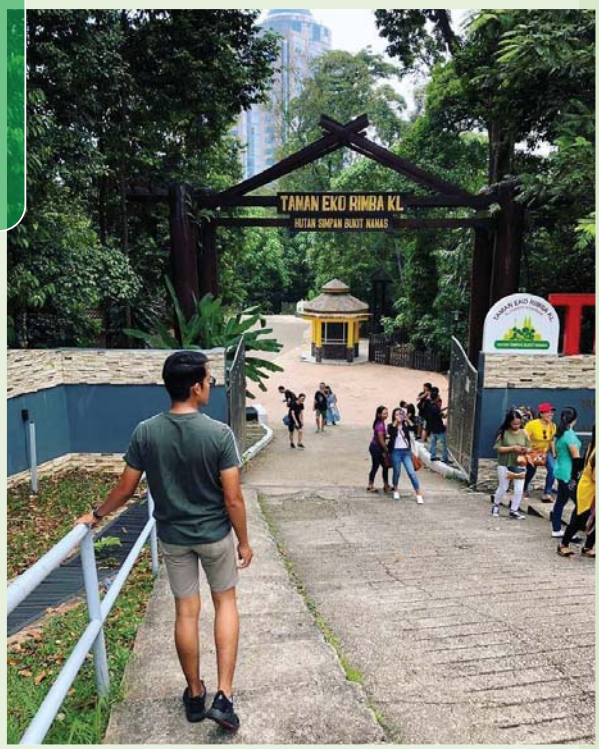
"Kuala Lumpur towards a Low Carbon City"

"Reduce congestion; together, we use public transportation"

市内の森林を市政府が登録

3.2 ALL FORESTS ARE GAZZATTED FOR PUBLIC PURPOSE

- Bukit Nanas Forest Reserve (10.5 hectares) - Gazetted as Wildlife and Bird Sanctuary in 1934
- Bukit Sungai Puteh Forest Reserve - Gazetted as Wildlife Reserve in 1932
- Bukit Sungai Besi Forest Reserve (42.29 hectares)
- Bukit Lagong Tambahan Forest Reserve (2.10 hectares)



商業地区の自転車専用レーン

3.3 DEDICATED CYCLE LANES IN DOWNTOWN AREA OF KUALA LUMPUR

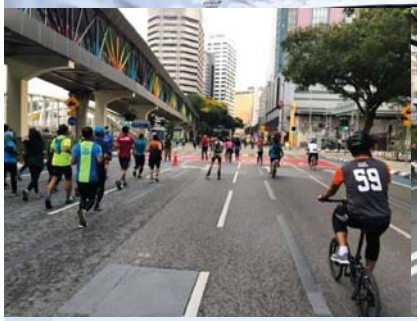
3.4 PROPERTY DEVELOPERS ARE ENCOURAGED TO BUILD GREEN BUILDINGS WITH SPECIAL INCENTIVES PACKAGE

太陽光を道源とする空調設備完備の歩行者専用道路

3.5 AIR-CONDITIONED ELEVATED WALKWAYS ARE RUN BY SOLAR ENERGY

KL 市内の午前中に行われたカーフリーイベントの模様

3.6 KUALA LUMPUR CAR FREE MORNING



市の緑地を公園に

3.7 POCKET PARK : LAMAN TUN PERAK

3.8 LANEWAY UPGRADING

商業地区を走る無料バス

3.9 FREE BUS RIDES WITHIN DOWNTOWN KL

KLCC - Bukit Bintang (Green Line)
Pasar Seni - Bukit Bintang (Purple Line)
Titiwangsa - Bukit Bintang (Blue Line)
Titiwangsa - KL Sentral through Dataran Merdeka (Red Line)
Titiwangsa - MINDEF (Orange Line)
LRT Universiti - PPR Pantai Ria (Pink Line)

生ごみコンポスト

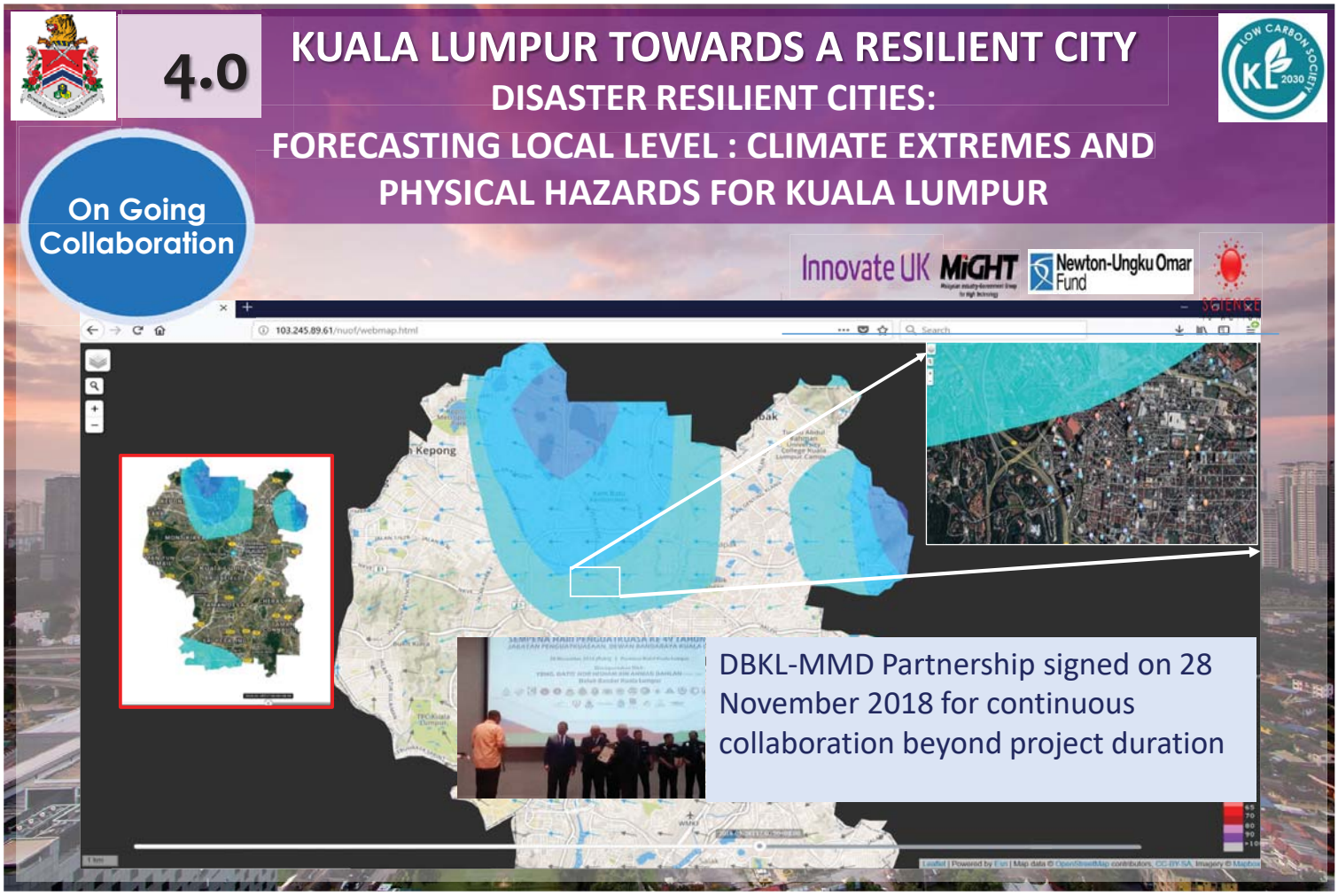
3.10 COMMUNITY FOOD WASTE COMPOSTING PROJECT

バイオ・ディーゼル（B10）

3.11 USING B10 BIODIESEL

市内の観光名所：ブループール（河川美化事業）

災害に強靭な都市づくり



5.0 NEW ADDITIONAL PROGRAMME

1. To introduce cooling district for all new projects with land area more than 10 acres.
2. To retrofit 1,800 units of existing facilities owned by KLCH to use alternative energy equipment.
3. All new KL City Hall buildings will adopt green building concept. More green building owned by private developers are encouraged as well.
4. Collaborating with TNB to use solar energy for KL City Hall buildings and street lights.
5. Reduce private vehicles entering the city center of Kuala Lumpur during peak hours.
6. Increase public outreach and engagement programme to get the buy in from all the stakeholders.

結論

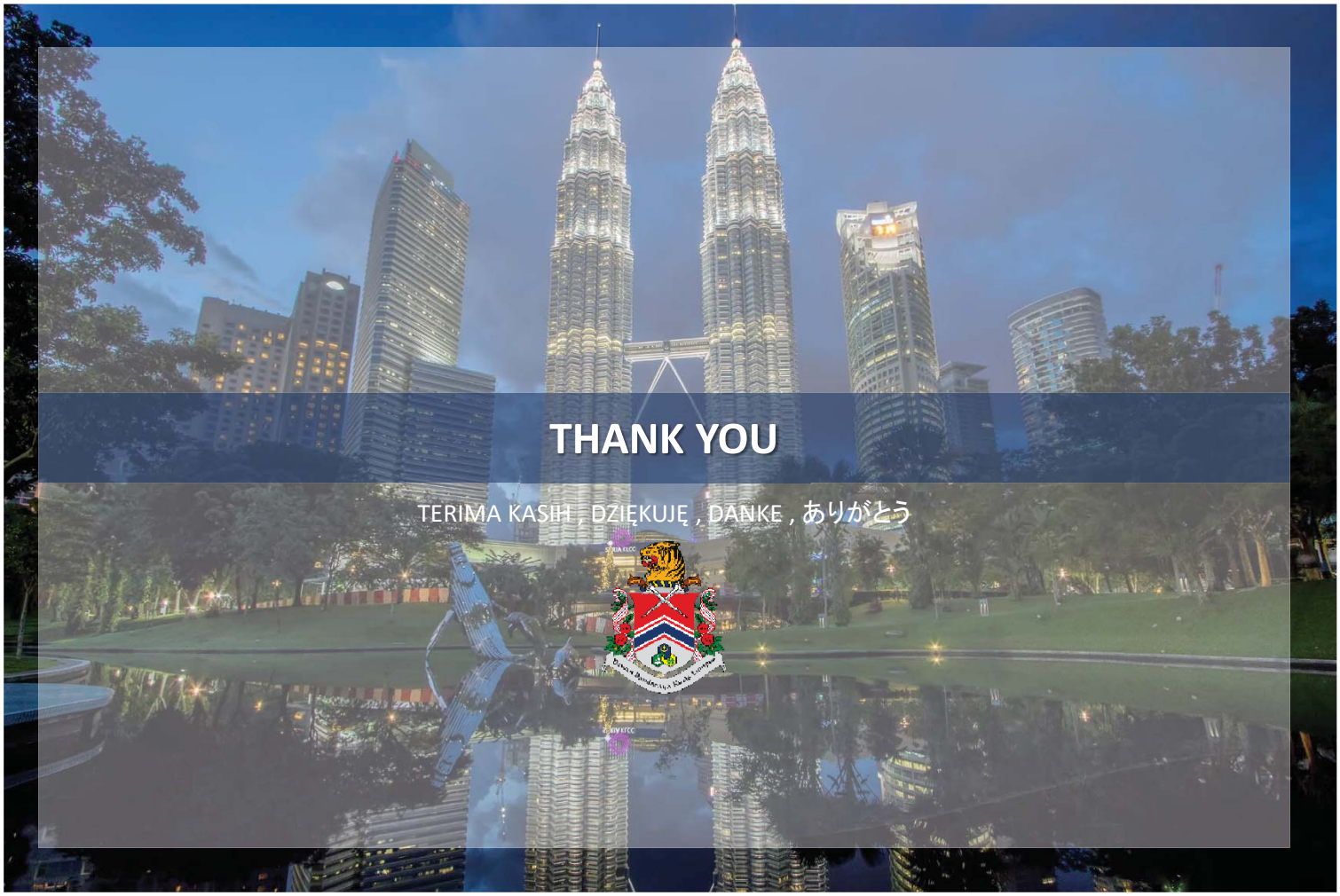
6.0 CONCLUSION

These initiatives need everyone's commitment; government, private developers, NGO's, local communities as well as private individuals. Together, they need to shoulder the shared responsibility of implementing the programmes to reduce carbon emissions.

Apart from the low carbon society initiative, KLCH has also embarked on computer application to predict local weather condition three days in advance. With this application, KLCH can prepare all the necessary actions to cope with the irregular weather related hazards to increase city's resilience.

It is a big challenge to KLCH as a comprehensive awareness and outreach programme for all stakeholders is needed.

Based on the projection (base year 2010), a reduction of more than 43% in carbon emissions will be achieved by 2020. But we need to do more with full commitment together, if we were to achieve the 70% reduction target by 2030.


THANK YOU
TERIMA KASIH , DZIĘKUJĘ , DANKE , ありがとう

東京都発表資料
2019年8月23日（本事業のローンチングセレモニー）
東京都の気候変動対策ービルのゼロ・エミッション化に向けて

August 23th, 2019

TOKYO - KUALA LUMPUR LOW CARBON SYSTEM (T2KLLCS)

Tokyo Metropolitan Government

Tokyo Climate Change Strategy

～ Towards Zero Emission Buildings ～

Toshiko CHIBA

Climate Change and Energy Division,
Bureau of Environment,
Tokyo Metropolitan Government

東京都の2030年目標

Tokyo Metropolitan Government

2030 Goals

4.2% increase
2017 preliminary
↓
30% reduction
compared to 2000 levels

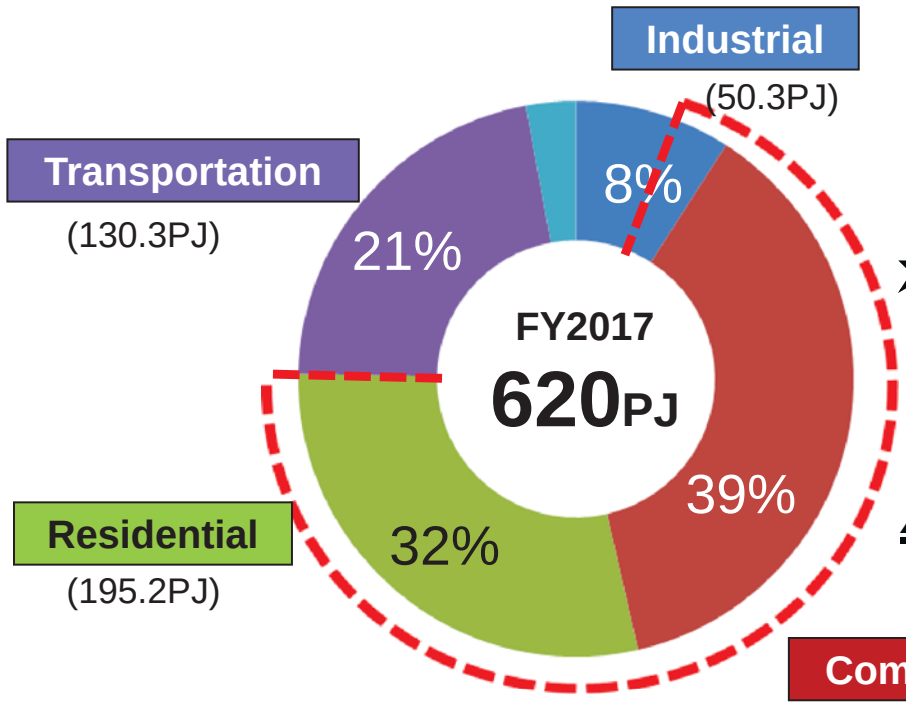
Greenhouse Gas Emissions

23% reduction
2017 preliminary
↓
38% reduction in energy consumption
compared to 2000 levels

Energy Efficiency

東京都のエネルギーシェア（2017年時点）

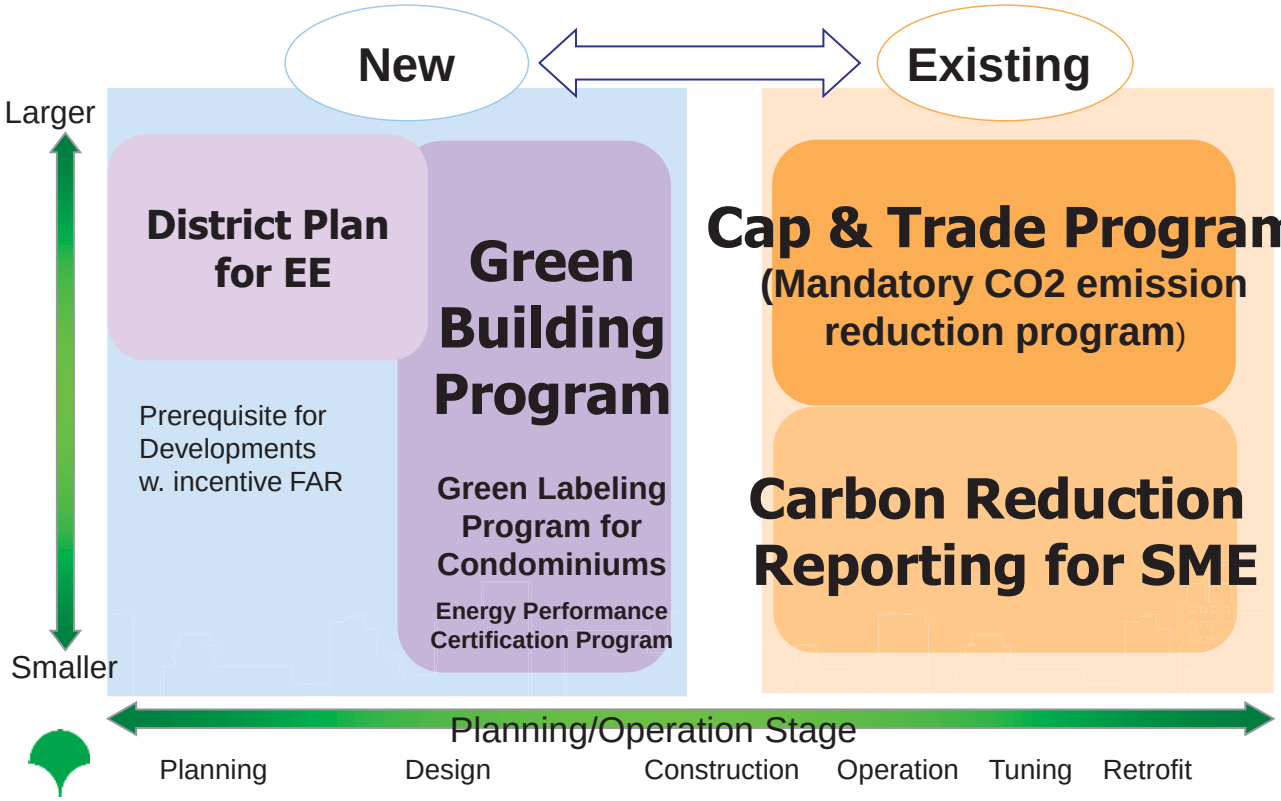
Energy Consumption in Tokyo (2017)



★**Building Sector emits Approx. 70%**

東京都の建物を対象とした気候変動対策

Climate Change Policy Framework for Buildings in Tokyo

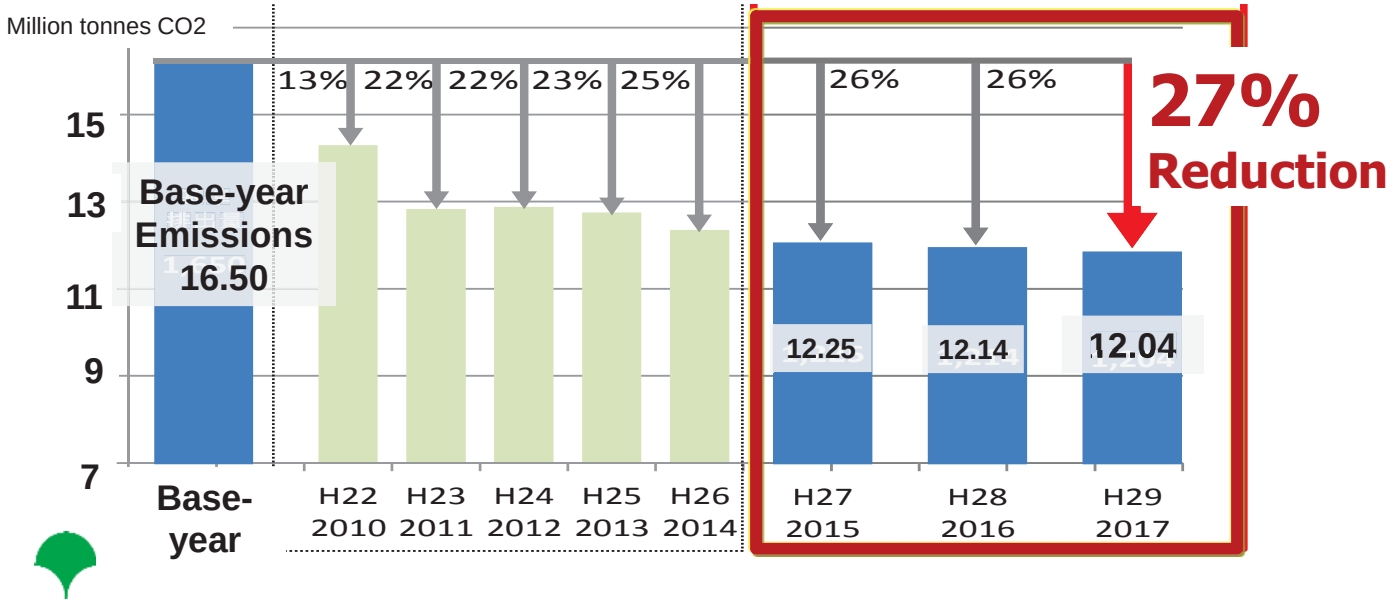


大規模事業所を対象としたキャップ＆トレード制度における削減実績

For Existing Large-sized Buildings

Tokyo Cap-and- Trade Program

- **Mandatory CO2 Reduction Program**
- Launched in 2010 by Tokyo ordinance
- 1200 facilities (office, commercial & institutional buildings, factories)



大規模事業所で取り組まれたCO2削減対策

For Existing Large-sized Buildings

Main Measures for CO2 Reduction

for 2nd compliance Period (2015-2019)

1. Installation of **high-efficiency heat source equipment**
2. Installation of **LED lights**
3. Installation of **high-efficiency air conditioning equipment**
4. Installation of **external air volume control** based on CO2 concentration

Start from Proposer

Initiative
from city government
bringing policy up

1. **Action for TMG properties**
   (measure for public buildings)
2. **Action for TMG city hall**

For TMG properties

都有施設における削減目標

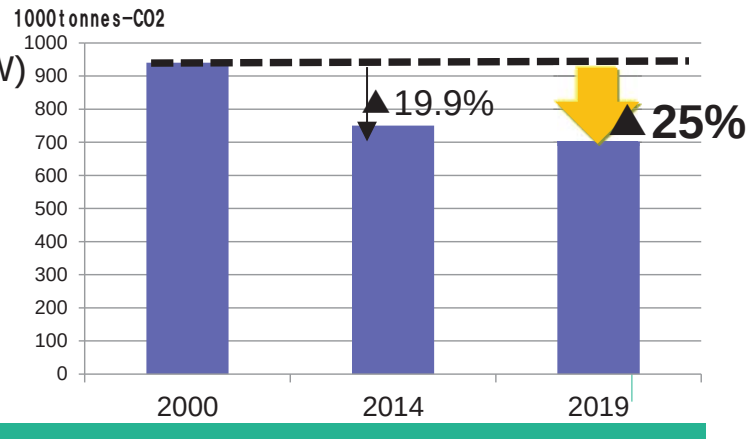
Action for Public Buildings of TMG

✓ **Planning period**: 2015-2019 *revised every 5 years*

✓ **2019goal**

- **25%reduction in GHG** Emissions compare to 2000
- **25% reduction in energy consumption** compare to 2000
- **Installation of new solar power equipment**: 4200kW
  (*Already installed by 2014: 3122kW)

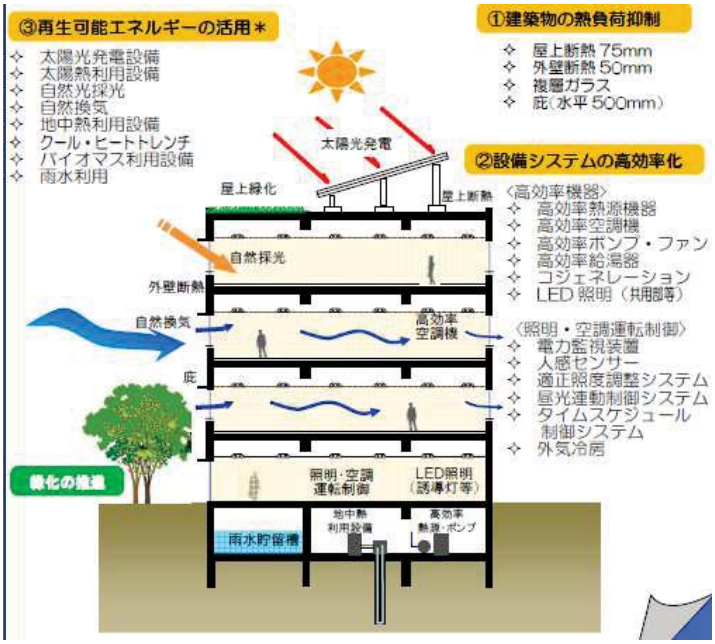
✓ Boundary:
government office
(not include public enterprise)



Polocy1: Highly Energy Efficiency Equipment Installation

◆ Follow the TMG guideline

"TMG guideline on **energy efficiency** and **renewable energy specification**" for **new or renovated buildings**



Polocy2: Energy Efficient Operation

1. Management of light illuminance

・**less than 500 lux** on the desk

2. Efficient management of air conditioning equipment

・Room temperature

With an action "COOL BIZ"

ex. 28℃ for cooling

・Reduce of volume of fresh air

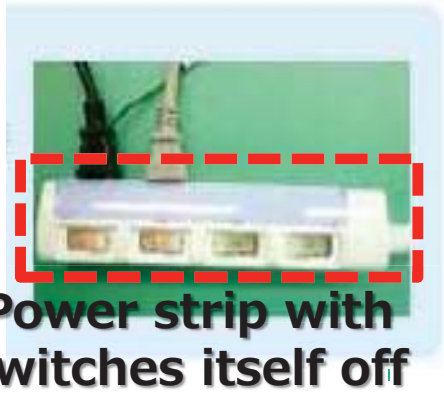
ex. CO2 concentration 900ppm

Polocy2: Energy Efficient Operation

3. Other daily efforts

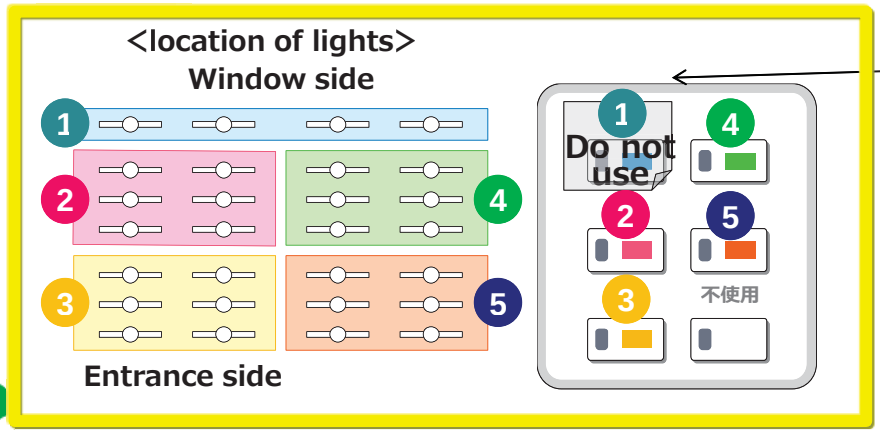
①Utilizing energy saving mode or functions

switching the power off or sleep mode during not used



Polocy2: Energy Efficient Operation

② Place the location of the lights beside the switch for turning off lights when and where not required, and restrain from over use of lights



Placing a cover over the switch that prevents use is also quite effective

Polocy2: Energy Efficient Operation

③Raising awareness for visitors and employees

Posters

Business card

Polocy2: Energy Efficient Operation

④Make sure to check and clean the filters and the outdoor units regularly

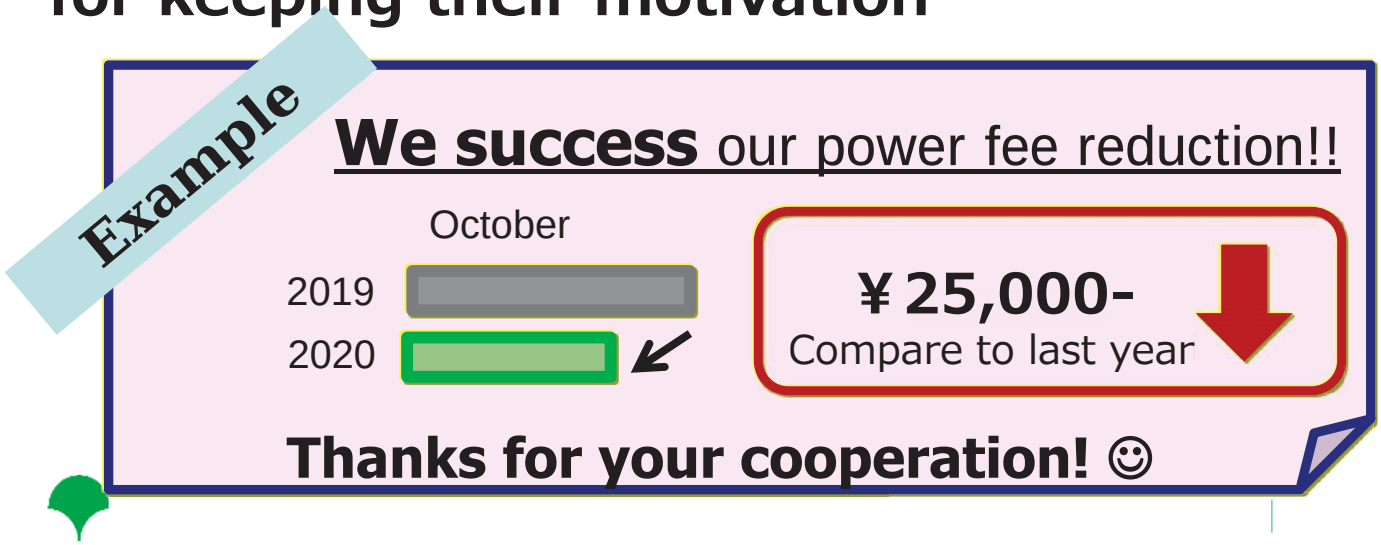
省エネ事例／空調室外機の清掃（フィンコイル）

現状　熱交換器のフィンが目詰まりしていた。

対策実施　フィンを清掃し、風量を確保することで消費電力を削減する。

Polocy2: Energy Efficient Operation

⑤Give feedback the information the effect to employees and visitors for keeping their motivation



Polocy3: Renewable Energy Usage

1. Installation of solar power for new building and retrofit others (solar thermos, ground thermos, passive solar /wind, etc.) are also important, so that we are needed to consider based on the characteristic of location and floor type.

2. Strengthen the renewable power procurement

都庁舎の削減目標

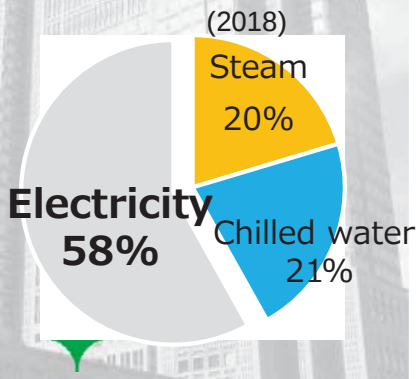
Action for TMG City Hall

30% CO2 reduction

compare to 2000's

<2017 Performance>

Energy share of TMG city hall



"+ action" in 2019

Moving to **100% renewable energy (power) procurement** at City Hall from Aug. 2019

省エネを効果的・継続的に推進するための取組

How to facilitate sustainable and effective energy efficiency

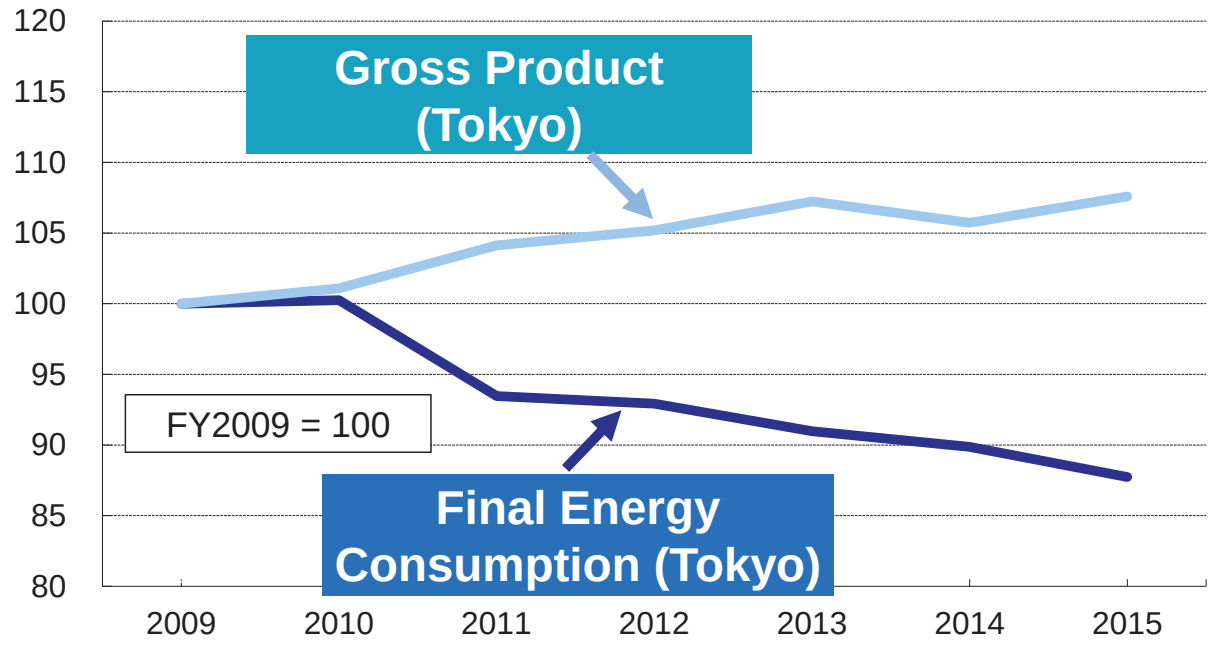
Investment (hardware) + **Management & operation** (soft methods)

Replace with highly efficient equipment, etc

Collaboration

Building management side ⇄ **Employees and visitors**

"Decoupled" Energy Consumption and Economic Growth in Tokyo



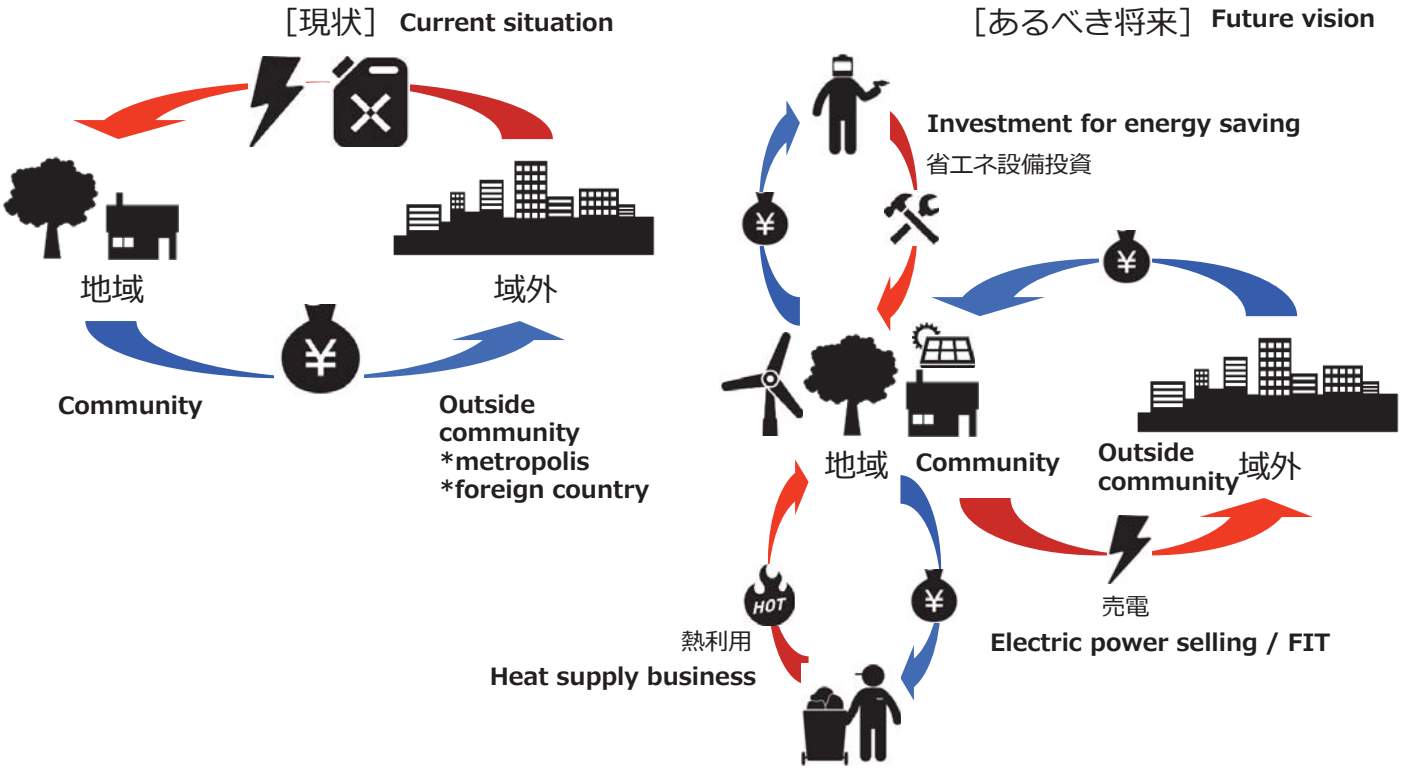
2050年にCO2排出実質ゼロに貢献する
「ゼロエミッション東京」を目指して

Realizing Zero Emission Tokyo by 2050


Towards realizing decarbonized society
TOKYO - KUALA LUMPUR
LOW CARBON SYSTEM
(T2KLLCS)
Bureau of Environment,
Tokyo Metropolitan Government

Mechanism of energy and local economy

地域政策デザインオフィス
Local Policy Design Office



自然エネルギー財団／Renewable Energy Institute

出費があるのなら、初期投資と運用経費どちらが割安でしょうか。

Which is your choice ?

地域政策デザインオフィス
Local Policy Design Office

Their color, design, dimension and room layout are most of the same.

A

Building cost
¥ 20,000,000

Energy cost
¥ 200,000/year

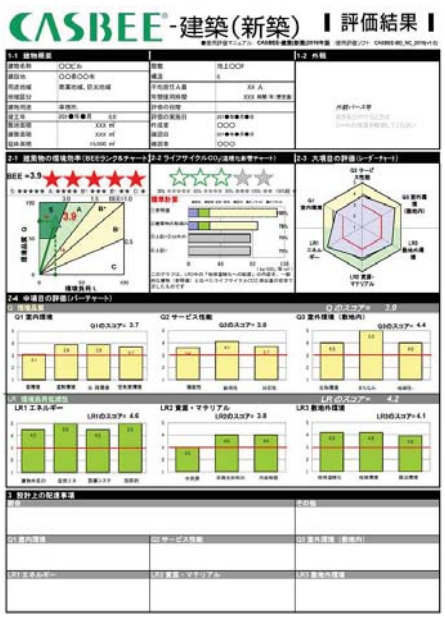
B

Building cost
¥ 22,000,000

Energy cost
¥ 100,000/year

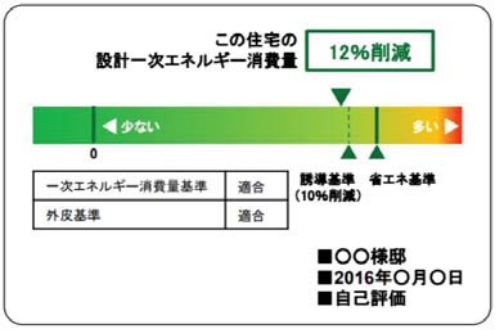
エネルギーコストと環境へのインパクトを分析するツール

They use assessment tools for energy cost or environment effect.



CASBEE

Energy Pass

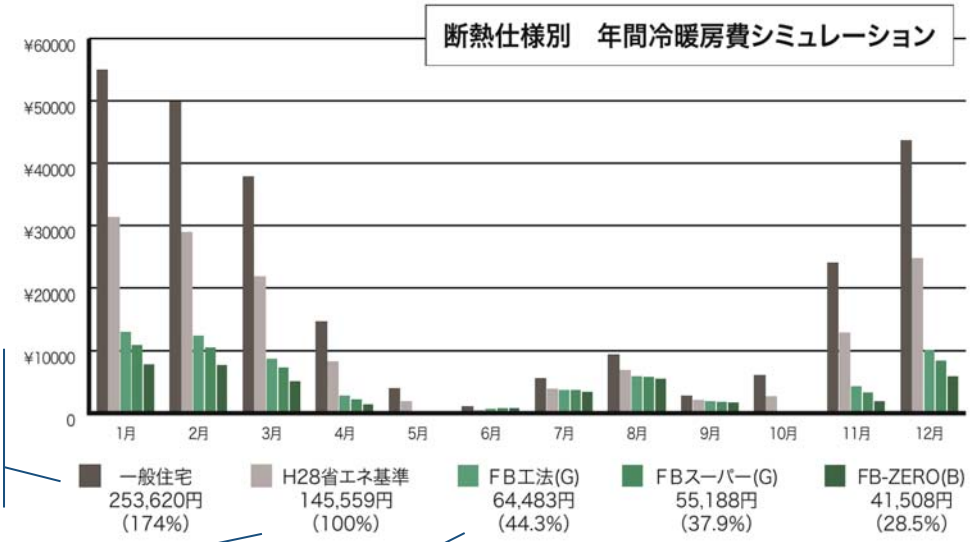


Primary Energy Calculating Program

長野県の事例:ホクシンハウス

Nagano case : Hokushin House Co.

地域政策デザインオフィス
Local Policy Design Office



Energy Cost in Nagano
Mid-level
¥253,620/year

National Energy Saving Model
¥145,559/year

Hokushin House
Low-level Model
¥64,483/year

Hokushin House
Mid-level Model
¥55,188/year

Hokushin House
High-level Model
¥41,508/year

http://www.hokushinhouse.com/

田中信一郎「信州はエネルギーシフトする」

Best Practice in Tokyo

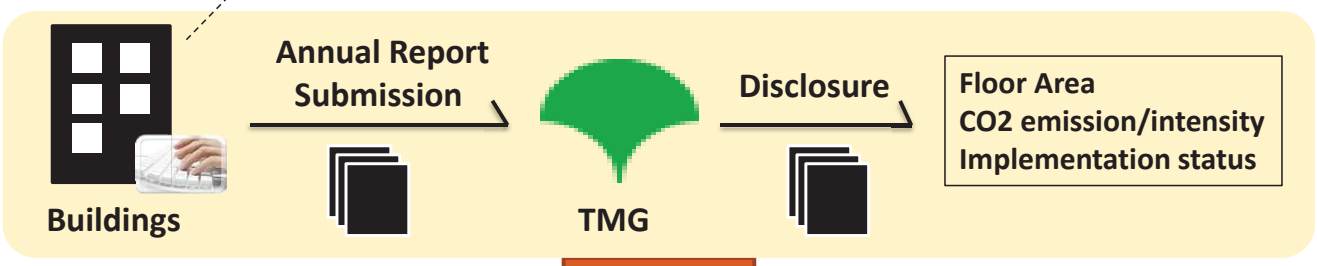
- Tokyo Metropolitan Government (TMG) has operated Carbon Reduction Reporting Program for mid-small scale buildings, which aims to enhance mitigation actions.
- The program asks buildings to monitor and report their CO2 emission as well as mitigation actions taken by owners and/or tenants.

1. Energy Consumption and CO2 Emission in Previous FY

- Calculate CO2 emissions from previous FY's fuel, energy, electricity, water and sewerage use

2. Mitigation Actions Taken in Previous FY

- Choose measures taken from 255 option menu which has been categorized by TMG

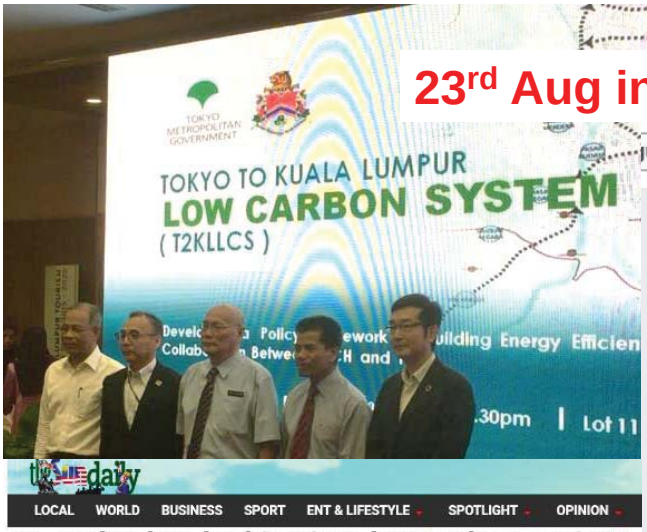


Continuous Efforts on the Global Warming Measures

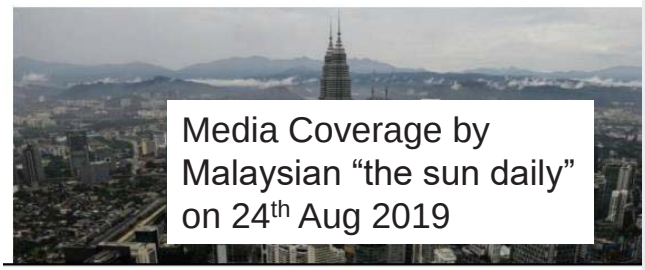
- Realize continuous understanding/management of energy consumption
- Continuous efforts and improvement on the global warming measures

CO2 Emission Reduction (10% reduction has achieved)

23rd Aug in KL



KL and Tokyo looking into low carbon society collaboration



Media Coverage by Malaysian "the sun daily" on 24th Aug 2019

KL市の2030年目標は炭素強度の70%削減

気候変動行動計悪をUTMとIGESとで作成

気候変動対策と2030開発アジェンダの両方を目指す國と都市が目指す

NDCs: National Determined Contributions

LDCs: Locally Determined Contributions

+

VLR: Voluntary Local Review

VNR: Voluntary National Review

Sustainable Energy Low Carbon Building Assessment System (GreenPASS) and Building Energy Data Online System (BeDOS)

- How SEDA Malaysia can support DBKL's Low Carbon Building Program (Data collection for Building Sector).

Steve Anthony Lojuntin
Director, Technical Development & Facilitation
Sustainable Energy Development Authority (SEDA) Malaysia

Tel : +6019-2829102
steve@seda.gov.my / asetip@damansara.net

15 January 2020

CONTENT

a) SEDA Malaysia current initiatives under the Low Carbon Building Facilitation to State, Local Authorities (PBTs) and building industry.
b) How SEDA Malaysia can assist and facilitate DBKL using SEDA Malaysia's initiatives and tools.

SEDA MALAYSIA
SUSTAINABLE ENERGY PROGRAM

SUSTAINABLE ENERGY

RENEWABLE ENERGY
- Solar Photovoltaic
- Biomass
- Biogas
- Small Hydro

i. Feed-In Tarif
ii. Net Energy Metering (NEM)
iii. Self-consumption (SELCO)

ENERGY EFFICIENCY
- Energy Conservation
- Energy Efficiency
- Energy Management

i. Energy Audit
ii. Sustainable Low Carbon Building Facilitation
iii. Low Carbon Building Certification – GreenPASS

SUSTAINABLE ENERGY INTEGRATED PROGRAM
i. Trainings & Capacity Building
ii. Technical experts & facilitation
iii. Sustainable Energy Low Carbon Development
iv. Zero Energy Building Facilitation Program.

政府向けのプログラム

SEDA MALAYSIA's LOW CARBON BUILDING FACILITATION PROGRAM
(For PBTs & States Government

➢ Any activities under the current SEDA's Program;

- ✓ Energy Efficiency / Energy Management program.
- ✓ Monitoring and Verification (setting target and annual assessment).
- ✓ Building Energy Data Online System (BeDOS) for data collection program.
- ✓ Online energy & power monitoring system .
- ✓ Energy Audit and Retrofitting program.
- ✓ Low carbon green building design input & management (new buildings).
- ✓ Awareness program & promotion.
- ✓ Development of Common Carbon Metric (CCM) for various building topology.
- ✓ Data repository on carbon emission from building sectors.
- ✓ Building performance assessment using GreenPASS.
- ✓ Development of EE performance based incentive.
- ✓ Zero Energy Building (ZEB).
- ✓ Solar PV Net Energy Metering (NEM).

ビルの低炭素化に役立つサービス

Sustainable Energy Low Carbon Building Facilitation Offered by SEDA

- Development Data & Inventory carbon reduction in building sector.
- Development of Common Carbon Metric for various type of building topology.
- Development of Low Carbon Building program.
- Sharing data & information.
- Capacity buildings

グリーンビルディングの認証制度

greenPASS performance assessment system

SUSTAINABLE ENERGY LOW CARBON BUILDCING ASSESSMENT

by SEDA Malaysia

ゼロ・エネルギー・ビル　認証制度　グリーンパス

Sustainable Energy Low Carbon Building / Zero Energy Building : LCB - GreenPASS Certification

Rating Classification

The table belows shows SEDA LCB – GreenPASS Assesment and their respectives diamond rating scores;

TOWARDS CARBON NEUTRAL — TOWARDS ZERO ENERGY (ZEB)

Level of Achievement (% of CO_2e Reduction)	Assessment Scheme for buildings (diamond)	Proposed ZEB Scheme *
100% Carbon Neutral	6	Net ZEB (NZEB)
≥ 70 to < 100	5	Near ZEB (nZEB)
≥ 50 to < 70	4	Ready Towards ZEB
≥ 30 to < 50	3	
≥ 10 to < 30	2	
≥ 1 to < 10	1	

GreenPASS = CIDB's Construction Industry Standard (CIS) 20 : 2012

グリーンパスの証明書

Low Carbon Building GreenPASS Certification

GreenPASS join certification by SEDA – Local Authority

GreenPASS certification by SEDA

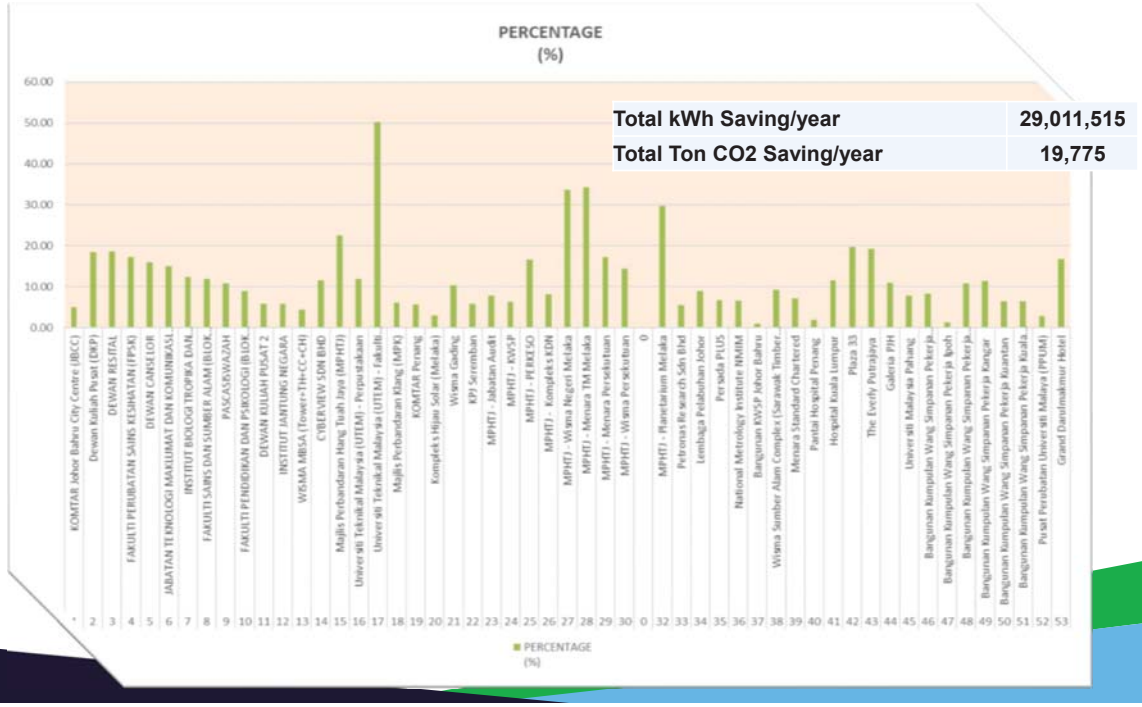
Low Carbon Building GreenPASS Certification Event with PBT

Handing over GreenPASS certificate to building owners

二酸化炭素削減量を示すデータ

Carbon Reduction Data

Low Carbon Building Assessment GreenPASS



Total kWh Saving/year	29,011,515
Total Ton CO2 Saving/year	19,775

ビルのエネルギーデータを管理するオンラインシステム

Building Energy Data Online System (BeDOS)
by
SEDA Malaysia

BEDOS

www.seda.gov.my/bedos

ビルのオンラエネルギーデータのオンライン管理システム

Building Energy Data Online System (BeDOS)

MULTI PURPOSE APPLICATIONS

ONLINE APPLICATION FOR GREENPASS CERTIFICATION

i. Yearly Certification.
ii. Self assessment and simulation of potential GreenPASS rating achieved.
iii. Apply GreenPASS certification

DATA COLLECTION

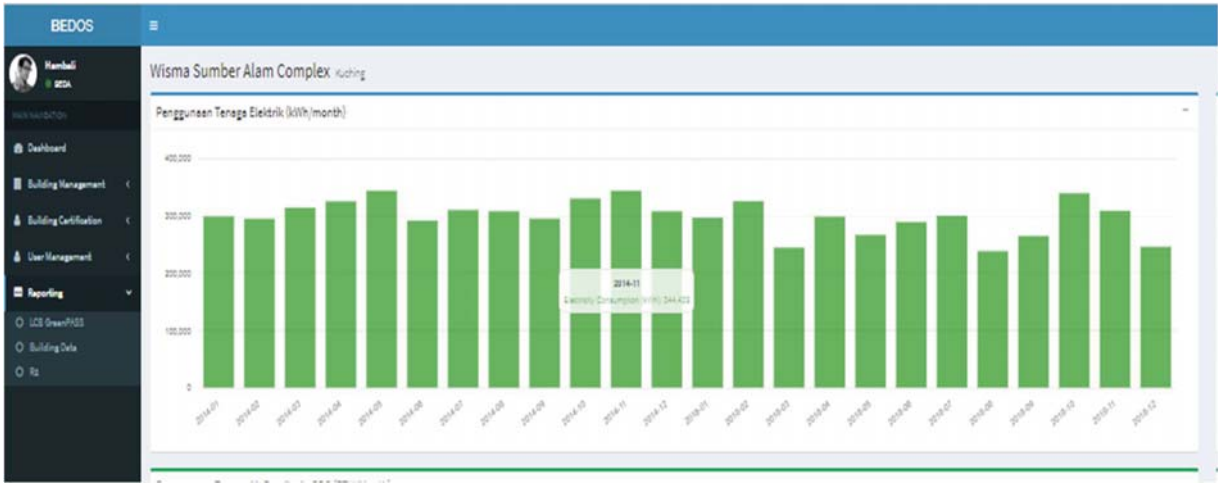
i. Monthly data collection, submitted by building owners or their maintenance.

ENERGY MANAGEMENT & REPORTING PROGRAM

i. Routine energy monitoring activities.
ii. Operation & maintenance

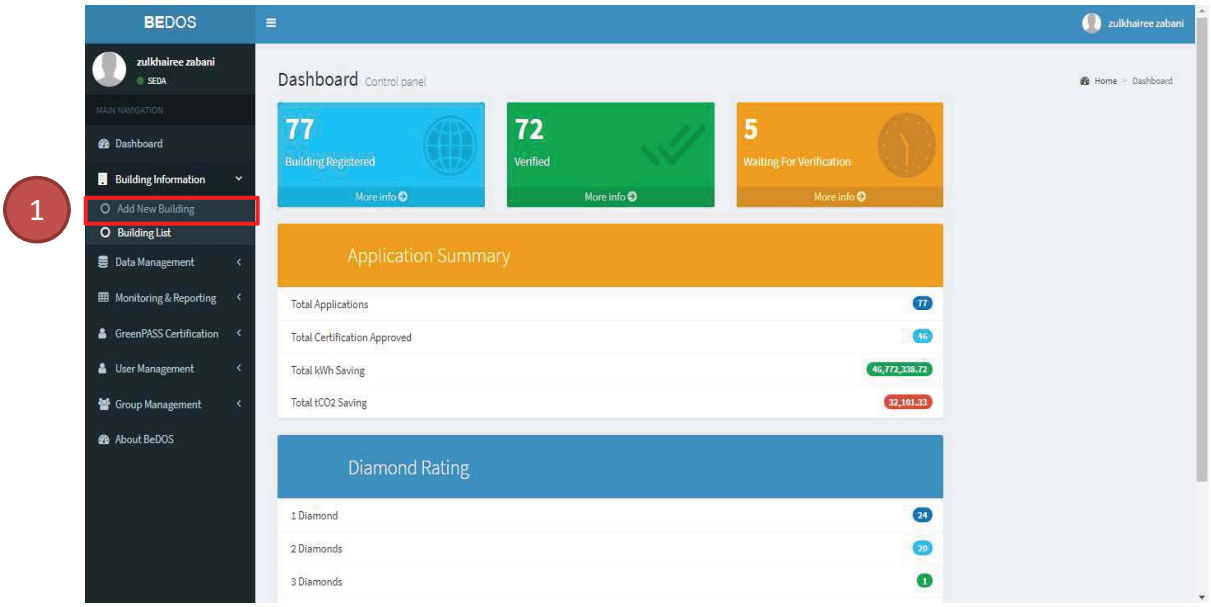
Building Energy Data Online System (BeDOS)

- To encourage users to self key-in Baseline & Current Data to apply Green PASS certification.
- Provides analysis and GreenPASS Rating achieved for certification.
- Historical Baseline and current performance.



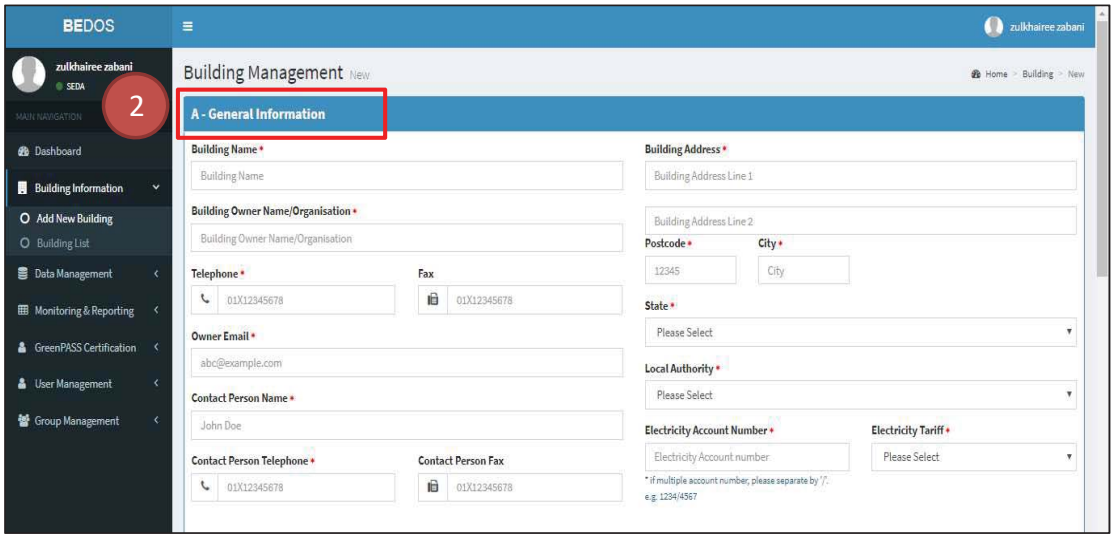
PART B

FILL IN YOUR BUILDING INFORMATION

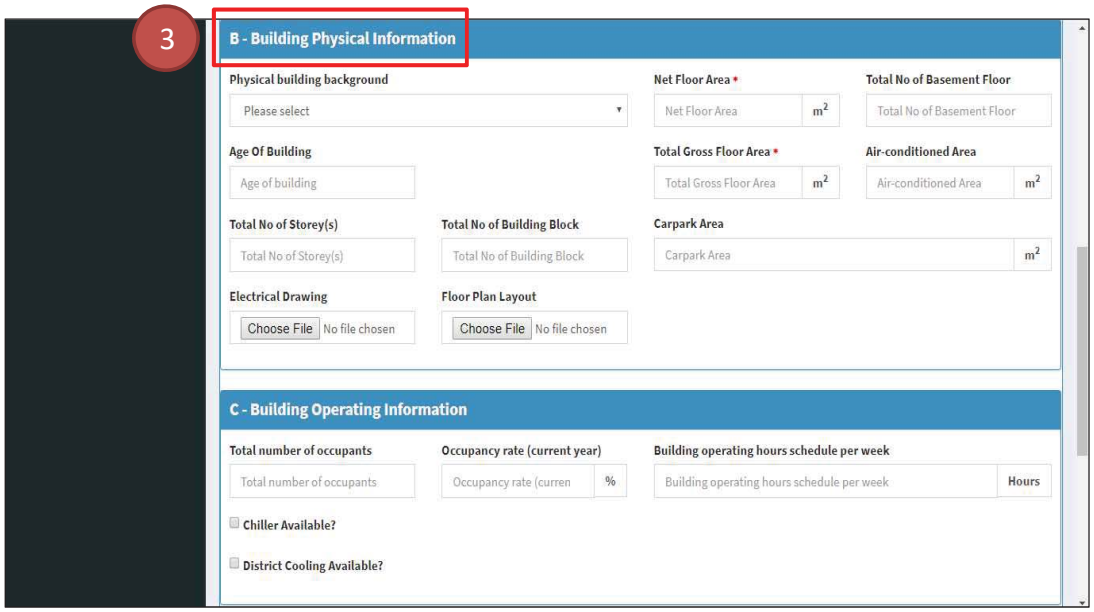


1

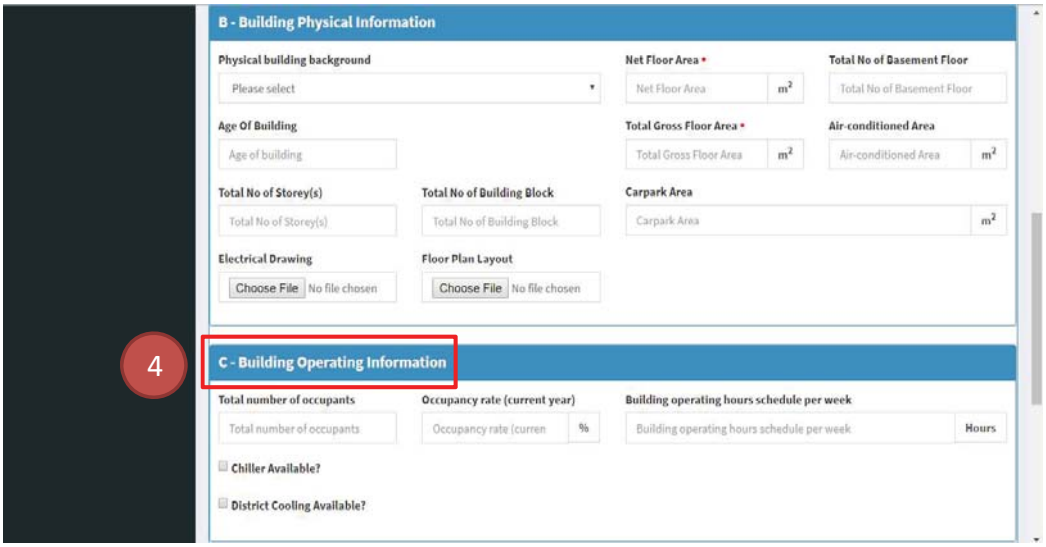
Upon logging into BEDOS, click the **Building Information** tab and select ①**'Add New Building'** to fill in required information of the building that is to be registered



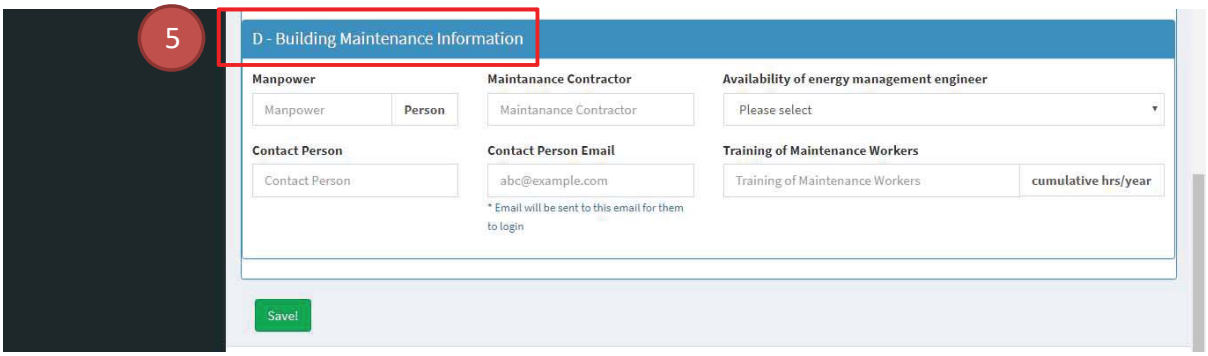
The primary information needed is the building's ②**General Information** such as **Building Name**, **Building Address** and **Contact Person details**. All the information with red starred(*) are compulsory



Part B includes ③**Building Physical Information** such as **Net Floor Area, Age Of Building, Total No of Storey(s)** etc. All the information with red starred(*) are compulsory



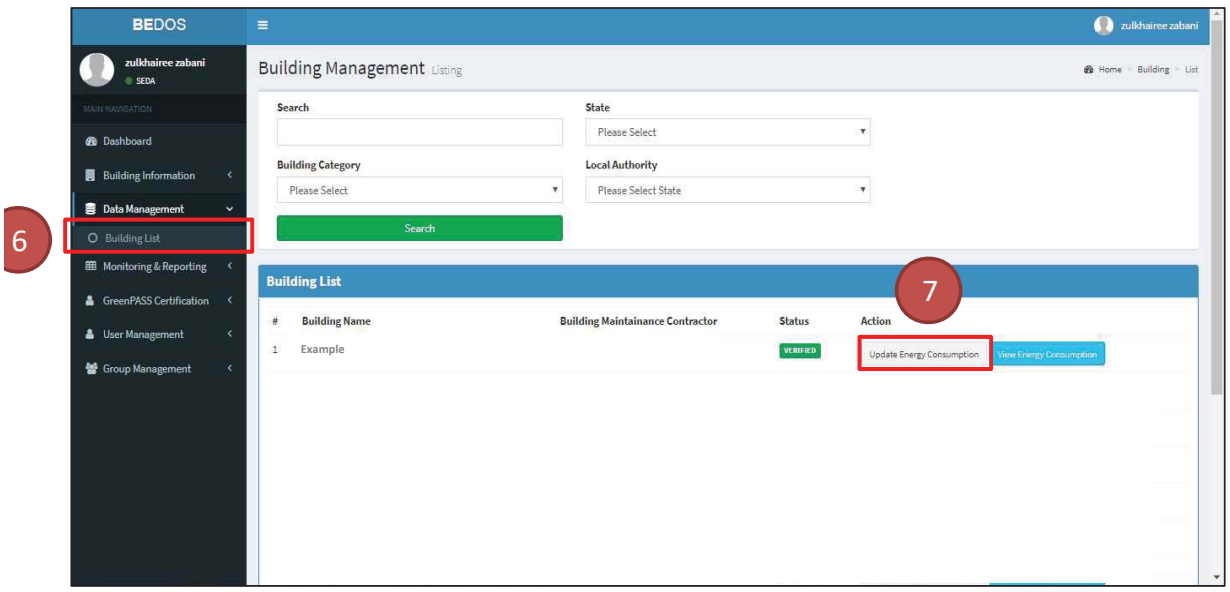
Part C indicates ④**Building Operating Information** such as the **Total number of occupants** and **Building operating hours schedule per week**



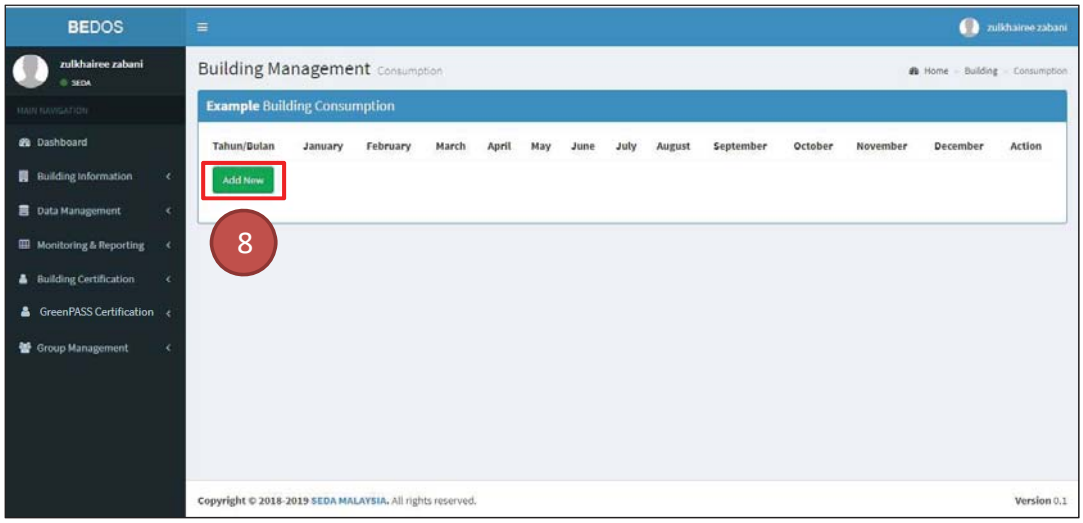
Part D includes ⑤**Building Maintenance Information**. Once this section is completed, click **'Save!'**

PART C

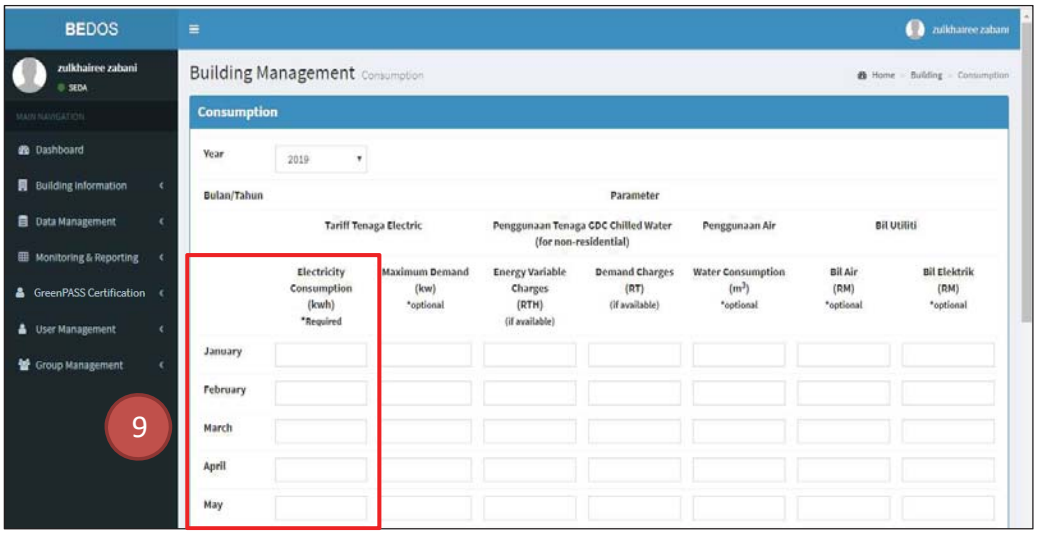
FOR DATA MANAGEMENT



Next, select ⑥**'Building List'** under the **Data Management** tab. Then, click on the ⑦**'Update Energy Consumption'** to fill in your monthly data consumption



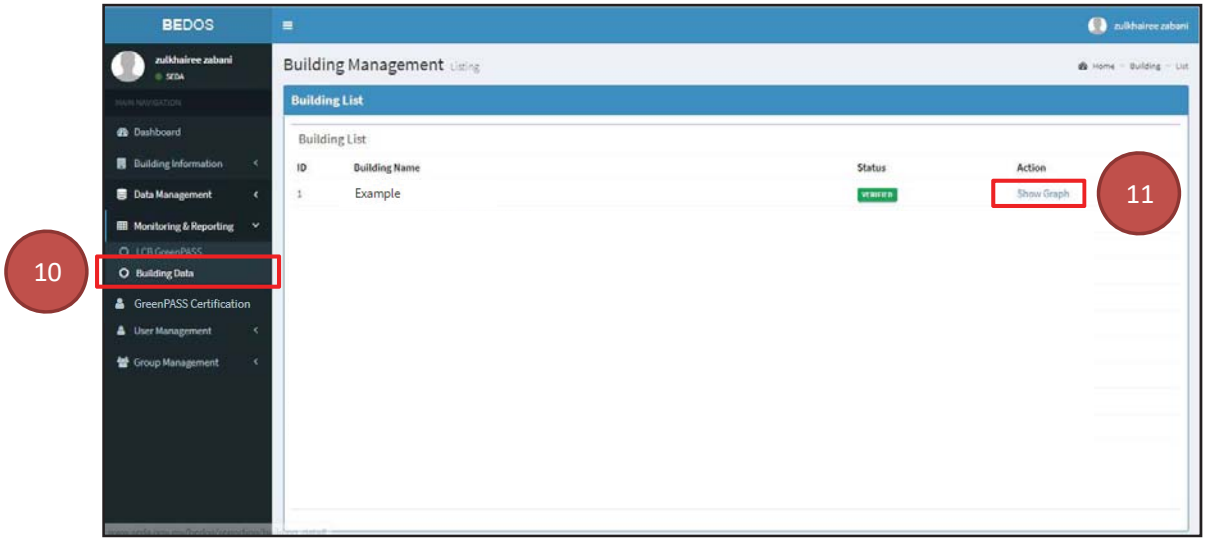
Select ⑧**'Add New'** to start key in your monthly data consumption



In this section, monthly ⑨**Electricity Consumption(kwh)** of the target year and baseline year is to be filled up. Then, click **'save!'** to save your data in the system

PART D

FOR DATA MONITORING AND REPORTING



In order to monitor your building data, click on ⑩**'Building Data'** under the **Monitoring & Reporting** tab. Then, select ⑪**'Show Graph'**

All these graph will be displayed on your screen and show all the data that you want. Now, you can start monitoring your building data

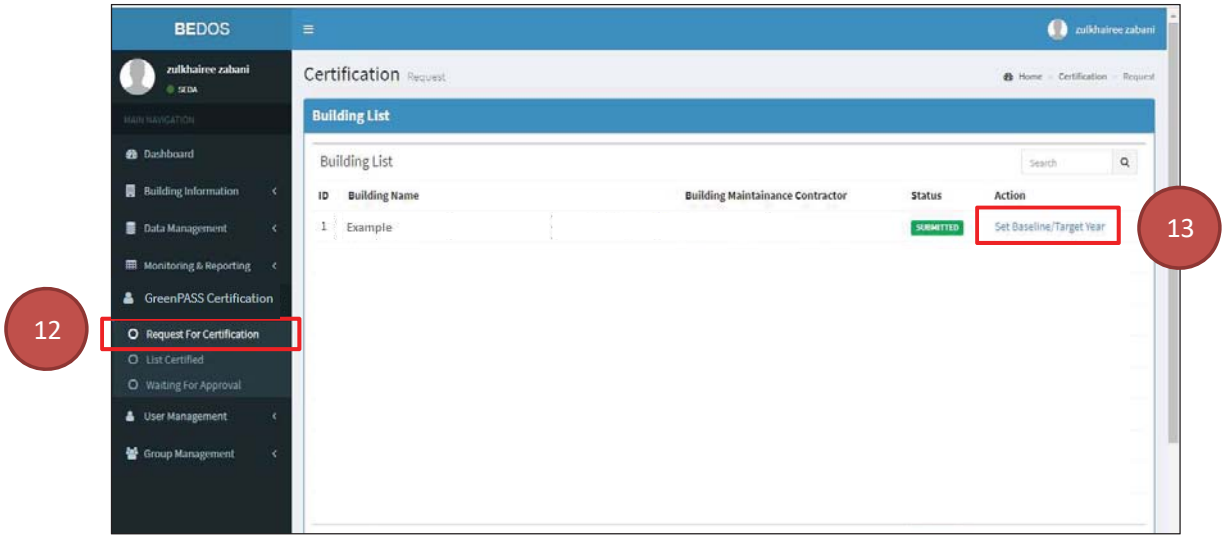
PART E

FOR CERTIFICATION PURPOSES

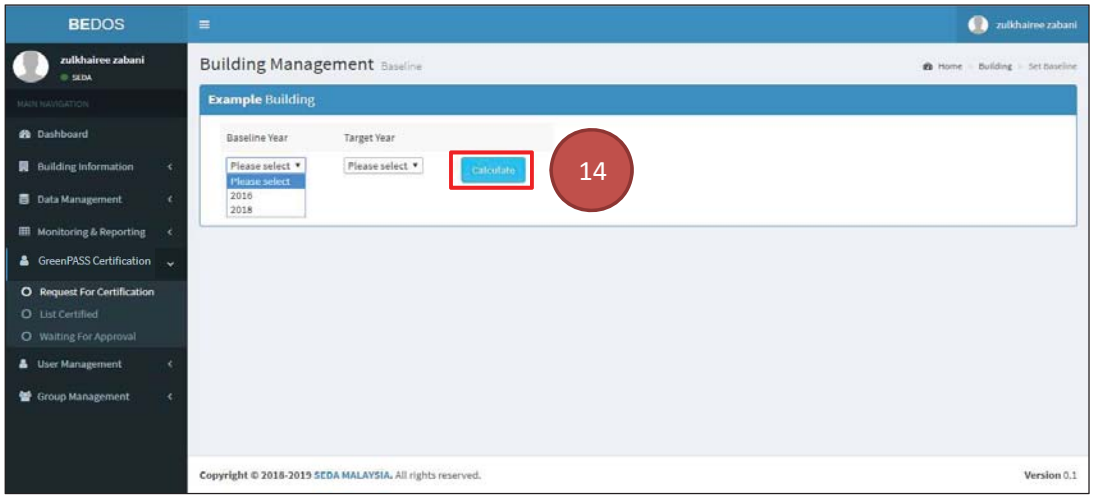
BEDOS

greenPASS performance assessment system

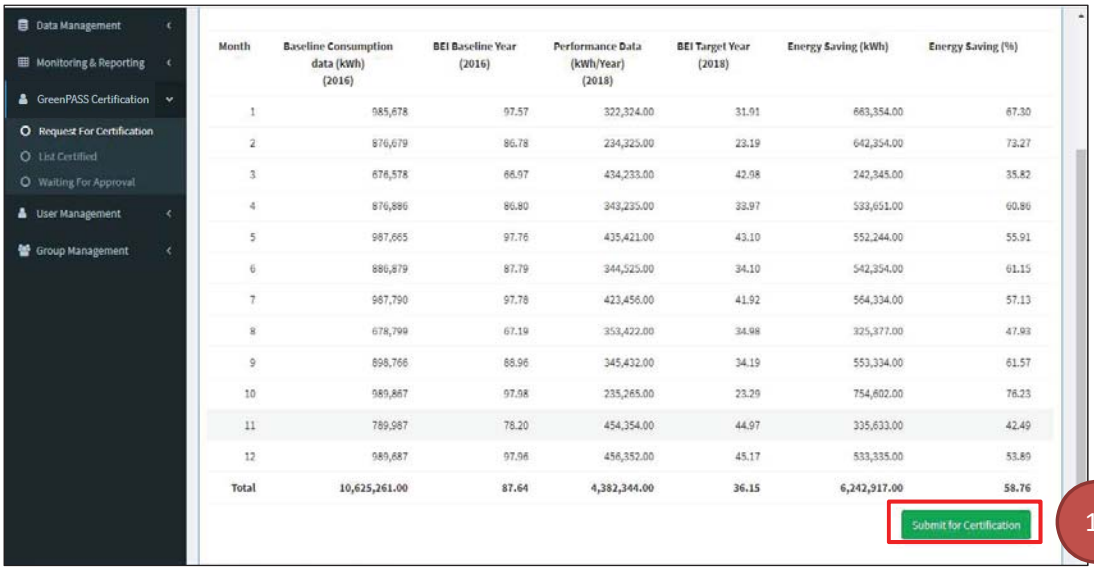
SUSTAINABLE ENERGY LOW CARBON BUILDCING ASSESSMENT



Next, under the **GreenPASS Certification** tab, select ⑫**'Request For Certification'**. Proceed to click on ⑬**'Set Baseline/Target Year'** placed in the action column for the building that has been registered



Select the relevant **Baseline Year** and **Target Year** then click on ⑭**'Calculate'**. The system will then proceed to calculate the energy savings that has been achieved based on the baseline and target year selected.

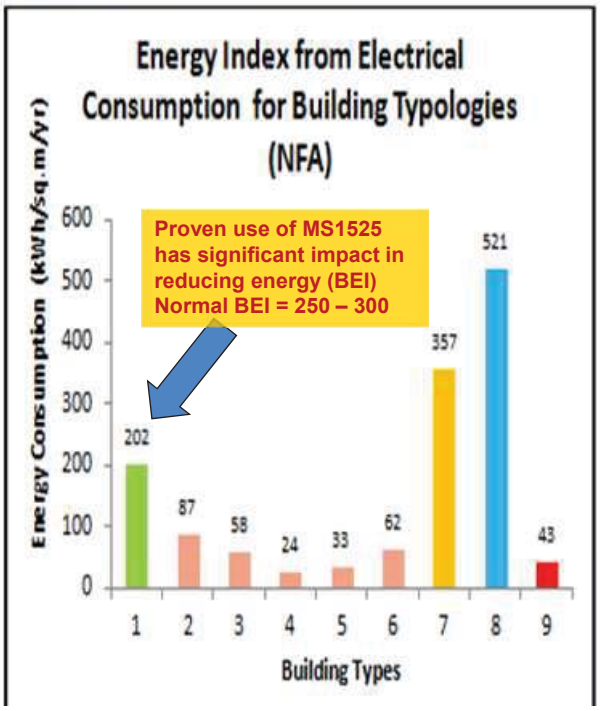


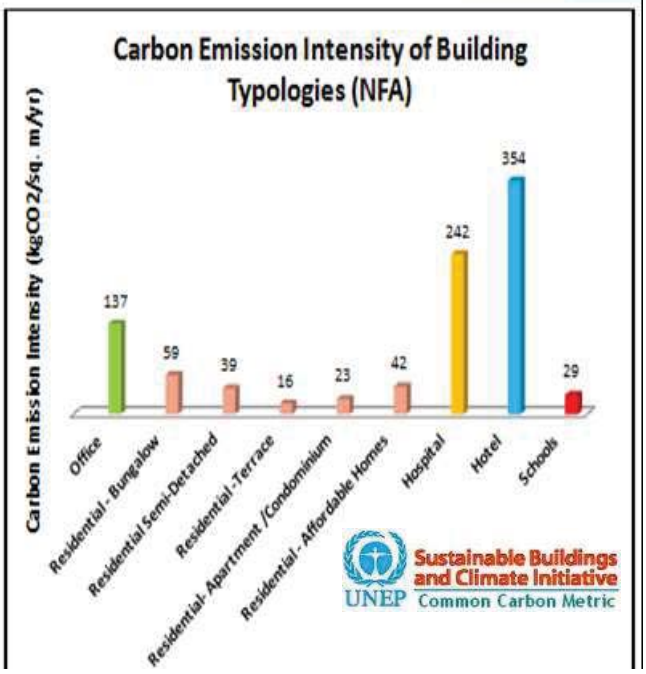
The final step is to select ⑮**'Submit for Certification'**. The registration process is now complete. An email will be sent to the contact person once it is approved. The name of the building will be placed in the certified list of buildings

Common Carbon Metric (CCM) for Building Sector for Various Type of Building

Building Energy Index and Carbon Emission Intensity for Building Typologies

In PUTRAJAYA





Access

DBKL ADMIN
(Can see, create, monitor)

DBKL 1	DBKL 2	DBKL 3	IDB
i. Account dedicated for DBKL1.	i. Account dedicated for DBKL2.	i. Account dedicated for DBKL3.	i. Account dedicated for DBKL IDB.
ii. Can see own building data only.	ii. Can see own building data only.	ii. Can see own building data only.	ii. Can see own building data only.
iii. To be keyin by person incharge / maintenance .	iii. To be keyin by person incharge / maintenance .	iii. To be keyin by person incharge / maintenance .	iii. To be keyin by person incharge / maintenance .

ACCESS

Thank you for your attention

NEED HELP ON LOW CARBON GREEN BUILDING PROGRAM / ZERO ENERGY BUILDINGS?

- Tel / SMS / WhatApps: +6019-2829102

steve@seda.gov.my / asetip@damansara.net

SEDA Malaysia,
Galeria PjH, Level 9
Jalan P4W, Persiaran Perdana,
Presint 4, 62100 Putrajaya, Malaysia.

Steve Anthony Lojuntin

Phone : +603-8870 5800 / 5841
Email: steve@seda.gov.my
Web: www.seda.gov.my

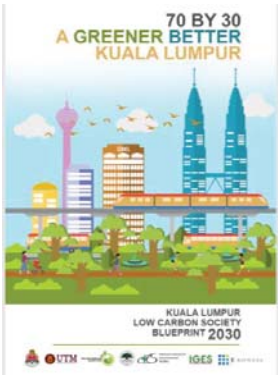
KUALA LUMPUR CITY HALL ENERGY REDUCTION POTENTIAL

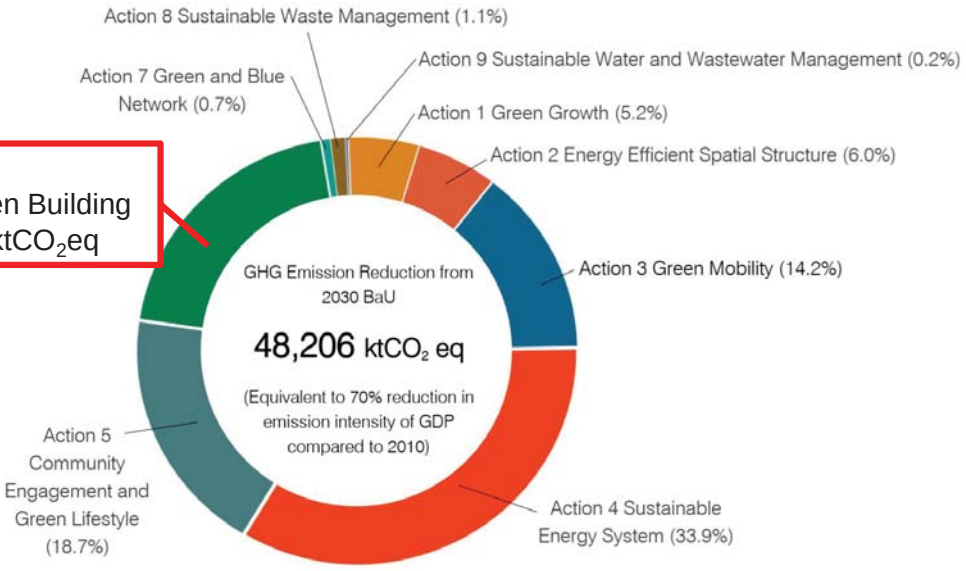
29 JULY 2019

1

BACKGROUND

Buildings contribute to 49% of total GHG emissions in Kuala Lumpur





DBKL Buildings by Type

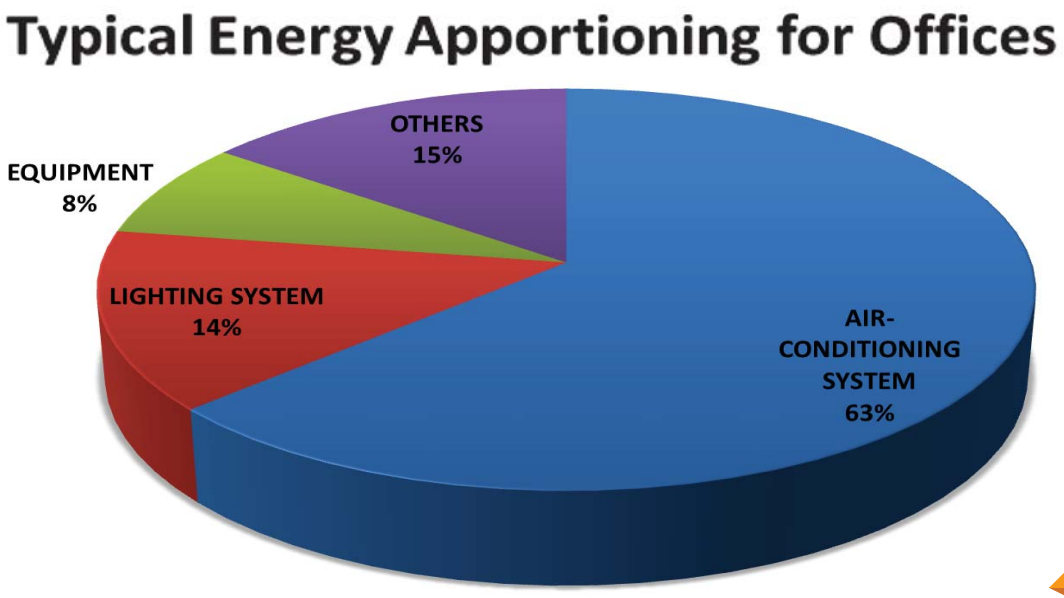
No	Type of Building	No. of Buildings	Data Given
1	Quarters	1,063	0
2	Offices	35	13
3	Clinic for Pregnant Women & Children	15	0
4	Library	8	0
5	Building under *NADI*	13	0
6	Building under *Jabatan Penilaian & Pengurusan Harta*	592	0
7	Guesthouse	23	0
8	Public Toilet	34	0
9	Market	38	0
10	Hawker Centre	45	0
11	Kiosk	26	0
12	Community Centre & Multipurpose Hall	30	0
13	Stadium & Sport Complex	15	0
14	Park	16	14
15	Others	2	0
	Total	**1,955**	

2

PRELIMINARY ANALYSIS

	Scenario 1					Scenario 2				
	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO_2 Reduction ($kgCO_2e/yr$)	% CO_2 Reduction	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO_2 Reduction ($kgCO_2e/yr$)	% CO_2 Reduction
Offices (13/35 buildings)	15,870,384	3,808,892	1,587,038	3,744,776	35	15,870,384	4,761,115	1,587,038	4,405,619	47
Parks (14/16 parks)	36,005,220	5,400,783	7,201,044	8,745,668		36,005,220	10,801,566	7,201,044	12,493,811	
Total	51,875,604	9,209,675	8,788,082	12,490,444		51,875,604	15,562,681	8,788,082	16,899,430	
Assumptions (Offices)	❑ CO_2 Conversion is based on 2014: Baseline CO_2 for Peninsular - 0.694 tCO_2/ MWh ❑ Building Energy Index (BEI) for Offices is based on BEI and Common Carbon Metric Study in Putrajaya (2010) ❑ Estimated 10% of Contribution from Renewable Energy is based on estimated roof space of the building									
	❑ Estimated 24% potential reduction is based on potential average energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan					❑ Estimated 30% potential reduction is based on average of highest range energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan				
Assumptions (Parks)	❑ CO2 Conversion is based on 2014: Baseline CO_2 for Peninsular - 0.694 tCO_2/ MWh									
	❑ Estimated 15% potential reduction is based on conservative assumption ❑ Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway					❑ Estimated 30% potential reduction is based on stretch value of possibility with the consideration of best technology available (higher effort and higher investment) ❑ Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway				

TYPICAL OFFICE ENERGY APPORTIONING



3

POSSIBLE TECHNOLOGY IMPLEMENTATION

POSSIBLE TECHOLOGY IMPLEMENTATION

Building Envelope	1	Infiltration - Airtight Building Envelope
	2	Reduce Direct Sunlight - Shading, Window Blind
	3	Insulation - Green Roof, Roof Insulation, Wall Insulation, Window Tinted, Window Glass
Air-Conditioning System	4	Outdoor Air Ventilation Control
	5	Zoning & Control of Air Distribution System - VAV, Temperature & Humidity Control, Setback & Shut-off Control, Off-hour control
	6	High Efficiency Fan System
	7	High Efficiency Air Filtration
	8	Effective Piping & Ducting Insulation
	9	High Efficiency Unitary Air Conditioning System - Single Split, Package, Multi Split, VRF
	10	High Efficiency Centralized Air Conditioning System - Chiller, Hydronic System, Cooling Tower
	11	Control of Centralized Air Conditioning System - Automation & Optimization
Lighting	12	Lighting Control - Daylight Control, Illuminance Control, Zoning Control, Motion Control, Off-hour Control
	13	High Efficiency Lighting System - Indoor & Outdoor
Energy Management Control System	14	Control of Equipment, Monitoring of Equipment, Integration of Equipment and Other Sub-systems, Energy related Data Collection and Analyses
Renewable Energy	15	Solar PV

4

SUMMARY

BENEFITS UP TO BASED ON 2nd SCENARIO:

16,899,430 kgCO_2e/year

CO_2 EMISSION REDUCTION

24,350,764 kWh/year

ENERGY SAVING

= approx. MYR **9.74** million!

47%

CO_2 EMISSION IMPROVEMENT

THANKS!

運用対策の重要性

The Importance of Good Building Operation Management

・Good collaboration between building management officers and users is essential to promote effective and continuous energy saving actions

Investment (hardware) + **Management & operation** (soft methods)

Replace with highly efficient equipment, etc.

Collaboration

Building management side  **Employees and visitors**

運用対策の効果的な進め方

Effective operational measures

・Cost effective measures to save energy can be achieved from the actions of the officials.

・It is crucial to continue to improve through a PDCA cycle and by institutionalizing energy saving.

Steps for operational measures

① Develop energy saving manuals & checklists

② Institutionalize energy saving (share information between section heads, status)

③ Correctly perceive the reality (self checking by checklists)

④ Analyze the results (achievement levels, issue-mining)

⑤ Set targets for energy saving activities (improve energy saving activities)

⑥ Carry out energy saving measures ⇒③

P D C A

省エネマニュアル、チェックリストの整備

① Energy saving manuals & check-lists

・Building operations manager should develop energy saving manuals, operation procedures and self-checklist (for civil officers).

・Manuals, operation procedures could serve as reference for self-checking.

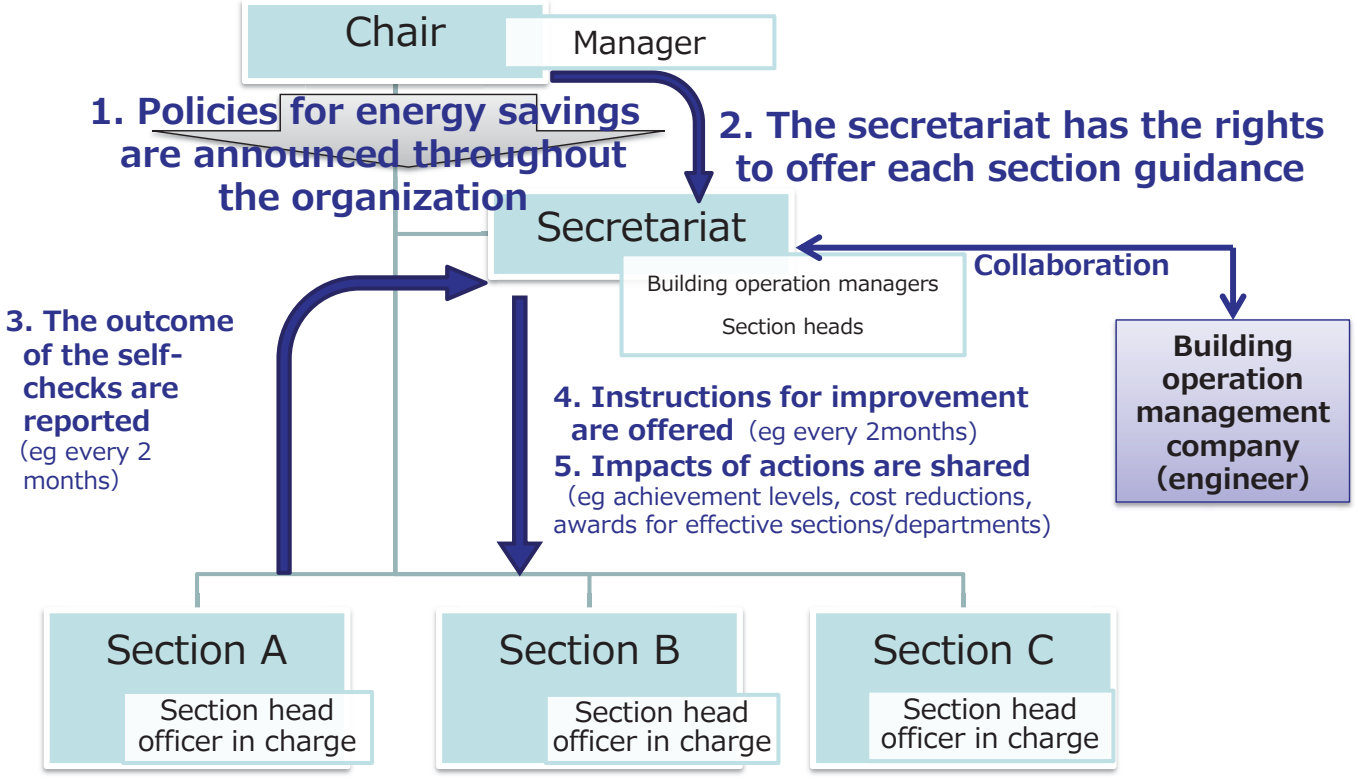
＜Example of a checklist for self-checking＞

Item	Practiced		Not practiced	N/A	Execution rate
Setting ○○	For the whole floor				
	For 50% of the floor				
	For 20% of the floor				
Switching off ○○	For the whole floor				
	For 50% of the floor				
	For 20% of the floor				
…					

省エネ推進体制の整備（責任者の配置、状況の共有）

②Institutionalization of energy saving

(Sharing information between section heads, status)



Section head : The person responsible for the activity within the section
Officer in charge : The officer in charge of conducting the activity (self-checks)

③ Correctively perceive the reality (self checking by checklists)

- The officer in charge checks the status of his/her section
- A common checklist for self-checking is used
- Numerical targets such as execution rates are used which will allow the officer to evaluate the status and recognize the issues even without technical knowledge

<Example of a checklist for self-checking>

Item	Practiced		Not practiced	N/A	Execution rate
Setting ○○	For the whole floor	○			100%
	For 50% of the floor				
	For 20% of the floor				
Switching off ○○	For the whole floor				50%
	For 50% of the floor	○			
	For 20% of the floor				
…					

④Analyze the results (achievement levels, problem mining)

- Analyze their own checklist and identify measures to counter their issues（eg. Check which items have not exceeded 95% = work on those specific items)
- Report the self-check results to the secretariat

  ⇒ The secretariat conducts comparative studies and offers pointers for improvement

<Example of an evaluation>

Status	Levels	Criteria
Good	5	Over 95% is practiced
	4	Over 70% and less than 95% is practiced
	3	Over 30% and less than 70% is practiced
	2	Over 5% and less than 30% is practiced
Bad	1	Less than 5% is practiced

⑤ Set targets for energy saving activities（improve energy saving activities）

・Target setting is conducted according to the results to the self checks

・The targets are satisfied if all of the planned actions / measures are implemented (target is completed)

⇒ move on to new actions and higher achievement levels

<Example for target setting>

<Policies set by the Chair>

All energy saving actions itemized in "step 1" reach level 5 within a year

The secretariat should develop the Targets

PDCA cycle	Target
6 months	【Interim target】 All items reach **level 3 or higher**
12 months	【Final target】 All items reach **level 5 or higher**

⑥ Carry out energy saving actions

"immediate implementation"

・Once the functions are set, it is not required for a second time. Immediate action is favored.
・carry out the actions immediately and notify the official in charge when completed　⇒ report goes to the secretariat

Action / Measures	By whom
○ PC is set at an energy saving mode ・Appliances enter into a sleep mode if they are left unattended for a short timespan. ・The displays are set at an appropriate luminance（Especially for new PCs which are set at 100% and are the reason for eye fatigue） ＊Officers are notified of how to set their appliances through the distribution of manuals（Building Operation Manager）	Officer(user)／ Building operation manager
○Printers, and facsimile are set at energy saving mode ・Appliances enter into a sleep mode if they are left unattended for a short timespan.	Building operation manager
○Lighting floor maps and specific locations prohibited for lights is illustrated	Building operation manager
○ Lightings are set at the appropriate luminance ・For example offices are set at 500lx	Building operation manager

省エネ活動の実践：「積極対応型」取組み

⑥Carry out energy saving actions

"Active measures"

・Measures that need to be conducted actively at times
・Awareness raising required to facilitate voluntary actions

Action / Measures	By whom
○ Use window shades (blinds) ・Block sunlight using window shades during the time of day when direct sun radiation comes inside the building ・Utilize daylight by calibrating the angle of the blades for the window shade	Official
○ Utilize daylight to calibrate the luminance ・Switch off some of the lights along the window cells: places that are bright	Building operation manager
○ Utilize lighting floor maps and see that areas with no occupants are switched off partially	Official
○ Frequently switch off PC displays ・Switch it off when vacant from the desk ・Close the lid of the notebook pc（also effective security-wise） ＊Place awareness raising labels on the PC displays（Building operation manager）	Official / Building operation manager
○ Regular inspection and cleaning of filters and the blades for the A/C outdoor unit ・Eg. Filters: 2 times/year, blades：once per 5 years ＊With no maintenance, electricity consumption can rise by 50% in two years	Building operation manager
○ Confirm the difference in temperature within the room ・identify locations where there is a drop/rise in room temperature, such as windowsills and near office appliances. ・utilize circulators to accommodate for the difference in these specific locations rather than change the A/C setting of the room temperature	Building operation manager

省エネ活動の実践：「継続改善」型取組み

⑥ Carry out energy saving actions

"Continued implementation"

・Actions with continued improvements using a PDCA cycle
・Official in charge should regularly check up ⇒ and report to the secretariat

Actions / Measures	By whom
○Lights and A/Cs are switched off per each area by the last official ・The checklist is used by the last official to prevent them from forgetting to switch off the appliances（light, A/C, printer, facsimile etc..）	Official
○Pull PC cables out of the sockets when departing from office ・When vacant from the office for a long time during office hours, switch off and pull the cable out from the power socket（to prevent consumption of the standby power which happens even if it is switched off） ＊use table taps with switches to make it simple	Official
○Appropriate temperature setting for A/Cs ・Define rules that acknowledge the area's characteristic（number of officers, use（dedicated for officers only, a rooms to which visitors are admitted etc..）） ＊Be mindful of the difference in the temperature within the room（Building operation manager）	Official/Building operation manager
○Switch off the A/Cs in rooms that are vacant or when they are vacant ・Lights and A/Cs for conference rooms, locker rooms, tea rooms etc.. Should be switched off ＊An awareness raising poster should be placed on the conference room door（Building operation manager）	Official/Building operation manager
○Switch off appliance outside of office working hours ・Switch off appliances outside of office working hours （ventilation facilities (toilets, warehouse etc..), electric water heater etc.）	Official

⑥Carry out energy saving actions

<Example: Checklist when departing from office>

Date and time of departure		Check if lights are switched off・A/C is off			Close doors and windows			Last official to depart		Confirmation by the section head (next day)
Month / day	Time	Office	Copy room	Design room	Office	Copy room	Design room	Dept. / section	Full name	
1/15	19:00	☑	☑	☑	☑	☑	☑	Strategic section	○○○○	☑
		☐	☐	☐	☐	☐	☐			☐
		☐	☐	☐	☐	☐	☐			☐
		☐	☐	☐	☐	☐	☐			☐
		☐	☐	☐	☐	☐	☐			☐
		☐	☐	☐	☐	☐	☐			☐
		☐	☐	☐	☐	☐	☐			☐

・Each area is required to check if the last official has turned all the appliances off before departing by using the checklist.
・The checklist will be placed near the door from which everyone departs.
・The section head should confirm the following day if the checklist is complete.
・The building operation management company should check during their night time patrol.

70 BY 30

A GREENER BETTER KUALA LUMPUR

KUALA LUMPUR LOW CARBON SOCIETY BLUEPRINT 2030

SUMMARY FOR POLICYMAKERS 4th EDITION

JULY 2018

UTM UNIVERSITI TEKNOLOGI MALAYSIA | UTM-LOW CARBON ASIA RESEARCH CENTRE | National Institute for Environmental Studies | IGES | E KONZAL

EDITORIAL TEAM

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Muhammad Akmal Hakim Hishammuddin
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Photo credit: UTM LCARC

WHAT'S INSIDE

SUMMARY FOR POLICYMAKERS

KUALA LUMPUR LOW CARBON SOCIETY BLUEPRINT 2030

FOREWORD FROM THE MINISTER

Tuan Hj. Khalid bin Abd. Samad
Minister of Territories

At the 2009 United Nations Climate Change Conference in Copenhagen, the former Prime Minister announced Malaysia's commitment to reducing its carbon emission intensity in comparison to Gross Domestic Products (GDP) by up to 40% by the year 2020 compared to the 2005 level, with the assistance from developed countries.

The country has achieved great progress since then, recording a 33% reduction in emission intensity by 2015. Building on this success and as a further commitment to tackling global climate change, Malaysia has ratified The Paris Agreement 2015 and re-pledged to reduce the country's carbon emission intensity of GDP by 45% by 2030.

In order to stand by our pledges, our actions have to be planned, informed and coordinated across different cities, townships and communities. We have to ensure that our future generations inherit a place that is not only fit for human habitation, but also conducive for future growth and prosperity.

As the nation's capital, Kuala Lumpur must lead the change. It is essential for Kuala Lumpur to put in place and implement concrete Low Carbon Society (LCS) blueprint towards reducing greenhouse gases (GHG) emissions of the city. I commend the Kuala Lumpur City Hall (KLCH) in leading the cause, and hope that the LCS blueprint would increase and strengthen investments in environmental assets, green technology and production for Kuala Lumpur.

May this initiative serve as a working model for other cities within Malaysia and beyond.

FOREWORD FROM THE MAYOR

Tan Sri Hj. Mhd. Amin Nordin bin Abd Aziz
Mayor of Kuala Lumpur

We have an ambitious vision yet achieveable for Kuala Lumpur.

We envision Kuala Lumpur to be a World Class City by 2020. We are enhancing our economic growth, societal wellbeing and development of its people. We hope to see Kuala Lumpur on par with other global cities like Melbourne, Copenhagen, Tokyo and New York, by adopting a holistic approach in managing resources, environment and space within the city.

With this in mind, the Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) is formulated. This blueprint will provide Kuala Lumpur City Hall (KLCH) with a strategic direction and clear framework for coordinating related policies and programs towards the reduction of GHG emissions for Kuala Lumpur. It also optimises the City's limited resources towards more effective and impactful implementation of various measures related to GHG emissions reduction.

Based on the projected development scenarios and baseline assessment of GHG emissions reduction potentials in 2020 and 2030, we have identified 10 Actions and 245 Programs to be implemented in a timely and proactive manner. I expect Kuala Lumpur City Hall to play the leading role in the process, engaging our stakeholders to work together in achieving our targets.

I wish to thank the UTM-Low Carbon Asia Research Centre team for their invaluable research efforts and consultation throughout the formulation of the Kuala Lumpur Low Carbon Society Blueprint 2030.

PREAMBLE

This Summary for Policymakers (SPM) offers a concise synopsis of the Kuala Lumpur Low Carbon Society Blueprint 2030 (the Blueprint). It is aimed at facilitating quick and convenient reference to the Blueprint's 10 Low Carbon Society (LCS) actions and the potential carbon emission reductions achievable from the implementation of the actions in Kuala Lumpur. It is targeted especially at readers who need to get a *straightforward yet sufficient* overview of the LCS actions and how the actions, severally and jointly, potentially contribute to reducing carbon emission levels in Kuala Lumpur, without the burden of unneeded technical complexities. Target reader groups include policy/decision makers or relevant officials of various public, private and/or not-for-profit entities, as well as stakeholder groups and citizens concerned with Kuala Lumpur's development and its impacts on the environment, society and climate change, and anyone who would like to have a role in reducing carbon emission in Kuala Lumpur.

This summary focuses readers on key explanations and justifications of each LCS 'action' and their supportive 'sub-actions' that are deemed vital and sufficient for guiding *strategic- and policy-level discussions and decision making,* saving all scientific and technical details to the master Blueprint document. Therefore, 'measures' and 'programs' that follow each LCS sub-action are listed under the relevant LCS action but specific descriptions and explanations of the measures and programs, which are more pertinent to the operational and implementation levels, have been excluded from this summary. When these and further technical details are required, and for better insight into the complete strategies to transform Kuala Lumpur into a low carbon society, readers should consult the master Blueprint document.

PREFACE to KL LCSBP 2030

Cities are increasingly recognised as the most effective and important non-state actors in mitigating global climate change in terms of yielding real cuts in urban Greenhouse Gas (GHG) emissions. Kuala Lumpur, as the Capital City and economic powerhouse of rapidly developing Malaysia, needs to lead the way to reducing GHG emissions of rapid economic growth, especially in contributing to the achievement of the national target of 45% reduction in GHG emission intensity of GDP by 2030 (compared to the 2005 level). To that end, the formulation and implementation of a holistic, scientifically grounded and people-centric city-level climate change mitigation plan – the Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) – using the 'Science to Action' (S2A) approach are highly essential.

As a holistic plan, the KL LCSBP 2030 proposes 10 Actions, 37 Sub-actions, 82 Measures and 245 Programs for implementation that straddle three key thrusts: 1) Prosperous, Robust and Globally Competitive Economy; 2) Healthy, Creative, Knowledgeable and Inclusive Community; and 3) Ecologically Friendly, Liveable and Resilient Built Environment.

Being scientifically grounded, the internationally-recognised Asia-Pacific Integrated Model (AIM) has been used to project Kuala Lumpur's GHG emission intensity reduction potential under various scenarios (with different sets of parameters and justified assumptions for the proposed Measures and Programs). The model shows Kuala Lumpur can potentially reduce its GHG emission intensity by up to 70% by 2030 (compared to the 2010 level), which is equivalent to an absolute reduction of 48,206 ktCO_2eq from the business as usual scenario.

As a people-centric plan, the proposed Actions, Sub-actions, Measures and Programs have been put under scrutiny and review by multiple stakeholders in three Focus Group Discussion (FGD) workshops. The KL LCSBP 2030 is therefore the outcome of review by, and feedback from, the multiple stakeholders engaged in the workshops.

Ultimately, the KL LCSBP 2030 seeks to be a people's policy that is grounded in scientific research with practical implementation in mind. It will provide a strategic direction and clear framework for coordinating and consolidating various related but largely unconnected sustainability and climate change mitigation policies and programs to optimise the City's limited resources towards more effective and impactful implementation of GHG reduction measures towards meeting the city's emission intensity reduction target of 70% by 2030.

November 2017

UTM-Low Carbon Asia Research Centre (UTM-LCARC)
Faculty of Built Environment and Surveying
Universiti Teknologi Malaysia
Johor Bahru
Malaysia

UTM-LOW CARBON ASIA RESEARCH CENTRE

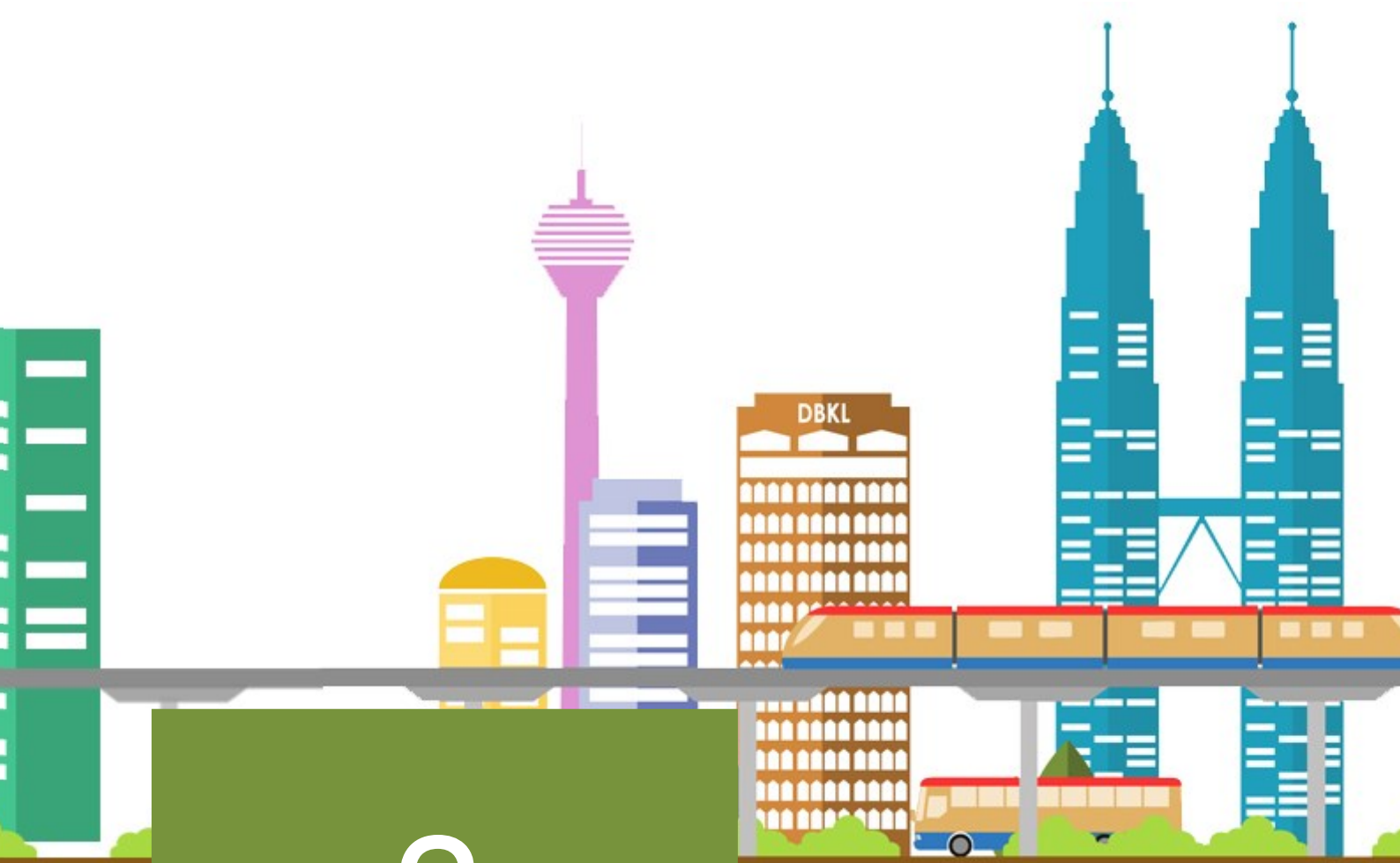
KEY MESSAGES TO POLICYMAKERS

1

Kuala Lumpur as Malaysia's economic capital and an emerging global city is well positioned to lead developing cities nationally and globally towards reducing significant GHG emissions of rapid economic growth

2

Kuala Lumpur presents a huge potential for reducing over 48,000 $ktCO_2eq$ by 2030 and up to 70% of the reduction can be effected through measures and programs that are under KLCH's direct and indirect purviews



3

Immediate adoption and progressive implementation of LCS Blueprint by KLCH are crucial to putting Kuala Lumpur on the path towards achieving carbon neutrality beyond 2030

4

KLCH needs to work with, and secure effective buy-in of the KL LCSBP 2030 from, various stakeholders, including residents and the civil society; businesses and industries; as well as relevant ministries and federal agencies

KUALA LUMPUR

Function

National Capital of Malaysia. One of the major commercial, financial, education, entertainment, healthcare, cultural, and tourism centres of Asia.

Location

On the central west coast of Peninsular Malaysia, enclave within the State of Selangor and Klang Valley.

3.1390° N, 101.6869° E

Area

242km² (24,221 hectares)

BASIC PROFILE

1,674,621 (2010);

2,198,400 (2020 projected);

2,488,399 (2030 projected)

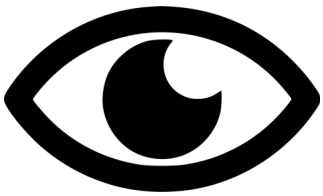
Population

RM 84,852 million (2010);

RM 227,621 million (2020 projected);

RM 399,013 million (2030 projected)

Gross Domestic Product



A World Class City

Vision

Kuala Lumpur City Hall (KLCH)

Administration

KL LCSBP 2030
BASELINE SCENARIOS
AT A GLANCE

Sector/Aspects	Components	2020 (Mid-term) Targets	2030 Targets	Cumulative Reduction Induced in 2030
Transport				
Trip Generation (trips/person/day)	Transport	4.5	3.7	12,690 $ktCO_2$ (26.3%)
Mode Share (%)	Public Transport	30	60	
	Private Transport	70	40	
Average Trip Distance (km)	Public Transport	64	70	
	Private Transport	15	23	
Passenger Vehicle by Fuel Type (%)	Conventional Vehicle Oil	90	40	
	Conventional Vehicle (Biodiesel)	1	15	
	Hybrid (Oil)	7	20	
	Hybrid (Biodiesel)	0	5	
	Electric Vehicle	2	20	
Bus by Fuel Type (%)	Conventional (Oil)	95	50	
	Hybrid Bus (Oil)	5	40	
	Hybrid Bus (Biodiesel)	0	10	
Rail (%)	Conventional Passenger Train (Electric)	90	40	
	High Efficiency Train	10	60	
Behaviour Change (%)	Eco-Driving (Percent of drivers)	20	25	
Freight Vehicle by Fuel Type (%)	Conventional Vehicle (Oil)	80	50	
	Conventional Vehicle (Biodiesel)	20	30	
	Hybrid Vehicle (Oil)	0	20	
Rail (%)	Conventional Freight Train (Electric)	90	70	
	High Efficiency Freight Train (Electric)	10	30	
Waste Management				
Recycling Rate (%)		22	30	878 $ktCO_2$ (1.8%)
Composting Rate (%)		8	15	
Diversion of Solid Waste from Landfill (%)		30	45	
Energy				
Power Generation (%)	Solar	3	10	17,525 $ktCO_2$ (36.4%)
	Hydropower	5	10	
	Coal	59	42	
	Oil	5	3	
	Natural Gas	28	30	
	Biomass	0	5	

Sector/Aspects	Components	2020 (Mid-term) Targets	2030 Targets	Cumulative Reduction Induced in 2030
Low Carbon Green Building				
Commercial Buildings				
Air Conditioner (%)	High Efficiency Air Conditioner	15	40	14,433 $ktCO_2$ (29.9%)
	Conventional Air Conditioner	85	60	
Water Heating (%)	High Efficiency Oil Water Heater	5	5	
	Conventional Oil Water Heater	5	5	
	High Efficiency Electric Water Heater	5	20	
	Conventional Electric Water Heater	85	50	
	Solar Water Heater	0	20	
Kitchen (%)	High Efficiency Gas Cooking Stove	5	20	
	Conventional Gas Cooking Stove	0	0	
	High Efficiency Oil Cooking Stove	7	20	
	Conventional Electric Cooking Stove	83	30	
	IH Cooking Device	5	30	
Other Electrical Appliances (%)	High Efficiency Electric Appliances	20	40	
	Conventional Electric Appliances	80	60	
Building (%)	Solar Power Generation	10	40	
	Insulation of Commercial Building	15	30	
Behaviour Change (%)	Energy Saving Action (percent of commercial buildings)	10	20	
Residential Buildings				
Air Conditioner (%)	High Efficiency Air Conditioner	20	60	2,153 $ktCO_2$ (4.5%)
	Conventional Air Conditioner	80	40	
Water Heating (%)	High Efficiency Oil Water Heater	10	5	
	Conventional Oil Water Heater	40	5	
	High Efficiency Electric Water Heater	15	70	
	Conventional Electric Water Heater	35	20	
Kitchen (%)	High Efficiency Gas Cooking Stove	5	10	
	Conventional Gas Cooking Stove	20	0	
	High Efficiency Oil Cooking Stove	4	20	
	Conventional Electric Cooking Stove	70	40	
	IH Cooking Device	1	30	
Home Electrical Appliances (%)	High Efficiency Home Electric Appliances	40	60	
	Conventional Home Electric Appliances	60	40	
Building (%)	Solar Power Generation (percent of residential buildings)	15	60	
Behaviour Change (%)	Energy Saving Action	10	20	
Industry				
Equipment (%)	Energy Efficiency Improvement	5	10	75 $ktCO_2$ (0.2%)
Carbon Sink				
Green Spaces (hectares)		2,808.6	5,164.7	452 $ktCO_2$ (0.9%)
Number of Street Trees (mill.)		1.52	2.49	
TOTAL POTENTIAL REDUCTION			48,206 $ktCO_2$	

Photo credit: UTM LCARC

KUALA LUMPUR 70 BY 30

In transforming Kuala Lumpur towards achieving 70 by 30: A Greener and Better City by 2030, a clear sustainable and climate-responsive growth vision is crucial to frame and direct KLCH's commitment to becoming a leading city in combating climate change while simultaneously improving the city's economic, social and environmental performances. As Kuala Lumpur is envisioned to become a World Class Sustainable City by 2030, it needs to play a major global and sub-global role in tackling climate change and protecting the environment while benefiting all its residents, workers, visitors and investors socially and economically.

70 by 30 expresses Kuala Lumpur's aspiration to reduce the city's carbon emission intensity of GDP by up to 70% by 2030, which crucially supports Malaysia's renewed national carbon emission intensity reduction target of 45% by 2030. This calls for the adoption and implementation of ambitious yet achievable LCS measures and programs that have been formulated based on a holistic, Science-to-Action (S2A) and people-centric approach. The implementation of 245 LCS Programs, framed under 82 Measures, 37 Sub-actions and 10 LCS Actions, sets Kuala Lumpur on the path towards more ambitious carbon neutrality goals beyond 2030.

INTRODUCTION TO KL LCS

As Malaysia's vibrant capital city and commercial heart, and as a leading economic and cultural growth centre in Asia, Kuala Lumpur plays a pivotal role in the country's transformation towards becoming a socially progressive high income nation by 2020 and beyond.

In a climate changed world, it is essential that Kuala Lumpur realises its growth vision and at the same time contributes to meeting Malaysia's global commitment to reducing carbon emissions. The concept of LCS is therefore fundamental to guiding Kuala Lumpur's development up to 2030. The KL LCSBP 2030 will provide an effective policy platform for consolidating and coordinating in an integrated manner various related but largely unconnected sustainability and climate change mitigation policies that have been separately put in place over the years in Kuala Lumpur.

In doing so, the KL LCSBP 2030 lays down a strategic direction and clear policy framework that optimises Kuala Lumpur's limited resources towards more effective and impactful implementation of GHG reduction measures while enabling the city to continue its economic growth and social development visions.

POLICY CONTEXT OF KL LCSBP 2030

Towards decarbonising Kuala Lumpur's rapid economic growth and development, the city faces immense challenges in simultaneously meeting competing pro-growth and pro-environment goals, especially in the context of needing to advance institutionally less emphasised pro-environment goals within a traditionally deeply institutionalised pro-growth development policy framework. As such, it is critical that the formulation of the KL LCSBP 2030 carefully considers as much as possible all relevant global and national climate change mitigation and sustainable development policies as well as all existing national, regional and local development and environmental policies with a view to concretely linking the former with the latter policy sets.

The KL LCSBP 2030 therefore serves as a key policy instrument that translates and bridges between higher level sustainable, low carbon development policies (including the recent Sustainable Development Goals 2030, the Paris Agreement and the New Urban Agenda) and the city-level development policies (see Figure 1).

Crucially, towards operationalising the KL LCSBP 2030, it needs to be streamlined into Kuala Lumpur's existing spatial development planning framework, in particular into the city's statutory development plans (the Kuala Lumpur Structure Plan and the Kuala Lumpur City Plan) so as to take effect through the statutory planning control process to which all developments within the city are subject.

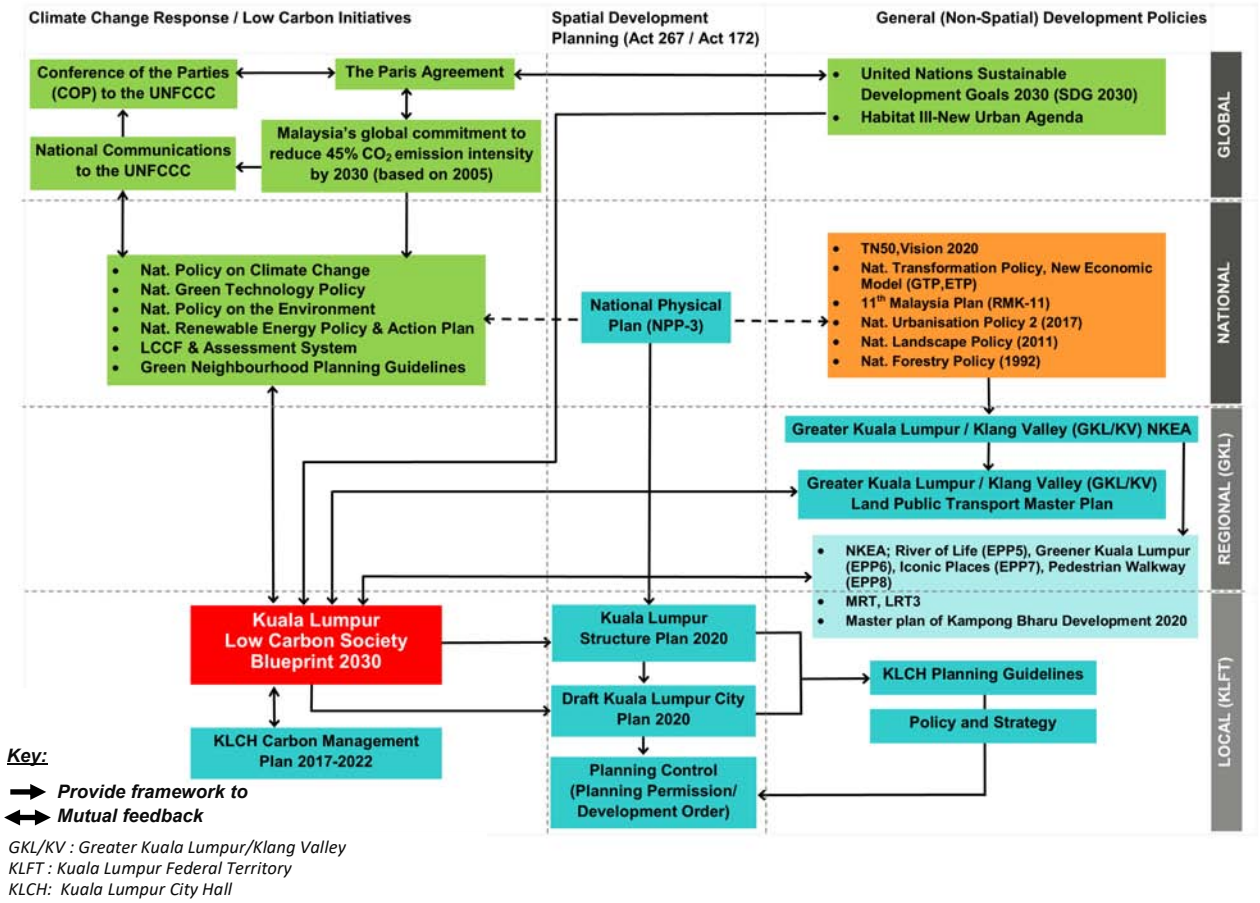


Figure 1: The policy context for the development of the KL LCSBP 2030

KL LCSBP 2030 PROCESS AND METHODOLOGY

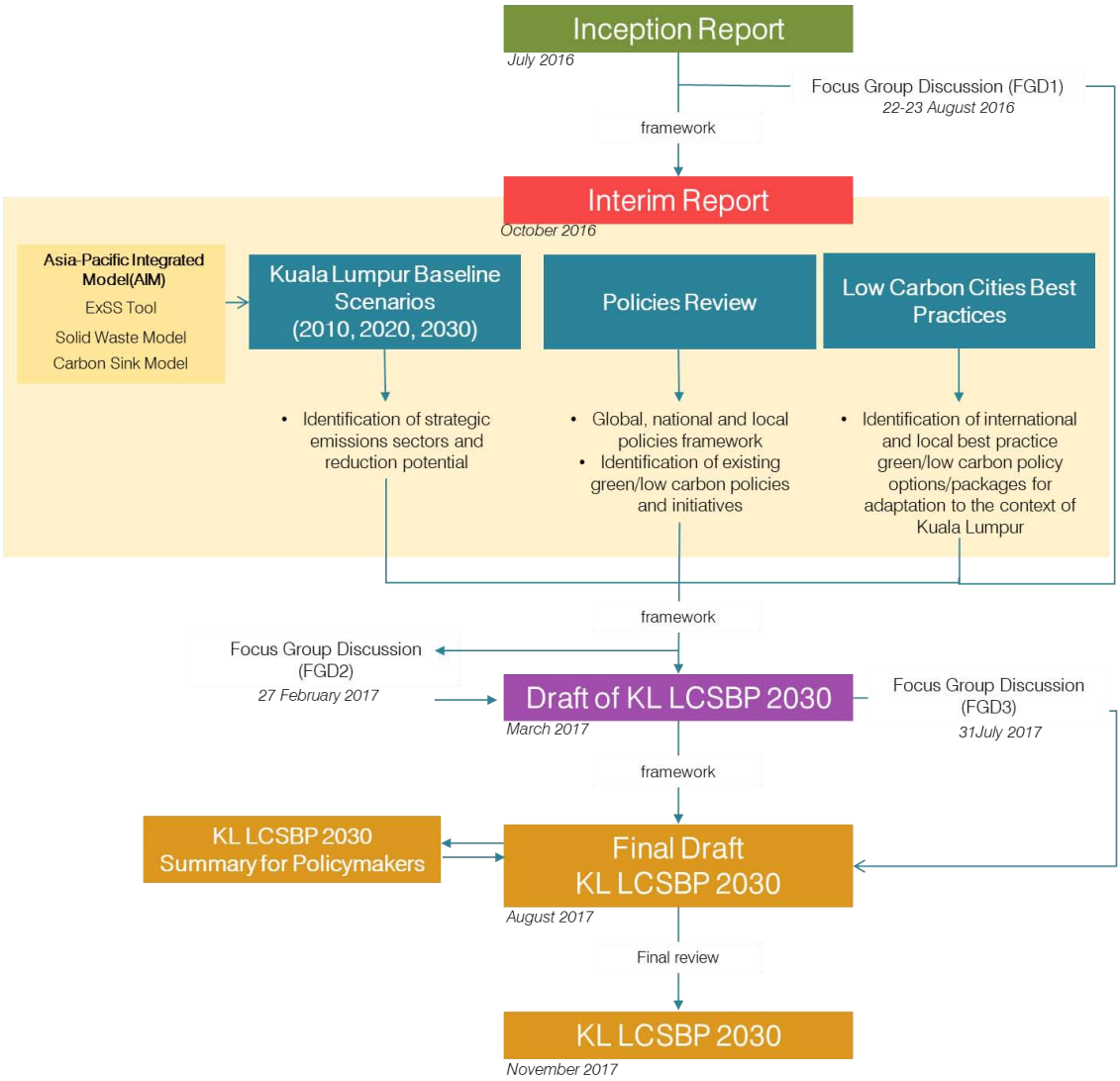


Figure 2: Project framework for KL LCSBP 2030

Formulation of the KL LCSBP 2030 began in July 2016 with a scoping exercise (Inception Report) that provided a framework for preparing the baseline study for Kuala Lumpur's GHG emissions (Interim Report) (see Figure 2). The baseline study comprises four key components, namely 1) the setting of various baseline development scenarios for Kuala Lumpur (2010, 2020, 2030); 2) a careful review of all relevant global, national and local policies with respect to sustainable and low carbon development; 3) precedent and benchmarking studies on international and local best practices on sustainable and low carbon development; and 4) GHG modeling using the internationally recognised Asia-Pacific Integrated Model (AIM, see below and Figure 3 for details).

In tandem with the preparation of the baseline study, a multiple stakeholder engagement workshop (the first Focus Group Discussion, FGD1) was conducted in order to gain feedback and comments on modeling results and framework assumptions used in the baseline study. Findings from the FGD1 were then synthesised with that of the baseline study and results from FGD2, which provided a subsequent framework for preparing the Draft KL LCSBP 2030.

The Draft KL LCSBP 2030 was put to a final scrutiny by multiple stakeholders in FGD3, from which refinements were made to the program structures and emissions results, to produce the KL LCSBP 2030 and its Summary for Policymakers (SPM).

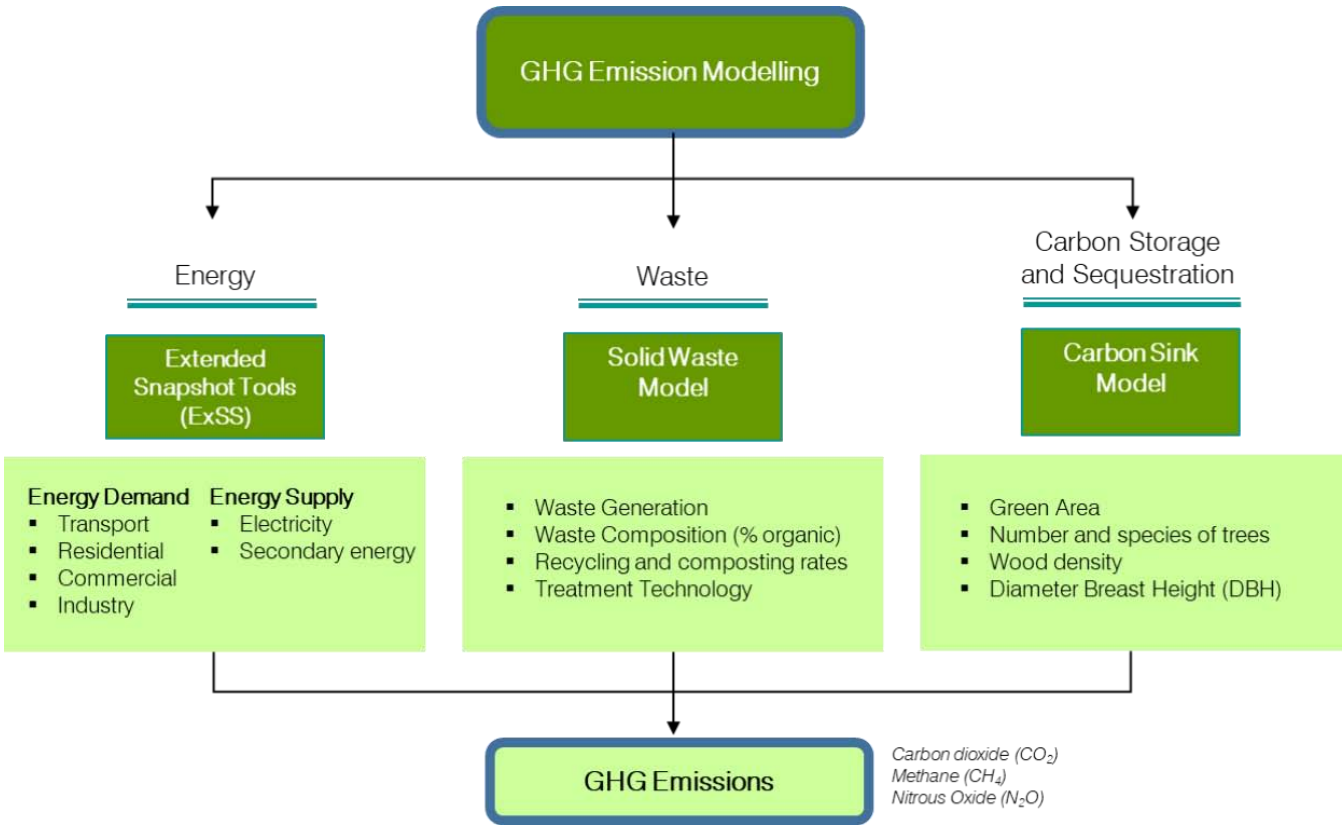


Figure 3: GHG Emission Modelling

The Asia-Pacific Integrated Model (AIM) quantifies GHG emissions for Kuala Lumpur for Business as Usual (BaU) and Counter Measure (CM) scenarios for 2020 and 2030. Three main models have been used including AIM's Extended Snapshot Tool (ExSS), Solid Waste Model (SWM) and Carbon Sink Model (refer Figure 3).

These models present the carbon emissions and reduction potentials of various low carbon countermeasures for Kuala Lumpur, which lead to the setting of priority sectors for effective emission reduction.

OBJECTIVES

The Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) is a written document that presents comprehensive climate change mitigation policies and detailed strategies to guide the development of Kuala Lumpur towards becoming A World Class Sustainable City: A Greener Better Kuala Lumpur by 2030.

The blueprint incorporates various existing low carbon related plans and projects in Kuala Lumpur along with the Kuala Lumpur Structure Plan 2020 and Draft Kuala Lumpur City Plan 2020 in transforming Kuala Lumpur into a low carbon city. The blueprint discusses and provides more technical details of carbon mitigation options (with specific measures and programs) for implementation in Kuala Lumpur's development.

The blueprint aligns with the city's vision and aims to reduce the city's carbon emission intensity by 70% by 2030 while contributing to the economic growth targets. After an assessment of the current situation and future goals, the report lays down the following objectives:

1. To review existing policies and development plans of Kuala Lumpur;
2. To benchmark Kuala Lumpur with selected global cities in terms of low carbon best practices;
3. To develop baseline and future scenarios and quantify carbon emissions and enhance co-benefits of improved livability and green growth for Kuala Lumpur;
4. To develop a roadmap and identify the relevant implementation agencies.

ROAD TO ACHIEVING 70 BY 30 GOAL

LOW CARBON KUALA LUMPUR GOALS AND INITIATIVES

KL LCSBP 2030 provides a strong foundation for promotion of economic growth, decoupling GHG emissions from growth and achieving various co-benefits, including the enhancement of quality of life in an equitable manner and protection of the environment. The LCS vision of Kuala Lumpur World Class Sustainable City 2030 is buttressed by three major thrusts: 1) prosperous, robust and globally competitive economy; 2) healthy, creative knowledgeable and inclusive community; and 3) ecologically friendly, liveable and resilient built environment. These thrusts are well aligned with the triple bottom line of sustainable development, the 17 Sustainable Development Goals (SDGs) 2030, the tree transformative commitments of the New Urban Agenda as well as the Draft Kuala Lumpur City Plan 2020 (refer Figure 4). Kuala Lumpur World Class Sustainable City 2030 entails the creation of A Greener Better Kuala Lumpur that embraces a GHG emission intensity reduction target of up to 70% by 2030. To that end, 10 actions have been formulated which are organised under the three Thrusts that encompass Economy, Social and Environment. Actions under "Economy" include green growth (GG); energy efficient spatial structure (SS); green mobility (GM) and sustainable energy system (SE). Under "Social" is the action on community engagement and green lifestyle (CE) while under "Environment" are the actions of low carbon green building (GB); green and blue (BG); sustainable waste management (WM) and sustainable water management (WW). The last action—green urban governance (UG)—acts as the Kuala Lumpur low carbon society enabler.

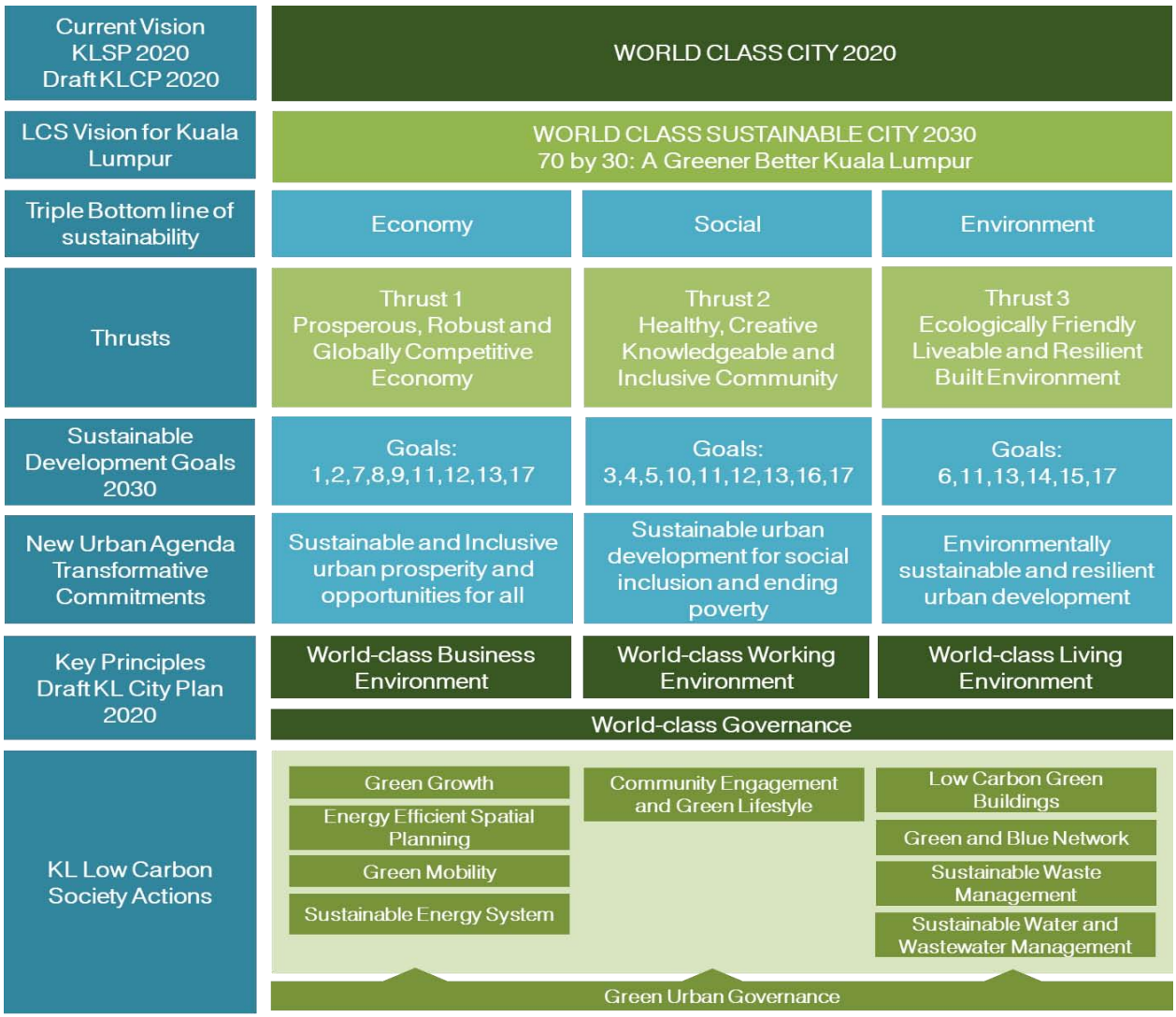


Figure 4: The framework of Kuala Lumpur Low Carbon Society Blueprint 2030

To provide a clear and effective framework for future implementation, monitoring and reporting of the KL LCSBP 2030, the 'work breakdown structure' (WBS) approach has been adopted. Through the WBS approach, key low carbon society actions are divided into sub-actions, which are further divided into measures and detailed implementation programs as described in Figure 5.

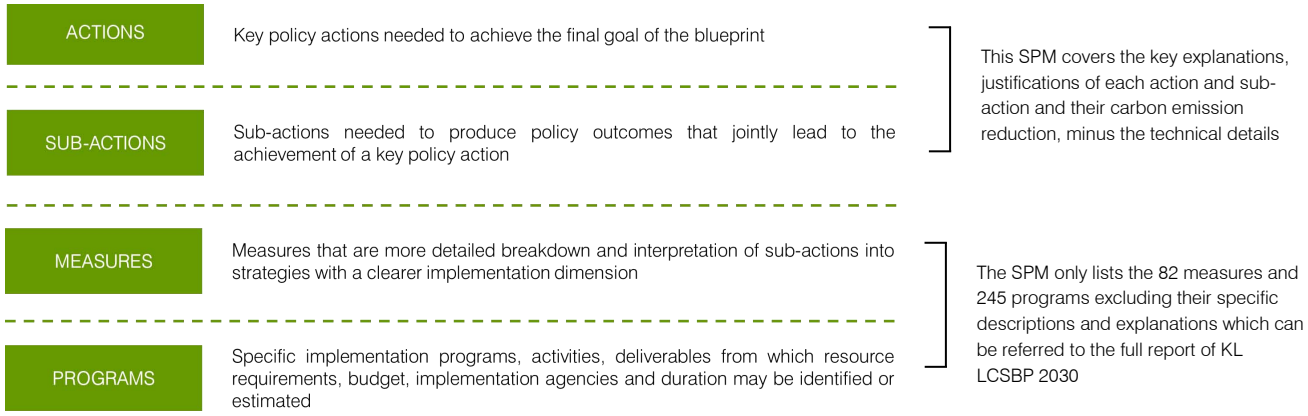


Figure 5: Work breakdown structure for Kuala Lumpur's Low Carbon Society Blueprint 2030

KUALA LUMPUR EMISSION PROFILE

GHG emission intensity of GDP

Figure 6 shows the GHG emission intensity of GDP of Kuala Lumpur. Based on Table 1, Kuala Lumpur's GHG emission intensity in 2010 is estimated at 0.30 $ktCO_2eq$/Mill.RM. In the 2030 CM scenario, the value decreases to 0.09 $ktCO_2eq$/Mill.RM, which is equivalent to a 70% reduction. This is higher than the national GHG emission intensity reduction target of 45% by 2030. As such, proper implementation of the KL LCSBP 2030 is essential to enable Kuala Lumpur to significantly contribute to Malaysia's global commitment to mitigating climate change while maintaining strong economic growth.

Table 1: GHG emission intensity by GDP

	2010	2020		2030	
		BaU	CM	BaU	CM
GDP (Mill.RM)	84,852	227,621	227,621	399,013	399,013
Total CO_2 Emission ($ktCO_2eq$)	25,427	54,609	38,497	84,314	36,106
GHG Emission Intensity of GDP ($ktCO_2eq$/Mill.RM)	0.30	0.24	0.17	0.21	0.09
Reduction in Intensity	-	20%	43%	30%	70%

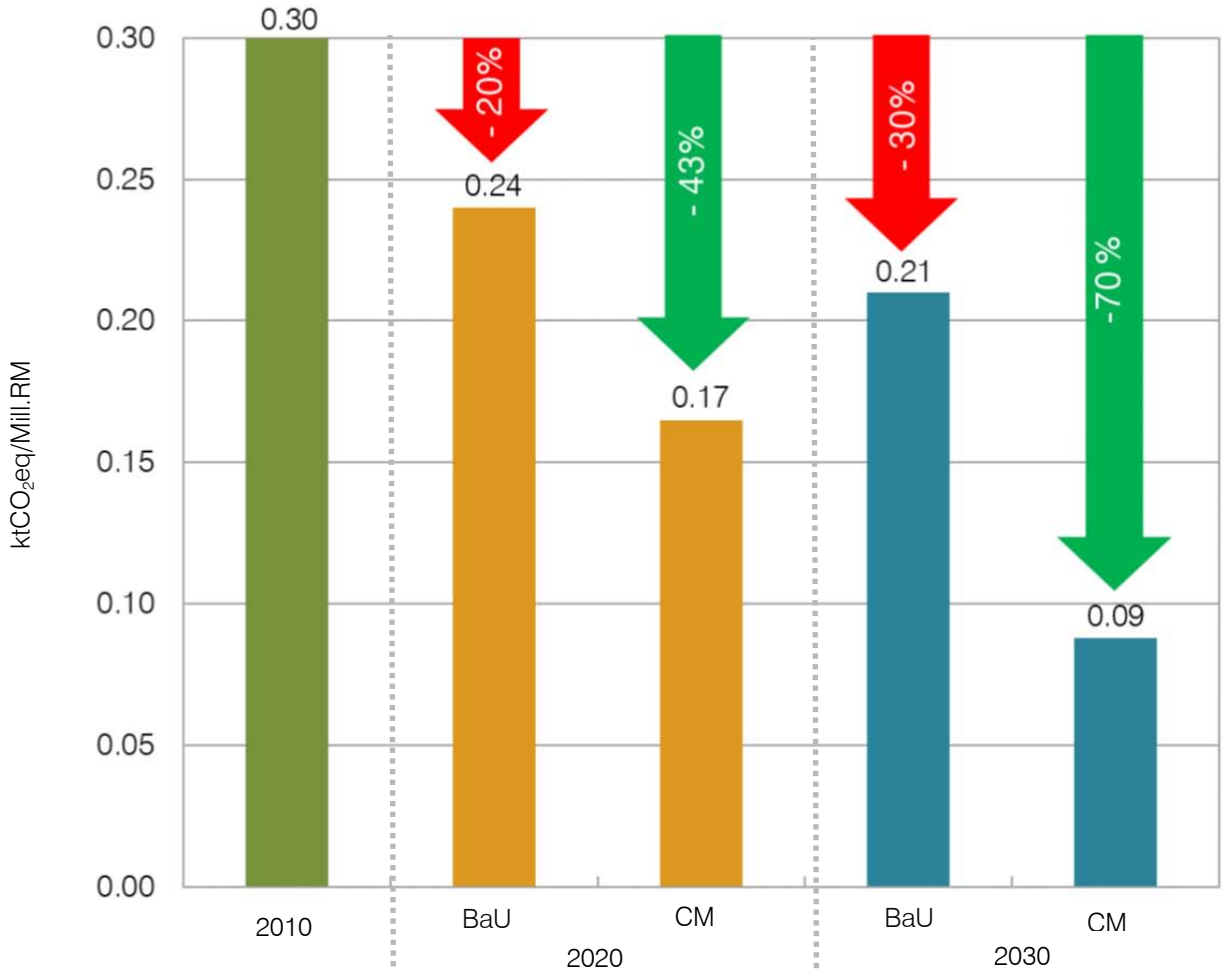


Figure 6: GHG emission intensity by GDP

EMISSION REDUCTION CONTRIBUTION BY ACTION

Towards providing further guidance to policymakers in prioritising and strategising implementation of the KL LCSBP 2030, the potential contribution of each of the 10 LCS Actions that have been identified has been estimated (see Figure 7 and Table 2). With respect to LCS programs that come under direct and indirect purviews of KLCH, investments in Low Carbon Green Building, Community Engagement and Green Lifestyle, Green Mobility, Energy Efficient Spatial Structure and Green Growth are highly recommended as these jointly potentially contribute to over 64% of the targeted emission reduction in 2030.

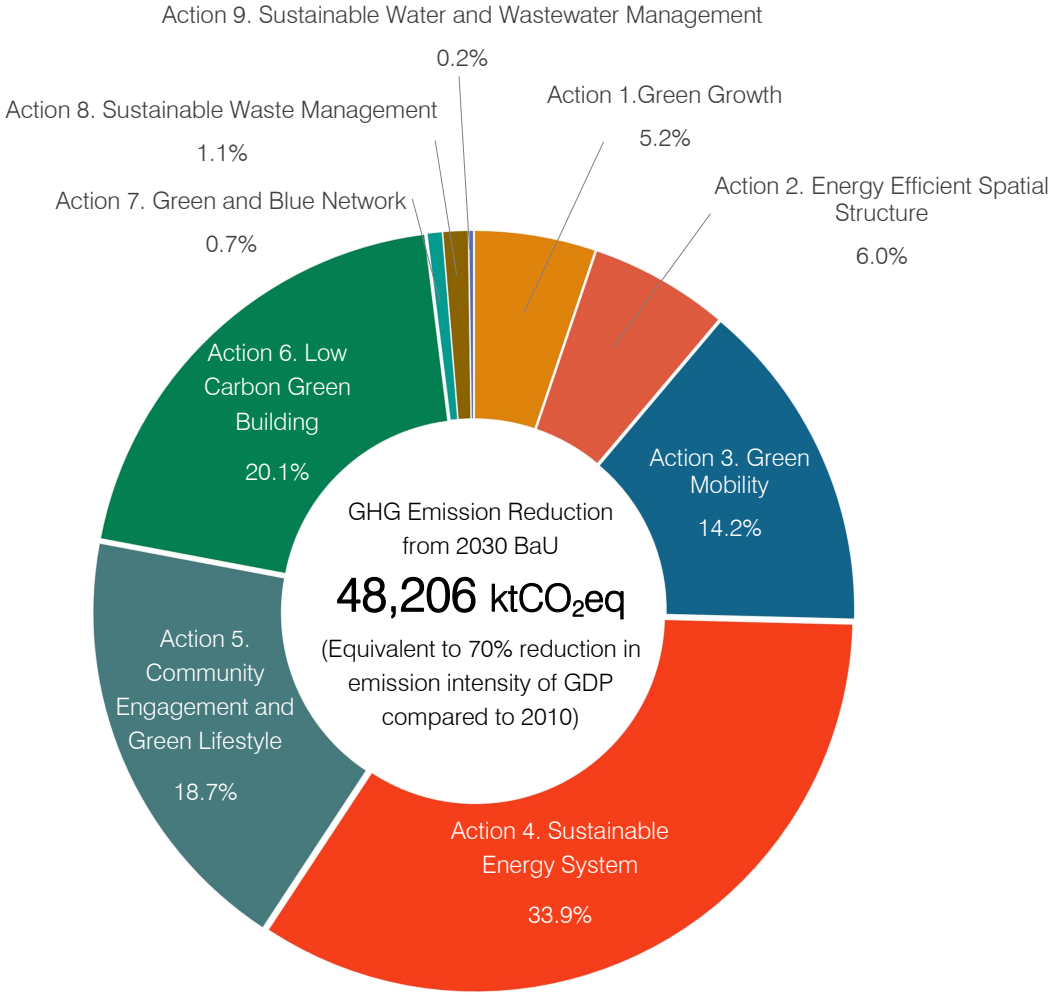


Figure 7: The carbon emission reduction contribution for the 10 actions

Table 2: Carbon emission reduction contribution and share of 10 LCS Actions

Thrusts	Actions	Reduction ($ktCO_2eq$)	Share by Actions (%)*	Share by Thrusts (%)
Economy	Action 1 Green Growth (GG)	2,502	5.2	59
	Action 2 Energy Efficient Spatial Structure (SS)	2,872	6.0	
	Action 3 Green Mobility (GM)	6,868	14.2	
	Action 4 Sustainable Energy System (SE)	16,327	33.9	
Social	Action 5 Community Engagement and Green Lifestyle (CE)	9,015	18.7	19
Environment	Action 6 Low Carbon Green Building (GB)	9,673	20.1	22
	Action 7 Green and Blue Network (BG)	316	0.7	
	Action 8 Sustainable Waste Management (WM)	527	1.1	
	Action 9 Sustainable Water and Wastewater Management (WW)	105	0.2	
Enabler	Action 10 Green Urban Governance (UG)	-	-	0
	Total	48,206	100	100

**Numbers may not add up precisely to 100% due to rounding*

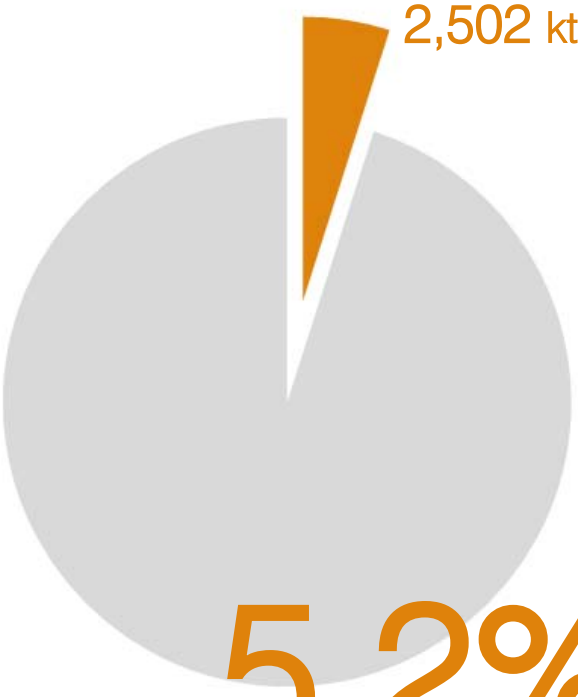
ACTION 1

GREEN GROWTH

In the face of pressing economic and environmental challenges, national and international efforts to promote green growth as a new source of economic growth have been intensified in recent years. The current economic system is not only unsustainable and inefficient in its resource use, but is inequitable in its distribution of costs and benefits. A business that does not invest in low carbon measures will be at risk of being locked out of low-carbon growth markets demand and may experience a reduced market share in the traditional economy in the future. Align with Kuala Lumpur vision of becoming "a sustainable city" and achieving 70% GHG reduction by 2030, the progression towards low carbon society must ensure that carbon reduction targets are met without compromising the economic growth of the city.

Sectoral contribution to CO_2 emission reduction

2,502 $ktCO_2eq$



5.2%

1.1 Kuala Lumpur As A Green Business Hub

It is important for KLCH to develop Kuala Lumpur into a business hub that provides business owners and investors clear guide to its strategic directions, priority sectors, policy framework, incentives and procedures on investing in Kuala Lumpur.

Measure 1.1.1 Promote New Green Sectors and Services

Programs:

GG 1 Establish Kuala Lumpur as a major global venue for annual exhibitions, conferences and/or workshops on green businesses and investments

GG 2 Promote and attract R&D activities in strategic green sectors that are suited to Kuala Lumpur's economic and business ecosystems

GG 3 Establish a Green Enterprise Zone in each of Kuala Lumpur's six strategic zones to accommodate new green businesses and investments

Photo credit: www.klia.com.my

Photo credit: www.digitalnewsasia

Measure 1.1.2 Incentives and Fiscal Measures to Attract Green Businesses

Programs:

GG 4 KLCH to work with relevant ministries/agencies to create viable taxation systems and incentive mechanisms to attract strategic green sectors and Foreign Direct Investment (FDI) in green business

GG 5 KLCH to collaborate with relevant agencies and liaise with major financial institutions to expand on environmental investment opportunities and create attractive loan options for green investments

GG 6 Put in place procedures that expedite approval processes for green business and investments in Kuala Lumpur

1.2 Greening Existing Business

Measures such as reducing energy and resource intensity of existing businesses and green incentives and taxation for greening business are identified in order for greening every business in Kuala Lumpur to take place.

Measure 1.2.1 Reduce Energy and Resource Intensity of Existing Businesses

Programs:

GG 7 Progressive requirement for greener operation & eco-efficient policies in business administration, supply chain, and operations

GG 8 Promotion of environmental analytical & advisory services towards improving resource & energy efficiency in existing businesses

GG 9 KLCH to lead the way in preparing institutional/ establishment level 5-year carbon management plan to reduce institutional/ establishment operational carbon emissions

GG 10 Create "KL Green Business Champions" by engaging KL's dominant building uses and/or biggest energy users (e.g. major offices, hotels, shopping malls, hospitals, educational institutions and restaurants) in greening their administration, supply chain and operation

Photo credit: UTM LCARC

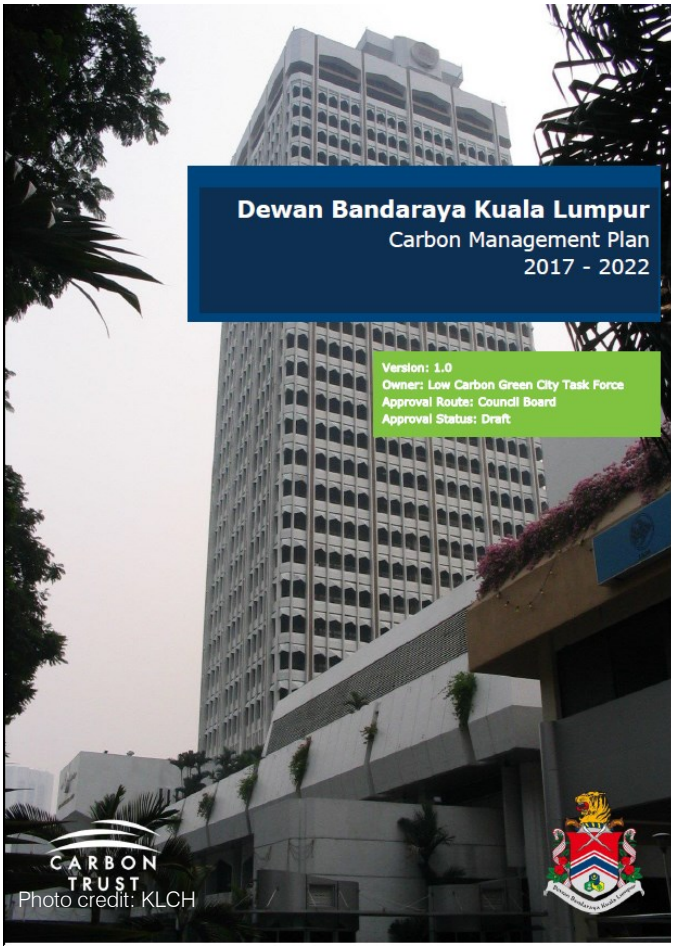


Photo credit: KLCH

Measure 1.2.2 Green Incentives and Taxation for Greening Business

Programs:

GG 11 Introduce green incentives that cover and support existing businesses' green initiatives in investment and/or innovation in reducing energy and resource intensity of their administration, supply chain and operations

GG 12 Provide green incentives for business to set up an environmental & energy performance unit that generates green employment

GG 13 Introduce prestigious annual green awards that recognise and/or reward existing businesses that achieve significant results in resource and energy efficiency improvement in their overall operations


Photo credit: www.digitalnewsasia

1.3 Establish Green Economy Ecosystem

Green economy focusing on the consumers as one of the players in the ecosystem. It is important to strengthen institutional support for green growth, create and expand green markets and capacity building in Kuala Lumpur.

Measure 1.3.1. Strengthen Institutional Support for Green Growth

Programs:

GG 14 Establish a Green Economy Unit in KLCH to promote, coordinate, advise, enable and facilitate the setting up of green businesses and markets in Kuala Lumpur

GG 15 KLCH through the Green Economy Unit to facilitate businesses and public sector organisations in solicitation of advice from relevant agencies (e.g. GreenTech Malaysia, MESTECC) on energy efficiency and renewable energy

GG 16 Develop a Green Growth Action Plan for Kuala Lumpur that clearly outlines KLCH's green growth policy direction and strategies, and provides clear policy guidance to green businesses and investors

Photo credit: UTM LCARC

Measure 1.3.2 Create and Expand Green Markets

Programs:

GG 17 All government entities within KLCH area to implement the Government Green Procurement (GGP) practice

GG 18 Set up and maintain a "Kuala Lumpur Green Portal" that provides real-time information on Kuala Lumpur's LCS progress, green technologies, green jobs, green education and links to key government green portals

GG 19 Widespread adoption of green certification (e.g. MyHIJAU Mark) for all range of green products and services within Kuala Lumpur to provide consumers with an authoritative and reliable guide to the emerging green market

GG 20 Encourage business establishments in Kuala Lumpur to tap into the MyHIJAU platform to expand connections to other green businesses and wider consumers

1.4 Capacity Building

Kuala Lumpur needs diverse range of workers with broad skill sets as well as workers that can cope with shifting demands in skills set. The adoption of green growth in Kuala Lumpur will create new jobs and redefine existing occupations. These changes involve the process such as reskilling, cross-skilling, and upskilling of new work practices.

Measure 1.4.1 Human Capital Enhancement

Programs:

GG 21 Work with the academia, industry and relevant government agencies to establish Kuala Lumpur as the regional hub for accredited professional short courses on green growth and green businesses

GG 22 Develop systematic up-skills programs for progressive upgrading/retraining of existing pool of professional and semi-professional workers in various green sectors

GG 23 Fiscal incentives for business establishment that offer continuous professional education for current employees in the green sector

Action 1 GREEN GROWTH

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 1.1.1 Promote New Green Sectors and Services						
GG 1 Establish Kuala Lumpur as a major global venue for annual exhibitions, conferences and/or workshops on green businesses and investments		▬		Corporate Planning Dept.	KW (Corporate Communication), MIDA, MESTECC, MOTAC,MOHR	GreenTech Malaysia
GG 2 Promote and attract R&D activities in strategic green sectors that are suited to Kuala Lumpur's economic and business ecosystems	▬	▬	▬	Corporate Planning Dept.	KLCH (Administration Dept.), KW (Corporate Communication, and Policy Planning Dept.), MIDA	MIDA, GreenTech Malaysia
GG 3 Establish a Green Enterprise Zone in each of Kuala Lumpur's six strategic zones to accommodate new green businesses and investments	▬	▬	▬	City Planning Dept.	KLCH (Economic Planning & Development Dept.), KW (Corporate Communication), MIDA, MOHR	Business assoc.
Measure 1.1.2 Incentives and Fiscal Measures to Attract Green Businesses						
GG 4 KLCH to work with relevant ministries/ agencies to create viable taxation systems and incentive mechanisms to attract strategic green sectors and Foreign Direct Investment (FDI) in green business	▬	▬	▬	Corporate Planning Dept.	KW (Policy Planning Division), GreenTech Malaysia, InvestKL, KLN, SSM	MIDA, SSM
GG 5 KLCH to collaborate with relevant agencies and liaise with major financial institutions to expand on environmental investment opportunities and create attractive loan options for green investments		▬		Corporate Planning Dept.	KW (Finance, and Policy Planning Dept.), MIDA, MESTECC, SSM, SME Corporation	Business assoc., SME assoc.
GG 6 Put in place procedures that expedite approval processes for green business and investments in Kuala Lumpur		▬		Economic Planning & Development Dept.	GreenTech Malaysia, SSM, InvestKL, PEMANDU, MIDA, SME Corporation, MITI, MIGHT	KLCH (Economic Planning & Development Dept.)
Measure 1.2.1 Reduce Energy and Resource Intensity of Existing Businesses						
GG 7 Progressive requirement for greener operation & eco-efficient policies in business administration, supply chain, and operations	▬	▬	▬	City Planning Dept.	KW (Policy Planning Dept.), SSM, GreenTech Malaysia, MIDA	SSM, Business assoc.
GG 8 Promotion of environmental analytical & advisory services towards improving resource & energy efficiency in existing businesses		▬		Licensing & Petty Traders Development Dept.	KW (Corporate Communication), SSM, GreenTech Malaysia, MAESCOs, MIDA	Business assoc.
GG 9 KLCH to lead the way in preparing institutional/establishment level 5-year carbon management plan to reduce institutional/ establishment operational carbon emissions	▬	▬	▬	Administration Dept.	KLCH (Administration Dept. *(Jawatankuasa Tenaga))*	KLCH (Administration Dept.)
GG 10 Create "KL Green Business Champions" by engaging KL's dominant building uses and/or biggest energy users (e.g. major offices, hotels, shopping malls, hospitals, educational institutions and restaurants) in greening their administration, supply chain and operations		▬		Licensing & Petty Traders Development Dept.	SSM, MIDA, GreenTech Malaysia	Business assoc., Building owners
Measure 1.2.2 Green Incentives and Taxation for Greening Business						
GG 11 Introduce green incentives that cover and support existing businesses' green initiatives in investment and/or innovation in reducing energy and resource intensity of their administration, supply chain and operations		▬		Property Management & Valuation Dept.	KW (Corporate Communication), SSM, MIDA, GreenTech Malaysia, MOF	Business assoc.

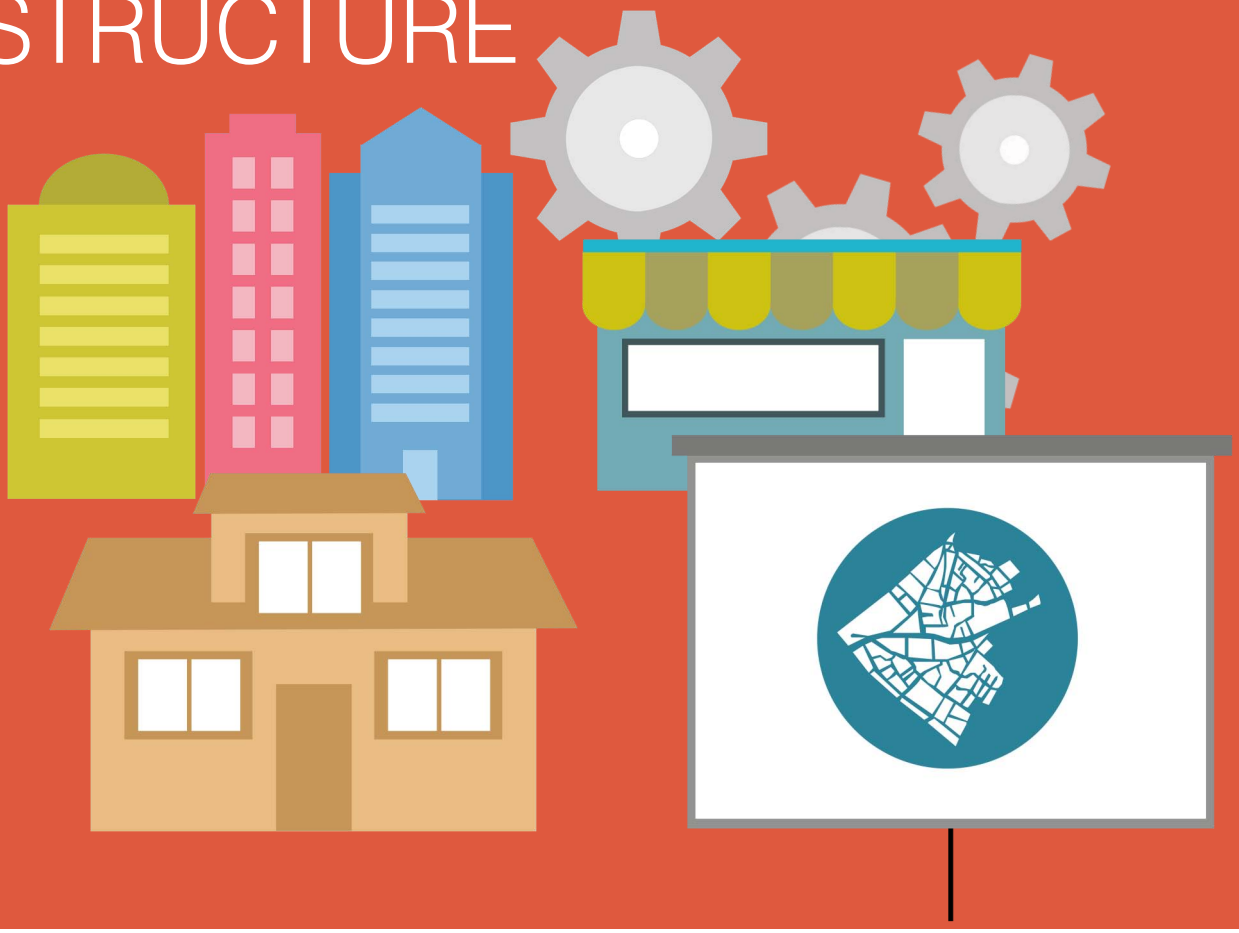
Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 1.2.2 Green Incentives and Taxation for Greening Business						
GG 12 Provide green incentives for business to set up an environmental & energy performance unit that generates green employment				Administration Dept.	KW (Finance, Corporate Communication, and Socio Economic), SSM, MIDA, GreenTech Malaysia, MOF	Business assoc.
GG 13 Introduce prestigious annual green awards that recognise and/or reward existing businesses that achieve significant results in resource and energy efficiency improvement in their overall operations				Licensing & Petty Traders Development Dept.	KW (Corporate Communication), SSM, MIDA, GreenTech Malaysia	Business assoc.
Measure 1.3.1. Strengthen Institutional Support for Green Growth						
GG 14 Establish a Green Economy Unit in KLCH to promote, coordinate, advise, enable and facilitate the setting up of green businesses and markets in Kuala Lumpur				Administration Dept.	KLCH (Human Resource Dept.), MIDA, GreenTech Malaysia, SSM	KLCH (Administration Dept.)
GG 15 KLCH through the Green Economy Unit to facilitate businesses in solicitation of advice from relevant agencies (e.g. GreenTech Malaysia Malaysia, MESTECC) on energy efficiency and renewable energy				Administration Dept.	KLCH (Human Resource Dept.), GreenTech Malaysia, MESTECC, SEDA, MAESCOs	Business assoc.
GG 16 Develop a Green Growth Action Plan for Kuala Lumpur that clearly outlines KLCH's green growth policy direction and strategies, and provides clear policy guidance to green businesses and investors				Administration Dept.	KW (Policy Planning, and Corporate Communication), GreenTech Malaysia, MIDA, SSM	KLCH (City Planning Dept.), Business assoc.
Measure 1.3.2 Create and Expand Green Markets						
GG 17 All government entities within the KLCH area to implement the Government Green Procurement (GGP) practice				Administration Dept.	GreenTech Malaysia	Business assoc.
GG 18 Set up and maintain a "Kuala Lumpur Green Portal" that provides real-time information on Kuala Lumpur's LCS progress, green technologies, green jobs, green education and links to key government green portals (e.g. MyHIJAU)				Information Management Dept.	GreenTech Malaysia, MIDA	KLCH (Information Management Dept.)
GG 19 Widespread adoption of green certification (e.g. MyHIJAU Mark) for all range of green products and services within Kuala Lumpur to provide consumers with an authoritative and reliable guide to the emerging green market				Administration Dept.	GreenTech Malaysia	KLCH (Administration Dept.), GreenTech Malaysia
GG 20 Encourage business establishments in Kuala Lumpur to tap into the MyHIJAU platform to expand connections to other green businesses and wider consumers				Administration Dept.	GreenTech Malaysia, KW (Corporate Communication)	Business assoc.
Measure 1.4.1 Human Capital Enhancement						
GG 21 Work with the academia, industry and relevant government agencies to establish Kuala Lumpur as the regional hub for accredited professional short courses on green growth and green businesses				Human Resource Management Dept. (IDB)	KPM, KW, SSM, MIDA, GreenTech Malaysia	KLCH (Human Resource Management Dept. (IDB)), Business assoc.
GG 22 Develop systematic up-skills programs for progressive upgrading/retraining of existing pool of professional and semi-professional workers in various green sectors				Human Resource Management Dept. (IDB)	KPM, SSM, GreenTech Malaysia	KLCH (Human Resource Management Dept. (IDB)), Business assoc.
GG 23 Fiscal incentives for business establishments that offer continuous professional education for current employees in the green sector				Human Resource Management Dept. (IDB)	KLCH (Licensing and Petty Traders Development Dept.), KW (Finance), SSM, GreenTech Malaysia	KLCH (Licensing and Petty Traders Development Dept.), Business assoc.

Importance Level

High Medium Low

ACTION 2

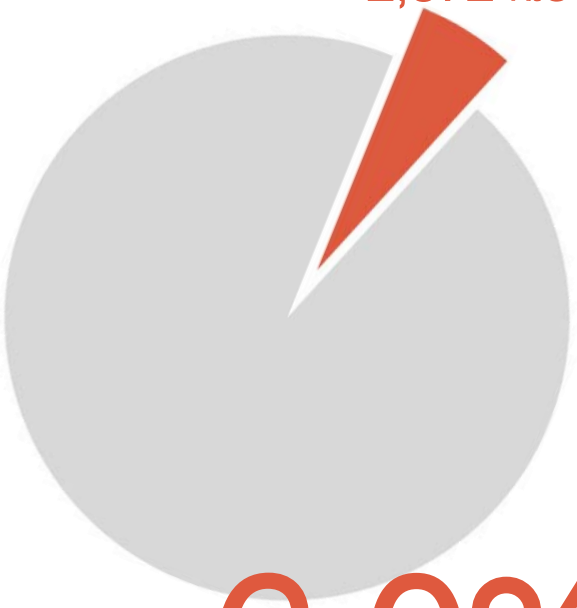
ENERGY EFFICIENT SPATIAL STRUCTURE



Kuala Lumpur's population is expected to increase to 2.49 million by 2030. With the growing population, along with the scarcity and increasing demand for urban spaces in Kuala Lumpur, the spatial structure of this metropolis needs to be efficiently developed to reduce its energy consumption and CO_2 emission. This can be achieved by promoting polycentric spatial structure, materialising Transit Oriented Development (TOD) as well as encouraging walking and cycling as a mode of travel within suitable distance. Kuala Lumpur needs a more human-oriented urban design, which offers its residents a healthy and safe living environment, higher quality of life whilst reducing travel and energy demand as well as cost of living. This requires continuous collaboration between city planners, key economic actors and residents of Kuala Lumpur.

Sectoral contribution to CO_2 emission reduction

2,872 $ktCO_2eq$



6.0%

2.1 Compact Urban Form

Rapid development and economic growth coupled to limited land and strong demand for housing and urban space points to the importance of having a more compact urban form, which promotes higher density development with mixing of various activities as well as pedestrian and cyclist-friendly environments with better accessibility to services and facilities within closer proximity.

Measure 2.1.1 Promote Polycentric, Compact Growth Pattern in Kuala Lumpur

Programs:

SS 1 Gradual densification in polycentric nodes connected by public transportation

SS 2 Focus on high density mixed use development to minimise the need to travel

SS 3 Plan to achieve a compact, contiguous pattern of growth – looking "inward and upward"

Measure 2.1.2 Promote Transit Supportive Land Use Planning

Programs:

SS 4 Promote higher intensity urban development around transit stations

SS 5 Rationalise key locations for TOD in relation to existing and proposed MRT and LRT networks

SS 6 Station Area Planning (SAP)

SS 7 Concentrate provision of new affordable homes around transit stations

Photo credit: Malaysia Property Review, May 201

2.2 Walkable and Cyclist-Friendly Urban Districts

Creating a human-oriented environmentally friendly urban design, which is a key aspect of a low carbon society, will eventually contributing to the CO_2 emission reduction. Like other cities such as Copenhagen, Amsterdam and especially Singapore, Kuala Lumpur can potentially solve its traffic problem by providing extensive and comprehensive pedestrian walkways and cycling lanes.

Measure 2.2.1 Enhance Interconnected Pedestrian Network

Programs:

SS 8 Design permeable street layouts

SS 9 Identify and connect discontinuities within existing pedestrian network and sub-urban areas

SS 10 Create continuous active street frontages

SS 11 Safe walking routes to schools and public institutions

Photo credit: PADU,2015

Measure 2.2.2 Providing Comfortable and Safe Walkways

Programs:

SS 12 Street planting for shades

SS 13 Improve street furniture

SS 14 Extend existing covered walkways to include all main pedestrian routes

SS 15 Enforce universal design concept

Measure 2.2.3 Build Quality Public Spaces and Pedestrian Environments that Support Walking

Programs:

SS 16 Identify potential urban spaces as public realms

SS 17 Improve and redesign existing pocket parks

SS 18 Conduct pedestrian Level of Service (LOS) analysis on high pedestrian traffic areas

Measure 2.2.4 Providing Safe and Comfortable Cycling Network

Programs:

SS 19 Engaging local cycling clubs in planning Kuala Lumpur cycling routes

SS 20 Dedicated cycle lanes on major routes in Kuala Lumpur

SS 21 Bike Expressway (Bike E-Way) from suburbs area to city centre and along major rivers and railway lines

Photo credit: UTM LCARC

Measure 2.2.5 Crime Prevention Through Environmental Design (CPTED)

Programs:

SS 22 Install CCTVs

SS 23 Set up security beats at appropriate locations

SS 24 Increase natural surveillance through proper building orientation and landscape design

SS 25 Eliminate blind spots in urban environments

SS 26 Enhance street lighting along pathway and other pedestrian used areas

Photo credit: Oxford Street by James Reid, 2014

2.3 Designing Civilised and Livable Streets

The liveability of streets decline as the traffic volumes and speeds increase. Streets with moderate to low traffic volume and speed are more satisfying to residents. In line with Kuala Lumpur policy documents in ensuring the safety of all road users, 'traffic calming" should be introduced. Traffic calming can potentially control the volume and speed of traffic for example via road humps and 30km/h traffic sign which have been used in roads in Amsterdam and Barcelona.

Measure 2.3.1 Street Environment Enhancement

Programs:

SS 27 Create 'home zones' in residential areas

SS 28 Community landscaping program

Measure 2.3.2 Reducing Vehicular Traffic Speed for Enhanced Pedestrian Safety

Programs:

SS 29 Carriageway narrowing, chicanes, pavement widening and kerb extension at junctions

SS 30 Install humped pedestrian crossings and raised junction plateau

Action 2 ENERGY EFFICIENT SPATIAL STRUCTURE

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
2.1.1 Promote Polycentric, Compact Growth Pattern in Kuala Lumpur						
SS 1 Gradual densification in polycentric nodes connected by public transportation				City Planning Dept.	KLCH(Civil Engineering & Urban Transportation Dept.), Neighbouring local authorities, MOT	Developers
SS 2 Focus on high density mixed use development to minimise the need to travel				City Planning Dept.	MOT, KPKT	Developers
SS 3 Plan to achieve a compact, contiguous pattern of growth – looking "inward and upward"				City Planning Dept.	KPKT, PLANMalaysia	Developers
Measure 2.1.2 Promote Transit Supportive Land Use Planning						
SS 4 Promote higher intensity urban development along transit stations				City Planning Dept.	PRASARANA, MOT, KPKT	Developers
SS 5 Rationalise key locations for TOD in relation to existing and proposed MRT and LRT networks				City Planning Dept.	MOT, KPKT, KW	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 6 Station Area Planning (SAP)				Infrastructure Planning Dept.	KLCH (City Planning Dept.), MOT, KPKT, KW	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 7 Concentrate provision of new affordable homes around transit stations				City Planning Dept.	KLCH (Housing Management & Community Development Dept.)	KLCH (Economic Planning & Development Dept.), KW, Developers
Measure 2.2.1 Enhance Interconnected Pedestrian Network						
SS 8 Design permeable street layouts				Infrastructure Planning Dept.	KLCH (City Planning, Building Control Dept., Project Implementation & Building Maintenance Dept., Civil Engineering & Urban Transportation Dept., Landscape & Recreational Development Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 9 Identify and connect discontinuities within existing pedestrian network and sub-urban areas				Infrastructure Planning Dept.	KLCH (City Planning Dept., Civil Engineering & Urban Transportation Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 10 Create continuous active street frontages				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Licensing & Petty Traders Development Dept.), KW, KPKT	Property/business owners
SS 11 Safe walking routes to schools and public institutions				Infrastructure Planning Dept.	KW, KPKT, JPWPKL, JKR	KLCH (Civil Engineering & Urban Transportation Dept.), Developers, Communities, Schools

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
2.2.2 Providing Comfortable and Safe Walkways						
SS 12 Street planting for shades				Landscape & Recreational Development Dept.	KLCH (Infrastructure Planning Dept., Civil Engineering & Urban Transportation Dept., City Planning Dept.) KW, KPKT	KLCH (Landscape & Recreational Development Dept.) and Developers
SS 13 Improve street furniture				Civil Engineering & Urban Transportation Dept.	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Infrastructure Planning Dept.), KW, KPKT	KLCH(Project Implementation & Building Maintenance Dept. Civil Engineering & Urban Transportation Dept.), Developers
SS 14 Extend existing covered walkways to include all main pedestrian routes				Infrastructure Planning Dept.	KLCH (Landscape & Recreational Development Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.,), Developers
SS 15 Enforce universal design concept				Infrastructure Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., Landscape & Recreational Development Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
2.2.3 Build Quality Public Spaces and Pedestrian Environments that Support Walking						
SS 16 Identity potential urban spaces as public realms				City Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., Landscape & Recreational Development Dept.), KW, KPKT	Developers
SS 17 Improve and redesign existing pocket parks				Landscape & Recreational Development Dept.	KLCH (Project Implementation & Building Maintenance Dept.), KW, KPKT	KLCH (Landscape & Recreational Development Dept.), Developers
SS 18 Conduct pedestrian Level of Service (LOS) analysis on high pedestrian traffic areas				Civil Engineering & Urban Transportation Dept.	KLCH (Project Implementation & Building Maintenance Dept.), JKR, KW, KPKT, Prasarana	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
Measure 2.2.4 Providing Safe and Comfortable Cycling Network						
SS 19 Engaging local cycling clubs in planning Kuala Lumpur cycling routes				Infrastructure Planning Dept.	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Culture, Arts, Tourism & Sports Dept.), Prasarana, MOT, KW, KPKT, Cycling organisations	KLCH (Civil Engineering & Urban Transportation Dept.)
SS 20 Dedicated cycle lanes on major routes in Kuala Lumpur				Infrastructure Planning Dept.	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Culture, Arts, Tourism & Sports Dept.), Prasarana, MOT, KW, KPKT, Cycling organisations	KLCH (Civil Engineering & Urban Transportation Dept.,), Developers

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 2.2.4 Providing Safe and Comfortable Cycling Network						
SS 21 Bike Expressway (Bike E-Way) from suburbs area to city centre and along major rivers and railway lines				Infrastructure Planning Dept.	MOT, KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
2.2.5 Crime Prevention Through Environmental Design (CPTED)						
SS 22 Install CCTVs				Civil Engineering & Urban Transportation Dept.	PDRM, KW, KPKT, PLANMalaysia	KLCH (Civil Engineering & Urban Transportation Dept.), Community, Property owners
SS 23 Set up security beats at appropriate locations				Enforcement Dept.	PDRM, KW, KPKT, PLANMalaysia	KLCH (Civil Engineering & Urban Transportation Dept.)
SS 24 Increase natural surveillance through proper building orientation and landscape design				Project Implementation & Building Maintenance Dept.	KW, KPKT, PLANMalaysia	KLCH (Landscape & Recreational Development Dept.), Resident assoc., Property owners, Community
SS 25 Eliminate blind spots in urban environments				Project Implementation & Building Maintenance Dept.	KLCH (Landscape & Recreational Development Dept.) PDRM, KW, KPKT, PLANMalaysia	KLCH (Civil Engineering & Urban Transportation Dept.), Property owners
SS 26 Enhance street lighting along pathway and other pedestrian used areas				Mechanical & Electrical Engineering Dept.	KW, KPKT	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Civil Engineering & Urban Transportation Dept.), Property owners
2.3.1 Street Environment Enhancement						
SS 27 Create 'home zones' in residential areas				Civil Engineering & Urban Transportation Dept.	KLCH (Housing Management & Community Development Dept., Infrastructure Planning Dept..), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 28 Community landscaping program				Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL)), KW, KPKT	KLCH (Landscape & Recreational Development Dept.), Resident's assoc.
2.3.2 Reducing Vehicular Traffic Speed for Enhanced Pedestrian Safety						
SS 29 Carriageway narrowing, chicanes, pavement widening and kerb extension at junctions				Civil Engineering & Urban Transportation Dept.	KLCH (Project Implementation & Building Maintenance Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 30 Install humped pedestrian crossings and raised junction plateau				Civil Engineering & Urban Transportation Dept.	KLCH (Project Implementation & Building Maintenance Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers

Importance Level

High ■ Medium ■ Low

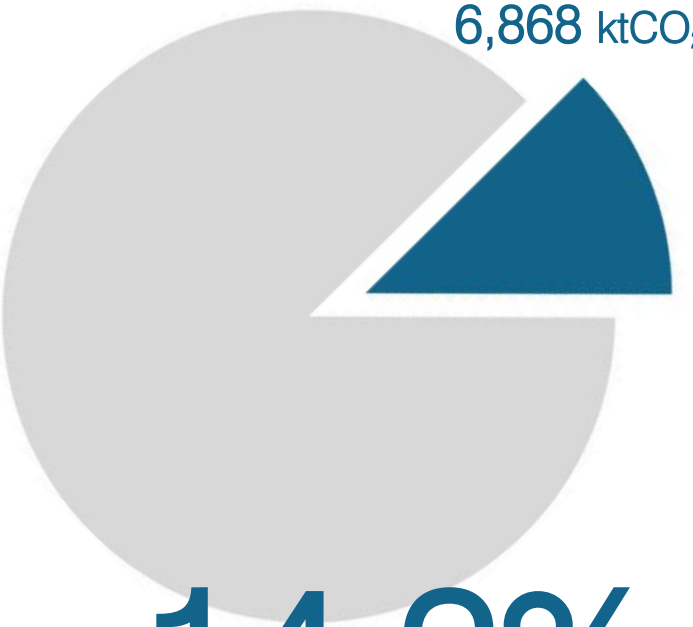
ACTION 3

GREEN MOBILITY

With the targeted strong growth in the economy and population in Kuala Lumpur, rapid growth in intra- and intercity passenger and freight transportation demand is inevitable. If left unchecked, growth in the transportation sector is expected to add to Kuala Lumpur carbon emission by 26,919 $ktCO_2$ and increased the transportation demand by 2030. In order to mitigate the carbon emission level of the projected increasing transportation demand, the development towards green mobility in Kuala Lumpur is essential. Its main purpose is to reduce Kuala Lumpur's carbon emission by inducing a voluntary modal shift from motorised vehicles to walking and cycling for short- to medium- distance trips, at the same time promoting public transport use. Undoubtedly, green mobility will create and promote a new culture of sustainable mobility in the Kuala Lumpur city.

Sectoral contribution to CO_2 emission reduction

6,868 $ktCO_2eq$



14.2%

3.1 Active Mobility

Active mobility is a form of transport of people and goods which use physical activity of the human being such as walking and cycling.

Measure 3.1.1 Promote Walking and Cycling on Short to Medium Trips

Programs:

GM 1 Provision of bicycle facilities

GM 2 Pedestrian and cycling priority at crossings

GM 3 Cycle Safe and Right

GM 4 Promote cycling as an attractive transport mode beyond recreational purposes

GM 5 Establish bike rental program – KL Cycle Hire Scheme

Measure 3.1.2 Designate Pedestrian Zones in Key Activity Centres

Program:

GM 6 Identify potential activity centres for implementation of pedestrian zones

3.2 Integrated Public Transportation

Integrated public transport system tends to meet the need of customers, which ultimately results in the increment of ridership.

Measure 3.2.1 Public Transport System Improvement (Bus and Rail)

Programs:

GM 7 Route network expansion planning

GM 8 Re-rationalisation of existing bus lane network

GM 9 Strengthen enforcement against misuse of dedicated bus lanes

GM 10 Work with relevant agencies to advocate for high capacity, fast, frequent and reliable rapid transit

GM 11 Provide real time arrival information at all bus stops and rail stations

GM 12 Reimaging public transport

GM 13 Implement flat rate tickets and central area free shuttle services

GM 14 Develop and promote web-based journey planner

Photo credit: www.data-display.com

Measure 3.2.2 Seamless Intermodal Transfer (Interchange Facilities)

Programs:

GM 15 Integrated e-ticketing system (across all platforms)

GM 16 Public transport interchange as destination and urban activity nodes

GM 17 Upgrading bus and rail integrated terminal

GM 18 Enhance 'Park and Ride' facilities in sub-urban transit nodes

Photo credit: UTM LCARC

3.3 Diffusion of Low Carbon Vehicles

It is imperative that the diffusion of low carbon vehicles in Kuala Lumpur to play its role as a potential to minimise the carbon impact of private vehicles for a low carbon future in Kuala Lumpur.

Measure 3.3.1 Promote the Use of Green Vehicles

Programs:

GM 19 KLCH to use viable low carbon vehicles

GM 20 Partnering with EV car sharing companies

GM 21 Tax reduction for green vehicle purchase

GM 22 Gradual phasing out for conventional diesel engine buses

Photo credit: www.autorentalnews.com

3.4 Enhancing Traffic Flow Conditions and Performance

Enhancing traffic flow in Kuala Lumpur means delivering more reliable journey times and more free-flowing travel conditions than at present.

Measure 3.4.1 Transport Demand Management

Programs:

GM 23 Enhance Intelligent Transportation System (ITS)

GM 24 Chart out practical timeline for progressive implementation of congestion pricing scheme

GM 25 Parking demand management

GM 26 Intelligent traffic control and support eco driving

GM 27 Enhance the use of effective Variable Message Signs (VMS)

GM 28 Improve traffic signal performance

GM 29 Tidal flow and contra-flow along primary radial routes

Photo credit: www.paultan.org

3.5 Green Freight Transportation

Government policies should focus on freight transport as much as it focuses on private vehicles and public transport.

Measure 3.5.1 Modal Shift to Greener Freight Transport Modes

Programs:

GM 30 Promote hybrid freight transport through tax incentives in hybrid freight transport acquisition

Measure 3.5.2 Freight Demand Management (FDM)

Program:

GM 31 Optimal scheduling of pick-up and delivery

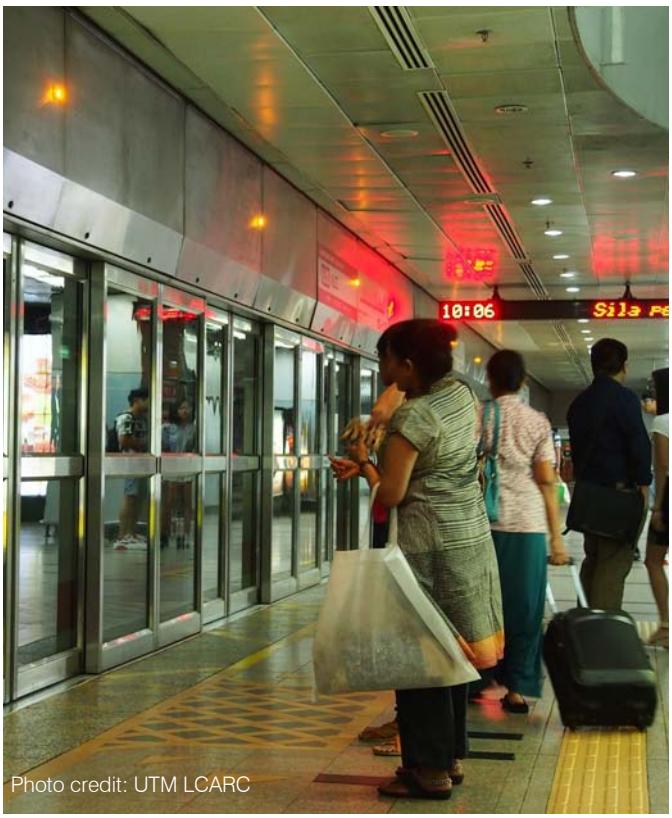


Photo credit: UTM LCARC

Action 3 GREEN MOBILITY

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 3.1.1 Promote Walking and Cycling on Short to Medium Trips						
GM 1 Provision of bicycle facilities	■	■	■	Infrastructure Planning Dept.	KLCH (City Planning Dept.), MOT, JKJR, Cycling organisations	KLCH (Civil Engineering & Urban Transportation Dept.), KL residents association, Neigbouring local authorities
GM 2 Pedestrian and cycling priority at crossings	■	■	■	Infrastructure Planning Dept.	KLCH (City Planning Dept.), JKR	KLCH (Civil Engineering & Urban Transportation Dept. Enforcement Dept.), PDRM
GM 3 Cycle safe and right		■	■	Infrastructure Planning Dept.	KLCH (Housing Management & Community Dev. Dept.), JPJ, MOT, MOE, Cycling organisations, JPWPKL, MIROS	KLCH (Infrastructure Planning Dept.)
GM 4 Promote cycling as an attractive transport mode beyond recreational purposes	■	■	■	Infrastructure Planning Dept.	KLCH (Housing Management & Community Dev. Dept.), JPJ, MOT, KPM, Cycling organisations, JPWKL, MIROS	KLCH (Infrastructure Planning Dept.)
GM 5 Establish bike rental program – KL Cycle Hire Scheme		■	■	Culture, Arts, Tourism & Sports Dept.	Prasarana, MOT, EC, MESTECC	KLCH (Civil Engineering & Urban Transportation Dept. Culture, Arts, Tourism & Sports Dept.), Cycling organisations, Residents assoc.
Measure 3.1.2 Designate Pedestrian Zones in Key Activity Centres						
GM 6 Identify potential activity centres for implementation of pedestrian zones	■	■	■	Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept. Maintenance Dept., Building Control Dept.,), JKR, JKJR, MOT, DID, NAHRIM, REHDA	KLCH (Enforcement Dept. Civil Engineering & Urban Transportation Dept.)
Measure 3.2.1 Public Transport System Improvement (Bus and Rail)						
GM 7 Route network expansion planning		■	■	Infrastructure Planning Dept.	KLCH (City Planning Dept., Civil Engineering & Urban Transportation Dept.), MOT, MOF	KLCH (Civil Engineering & Urban Transportation Dept.), MOT, Prasarana, MRT Corp., MYHSR
GM 8 Re-rationalisation of existing bus lane network		■	■	Infrastructure Planning Dept.	MOT, MRT Corp., Prasarana	KLCH (Civil Engineering & Urban Transportation Dept.), Prasarana, MOT
GM 9 Strengthen enforcement against misuse of dedicated bus lanes	■	■	■	Enforcement Dept.	KLCH (Legal & Prosecution Dept.), MOT, PDRM, JPJ	KLCH (Enforcement Dept., Civil Engineering & Urban Transportation Dept., (ITIS))
GM 10 Work with related agencies to advocate for high capacity, fast, frequent and reliable rapid transit	■	■	■	Civil Engineering & Urban Transportation Dept.	MOT	Prasarana, MRT Corp., MYHSR
GM 11 Provide real time arrival information at all bus stops and rail stations	■	■	■	Civil Engineering & Urban Transportation Dept.	MOT, Prasarana, MRT Corp.	MOT, Prasarana

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 3.2.1 Public Transport System Improvement (Bus and Rail)						
GM 12 Reimaging public transport				Civil Engineering & Urban Transportation Dept.	MOT, MOE, Malaysian Nature	Schools, HEIs
GM 13 Implement flat rate tickets and central area free shuttle services				Civil Engineering & Urban Transportation Dept.	EPU, MOT	Prasarana, MRT Corp.
GM 14 Develop and promote web-based journey planner				Civil Engineering & Urban Transportation Dept.	KLCH (Information Management Dept.), MOT	KLCH (Civil Engineering & Urban Transportation Dept., Information Management Dept.), MOT, Prasarana
Measure 3.2.2 Seamless Intermodal Transfer (Interchange Facilities)						
GM 15 Integrated e-ticketing system (across all platforms)				Civil Engineering & Urban Transportation Dept.	MOT	MOT, Prasarana, MRT Corp., MYHSR
GM 16 Public transport interchange as destination and urban activity nodes				Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept., City Planning Dept.), MOT	MOT, Prasarana, MRT Corp., MYHSR, Developers
GM 17 Upgrading bus and rail integrated terminal				Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept.) MOT,MOF	Prasarana, MRT Corp., MYHSR
GM 18 Enhance 'Park and Ride' facilities in sub-urban transit nodes				Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept.), MOT	MOT, Prasarana, MRT Corp., MYHSR
Measure 3.3.1 Promote the Use of Green Vehicles						
GM 19 KLCH to use viable low carbon vehicles				Mechanical & Electrical Engineering Dept.	MESTECC, GreenTech Malaysia	COMOS, MAI
GM 20 Partnering with EV car sharing companies				Mechanical & Electrical Engineering Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Corporate Planning Dept.), MESTECC, GreenTech Malaysia , MOT	COMOS, MAI, Various EV car manufacturers
GM 21 Tax reduction for green vehicle purchase				Mechanical & Electrical Engineering Dept.	MOF, KASTAM, MOT,MITI, JPJ	MESTECC, GreenTech Malaysia, COMOS
GM 22 Gradual phasing out for conventional diesel engine buses				Mechanical & Electrical Engineering Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), MESTECC, GreenTech Malaysia, MOT	MOT, Prasarana
Measure 3.4.1 Transport Demand Management						
GM 23 Enhance Intelligent Transportation System (ITS)				Civil Engineering & Urban Transportation Dept.	KLCH (Information Technology Management Dept.), MOT, MESTECC	MOT, PRASARANA
GM 24 Chart out practical timeline for progressive implementation of congestion pricing scheme				Civil Engineering & Urban Transportation Dept.	KLCH (Legal & Prosecution Dept., Enforcement Dept.), MOT	MOT, JPJ
GM 25 Parking demand management				Civil Engineering & Urban Transportation Dept.	KLCH (Legal & Prosecution Dept., City Planning Dept.)	KLCH (Economic Planning & Development Dept.)

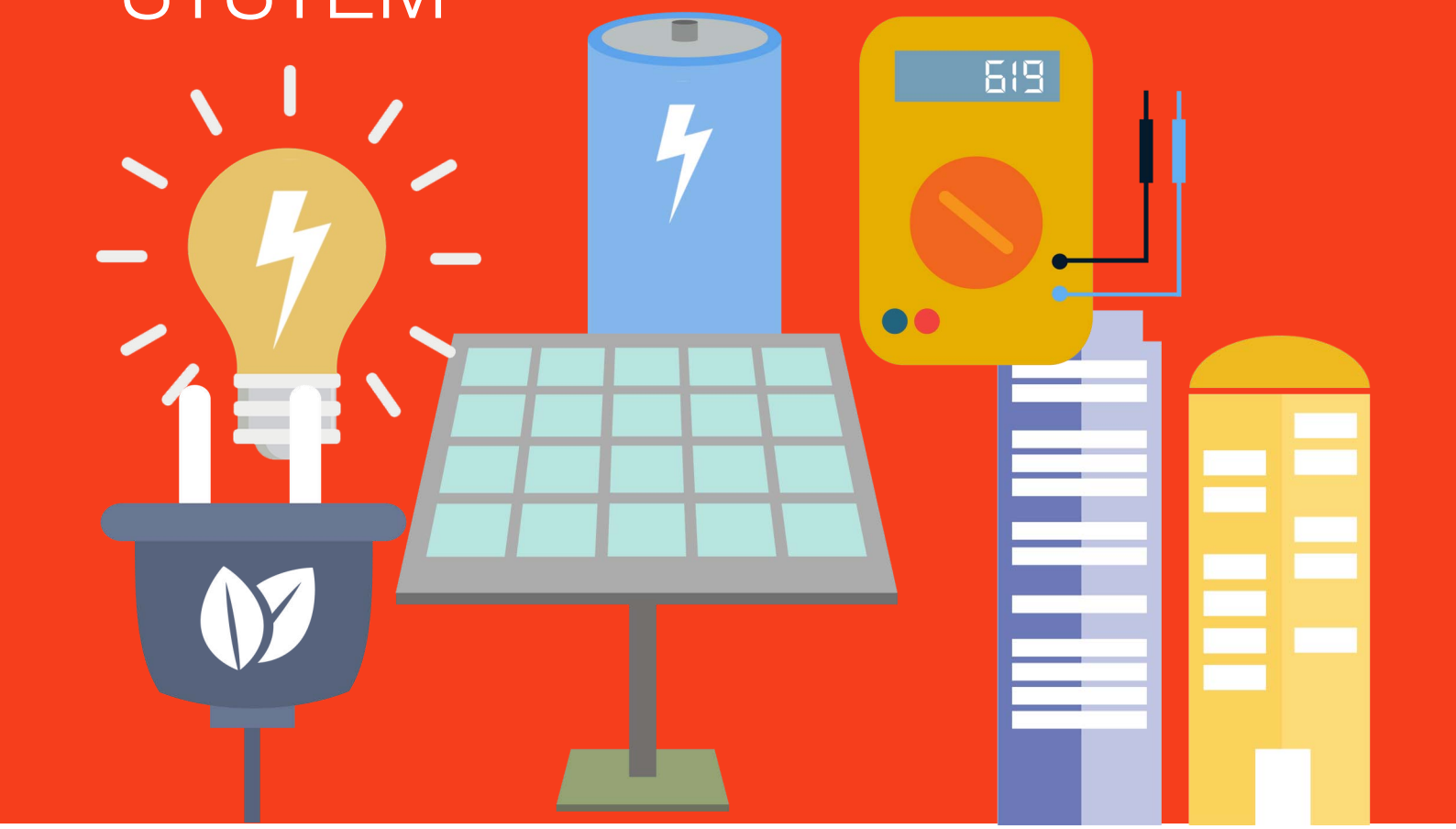
Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 3.4.1 Transport Demand Management						
GM 26 Intelligent traffic control and support eco driving				Civil Engineering & Urban Transportation Dept.	KLCH (Information Management Dept.), MOT,	GreenTech Malaysia , Various car manufacturers
GM 27 Enhance the use of effective Variable Message Signs (VMS)				Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept.)	KLCH (Civil Engineering & Urban Transportation Dept.), LLM and JKR
GM 28 Improve traffic signal performance				Civil Engineering & Urban Transportation Dept.	MOT	KLCH (Civil Engineering & Urban Transportation Dept.), LLM and JKR
GM 29 Tidal flow and contra-flow along primary radial routes				Civil Engineering & Urban Transportation Dept.	KLCH (Enforcement Dept., Infrastructure Planning Dept.), JKR, MOT	KLCH (Enforcement Dept.), JPJ and PDRM
Measure 3.5.1 Modal Shift to Greener Freight Transport Modes						
GM 30 Promote hybrid freight transport through tax incentives in hybrid freight transport acquisition				Mechanical & Electrical Engineering Dept.	KASTAM, MITI, MESTECC, MOT	GreenTech Malaysia, Logistics operators
Measure 3.5.2 Freight Demand Management (FDM)						
GM 31 Optimal scheduling of pick-up and delivery				Civil Engineering & Urban Transportation Dept.	MOT	KLCH (Enforcement Dept.), JPJ, PDRM, Logistics operators

Importance Level

High Medium Low

ACTION 4

SUSTAINABLE ENERGY SYSTEM



Energy consumption of a modern society like Kuala Lumpur city is far less sustainable with high carbon emissions from the centralised power generation. As a countermeasure, the development of sustainable energy systems comprising efficient energy (in terms of operation and management) and renewable power generation are necessary. To accommodate a complex network of energy-demanding premises which are not initially designed with sustainable energy consumption criteria, there is still a long way to go for KLCH and relevant stakeholders to harmonise the existing situation with the sustainable energy consumption practices, besides stimulating renewable resources in the current power system.

33.9%

16,327 $ktCO_2eq$

Sectoral contribution to CO_2 emission reduction

4.1 Utilise Renewable Energy

Maximising the penetration of renewable and sustainable energy sources is an effective means of reducing the GHG emissions, via reduction of fossil fuel combustion for power generation.

Measure 4.1.1 Solar Energy System

Programs:

SE 1 To provide solar farms

SE 2 To promote PV and solar thermal system on buildings

SE 3 To promote PV system on public infrastructure

Measure 4.1.2 Waste-to-Energy

SE 4 Conversion of waste oil to biodiesel for KLCH transportation

SE 5 To recover energy from municipal solid waste using gasification

SE 6 Energy harvest from sewage treatment plant

SE 7 To convert food waste to energy

4.2 Enhance Efficient Energy System

The prediction from the Intergovernmental Panel on Climate Change (IPCC) reveals that a 75% reduction in energy consumption can be achieved by incorporating holistic and systematic energy efficiency strategies in buildings' design and operation, rather than improving individual component efficiency (M. Zaid et al., 2013).

Measure 4.2.1 Advanced Energy System

Programs:

SE 8 Implementation of district cooling system

Measure 4.2.2 Energy Storage System

Programs:

SE 9 To promote energy storage for efficient energy consumption

SE 10 Promote thermal energy storage for cooling

4.3 Implement Effective Energy Management System

As a countermeasure, an effective implementation of energy management system and some effective energy efficiency (EE) programs shall be scrutinised. Strengthening the funding and financial assistance are also vital for promoting a sustainable energy management system.

Measure 4.3.1 Energy Management System

Programs:

SE 11 To obtain certification in energy management system

SE 12 Implementation of online energy monitoring

4.4 Funding and Incentives to Encourage Energy Efficient and Renewable Energy Strategies

Sufficient funding and subsidies have to be provided for incentivising the energy efficiency strategies.

Measure 4.4.1 Funding and Incentives Support

Programs:

SE 13 To provide tax incentives for Waste-to-Energy (WtE) Initiatives

SE 14 Energy Performance Contracting to overcome financial barriers

Photo credit: Namita Shah

Action 4 SUSTAINABLE ENERGY SYSTEM

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partner	Implementer
Measure 4.1.1 Solar Energy System						
SE 1 To provide solar farms				Mechanical & Electrical Engineering Dept.	KLCH (Health & Environment Dept.), TNB, SEDA, MESTECC, GreenTech Malaysia, MIGHT, Alam Flora Sdn. Bhd.	Solar PV technology provider land owners, Alam Flora Sdn. Bhd.
SE 2 To promote PV and solar thermal system on buildings *Please cross reference with GB 18				Mechanical & Electrical Engineering Dept.	KLCH (City Planning Dept., Building Control Dept.), TNB, SEDA, MESTECC, GreenTech Malaysia, MIGHT	KLCH (Project Implementation & Building Maintenance Dept.), Building owners, Solar PV technology suppliers
SE 3 To promote PV system on public infrastructure				Mechanical & Electrical Engineering Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), SEDA, MIGHT, SIRIM, MESTECC, GreenTech Malaysia	KLCH (Project Implementation & Building Maintenance Dept.), Infrastructure owners, Solar PV technology supplier
Measure 4.1.2 Waste-to-Energy						
SE 4 Conversion of waste oil to biodiesel for KLCH transportation				Health & Environment Dept.	KLCH (City Planning (LA21KL)), MESTECC	KLCH (Mechanical & Electrical Engineering Dept.), Alam Flora Sdn. Bhd., Waste oil treatment company, Hotel and Restaurant operators, Resident's assoc.
SE 5 To recover energy from municipal solid waste using gasification				Mechanical & Electrical Engineering Dept.	KLCH (Health & Environment Dept.), SEDA, Alam Flora Sdn. Bhd	WtE technology provider
SE 6 Energy harvest from sewage treatment plant				Mechanical & Electrical Engineering Dept.	SEDA, IWK, SPAN	IWK
SE 7 To convert food waste to energy *As a pilot project				Health & Environment Dept.	KLCH (Mechanical & Electrical Engineering Dept.),Perbadanan Kampung Bharu, SEDA, MESTECC, SWCorp	Pasar Chow Kit, WtE technology providers
Measure 4.2.1 Advanced Energy System						
SE 8 Implementation of district cooling system				Mechanical & Electrical Engineering Dept.	KLCH (City Planning Dept., Building Control Dept.), GreenTech Malaysia	KLCH (Mechanical & Electrical Engineering Dept.), Building owners, utility (chilled water and electricity) companies
Measure 4.2.2 Energy Storage System						
SE 9 To promote energy storage for efficient energy consumption				Mechanical & Electrical Engineering Dept.	TNB, SEDA, GreenTech Malaysia	Energy storage suppliers, Solar PV distributors, Building owners
SE 10 Promote thermal energy storage for cooling				Mechanical & Electrical Engineering Dept.	TNB, SEDA, GreenTech Malaysia	Energy storage suppliers, Solar PV distributors, Building owners

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partner	Implementer
Measure 4.3.1 Energy Management System						
SE 11 To obtain certification in energy management system				Project Implementation & Building Maintenance Dept.	KLCH (Human Resource Management Dept., Adminstration Dept.), EC,SEDA, GreenTech Malaysia	Commercial building owners, ESCO (Advisor of energy management system)
SE 12 Implementation of online energy monitoring system				Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA, EC, TNB	Building owners, Developers, Smart meter providers
Measure 4.4.1 Funding and Incentives Support						
SE 13 To provide tax incentives for Waste-to-Energy (WtE) initiatives				Property Management & Valuation Dept.	KLCH (City Planning Dept.), GreenTech Malaysia, MIDA	KLCH (Finance Dept.), LHDN, Building owners, Developers
SE 14 Energy Performance Contracting to overcome financial barriers				Economy Planning & Development Dept.	KLCH (Building Control Dept.), EC, GreenTech Malaysia, MIGHT, TNB	Building owners, Energy service companies, Technology suppliers

Importance Level

High Medium Low

ACTION 5

COMMUNITY ENGAGEMENT AND GREEN LIFESTYLE

People are the core element in achieving sustainability. Establishing a low carbon society whereby residents are practising low carbon behaviour is an essential element in transforming Kuala Lumpur into a world recognised low carbon city. However, changing how people behave is a challenging task and is time consuming. In response to this challenge, empowering community to undertake low carbon initiatives and adopt a low carbon lifestyle via effective action plans is highly crucial to motivate and support the establishment of low carbon society in Kuala Lumpur.

9,015 $ktCO_2eq$

Sectoral contribution to CO_2 emission reduction

5.1 Sustainable Consumption

Operation of electrical appliances to support modern lifestyle consume massive amount of electricity and considering that electricity is generated by power plant, mainly from natural gas and coal, it can lead to carbon emission.

Measure 5.1.1 Foster Sustainable Consumption Behaviour

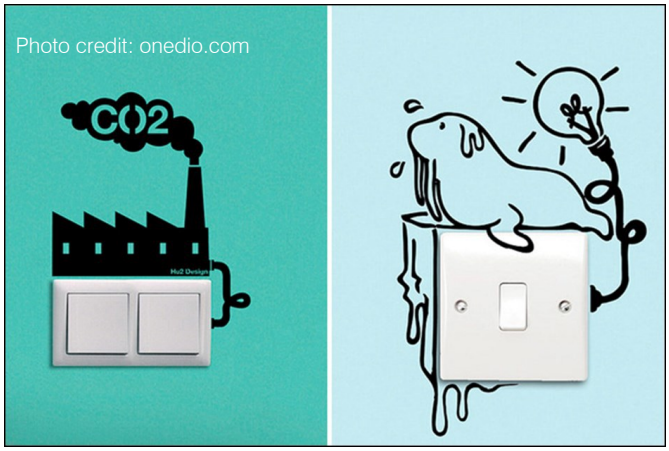
Programs:

CE 1 Survey sustainable consumption practice

CE 2 Stimulate sustainable consumption practice

CE 3 Strengthen sustainable consumption practice

CE 4 Sustain sustainable consumption practice



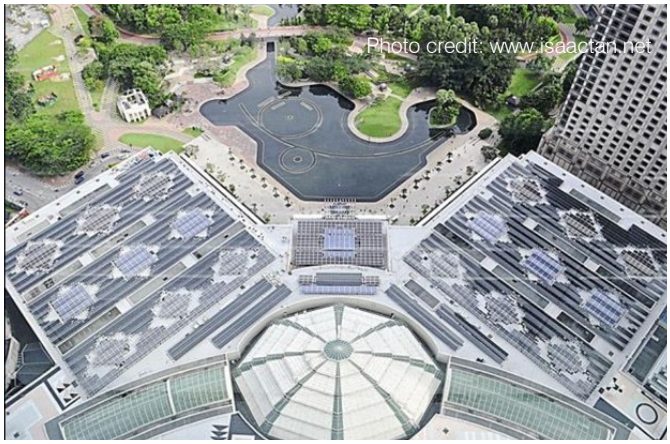
Measure 5.1.2 Promote Use of Technology that Contributes to Low Carbon Society

Programs:

CE 5 Promote the adoption of Energy Star Rating /eco-labelling appliances

CE 6 Promote the adoption of rainwater harvesting system

CE 7 Promote the adoption of photovoltaic panel



5.2 Low Carbon Society

Awareness about low carbon is a must in converting a society into a low carbon society. Local citizen's awareness can be fostered via a series of public relation and marketing campaign and educational campaign.

Measure 5.2.1 Public Community Awareness

Programs:

CE 8 Communicate LCS progress through mass media

CE 9 Raise environmental awareness through community-based social marketing program

Measure 5.2.2 Community Awareness through Education

Programs:

CE 10 KLCH to collaborate with agencies and schools/ pre schools on educating public

CE 11 Virtual science centre for children and youth education

CE 12 Develop new climate projects for children and youth

CE 13 Climate Ambassador program

CE 14 Green School Awards program

CE 15 Introduce Eco-Life Challenge (ELC) in schools

5.3 Public Involvement

Alternatively, viewing the local community as partner by the local authority via fostering public involvement and engagement into low carbon initiative is an important strategy in promoting co-operation and collaboration between the authority and the local community as well as among the member of the community in moving towards a low-carbon society.

Measure 5.3.1 Community Engagement and Involvement

Programs:

CE 16 Introduce Community Energy Saving program

CE17 Promote community garden association and urban farming

CE 18 Setting up database to record low carbon activities

CE 19 Setting up Low Carbon Residential Association

CE 20 Setting up community-based waste recycling centre

CE 21 Introduce Waste to Wealth program

CE 22 KLCH to collaborate with local communities in green space design

Measure 5.3.2 Increase Community Involvement in Community Safety and Security

Programs:

CE 23 Set up community/police patrolling

CE24 Set up Business Improvement District (BID)

Photo credit: KLCH

5.4 Green Lifestyle

Lifestyle is closed related to the formulation of a sustainable low carbon city.

Measure 5.4.1 Green Lifestyle and Smart Working Style

Programs:

CE 25 Promote 'Work-from-Home" and the adoption of flexi working hours initiative

CE 26 Reinforce 24 degree Celsius campaign

CE 27 Promote *Cool Biz* campaign

CE 28 Introduce turn-off Idling engine campaign

CE 29 Promote “Stop Open Burning” campaign

CE 30 Promote Eco-driving campaign

Action 5 COMMUNITY ENGAGEMENT AND GREEN LIFESTYLE

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 5.1.1 Foster Sustainable Consumption Behaviour						
CE 1 Survey sustainable consumption practice	▬	▬	▬	Health & Environment Dept.	KLCH (Information Management Dept.),JPWPKL, HEIs	KLCH (Housing Management & Community Development Dept.), Local research and higher learning institutions, NGOs, Resident's assoc.
CE 2 Stimulate sustainable consumption practice	▬	▬	▬	Health & Environment Dept.	KLCH (Housing Management & Community Development Dept.)	NGOs, Resident's assoc.
CE 3 Strengthen sustainable consumption practice	▬	▬	▬	Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., Corporate Planning Dept., City Planning Dept. (LA21KL), Civil Engineering & Urban Transport Dept. (ITIS)).	NGOs, Resident's assoc.
CE 4 Sustain Sustainable consumption practice	▬	▬	▬	Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., City Planning Dept. (LA21KL), Information Management Dept.)	NGOs, Resident's assoc.
Measure 5.1.2 Promote Use of Technology that Contributes to Low Carbon Society						
CE 5 Promote the adoption of Energy Star Rating / eco-labelling appliances	▬	▬	▬	Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL), Housing Management & Community Development Dept.), EC, MESTECC	NGOs, Resident's assoc.
CE 6 Promote the adoption of rainwater harvesting system	▬	▬	▬	Infrastructure Planning Dept.	KLCH (Health & Environment Dept., Project Implementation & Building Maintenance Dept. Building Control Dept.), DID, NAHRIM, REHDA	Developers, Building owners, Resident's assoc.
CE 7 Promote the adoption of solar photovoltaic panel (cross reference with energy SE2)	▬	▬		Mechanical & Electrical Engineering Dept.	KLCH (Building Control Dept., Project Implementation & Building Maintenance Dept.), GreenTech Malaysia, SEDA	Building/Property owners, Resident's assoc.

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 5.2.1 Public Community Awareness						
CE 8 Communicate LCS progress through mass media	■	■	■	Corporate Planning Dept.	KLCH (Health & Environment Dept., Culture, Arts & Sport Dept., Information Management Dept.)	Mass Media
CE 9 Raise environmental awareness through community-based social marketing program	■	■	■	City Planning Dept. (LA21KL)	KLCH (Housing Management & Community Development Dept., Health & Environment Dept., Culture, Arts & Sport Dept.)	Resident's Assoc., NGOs
Measure 5.2.2 Community Awareness through Education						
CE 10 KLCH to collaborate with agencies and schools/pre schools on educating public	■	■	■	City Planning Dept. (LA21KL)	KLCH (Health & Environment Dept.), PPD, JPWPKL, JKM	NGOs, Schools
CE 11 Virtual science centre for children and youth education		■	■	Administrative Dept.	KLCH (Health & Environment Dept., Culture, Arts & Sport Dept.), Young Scientists Network-Academy Of Sciences Malaysia, PPD, JPWPKL, JKM, MOE, Malaysian Nature Society	Schools, HEIs
Measure 5.2.2 Education Community Awareness						
CE 12 Develop new climate projects for children and youth	■	■	■	Housing Management & Community Development Dept.	KLCH (City Planning Dept., Housing Management & Community Development Dept., Health & Environment Dept.),PPD,JPWPKL,PIBG, JKM, MOE	Schools, HEIs
CE 13 Climate Ambassador Program		■	■	Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL), Health & Environment Dept.), PPD,JPWPKL,PIBG	Schools, Resident's Assoc.
CE 14 Green School Awards program		■	■	Housing Management & Community Development Dept.	KLCH ((City Planning Dept. (LA21KL), Culture, Arts & Sport Dept.), PPD, JPWPKL, Social Welfare Dept., DOE, MOE, WWF, MESTECC	JPWPKL, Schools
CE 15 Introduce Eco-Life Challenge (ELC) in schools	■	■	■	Housing Management & Community Development Dept.	KLCH ((City Planning Dept. (LA21KL), Health & Environment Dept.), PPD,JPWPKL, DOE, MOE, MESTECC, WWF	JPWPKL, Schools
Measure 5.3.1 Community Engagement and Involvement						
CE 16 Introduce Community Energy Saving program	■	■	■	Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL)), TNB, GreenTech Malaysia	KLCH (Housing Management & Community Development Dept.), Resident's Assoc.
CE 17 Promote community garden association and urban farming	■	■	■	City Planning Dept. (LA21KL)	KLCH (Landscape & Recreation Development Dept., Housing Management & Community Development Dept.), MARDI, UPM	Resident's Assoc., NGOs, Schools

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
CE 18 Setting up database to record low carbon activities				City Planning Dept.	KLCH (Health & Environment Dept., Information Management Dept., Landscape & Recreation Development Dept.)	Resident's Assoc., NGOs
CE 19 Setting up Low Carbon Residential Association				Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL)), KW	Resident's assoc.
CE 20 Setting up community-based waste recycling centre				Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., Mechanical & Electrical Engineering Dept.), Alam Flora Sdn. Bhd., SWCorp	Resident's assoc.
CE 21 Introduce Waste to Wealth program				Health & Environment Dept.	KLCH (City Planning Dept., Project Implementation & Building Maintenance Dept., Housing Management & Community Development Dept.)	Resident's assoc., NGOs
CE 22 KLCH to collaborate with local communities in green space design				Landscape & Recreation Development Dept.	KLCH (City Planning Dept., Housing Management & Community Development Dept.), JLN	Resident's assoc., Business community, Property owners, NGOs
Measure 5.3.2 Increase Community Involvement in Community Safety and Security						
CE 23 Set up community/police patrolling				City Planning Dept.	KLCH (Enforcement Dept.), PDRM	Resident's Assoc., Business community
CE 24 Set up Business Improvement District (BID)				City Planning Dept.	KLCH (Enforcement Dept., Licensing & Petty Traders Dept.), PDRM	Business community
Measure 5.4.1 Green Lifestyle and Smart Working Style						
CE 25 Promote 'Work-from-Home" and the adoption of flexi working hours initiative				Administration Dept.	KLCH (Human Resource Management Dept.)	Private & public sectors
CE 26 Reinforce 24 degree Celsius campaign				Administration Dept.	KLCH (Project Implementation & Building Maintenance Dept.), JPKKB	Private & public sectors
CE 27 Promote *Cool Biz* campaign				Administration Dept.	KLCH (Human Resource Management Dept.), MESTECC	Private & public sectors
CE 28 Introduce turn-off Idling engine campaign				Health & Environment Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Enforcement Dept.), PDRM, MOT	KLCH (Health & Environment Dept.), Car park operators
CE 29 Promote "Stop Open Burning" campaign				Health & Environment Dept.	KLCH (Enforcement Dept.), DOE	Resident's assoc., NGOs
CE 30 Promote Eco-driving campaign				Civil Engineering & Urban Transportation Dept.	KLCH (Mechanical & Electrical Engineering Dept., Civil Engineering & Urban Transportation Dept), MOT, JPJ	MIROS & MKJR, Driving schools, MAI, NGOs, Car manufacturers

Importance Level

High Medium Low

ACTION 6

LOW CARBON GREEN BUILDING

Kuala Lumpur as the capital city of Malaysia has become one of the major commercial centres in Asia region, which comprises many headquarters of multinational corporations as well as mega shopping building complexes. With the total area of 242 km^2, about 28% of the city's land use are used for commercial and residential buildings. Buildings contributed to 49% from the total of Kuala Lumpur's GHG emission where 10,329 $ktCO_2$ generates from commercial buildings and 2,152 $ktCO_2$ from residential buildings, respectively. In fact, about 80% of the commercial and residential space supply in Kuala Lumpur city centre is from the existing buildings (Kuala Lumpur Structure Plan 2020). With the rapid growth of GDP in the city, the total GHG emission from the building sector will rise about three times by 2030. Therefore, countermeasures are urgently needed for both the new and existing buildings.

9,673 $ktCO_2eq$

Sectoral contribution to CO_2 emission reduction

6.1 Implementation of Sustainable Design Strategies

By responding to the local climatic conditions, which include the sun, wind and rain, buildings can reduce their dependency on mechanical and electrical equipment that require energy to achieve indoor comfort.


Photo credit: UTM LCARC

Measure 6.1.1 Efficient Building Envelope Performance

Programs:

GB 1 Minimum building envelope requirements

GB 2 Reduction of heat gain from direct solar radiation

GB 3 Maximising daylighting zone

GB 4 Promoting the use of natural ventilation

GB 5 Retrofitting the existing building envelope


Photo credit: UTM LCARC

Measure 6.1.2 Mitigation of Urban Heat Island (UHI) Phenomenon

Programs:

GB 6 Using appropriate materials on building surfaces

GB 7 Increasing the requirement of building green covering

GB 8 Improving coverings of the existing buildings

Measure 6.1.3 Increasing Building Water Efficiency

Programs:

GB 9 Implementation of rainwater harvesting

GB 10 Reduction of potable water consumption

GB 11 Improving water efficiency of existing buildings

Measure 6.1.4 Sustainable Low Carbon Building Construction

Programs:

GB 12 Incentives for certified low carbon green building materials and products

GB 13 Reuse of building materials for redevelopment projects

6.2 Usage of Energy Efficient (EE) & Renewable Energy (RE) Building Technologies

Efforts are needed to reduce the usage of non-renewable energy sources towards achieving zero energy or carbon neutral building.

Measure 6.2.1 Energy Efficient Air Conditioning System

Programs:

GB 14 High efficiency air conditioner for new non-residential buildings

GB 15 Conversion to high efficiency air conditioner for existing buildings


Photo credit: UTM LCARC

Measure 6.2.2 Energy Efficient Lighting System

Programs:

GB 16 Energy efficient lighting system for new buildings

GB 17 Conversion to energy efficient lighting for existing buildings

Measure 6.2.3 Renewable Energy System

Programs:

GB 18 Installation of renewable energy system in commercial buildings

GB 19 Implementation of net metering for PV System

Photo credit: http://www.kenan-flagler.unc.edu

Measure 6.2.4 Other Energy Efficient Equipment and Systems

Program:

GB 20 Incentives for energy efficient products and electrical appliances usage

6.3 Monitoring and Management of Green Buildings

Maintenance and monitoring of the performances of green buildings require additional measures and are essential to assure the sustainability of these buildings with low carbon emission.

Measure 6.3.1 Low Carbon Green Building Monitor

Programs:

GB 21 Low carbon green building calculator

GB 22 Low carbon building award (LCBA)

Measure 6.3.2 Low Carbon Green Building Plan

Programs:

GB 23 Submission of low carbon building plan

GB 24 Submission of sustainable building waste management plan

GB 25 Submission of green building user manual

Measure 6.3.3 Sustainable Management and Building Audit

Programs:

GB 26 Energy management system (EMS) requirement

GB 27 Smart and centralised building data collection

GB 28 Modernising facility management for existing buildings

GB 29 Building energy audit and certificate

Photo credit: Metro Services

Measure 6.3.4 Global Warming Control

Program:

GB 30 Banning of Global Warming Potential (GWP) substance

Action 6 LOW CARBON GREEN BUILDING

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 6.1.1 Efficient Building Envelope Performance						
GB 1 Minimum building envelope requirements				Building Control Dept.	KLCH (City Planning Dept., Project Implementation & Building Maintenance Dept.), MESTECC, SEDA, JKR, CIDB	Professional Architects, Developers, Building owners
GB 2 Reduction of heat gain from direct solar radiation				Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept.), SEDA, JKR	Building owners, Professional Architects, Developers
GB 3 Maximising daylighting zone				Building Control Dept.	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept.), SEDA, PAM	Building owners, Professional Architects, Developers
GB 4 Promoting the use of natural ventilation				Building Control Dept.	KLCH (Project Implementation & Building Maintenance Dept.), SEDA, PAM	Building owners, Professional Architects, Developers
GB 5 Retrofitting the existing building envelope				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept., Property Management & Valuation Dept., Legal & Prosecution Dept.), SEDA, PAM	Building owners, Developers, Chamber of Commerce
Measure 6.1.2 Mitigation of Urban Heat Island (UHI) Phenomenon						
GB 6 Using appropriate materials on building surfaces				Project Implementation & Building Maintenance Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Building Control Dept., Quantity Surveying Dept., Landscape & Recreation Development Dept.), SEDA	Building owners, Professionals Architects, Developers
GB 7 Increasing the requirement of building green covering				City Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., Building Control Dept., Landscape & Recreation Development Dept.)	Building owners, Professionals Architects, Developers
GB 8 Improving coverings of the existing buildings				Project Implementation & Building Maintenance Dept.	KLCH (Landscape & Recreational Development Dept., Building Control Dept., Property Management & Valuation Dept.), SEDA	Building owners, Professionals Architects, Developers
Measure 6.1.3 Increasing Building Water Efficiency						
GB 9 Implementation of rainwater harvesting				Infrastructure Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept., Building Control Dept.), NAHRIM	Building owners, Professionals Architects, Developers
GB 10 Reduction of potable water consumption				Infrastructure Planning Dept.	KLCH (Building Control Dept.) SPAN, SYABAS	Building owners

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 6.1.3 Increasing Building Water Efficiency						
GB 11 Improving water efficiency of existing buildings				Infrastructure Planning Dept.	KLCH (Building Control Dept., Project Implementation & Building Maintenance Dept.), SPAN, SYABAS	Building owners, Professionals Architects, Developers
Measure 6.1.4 Sustainable Low Carbon Building Construction						
GB 12 Incentives for certified low carbon green building materials and products				Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept.) MIDA, CIDB, SIRIM Berhad, SEDA, MESTECC, GreenTech Malaysia	Building owners, Professionals Architects, Developers
GB 13 Reuse of building materials for redevelopment projects				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept., Property Management & Valuation Dept.) CIDB	Building owners, Professionals Architects, Developers
Measure 6.2.1 Energy Efficient Air Conditioning System						
GB 14 High efficiency air conditioner for new non -residential buildings				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept.,) MESTECC, MIDA	Professionals bodies, Building owners
GB 15 Conversion to high efficiency air conditioner for existing buildings				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept., Housing Management & Community Development Dept.) MESTECC, MIDA, SEDA, EC	Professionals bodies, Building owners
Measure 6.2.2 Energy Efficient Lighting System						
GB 16 Energy efficient lighting system for new buildings				Project Implementation & Building Maintenance Dept.	KLCH (Mechanical & Electrical Engineering Dept., City Planning Dept.) MIDA, MESTECC, CIDB, SIRIM Berhad	Professionals bodies, Building owners
GB 17 Conversion to energy efficient lighting for existing buildings				Project Implementation & Building Maintenance Dept.	KLCH (Housing Management & Community Development Dept, Building Control Dept,), EC	Professionals bodies, Building owners
Measure 6.2.3 Renewable Energy System						
GB 18 Installation of renewable energy system in commercial buildings				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept.) SEDA, MESTECC, TNB	Professionals bodies, Building owners
GB 19 Implementation of net metering for PV System				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept, Licensing & Petty Traders Development Dept.), SEDA, MESTECC, TNB	Professionals bodies, Building owners
Measure 6.2.4 Other Energy Efficient Equipment and Systems						
GB 20 Incentives for energy efficient products and electrical appliances				Project Implementation & Building Maintenance Dept.	KLCH (Mechanical & Electrical Engineering Dept.), Administration Department *(Bahagian Perolehan)*), MESTECC *(Bdn penarafan hijau),* EC	Professionals bodies, Building owners
Measure 6.3.1 Low Carbon Green Building Monitor						
GB 21 Low carbon green building calculator				Project Implementation & Building Maintenance Dept.	KLCH (Property Management & Valuation Dept.)SEDA, JKR, INSPEN	Professionals bodies, Building owners
GB 22 Low carbon building award (LCBA)				Project Implementation & Building Maintenance Dept.	KLCH (Property Management & Valuation Dept.), MESTECC, Rating tool operators	Professionals bodies, Building owners

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 6.3.2 Low Carbon Green Building Plan						
GB 23 Submission of low carbon building plan				Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept., Health & Environment Dept, Infrastructure Planning Dept.), Relevant sector regulator / Sector facilitator	Professionals bodies, Building owners
GB 24 Submission of sustainable building waste management plan				Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept., Health & Environment Dept.), KPKT (Jabatan Pengurusan Sisa Pepejal Negara) Relevant sector regulator / Sector facilitator	Professionals bodies, Building owners
GB 25 Submission of green building user manual				Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept., City Planning Dept, Mechanical & Electrical Engineering Dept, Infrastructure Planning Dept, Civil Engineering & Urban Transportation Dept.), MESTECC, Professional bodies, REHDA, MIP	Professionals bodies, Building owners
Measure 6.3.3 Sustainable Management and Building Audit						
GB 26 Energy management system (EMS) requirement				Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept. & City Planning Dept.), SEDA, MESTECC, JKR	Professionals bodies, Building owners
GB 27 Smart and centralised building data collection				Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA, TNB	Professionals bodies, Building owners
GB 28 Modernising facility management for existing buildings				Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA	Professionals bodies, Building owners
GB 29 Building energy audit and certificate				Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA	Professionals bodies, Building owners
Measure 6.3.4 Global Warming Control						
GB 30 Banning of Global Warming Potential (GWP) substance				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Health & Environment Dept., Administration Dept.), MESTECC	Professionals, building owners

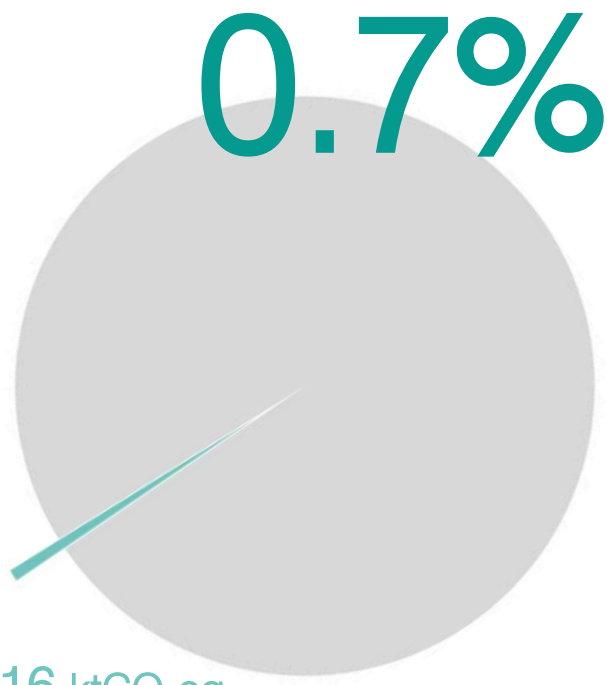
Importance Level

High ■ Medium ■ Low ■

ACTION 7

GREEN AND BLUE NETWORK

Enhancing green and blue elements in Kuala Lumpur city provides higher carbon sink and better liveable environment to the city inhabitants. Rapid development resulted in the decrease of green and blue elements in Kuala Lumpur. Based on the projection, carbon sink capacity of green infrastructure in Kuala Lumpur may rise from 1,067.65 (year 2010) to 1,746.36 $ktCO_2$ in 2030. KL LCSBP 2030 aims to increase the green cover of Kuala Lumpur from 10% (2010) to 30% (2030). In achieving this aim, the city's green space indicator (GSI) is expected to be increased from 0.36 to 2.0 hectare per 1000 population; which is corresponding to the current GSI of Melbourne, New York, and Toronto.



316 $ktCO_2eq$

Sectoral contribution to CO_2 emission reduction

7.1 Green Cover Protection

Preserving and conserving these green elements is very important to maintain their high carbon storage capability and to mitigate the urban heat island effect.

Measure 7.1.1 Enhance Forest Conservation

Programs:

BG 1 Protect existing reserved forests

BG 2 Law enforcement and governance

Measure 7.1.2 Improve Urban Parks Health

Programs:

BG 3 Develop an integrated pest management plan

BG 4 Inspect and retain topsoil quality of urban parks

7.2 Promote Tree Planting

In order to utilise the tree planting program in an effective manner, measures as below are formulated to meet the 2.5 million trees target by 2030.

Measure 7.2.1 Achieve Appropriate Canopy Cover

Programs:

BG 5 Establish canopy cover target by locations

BG 6 Identify new planting spaces

BG 7 Introduce 'no net tree canopy cover loss' policy

Photo credit: UTM-LCARC

Measure 7.2.2 Develop Tree Establishment Program

Programs:

BG 8 Establish tree inventory

BG 9 Prepare a 15-year tree planting plan

BG 10 Organise 'One Resident, One Tree program'

Measure 7.2.3 Establish Diversity in Tree Population

Programs:

BG 11 Develop standards for species at specific location

BG 12 Develop a native tree seedlings project

Photo credit: UTM-LCARC

Measure 7.2.4 Preserve and Enhance Local Natural Biodiversity

Programs:

BG 13 Manage green cover to enhance biodiversity

BG 14 Reintroduce, where appropriate, 'lost' or rare native species in natural areas

BG 15 Develop Kuala Lumpur green cover preservation master plan

BG 16 Improving existing policies by laws

BG 17 Revise the existing 'open space' policy

7.3 Improve Green Cover Maintenance

Tree maintenance improve the survival period of trees and other plants by pruning, watering, fertilization planning and keeping the surrounding environment clean.

Measure 7.3.1 Ensure Departments of KLCH Operate with Common Goals

Programs:

BG 18 Organise inter-departmental workshops on tree maintenance program

BG 19 Using tree for place making

Measure 7.3.2 Monitor Existing Canopy Cover

Programs:

BG 20 Carry out tree surveys for existing green areas

BG 21 Encourage reporting of illegal tree felling

Photo credit: UTM-LCARC

Measure 7.3.3 Undertake Research to Improve Green Cover Performance and Encourage Adaptive Management

Programs:

BG 22 Form research partnerships with local institutions to study different aspects of green cover

7.4 Facilitate Local Community Engagement

The engagement of local community by facilitating events and workshops and by consultation and cooperation with stakeholders such as private landholders, developers, nurseries, and citizens at the neighbourhood can increase the awareness and acknowledge the importance of canopy cover.

Measure 7.4.1 Increase Public Awareness

Programs:

BG 23 Facilitate events and educational workshops

7.5 Promote More Water Bodies

Open water bodies are a great source of moisture for a relatively dry urban environment.

Measure 7.5.1 Preserve and Create Attractive Waterfronts

Programs:

BG 24 Monitor and improve water quality

BG 25 Increase new water elements

BG 26 Create linear urban parks along river and waterway reserves

Photo credit: UTM-LCARC

Action 7 GREEN AND BLUE NETWORK

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 7.1.1 Enhance Forest Conservation						
BG 1 Protect existing reserved forest				Landscape & Recreation Development Dept.	KLCH (Property Management & Valuation Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.), PTG WPKL	Federal Territory of Kuala Lumpur (Forestry Dept.)
BG 2 Law enforcement and governance				Landscape & Recreation Development Dept.	KLCH (Property Management & Valuation Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.)	Federal Territory of Kuala Lumpur (Forestry Dept.)
Measure 7.1.2 Improve Urban Parks Health						
BG 3 Develop an integrated pest management plan				Landscape & Recreation Development Dept.	KLCH (Health & Environmental Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.), FRIM	KLCH (Landscape & Recreation Development Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.)
BG 4 Inspect and retain topsoil quality of urban parks				Landscape & Recreation Development Dept.	KLCH (Health & Environmental Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.), FRIM	KLCH (Landscape & Recreation Development Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.)
Measure 7.2.1 Achieve Appropriate Canopy Cover						
BG 5 Establish canopy cover target by locations				Landscape & Recreation Development Dept.	KLCH (City Planning Dept.), HEIs	KLCH (Landscape & Recreation Development Dept.)
BG 6 Identify new planting spaces				Landscape & Recreation Development Dept.	KLCH (Landscape & Recreation Development Dept.), HEIs	KLCH (City Planning Dept.), Building owners, Local communities
BG 7 Introduce 'no net tree canopy cover loss' policy				Landscape & Recreation Development Dept.	KLCH (City Planning Dept.), Enforcement Dept., Legal & Prosecution Dept.), HEIs, FRIM	KLCH (Landscape & Recreation Development Dept.),
Measure 7.2.2 Develop Tree Establishment Program						
BG 8 Establish tree inventory				Landscape & Recreation Development Dept.	FRIM, JLN, HEIs	KLCH (Landscape & Recreation Development Dept.), NGOs, Local communities
BG 9 Prepare a 15-year tree planting plan				Landscape & Recreation Development Dept.	FRIM, JLN, HEIs	KLCH (Landscape & Recreation Development Dept.), NGOs, Local communities
BG 10 Organise 'One Resident, One Tree' program				Landscape & Recreation Development Dept.	KLCH (City Planning Dept. (LA21KL), Corporate Planning Dept.), FRIM, JLN, HEIs	KLCH (Landscape & Recreation Development Dept.), NGOs, Local communities
Measure 7.2.3 Establish Diversity in Tree Population						
BG 11 Develop standards for species at specific location				Landscape & Recreation Development Dept.	FRIM, JLN., HEIs	KLCH (Landscape & Recreation Development Dept.)
BG 12 Develop a native tree seedlings project				Landscape & Recreation Development Dept.	JPWPKL, FRIM, HEIs, JLN.	KLCH (Landscape & Recreation Development Dept.), NGOs, Local

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 7.2.4 Preserve and Enhance Local Natural Biodiversity						
BG 13 Manage green cover to enhance biodiversity	■	■	■	Landscape & Recreation Development Dept.	FRIM, Federal Territory of Kuala Lumpur (Forestry Dept.), JPWPKL, HEIs, JLN	KLCH (Landscape & Recreation Development Dept.)
BG 14 Reintroduce, where appropriate, 'lost' or rare native species in natural areas	■	■	■	Landscape & Recreation Development Dept.	KLCH (City Planning Dept. (Landscape Valuation unit)), FRIM, Federal Territory of Kuala Lumpur (Forestry Dept.), JPWPKL, HEIs, JLN	KLCH (Landscape & Recreation Development Dept.), NGOs
BG 15 Develop Kuala Lumpur green cover preservation master plan	■			Landscape & Recreation Development Dept.	FRIM, Federal Territory of Kuala Lumpur (Forestry Dept.), JPWPKL, HEIs, JLN	KLCH (Landscape & Recreation Development Dept.)
BG 16 Improving existing policies by laws	■	■	■	Landscape & Recreation Development Dept.	KLCH (City Planning Dept. (Landscape Valuation unit))	KLCH (Enforcement Dept.)
BG 17 Revise the existing 'open space' policy	■			City Planning Dept.	KLCH (Landscape & Recreation Development Dept.) , JLN	KLCH (City Planning Dept.)
Measure 7.3.1 Ensure Departments of KLCH Operate with Common Goals						
BG 18 Organise inter-departmental workshops on tree maintenance program	■			Landscape & Recreation Development Dept.	KLCH (City Planning Dept.), JLN, Arborists, HEIs, FRIM	KLCH (Landscape & Recreation Development Dept.)
BG 19 Using tree for place making	■	■	■	Landscape & Recreation Development Dept.	KLCH (City Planning Dept., Development Dept.), Arborist, HEIs, FRIM	KLCH (City Planning Dept., Landscape & Recreation Development Dept.)
Measure 7.3.2 Monitor Existing Canopy Cover						
BG 20 Carry out tree surveys for existing green areas	■			Landscape & Recreation Development Dept.	NGOs, Local Communities, HEIs	KLCH (Landscape & Recreation Development Dept.)
BG 21 Encourage reporting of illegal tree felling	■	■	■	Landscape & Recreation Development Dept.	KLCH (Enforcement Dept., Legal & Prosecution Dept., Information Management Dept., Corporate Planning Dept.), NGOs, Local Communities, HEIs	KLCH (Landscape & Recreation Development Dept.)
Measure 7.3.3 Undertake Research to Improve Green Cover Performance and Encourage Adaptive Management						
BG 22 Form research partnerships with local institutions to study different aspects of green cover	■	■	■	Landscape & Recreation Development Dept.	KLCH (Human Resources Management Dept.), FRIM, HEIs, Arborists	KLCH (Landscape & Recreation Development Dept.)
Measure 7.4.1 Increase Public Awareness						
BG 23 Facilitate events and educational workshops	■	■	■	Landscape & Recreation Development Dept.	KLCH (Human Resources Management Dept. (IDB), City Planning Dept. (LA21KL)), JLN, JPWPKL, FRIM, HEIs	KLCH (Landscape & Recreation Development Dept., City Planning Dept. (LA21KL)), Schools, Kindergarten, Local communities

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 7.5.1 Preserve and Create Attractive Waterfronts						
BG 24 Monitor and improve water quality				Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept., , Health & Environment Dept.), DID	KLCH (Civil Engineering & Urban Transportation Dept.), DOE
BG 25 Increase new water elements				Landscape & Recreation Development Dept.	KLCH (Infrastructure Planning Dept., Civil Engineering and Urban Transportation Dept.)	KLCH (Landscape & Recreation Development Dept.)
BG 26 Create linear urban parks along river and waterway reserves				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept.)	KLCH (Landscape & Recreation Development Dept.)

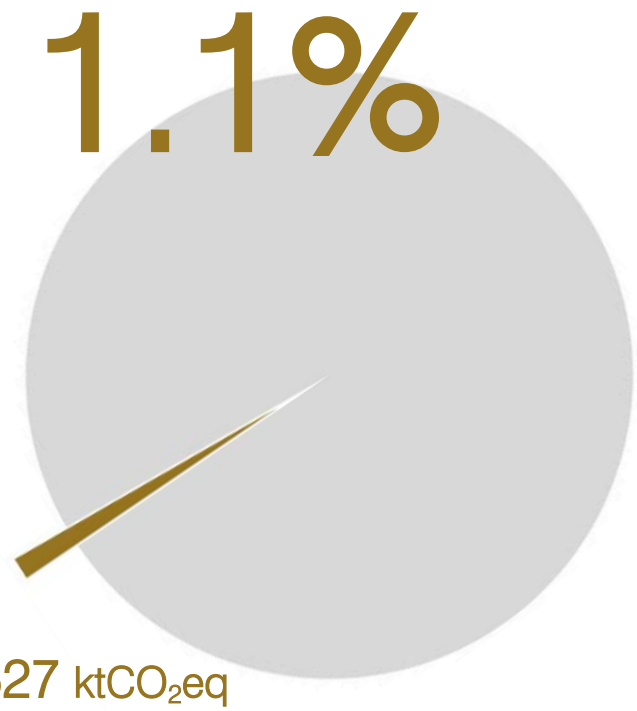
Importance Level

High Medium Low

ACTION 8

SUSTAINABLE WASTE MANAGEMENT

Rapid urbanisation is expected to change urban consumption patterns of Kuala Lumpur's residents. It is estimated that a total of 1,582 $ktCO_2$ GHG emission generated by waste coming from both landfill and waste transportation within Kuala Lumpur year 2030. Inadequate and inefficient waste collection, recycling or treatment, and uncontrolled disposal of waste in dump areas could cause severe effects such as health risks to human beings and pollution to the environment. With these severe environmental issues arising from managing solid waste, protective and preventive measures should be in place to minimise the adverse effects of these issues to Kuala Lumpur.



527 $ktCO_2eq$

Sectoral contribution to CO_2 emission reduction

8.1 Sustainable Municipal Solid Waste (MSW) Management

Sustainable municipal solid waste (SMSW) management facilitates holistic approach in handling waste to reduce the environmental impact from the increased generation of waste and its disposal.

Measure 8.1.1 Nurturing Zero-Waste Culture

Programs:

WM 1 Encourage culture of sharing, borrowing, repairing and renting

WM 2 Promote the use of greener packaging, reusable bag

WM 3 KLCH to promote global "Love Food Hate Waste" initiative

WM 4 Encourage waste separation at source premises

WM 5 "Pay as You Throw" (PAYT) program

WM 6 Recycling of used cooking oil from residential premises

Measure 8.1.2 Promoting Education and Awareness on Waste Reduction

Programs:

WM 7 Involvement and promotion of green school initiative

WM 8 Organising reduction and awareness campaigns on enforcement of Act 672

Measure 8.1.3 Electronic Waste (E-waste) Reduction

Programs:

WM 9 Implementation of E-waste recycling program

Measure 8.1.4 Commercial Waste Reduction

Programs:

WM 10 Development and implementation of recycling commercial waste policies

WM 11 Food waste collection and treatment from commercial premises

Photo credit: feldavoice.com

8.2 Fostering Circular Economy (CE)

CE is known as an alternative to a traditional linear economy (make, use, dispose) in which resources are kept in use for as long as possible, extract the maximum value while in use, then recover and regenerate products and materials at the end of each service life.

Measure 8.2.1 Promoting Sustainable Consumption and Production (SCP)

Programs:

WM 12 Encouraging purchases of products made of recycled materials

WM 13 Development and implementation of Eco-Town

WM 14 Adoption of paperless meeting

Action 8 SUSTAINABLE WASTE MANAGEMENT

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 8.1.1 Nurturing Zero-Waste Culture						
WM 1 Encourage culture of sharing, borrowing, repairing and renting				Housing Management & Community Development Dept.	KLCH (Housing Management & Community Development Dept., City Planning Dept. (LA21KL), Corporate Planning Dept.), SWCorp, JPSPN	Resident's assoc., NGOs
WM 2 Promote the use of greener packaging, reusable bag				Health & Environment Dept.	KLCH (Licensing & Petty Traders Dept.), JPSPN, SWCorp, KW, SIRIM Berhad	Biodegradable companies/ manufacturers, Commercial premises, Resident's assoc.
WM 3 KLCH to promote global "Love Food Hate Waste" initiative				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), JPSPN, SWCorp., KW, KPDNKK	Resident's assoc., Residential premises, Commercial premises, Food truck assoc., Schools, NGOs
WM 4 Encourage waste separation at source at premises				Health & Environment Dept.	KLCH (Licensing & Petty Traders Dept., Housing Management & Community Development Dept.), JPSPN, SWCorp, KW	Resident's assoc., Commercial premises, Property owners, Schools, NGOs, MAH, Alam Flora Sdn. Bhd.
WM 5 "Pay as You Throw" (PAYT) program				Health & Environment Dept.	KLCH (Licensing & Petty Traders Dept.), JPSPN, SWCorp., Alam Flora Sdn. Bhd., JPWPKL	Resident's assoc., Commercial premises owners
WM 6 Recycling of used–cooking oil from residential premises				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), JPSPN, SWCorp., DOE	Resident's assoc., Residential premises, Commercial premises, Licensed oil waste carrier companies
Measure 8.1.2 Promoting Education and Awareness on Waste Reduction						
WM 7 Involvement and promotion of green school initiative				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), MOE, JPSPN, SWCorp, DOE, JPWPKL, Alam Flora Sdn. Bhd.	Schools, HEIs, NGOs
WM 8 Organising reduction and awareness campaigns on enforcement of Act 672				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL), Housing Management & Community Development Dept.), JPSPN, KPKT, MOE, Alam Flora Sdn. Bhd., SWCorp	Schools, HEIs, NGOs, JPWPKL
Measure 8.1.3 Electronic Waste (E-waste) Reduction						
WM 9 Implementation of E-waste recycling program				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), SWCorp, DOE	Resident's assoc., E-Waste collector companies, Commercial premises owners, Malaysian Shopping Malls assoc., MAH

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 8.1.4 Commercial Waste Reduction						
WM 10 Development and implementation of recycling commercial waste policies				Health & Environment Dept.	SWCorp, DOE, Resident's assoc., NGOs	Commercial premises owners, Malaysian Shopping Malls Assoc., MAH
WM 11 Food waste collection and treatment from commercial premises				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL), Licensing & Petty Traders Development Dept.), SWCorp, Alam Flora Sdn. Bhd.	Licensed contractors, Commercial premises owners, Malaysian Shopping Malls Assoc., MAH
Measure 8.2.1 Promoting Sustainable Consumption and Production (SCP)						
WM 12 Encouraging purchases of products made of recycled materials				Health & Environment Dept.	JPSPN, MESTECC, GreenTech Malaysia, SWCorp	Resident's assoc., Commercial premises, Property owners, MOE, NGOs, MAH
WM 13 Development and implementation of Eco-Town				Health & Environment Dept.	KLCH (City Planning Dept., Economic Planning Development Dept.), SWCorp, KPKT, KW	Developers, NGOs
WM 14 Adoption of paperless meeting				Administration Dept.	KLCH (Human Resource Management Dept., Information Management Dept.), SWCorp DOE, Alam Flora Sdn. Bhd., GreenTech Malaysia, HEIs, MOE	Private and government institutions, JPWPKL

Importance Level

High Medium Low

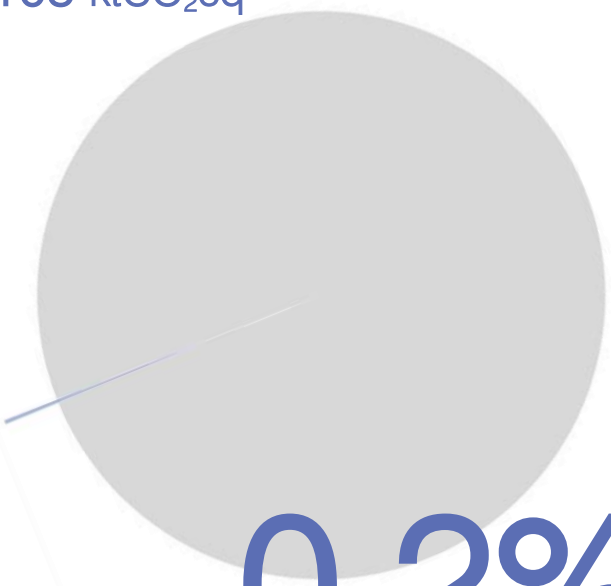
ACTION 9

SUSTAINABLE WATER AND WASTEWATER MANAGEMENT

Kuala Lumpur is facing similar challenges when it comes to water resources and wastewater management. The city is vulnerable to prolonged periods of dryness, when reservoir levels drop to dangerously low levels. This precarious situation happens even though Kuala Lumpur usually receives at least 2,600 mm of rain annually. On the flip side, the urban drainage system in the City centre is overstrained during heavy downpours, leading to flash floods. As Kuala Lumpur is heavily reliant on surface water, it is also vulnerable to river pollution, where the bulk of raw water comes from. It is expected that the pollution nearby Sungai Langat, Sungai Semenyih and Sungai Selangor are recurring examples grey water recycling will be important option for sustainable water and wastewater management.

Sectoral contribution to CO_2 emission reduction

105 $ktCO_2eq$



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9.1 Water Supply Management

There are three measures introduced that are suitable for KLCH which includes: minimising the use of drinking quality water for nonpotable functions, reduction of non revenue water (NRW) loss and smart water management.

Measure 9.1.1 Minimising the Use of Drinking Quality Water for Non-Potable Functions

Program:

WW 1 KLCH to work with relevant agencies to develop viable non potable water system distribution in Kuala Lumpur for new residential and commercial development

Measure 9.1.2 Reduction of Non Revenue Water (NRW) Loss

Programs:

WW 2 Collaborate with respective agencies for incorporating smart water technologies that allow water providers to minimise Non- Revenue Water (NRW)

WW 3 Encourage and promote community awareness practice towards reduction of NRW

Measure 9.1.3 Smart Water Management System

Program:

WW 4 Kuala Lumpur smart water management

9.2 Sustainable Wastewater Management

Management of wastewater in the urban context must be adapted according, not only to the size, but also to the economic development and governance capacity of the urban area.

Measure 9.2.1 Limit Wastewater Production

Programs:

WW 5 Work with relevant agencies to promote reduction at source

Measure 9.2.2 Maximizing the Value of Wastewater

Programs:

WW 6 Collaborate with relevant agencies to promote usage of recycled wastewater in Kuala Lumpur

WW 7 Collaborate with relevant agencies and academics institution to utilise bioenergy harvesting method for energy recovery

WW 8 Collaborate with respective agencies on composting sewage sludge from wastewater

WW 9 Promote use of phosphorous recovery from wastewater as new sustainable fertiliser alternative

WW 10 Collaborate with respective agencies to use and promote sludge as soil amendment

WW 11 Promote application of sewage sludge in urban landscaping and forest rehabilitation and regeneration

9.3 Stormwater Management

In moving towards sustainability, KLCH should take up the approach of control-at-source in managing stormwater in Kuala Lumpur. With this approach , quality and quantity of the runoff from developing an area can be maintained to be the same as predevelopment condition.

Measure 9.3.1 Incorporation of Low Impact Development (LID) In Stormwater Management

Programs:

WW 12 Adoption of Low Impact Development (LID) in Kuala Lumpur

WW 13 Promote the installation of run off storage

Measure 9.3.2 Elimination or Minimisation of Non-Point Source Pollutants

Programs:

WW 14 Establish partnership with agencies in educating and training public and industries

WW 15 Support implementation of Best Management Practices at construction site

WW 16 Promote incorporation of NPS pollution prevention strategies and policies into regional and official community plans

WW 17 Promote effluent management

Action 9 SUSTAINABLE WATER AND WASTEWATER MANAGEMENT

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 9.1.1 Minimizing the Use of Drinking Quality Water for Non-Potable Functions						
WW 1 KLCH to work with relevant agencies to develop viable non potable water system distribution in Kuala Lumpur for new residential and commercial development				Economic Planning & Development Dept.	KLCH (Infrastructure Planning Dept., Health and Environment Dept., Community Development & Urban Wellbeing Dept.), KATS, SPAN, SYABAS, JPS	SPAN, Developers, SYABAS
Measure 9.1.2 Reduction of Non-Revenue Water (NRW) Loss						
WW 2 Collaborate with respective agencies for incorporating smart water technologies that allow water providers to minimise Non- Revenue Water (NRW)				Infrastructure Planning Dept.	KLCH (Community Development & Urban Wellbeing Dept., City Planning Dept., Infrastructure Planning Dept.), KATS, SPAN, SYABAS, JPS	Resident's assoc., SPAN, SYABAS
WW 3 Encourage and promote community awareness practice towards reduction of NRW				Corporate Planning Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), SPAN, SYABAS, HEIs, JPWPKL, KKMM (Information Dept.)	KLCH (Community Development & Urban Wellbeing Dept.), Resident's assoc., SPAN
Measure 9.1.3 Smart Water Management System						
WW 4 Kuala Lumpur smart water management				Economic Planning & Development Dept.	KLCH (Infrastructure Planning Dept., Community Development & Urban Wellbeing Dept.), MESTECC, KATS, SPAN	KLCH (Community Development & Urban Wellbeing Dept.), Developers, Resident's assoc.
Measure 9.2.1 Limit Wastewater Production						
WW 5 Work with relevant agencies to promote reduction at source				Project Implementation & Building Maintenance Dept.	KLCH (Infrastructure Planning Dept., Community Development & Urban Wellbeing Dept.), KATS, SPAN, DOE	DOE, IWK, Developers Resident's assoc.,
Measure 9.2.2 Maximizing the Value of Wastewater						
WW 6 Collaborate with relevant agencies to promote usage of recycled wastewater in Kuala Lumpur				Health & Environment Dept.	KLCH (Infrastructure Planning Dept., Health & Environment Dept.), SPAN, KATS, NGOs, IWK, KW, JPKKB	DOE, IWK, Resident's assoc.
WW 7 Collaborate with relevant agencies and academics institution to utilise bioenergy harvesting method for energy recovery				Health & Environment Dept.	KLCH (Infrastructure Planning Dept., Health & Environment Dept.), JPSPN, SPAN, Energy Commission (EC), HEIs, SEDA	DOE, IWK, Registered industrial and commercial companies

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 9.2.2 Maximizing the Value of Wastewater						
WW 8 Collaborate with respective agencies on composting sewage sludge from wastewater				Health & Environment Dept.	KLCH (Health & Environment Dept.), IWK, KATS, JPSPN, SPAN	KLCH (Civil Engineering & Urban Transportation Dept., Infrastructure Planning Dept.)
WW 9 Promote use of phosphorus recovery from wastewater as new sustainable fertiliser system alternative				Landscape & Recreational Development Dept.	KLCH (Health & Environment Dept., Infrastructure Planning Dept.), DOE, IWK, KATS	IWK, Registered industrial and commercial companies in KL
WW 10 Collaborate with respective agencies to use and promote sludge as soil amendment				Landscape & Recreational Development Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Health & Environment Dept.), SPAN, CREAM	KLCH (Health & Environment Dept.), IWK
WW 11 Promote application of sewage sludge in urban landscaping and forest rehabilitation and regeneration				Landscape & Recreational Development Dept.	KLCH (Health & Environment Dept., Infrastructure Planning Dept.), SPAN	KLCH (Health & Environment Dept.), IWK
Measure 9.3.1 Incorporation of Low Impact Development (LID) in Stormwater Management						
WW 12 Adoption of Low Impact Development (LID) in Kuala Lumpur				Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept., City Planning Dept.), PLANMalaysia	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept.), Developers
WW 13 Promote installation of run off storage				Infrastructure Planning Dept.	KLCH (City Planning Dept., Building Control Dept., Project Implementation & Building Maintenance Dept.), DID, PLANMalaysia	KLCH (City Planning Dept., Infrastructure Planning Dept.), DID, Developers, Run off storage suppliers
Measure 9.3.2 Elimination or Minimisation of Non-Point Source Pollutants						
WW 14 Establish partnership with agencies in educating and training public and industries				Health & Environment Dept.	KLCH (Human Resource Management Dept.), Alam Flora Sdn. Bhd., DOE, DID, HEIs, JPWPKL, NGOs, SYABAS	DOE, Developers, Industry players, Schools, NGOs
WW 15 Support implementation of Best Management Practices at construction site				Building Control Dept.	KLCH (City Planning Dept., Infrastructure Planning Dept.), CIDB	PSP (Engineer & Architect), IEM, PAM
WW 16 Promote incorporation of NPS pollution prevention strategies and policies into regional and official community plans				Health and Environment Dept.	DOE, DID, MESTECC	KLCH (Infrastructure Planning Dept.)
WW 17 Promote effluent management				Health and Environment Dept.	KLCH (City Planning Dept.), DOE, NGOs	KLCH (Health & Environment Dept.)

Importance Level

High Medium Low

ACTION 10

GREEN URBAN GOVERNANCE

With the emergence of the concept of sustainable cities, there has been a growing interest in the role which cities could have in addressing global environmental issues and, in particular, climate change. The past decade has witnessed a new wave of municipal actions on climate change mitigation in which transnational municipal networks have grown and multiplied, while a more geographically diverse range of cities have become involved in addressing this issue. In an increasingly urbanising world with emissions producing activities concentrated in cities, the question of how municipal authorities and other actors might intervene in order to reduce their impact remains a significant one.

Green Urban Governance programs do not lead to direct carbon emissions reduction in Kuala Lumpur but they are fundamental to the effective implementation of vital CO_2 emissions reduction measures and programs of most other LCS actions

10.1 Enabling Development of Low Carbon Society (LCS)

Providing funding and training are key means through which municipal governments can enable action by private sector organisations or even by individuals. However, it is important for KLCH to provide enough financial resources through the ability to secure funding from external sources such as from ministry as MESTECC or agencies such as GreenTech Malaysia or MIDA.

Measure 10.1.1 Fund, Grant and Sourcing

Programs:

UG 1 Identifying existing pool of funds

UG 2 Setting up special unit for fund and grant sourcing for projects/programs that related to realisation of LCS

Measure 10.1.2 Incentives, Subsidies, Taxation Framework

Programs:

UG 3 Collaboration with relevant agencies to work out possible framework for incentives/ subsidies/taxation

UG 4 Rebates for developments that comply with low carbon policies

UG 5 Energy Efficiency and Renewable Energy Management Centre which provides partial monetary aid to domestic users for the installation of solar water heating systems

Measure 10.1.3 Staff Development

Programs:

UG 6 Awareness programs and continuous training conducted by KLCH on low carbon development

UG 7 Ensuring complementarity with other research based activities in Malaysia that are focused on the low carbon / green skills agenda

UG 8 Identifying funding package for pilot training, capacity building and skills development, which will support the stimulation and growth of low carbon built environment workforce in Kuala Lumpur

10.2 KLCH as Low Carbon Leader

Municipal initiatives in the self-governing mode have also involved the development of 'exemplar' or best practice buildings, to showcase the possibilities of new technologies and of energy efficiency standards.

Measure 10.2.1 Introduction of Best Practice for Institutional Behaviour Change Towards Low Carbon

Programs:

UG 9 KLCH Carbon Management Plan towards going Low Carbon

UG 10 Procurement of vehicles which runs on new and emerging sustainable technologies in council's fleet and assessing their performance

UG 11 Encouraging environmentally friendly behavior in the workplace

Measure 10.2.2 Demonstration Project on Low Emission Technologies

Programs:

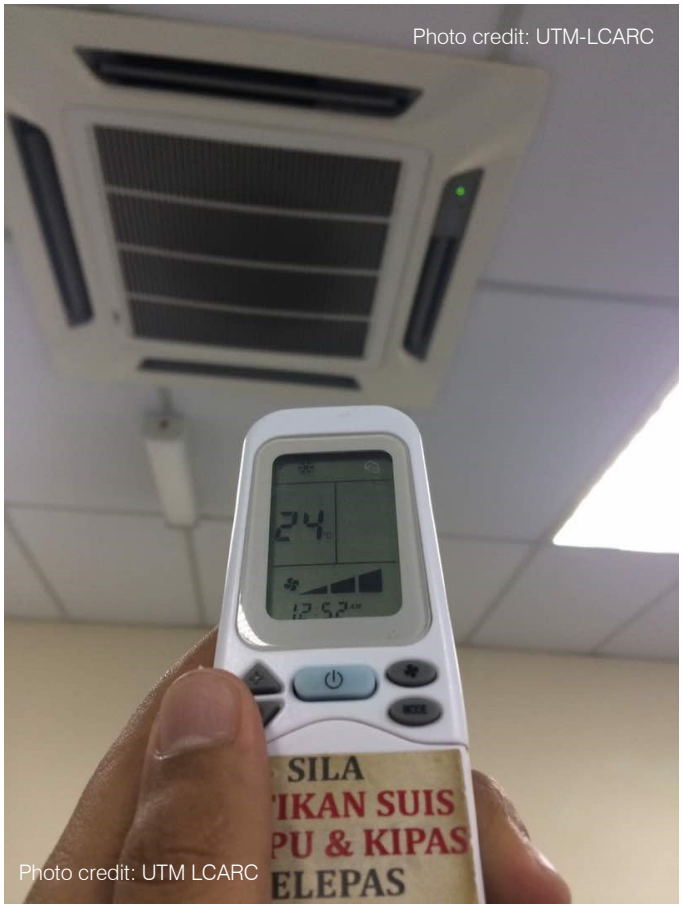
UG 12 Replacement of bulbs and banning of incandescent lighting in the government building

UG 13 Trial of low emissions technologies on city hall's buildings

UG 14 Effective usage of air-conditioner

UG 15 Setting up a target of increasing energy efficiency within the municipality by 20% by 2030

UG 16 Building energy and monitoring reporting system (BEMRS)



Measure 10.2.3 Sustainable Operation and Energy Consumption

Programs:

UG 17 Work with partners in the city to build new neighbourhood-scale renewable energy system

UG 18 Energy consumption mapping for energy management

10.3 Setting up Command and Control through Regulations

KLCH should ensure that it is vital to mandate local action for CO_2 mitigation and enabling planning authorities to take climate change into account in their decision-making.

Measure 10.3.1 Development Planning for Low Carbon Kuala Lumpur

Programs:

UG 19 Institutionalisation of low carbon vision and carbon reduction targets in all statutory plans (KLSP 2020 and KLCP 2020)

UG 20 Design clear low carbon zoning and urban design codes that are geared towards Kuala Lumpur's energy efficient spatial structure

UG 21 Launching of a new social housing model that integrates green areas, public spaces and environmental design

Measure 10.3.2 Planning Control Process, Procedures and Mechanism for Materialising LCS in Kuala Lumpur

Programs:

UG 22 Mandatory requirement for new government buildings to adopt green performance framework and achieve the qualified level of recognition

UG 23 Enhance substantive (content) aspects of development order approval

UG 24 Online submission for applications with respect to development projects (e-Submission)

UG 25 Progressive retraining of planners, architects, engineers and other built environment professionals and semiprofessionals

UG 26 Setting up of a low carbon monitoring unit / task force in KLCH

Photo credit: UTM LCARC

Photo credit: UTM LCARC

10.4 Partnership through Multi Stakeholders Engagement

In addition to engaging a range of stakeholders and partners in addressing climate change locally, municipalities have, sometimes, also sought to involve communities in responding to the challenges of reducing GHG emissions.

10.4.1 Encouragement on Low Carbon Practices

Programs:

UG 27 To promote energy and water efficiency in public facilities

UG 28 To promote extensive use of online services to citizens

Photo credit: UTM LCARC

Measure 10.4.2 Low Carbon Projects with NGOs

Programs:

UG 29 Awards and recognition for any corporates or NGOs efforts towards low carbon

UG 30 Existing LA21KL unit to collaborate with community and NGOs on low carbon and environmental friendly campaigns

Photo credit: BERNAMA

Action 10 GREEN URBAN GOVERNANCE

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 10.1.1 Fund, Grant and Sourcing						
UG 1 Identifying existing pool of funds				Finance Dept., Administration Dept.	MESTECC, KLCH (Economic Planning & Development Dept., Quantity Surveying Dept.), KW	KLCH (Finance Dept., Economic Planning & Development Dept.)
UG 2 Setting up special unit for fund and grant sourcing for projects/programs that related to realisation of LCS				Finance Dept., Administration Dept.)	KLCH (Administration Dept. Quantity Surveying Dept., Finance Dept., Economic Planning & Development Dept., Human Resource Management Dept.), MESTECC, KW	KLCH (Human Resource Management Dept.
Measure 10.1.2 Incentives, Subsidies and Taxation Framework						
UG 3 Collaboration with relevant agencies to work out possible framework for incentives/ subsidies/ taxation				Finance Dept., Administration Dept.)	KLCH (Building Control Dept. City Planning Dept., Legal and Prosecution Dept., Finance Dept.), MESTECC, SEDA, GreenTech Malaysia	KLCH (Economic Planning & Development Dept.)
UG 4 Rebates for developments that comply with low carbon policies				Building Control Dept.	KLCH (City Planning Dept., Economic Planning & Development Dept., Finance Dept.), MESTECC, SEDA, GreenTech Malaysia	Developers, Building owners
UG 5 Energy Efficiency and Renewable Energy Management Centre which provides partial monetary aid to domestic users for the installation of solar water heating systems				Economic Planning & Development Dept.	KLCH (Building Control Dept., Property Management & Valuation Dept. (*Commissioner of Building*)), KW, Residents, NGOs, MESTECC	KLCH (Housing Management & Community Development Dept.)
Measure 10.1.3 Staff Development						
UG 6 Awareness programs and continuous training conducted by KLCH on low carbon development				Human Resource Management Dept.	KLCH (City Planning Dept., Corporate Planning Dept., Administration Dept.), MESTECC, HEIs	KLCH (Administration Dept., Human Resource Management Dept.)
UG 7 Ensuring complementarity with other research based activities in Malaysia that are focused on the low carbon / green skills agenda.				Human Resource Management Dept.	HEIs, MESTECC, Professional Bodies, KW	KLCH (Human Resource Management Dept.)
UG 8 Identifying funding package for pilot training, capacity building and skills development, which will support the stimulation and growth of low carbon built environment workforce in Kuala Lumpur				Human Resource Management Dept.	HEIs, MESTECC, Professional Bodies, KW	KLCH (Finance Dept., Human Resource Management Dept.)
Measure 10.2.1 Introduction of Best Practice for Institutional Behavioural Change Towards Low Carbon						
UG 9 KLCH Carbon Management Plan towards going Low Carbon				Administration Dept.	KLCH*, SEDA	KLCH (Project Implementation & Building Maintenance Dept.)
UG 10 Procurement of vehicles which runs on new and emerging sustainable technologies in council's fleet and assessing their performance				Administration Dept.	KLCH (Quantity Surveying Dept. Administration Dept. (*Bahagian Perolehan*))	KLCH (Mechanical & Electrical Engineering Dept.), EV Providers
UG 11 Encouraging environmentally friendly behavior in the workplace				Administration Dept.	KLCH (All Dept.)	KLCH Staff

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 10.2.2 Demonstration Project on Low Emission Technologies						
UG 12 Replacement of bulbs and banning of incandescent lighting in the government building				Mechanical & Electrical Dept.	KLCH (Project Implementation & Building Maintenance Dept., Administration Dept. (*Bahagian Perolehan*))	KLCH (Mechanical & Electrical Dept.)
UG 13 Trial of low emissions technologies on city hall's buildings				Project Implementation & Building Maintenance Dept.	KLCH (Mechanical & Electrical Dept.), SEDA, GreenTech Malaysia	KLCH (Project Implementation & Building Maintenance Dept.)
UG 14 Effective usage of air-conditioner				Administration Dept.	KLCH (All Dept.)	KLCH (All Dept.)
UG 15 Setting up a target of increasing energy efficiency within the municipality by 20% by 2030				Administration Dept.	KLCH (Administration Dept.), Carbon Trust	KLCH (Project Implementation & Building Maintenance Dept.)*
UG 16 Building energy and monitoring reporting system (BEMRS)				Project Implementation & Building Maintenance Dept..	KLCH (Mechanical & Electrical Engineering Dept.), SEDA	KLCH (Project Implementation & Building Maintenance Dept.)
Measure 10.2.3 Sustainable Operation and Energy Consumption						
UG 17 Work with partners in the city to build new neighbourhood-scale renewable energy system				Mechanical & Electrical Engineering Dept.	KW, TNB, GreenTech Malaysia, SEDA, Resident's assoc.	KLCH (Economic Planning & Development Dept.), Developers, Land owners
UG 18 Energy consumption mapping for energy management				City Planning Dept.	KLCH (Information Management Dept.), TNB, Building owners, DOS	KLCH (City Planning Dept.)
Measure 10.3.1 Development Planning for Low Carbon Kuala Lumpur						
UG 19 Institutionalisation of low carbon vision and carbon reduction targets in all statutory plans (KLSP 2020 and KLCP 2020)				City Planning Dept.	KW, MESTECC, PLANMalaysia	KLCH (City Planning Dept.)
UG 20 Design clear low carbon zoning and urban design codes that are geared towards Kuala Lumpur's energy efficient spatial structure				City Planning Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), KW, SEDA, MOT, PLANMalaysia	KLCH (City Planning Dept.)
UG 21 Launching of a new social housing model that integrates green areas, public spaces and environmental design				Economic Planning & Development Dept.	KLCH (City Planning Dept., Landscape & Recreation Development Dept., Building Control Dept.), KW, Prime Minister Dept.	Land owners, Developers
Measure 10.3.2 Planning Control Process, Procedures and Mechanism for Materialising LCS in Kuala Lumpur						
UG 22 Mandatory requirement for new government buildings to adopt green performance framework and achieve the qualified level of recognition				Building Control Dept.	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept., Mechanical & Electrical Engineering Dept., Health & Environment Dept.), JKR, MESTECC, SPAN, TNB, Alam Flora Sdn.Bhd.	Government agencies (Building owners)

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 10.3.2 Planning Control Process, Procedures and Mechanism for Materialising LCS in Kuala Lumpur						
UG 23 Enhance substantive (content) aspects of development order approval				City Planning Dept.	KLCH Technical Departments & external technical agency**	KLCH (City Planning Dept., Building Control Dept.)
UG 24 Online submission for applications with respect to development projects (e-Submission)				City Planning Dept.	KLCH (All Dept.), Professional bodies, MESTECC, MAMPU, KW	KLCH (All Dept.)
UG 25 Progressive retraining of planners, architects, engineer and other built environment professionals and semiprofessionals				Human Resource Management Dept.	KW, MESTECC, HEIs, PLANMalaysia	MIP, PAM, Board of Engineers Malaysia (BEM) and other built environment professionals and semiprofessionals
UG 26 Setting up of a Low Carbon Monitoring unit / task force in KLCH				City Planning Dept.	KLCH (Human Resource Management Dept., Administration Dept.)	KLCH (City Planning Dept.)
Measure 10.4.1 Encouragement on Low Carbon Practices						
UG 27 To promote energy and water efficiency in public facilities				Corporate Planning Dept.	KLCH (Housing Management & Community Dept., Information Management Dept., Project Implementation & Building Maintenance Dept.), MESTECC, TNB, SYABAS, JKR	Public facilities owners, KL residents, NGOs
UG 28 To promote extensive use of online services to citizens				Corporate Planning Dept.	KLCH (Finance Dept., Information Management Dept., Enforcement Dept., Licensing & Petty Traders Development Dept., Housing Management & Community Development Dept., Legal & Prosecution Dept.)	KLCH (Finance Dept., Information Management Dept., Enforcement Dept., Housing Management & Community Development Dept., Legal & Prosecution Dept.), KL residents
Measure 10.4.2 Low Carbon Projects with NGOs						
UG 29 Awards and recognition for any corporates' or NGOs' efforts towards low carbon				Corporate Plannning Dept.	KLCH (Housing Management & Community Development Dept., Corporate Planning Dept., Landscape & Recreation Development Dept.Infrastructure Planning Dept., Civil Engineering & Urban Transportation Dept., Mechanical & Electrical Engineering Dept., City Planning Dept.(LA21KL)), Professional Bodies, MESTECC, KPKT	NGOs, Resident's assoc., Business owners.
UG 30 Existing LA21KL unit to collaborate with community and NGOs on low carbon and environmentally friendly campaigns				City Plannning Dept. (LA21KL)	KLCH (Housing Management & Community Development Dept. Landscape & Recreation Development Dept., Health & Environment Dept.), NGOs, Resident's assoc., HEIs, JPWPKL, Jabatan Pertanian, IWK, KW	NGOs, Resident's assoc.

Notes:

*Administration Department (Jawatankuasa Tenaga)

City Planning Department (Jabatan Perancangan Bandaraya)
Civil Engineering and Urban Transportation Department (Jabatan Kejuruteraan Awam dan Pengangkutan Bandar)
Administration Department (Jabatan Pentadbiran)
Human Resource Management Department (Jabatan Pengurusan Sumber Manusia)
Licensing and Petty Traders Development Department (Jabatan Pelesenan dan Pengurusan Penjaja)
Culture, Arts, Tourism and Sports Department (Jabatan Kebudayaan, Kesenian dan Sukan)
Housing Management and Community Development Department (Jabatan Pengurusan Perumahan dan Pembangunan Komuniti)
Landscape and Recreation Development Department (Jabatan Pembangunan Landskap dan Rekreasi)
Mechanical and Electrical Engineering Department (Jabatan Kejuruteraan Mekanikal dan Elektrikal)
Health and Environment Department (Jabatan Kesihatan dan Alam Sekitar)
Enforcement Department (Jabatan Penguatkuasaan)
DBKL Training Institute (Institut Latihan DBKL)
Kuala Lumpur Library (Perpustakaan Kuala Lumpur)

** Internal and External Technical Agencies OSC

Internal Technical Agency
Technical Department

City Planning Department

Infrastructure Planning Department
Building Control Department
Health and Environment Department

Landscape and Recreation Development Department

External Technical Agency
Pejabat Tanah dan Galian Wilayah Persekutuan (PTGWP)
Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM)
Tenaga Nasional Berhad (TNB)
Syarikat Bekalan Air Selangor (SYABAS)
Perbadanan Pengurusan Sisa Pepejal dan Pembersihan Awam (PPSP&PA)
Indah Water Konsortium (IWK)
Jabatan Mineral dan Geosains Malaysia (JMG)
Jabatan Bomba dan Penyelamat Malaysia (JBPM)
Jabatan Alam Sekitar (JAS)

Importance Level

High Medium Low

HOW TO READ KL LCSBP 2030 ROADMAP

Methods of Program Evaluation through FGD

Kuala Lumpur Low Carbon Society Blueprint 2030 is formulated to help guide Kuala Lumpur towards becoming a world class sustainable city by 2020. This blueprint will provide Kuala Lumpur City Hall with a strategic direction and clear framework for coordinating related policies towards the reduction of 70% GHG emissions intensity for Kuala Lumpur by 2030 based on 2010 level with the implementation of 245 policy programs in a timely and proactive manner. Towards the implementation phase, several questions must be answered such as which programs should be implement first? How long is the implementation timeline? When is the target implementation year? Which potential implementation agencies should play important role in carrying out the programs? Thus, the roadmap section provides pathway to the stated questions by outlining programs proposed in the blueprint according to the given priority, timeline and related implementation agencies for 2015-2020, 2021-2025 and 2025-2030 periods. The roadmap is subject to review to accommodate possible institutional and organisational roles changes both external and internal to KLCH that may arise from time to time.

This section explains briefly the KL LCSBP 2030 method of program evaluation through focus group discussions (FGD). Three sessions of FGD had been conducted in August 2016, and February and July 2017 during the Interim Report, Draft Blueprint and Final Draft KL LCSBP 2030 stages. The purpose of FGD1 was to introduce the KL LCS 2030 and share the preliminary baseline results of Kuala Lumpur in 2010, building continuous engagement with stakeholders and understanding their feedback and views on overall direction, scope, and methodology of KL LCS 2030. Based on the outcome of FGD1, the Draft Kuala Lumpur Low Carbon Society Blueprint 2030 (Draft KL LCSBP 2030) was produced to outline the proposed LCS programs for implementation. The FGD2 was then held to present the proposed programs outlined and gain feedback from stakeholders with respect to the FGD1. The FGD2 also involved the presentation of draft proposal of sub-actions, measures, and LCS programs outlined in the Draft KL LCSBP 2030, based on three weighted three main criteria: i) Significance, ii) Suitability and iii) Feasibility. The definition for the three main criteria are as follows:

Significance - Measures the extent to which proposed LCS programs are in line with a stakeholder's institutional/ corporate goal or policy direction.

Suitability - Appraises the appropriateness, acceptability and readiness of Kuala Lumpur's stakeholders on the proposed LCS programs with respect to Kuala Lumpur's local geographic setting and socio-cultural context.

Feasibility - Gauges the "implementability" of proposed LCS programs in terms of institutional and corporate financial capacity and human capital, as well as technological readiness and material resource availability in Kuala Lumpur.

Stakeholders were requested to assign a rating to each proposed LCS project based on three (3) levels which are Low (L), Medium (M) and High (H).

Programs	Significance			Suitability			Feasibility		
	Institutional Vision/Policy Direction			Long Geography setting/ socio-cultural context			Finance/Human Capital/ Local Technology/Material		
	L	M	H	L	M	H	L	M	H
CE6 Promote the adoption of rainwater harvesting system			●			●			●
CE7 Promote the adoption of photovoltaic panel					●				

The results were then analysed using the 'weighted scoring method' involving i) allocation of weights for each evaluation criterion, and ii) allocation of scores to each rating level to reflect each LCS program's performance in relation to each criterion. The result presented in a single weighted score for each criterion was then summed across for each proposed LCS program. The sum of the weighted score indicates the overall performance of a potential program, which combines all the three criteria of significance, suitability, and feasibility.

1) Criteria weightage

The three criteria were weighted to reflect the stakeholders' consensus on the relative importance of each criterion. Justification for the weights ascribed (Significance (40%), Suitability (20%), and Feasibility (40%)) was recorded to ensure the basis of the weights assigned is fully understood and accepted. Both the significance and feasibility criteria were equally given higher percentages as they were considered the most important compared to suitability. Ultimately, all the weights amounted to 100.

2) Score the levels to reflect how each program performs against each criterion and calculate the weighted scores

The next step was to score each level against each criterion on a suitable scale. A score value of 1,2, or 3 was assigned correspondingly to the rating level of Low (L), Medium (M) and High (H), and each LCS program was given a total score, by multiplying the score with the weightage that has been assigned to the criterion. The resulted weighted scores were then summed up to obtain an aggregate weighted score for each potential program (see table below):

Criteria	Significance (40%)			Suitability (20%)			Feasibility (40%)		
Level	Low	Medium	High	Low	Medium	High	Low	Medium	High
Score	1	2	3	1	2	3	1	2	3

Programs	Significance Institutional Vision/Policy Direction	Suitability Long Geography setting/socio-cultural context	Feasibility Finance/Human Capital/ Local Technology/Material	Weighted Score
CE6 Promote the adoption of rainwater harvesting system	2	3	3	83

3) Interpret the results

The weighted score results were then carefully translated into the importance level of Low, Medium and High with the target year in the implementation timeline (determined from the participants in FGD) to guide decision-makers. The three ranges of weighted scores were averaged for each different Action of the KL LCSBP 2030 accordingly and coloured based on the level of importance: light-gray (Low), medium-gray (Medium), and black (High) (see below).

Weighted scores	0-39	40-79	80-100
Colour			

The Draft KL LCSBP 2030 and Summary for Policymakers (SPM) were then presented in the FGD3 for further refinement of the LCS programs and roadmap (timeline and responsible actors). Based on the outcome of FGD3, the Final Draft KL LCSBP 2030 and SPM were then produced with better justified responsible actors, which have been divided to three key implementation actors namely: responsible KLCH department, partners, and implementers. The LCS program implementation timeline was also divided into three period of target years (2015-2020, 2021-2025, and 2026-2030 (see table below), while the operational definitions of actors are shown as follows:

PROGRAMS	2015-2020	2021-2025	2026-2030	Responsible KLCH Dept.	Partners	Implementers
2.1.1 Promote Polycentric, Compact Growth Pattern in Kuala Lumpur						
SS 1 Gradual densification in polycentric nodes connected by public transportation				City Planning Dept.	MPK, MPAJ, MOT	Developers

Responsible KLCH department

KLCH department with primary responsibility for initiating, coordinating, liaising with relevant external agencies, monitoring, and/or approving implementation of programs.

Partners

Technology providers, funding agencies or entities, and relevant government agencies with approving authority for and/or statutory duty of regulating, facilitating, and overseeing the implementation of programs.

Implementers

Agencies, entities and/or parties who implement, or are needed to implement, programs due to their statutory duty, ownership rights, institutional responsibility, and/or effective serving of collective interests.

ACRONYMS AND ABBREVIATIONS

AIM	Asia-Pacific Integrated Model
BaU	Business as Usual
BEI	Building Energy Intensity/Index
CO_2	Carbon dioxide
CM	Countermeasure
EE	Energy Efficiency
EEI	Electrical, Electronic and Information Technologies
EEI	Energy Efficiency Improvement
EC	Energy Commission
EMS	Energy Management System
EPU	Economic Planning Unit
ERP	Electronic Road Pricing
ExSS	Extended Snapshot Tools
EV	Electric Vehicle
FDI	Foreign Direct Investment
FDM	Freight Demand Management
FGD	Focus Group Discussion
FITs	Feed-in tariffs
GHG	Greenhouse gases
GDP	Gross Domestic Products
GEZ	Green Enterprise Zone
GGP	Government Green Procurement
GIS	Geographic Information System
GTFS	Green Technology Financing Scheme
GTP	Government Transformation Programme
ICT	Information Communication Technology
IGEM	International GreenTech and Eco Products Exhibition and Conference Malaysia
IGES	Institute for Global Environment Strategies
IEA	International Energy Agency
IT	Information Technology
ITS	Intelligent Transport System
ITT	Integrated Transportation Terminal
JASE	Japanese Business Alliance for Smart Energy WorldWide
KLCH	Kuala Lumpur City Hall
KLCP	Kuala Lumpur City Plan
KLSP	Kuala Lumpur Structure Plan
LCCF	Low Carbon City Framework
LCS	Low Carbon Society
LED	Light-emitting diode
LID	Low Impact Development
LRT	Light Rail Transit
MAESCO	Malaysia Association of Energy Service Companies
MRT	Mass Rapid Transit
MSW	Municipal Solid Waste
NC2	Second National Communication to the UNFCCC
NGTP	National Green Technology Policy
NIES	National Institute for Environmental Studies, Japan
NPCC	National Policy on Climate Change
NPE	National Policy on the Environment
NPP2	Second National Physical Plan
NPS	Non-point Source
NRW	Non-revenue Water
NREPAP	National Renewable Energy Policy and Action Plan
NUP	National Urbanisation Policy
OECD	Organisation for Economic Cooperation and Development
PV	Photovoltaic
R&D	Research and Development
RE	Renewable energy
RMK 11	Eleventh Malaysia Plan
RTTV	Roof Thermal Transfer Value
SDG	Sustainable Development Goals
SME	Small and Medium Enterprise
STP	Sewage Treatment Plant
TDM	Transportation Demand Management
TOD	Transit Oriented Development
UHI	Urban Heat Island
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organisation
UTM-LCARC	UTM-Low Carbon Asia Research Centre
VMS	Variable Message Signs

Unit

kg	Kilogram
g/km	Gram per kilometre
Mil.t/km	Million tonne per kilometre
mm	milimeter
Mt	Million tonne
MWp	MegaWatt peak
km	Kilometre
km^2	Kilometre squared
Km/h	Kilometre per hour
ktoe	Kilotonne oil equivalent
kWh	Kilowatt-hour
MJ	Mega joule
Mil.RM	Million ringit
t/day	Tonne per day
t/year	Tonne per year
tCO_2eq	Tonne carbon dioxide equivalent
$ktCO_2eq$	Kilotonne carbon dioxide equivalent

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PROJECT TEAM MEMBERS

Universiti Teknologi Malaysia (UTM)

Core Team Members

Ho Chin Siong
Chau Loon Wai
Mlysha Nurshyla Abdul Rahim
Mohamad Zulikhram Zulibrahim
Muhammad Akmal Hakim Hishammuddin
Nadzirah Jausus
Rohayu Abdullah
Nur Syazwani Saari

Subject Matter Experts

Mohd Hamdan Ahmad
Lim Yaik Wah
Muhammad Zaly Shah Muhammad Hussein
Lee Chew Tin
Zainura Zainon Noor
Haslenda Hashim
Fatin Aliah Phang
Kasturi Devi Kanniah
Siti Hajar Misnan
Lim Jeng Shun
Ho Wai Shin
Choong Weng Wai
Gobi Krishna Sinniah
Gabriel Ling Hoh Teck
Terrayline Kating-Jouman
Mohd Razman Salim
Christopher Heng Yii Sern
Cindy Lee Ik Sing
Lee Ming Kwee
Kang Chuen Siang
Liu Wen Hui
Chin Han Choong
Cassendra Bong Phun Chien

Kuala Lumpur City Hall

Mohd Najib Mohd
Sahrom Ujang
Nurazizi Mokhtar
Sulaiman Mohamed
Nik Mastura Diyana Nik Mohamad
Samsuddin Abd Kadir
Nor Hashida Harun
Bongsu Khairi Hashim
Nek Mah Basri

International Experts

Yuzuru Matsuoka
Junichi Fujino
Tomoki Ehara
Yuki Ochi

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