

# LOW CARBON SOCIETY

ACTION PLAN 2025



## KULAI

Smart Integrated Logistic Hub





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Smart Integrated Logistic Hub

Universiti Teknologi Malaysia  
Majlis Perbandaran Kulai  
Iskandar Regional Development Authority  
Kyoto University  
Okayama University  
National Institute for Environmental Studies

### Low Carbon Society Action Plan for Kulai 2025: Smart Integrated Logistic Hub

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# FOREWORD



*Y.A. B Dato' Seri Mohamed Khaled Nordin*

*Menteri Besar of Johor*

*Co-Chairman of Iskandar Regional Development Authority*

The Low Carbon Society Action Plans 2025 is a great initiative taken by all five local authorities within the Iskandar Malaysia economic region. The local authorities are Majlis Bandaraya Johor Bahru (MBJB), Majlis Perbandaran Johor Bahru Tengah (MPJBT), Majlis Perbandaran Pasir Gudang (MPPG), Majlis Perbandaran Kulai (MPKu) and Majlis Daerah Pontian (MDP).

These local authorities are among the first few in Malaysia to take address climate change issues to meet world community demands for concrete action in global environment conservation. I am confident that these plans will ensure the wellbeing and sustainable growth of Iskandar Malaysia. In the State of Johor and Iskandar Malaysia, we understand that astute and careful management of the environment and natural resources is key to pursuing sustainable green growth and ensuring resilient development. This sets the context within which all other factors from land use proposals and development to social engineering, service provision and economic growth potential must be considered. Every development must be sound and substantial, supported by solid scientific research and strong buy-in from the various stakeholders.

Therefore, the implementation must be done through collaboration with the local communities, whose knowledge and intimate experiences of their environment are crucial for a well-planned economic region. This will enhance the value proposition of such developments, without sacrificing the future.

I would like to commend all parties involved, especially the local authorities for taking up this challenge and making Johor a better living environment for all.

# FOREWORD



*Y.Bhg Haji Abdul Rahman Bin Salleh*

*Yang Dipertua Majlis Perbandaran Kulai*

Kulai Municipal Council (MPKu) aims at addressing economic growth, societal well-being and development, as well as environmental preservation and management in Kulai in a holistic manner, and the Low Carbon Society initiative is one of the various mechanisms that have been deployed to achieve these objectives.

We learned the idea of low carbon society through the Low Carbon Society Blueprint for Iskandar Malaysia 2025 prepared by Universiti Teknologi Malaysia (UTM) and Iskandar Regional Development Authority (IRDA), with support from the Japanese government and research institutions. The Blueprint gives us a clear view to an innovative approach and concrete framework for achieving sustainable development in Kulai. We are pleased to be one of the local authorities in Iskandar Malaysia that are on the path to realising low carbon society, enhancing inclusiveness by emphasising community centric development and promoting green growth for greater prosperity while at the same time reducing our GHG emissions. This Low Carbon Society Action Plan for Kulai 2025, with its 12 Actions and 258 programmes, will be implemented in a timely and proactive manner, with MPKu taking on the leading role.

We wish to thank UTM and Japanese researchers from Kyoto University, the National Institute for Environmental Studies (NIES) and Okayama University; and funders of the project, the Japan International Cooperation Agency (JICA) and Japan Science and Technology Agency (JST), for their invaluable research efforts, diligence, support and commitment to the sustainable, low carbon growth of Kulai. This is a major contribution towards the realisation of MPKu's vision of making Kulai a Smart Integrated Logistic Hub.

# PREFACE



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*Project Manager*  
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Malaysia is experiencing rapid urbanization and transformation. The government is aiming to become a high income nation that is both inclusive and sustainable by 2020. One of the major strategic thrusts of Eleventh Malaysia Plan 2016 – 2020 is stressing on the green growth for better wellbeing and quality of life. It is important to develop low carbon, vibrant and liveable communities in our major economic growth corridors that adopt climate resilient growth strategies. The formulation of a Low Carbon Action Plan for the cities of metropolis is one of the approaches to empower local authorities to implement climate resilient growth strategies to reduce emissions of greenhouse gases (GHGs) at local level.

This action plan is a complementary document that builds upon the Low Carbon Society Blueprint for Iskandar Malaysia 2025 with the focus on Kulai region specifically. Apart of emphasizing on low carbon development, this action plan is align with the vision of Kulai - Smart Integrated Logistic Hub. This report is the outcome of the strong partnership with Kulai Municipal Council (MPKu) and Iskandar Regional Development Authority (IRDA) to outline realistic implementation program by involving diverse stakeholders through focus group discussion.

This action plan is a continuous effort of research outputs of our SATREPS (Science and Technology Research Partnership for Sustainable Development) project on the Development of Low Carbon Society for Asian Region sponsored by Japan International Cooperation Agency (JICA) and Japan Science and Technology Agency (JST). The main research institutes involved in this collaboration work are Universiti Teknologi Malaysia (UTM), Kyoto University, National Institute for Environmental Studies (NIES), and Okayama University.

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# INTRODUCTION

The Low Carbon Society Blueprint for Iskandar Malaysia 2025 (LCSBP-IM2025), officially launched by the Prime Minister of Malaysia and adopted by the Iskandar Regional Development Authority (IRDA) in 2012, outlines a total of 281 implementation programs which are projected to reduce Iskandar Malaysia's carbon emission intensity by 58% in 2025 compared to 2005 levels. Several strategic programs outlined in the LCSBP-IM2025 have since been implemented. To accelerate the realisation of low carbon society (LCS) in Iskandar Malaysia (IM), which covers four local authority (LA) jurisdictions and part of a fifth LA jurisdiction, a set of five LCS Action Plans are formulated, one for each of the five LA jurisdictions (see figure below). This document presents the LCS Action Plan for the Kulai Municipal Council (Majlis Perbandaran Kulai, MPKu).

These LA-level LCS Action Plans are crucial to ensure effective implementation of the LCSBP-IM2025 as each LCS Action Plan recognises and responds to the distinctive economic, social and environmental characteristics, as well as strengths, potentials and issues unique to each LA. By adopting their respective LCS Action Plan, the LAs are in effect adopting LCS policies and

programs within the framework of the LCSBP-IM2025 that are appropriate to their socioeconomic and environmental contexts. To that end, three rounds of focus group discussions (FGDs) have been conducted for each LA prior to, during and after the preparation of the LA's Draft LCS Action Plan between March and October 2015. Through the FGD sessions, LA officials provided direct feedback and comments on the proposed LCS programs in terms of their priority, suitability and feasibility for implementation (see Appendix: Method of Project Evaluation).

This LCS Action Plan 2025 for Kulai aims at facilitating LCS development for the Kulai Municipal area to become a "Smart Integrated Logistic Hub". It recommends specific local level LCS programs and provides implementation guidance to policymakers of MPKu by identifying the level of importance, timeline and implementation agencies for each program. For consistency and ease of reference, LCS programs in this LCS Action Plan are structured following the 12 LCS Actions in the LCSBP-IM2025. For technical details of each LCS program, readers are referred to the Low Carbon Society Blueprint for Iskandar Malaysia 2025 – Full Report (UTM-LCAR, 2013).

**Iskandar Malaysia**  
A Strong Sustainable Metropolis of International Standing

- Johor Bahru**: Vibrant World Class Cosmopolis of the South
- Johor Bahru Tengah**: Green Livable City & Creative Innovation Belt
- Kulai**: Smart Integrated Logistic Hub
- Pasir Gudang**: Green & Clean Industrial City
- Pontian**: Clean Energy and Aaro-Biodiversity Hub

# LOW CARBON ISKANDAR MALAYSIA 2025

Iskandar Malaysia (IM) is a visionary economic region in Johor that was established in 2005 as one of the catalyst development corridors to spur growth of the Malaysian economy. Covering an area of 221,634 hectares (2,216.3 km<sup>2</sup>), IM is the largest single development project ever to be undertaken in the Southeast Asia region. Strategically located at the southernmost tip of Mainland Asia to tap on a vast market of about 0.8 billion people within a 6-hour flight radius, IM is set to become an integrated global node that synergises with growth of the global City-state of Singapore and Indonesia. To that end, it has been projected that population in IM will more than double from 1.35 million in 2005 to over 2.83 million by 2025, supported by a stable 7-8% annual GDP growth that is primarily driven by services and manufacturing. Towards strengthening the existing economic clusters and diversifying growth, five Flagship Zones have been earmarked as key growth poles for development in Iskandar Malaysia.

In line with IM's vision to be "A strong sustainable metropolis of international standing" and Malaysia's voluntary commitment to reducing the country's carbon emission intensity by 40% by year 2020 (based on 2005 levels), it is vital that the targeted strong growth is achieved while keeping IM's carbon emission at bay. This calls for the LCSBP-IM2025 to nurture a healthy, knowledgeable and globally competitive society that subscribes to low carbon living while at the same time develop a total urban-regional environment that enables rapid economic growth but reduces growth's energy demand and carbon emission intensity. It is a holistic and integrated approach that pulls together measures under green economy, green community and green environment to decouple rapid growth and development from carbon emission in IM. The LCSBP-IM2025 covers wide ranging aspects which include urban planning, transportation, industry, building, energy efficiency, renewable energy, lifestyle change, education and awareness, governance, forest conservation, waste management and air and environmental quality.

The Iskandar Malaysia LCS development is a pilot research project of the project of Development of Low Carbon Society Scenarios for Asian Regions initiated under the auspices of Science and Technology Research Partnership for Sustainable Development (SATREPS). The project aims at showcasing best practices in LCS for Asian Regions and will therefore benefit not only IM and Malaysia, but also the Asian Regions. It is a hands-on project where researchers and government officials of Asian Countries work together in implementing research outputs within the cities or regions involved, leading to the eventual establishment of an Asian Low Carbon Society network.



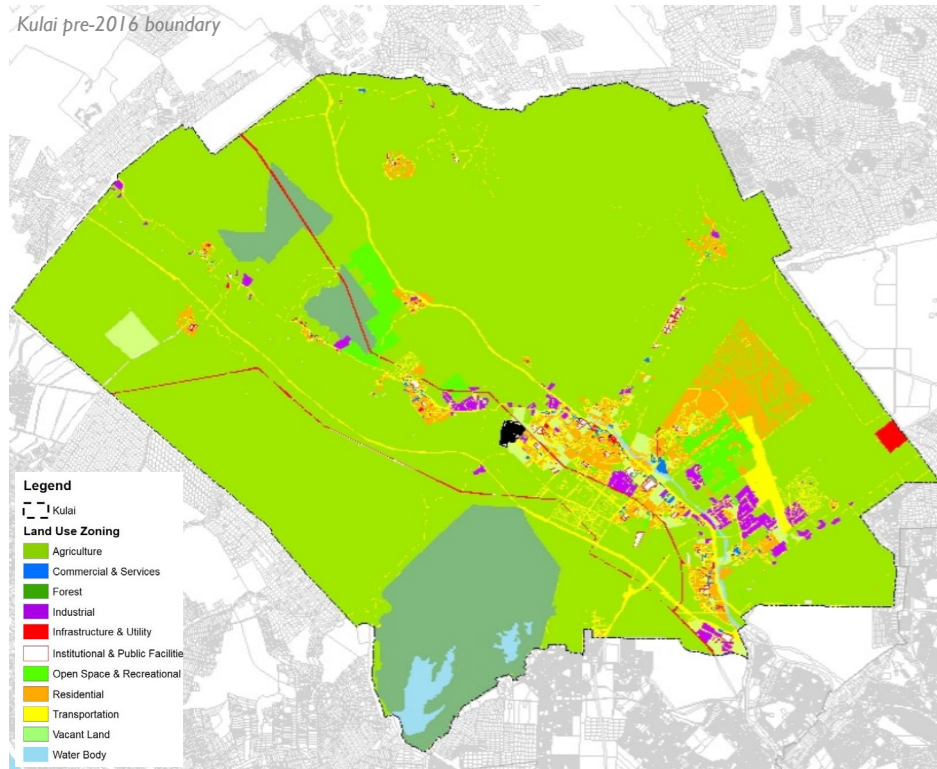
Iskandar Malaysia's strategic location in Asia (Source: Iskandar Regional Development Authority)

- FLAGSHIP A: JOHOR BAHRU CITY CENTRE**
  - New Financial District
  - Danga Bay Integrated Waterfront City
  - Upgrading of Central Business District
  - Tebrau-Pleasant Mixed Development
  - Customs, Immigration and Quarantine Complex (CIQ)
  - JB-Singapore Causeway
  - Lido Boulevard
- FLAGSHIP B: NUSAJAYA**
  - Kota Iskandar
  - Puteri Harbour
  - Medini
  - EduCity
  - Southern Industrial Logistic Clusters (SILC)
  - Medical Park
  - International Destination Resort
  - Housing and Residential Projects
- FLAGSHIP C: WESTERN GATE DEVELOPMENT**
  - Port of Tanjung Pelepas
  - Tanjung Bin Power Plant
  - Malaysia - Singapore Second Link
  - RAMSAR World Heritage
  - Tanjung Piai - Southernmost Tip of Mainland Asia
  - Free Trade Zone
- FLAGSHIP D: EASTERN GATE DEVELOPMENT**
  - Tanjung Lingsat Industrial Complex
  - Tanjung Lingsat Port
  - Johor Port
  - Pasir Gudang Industrial Park
  - APTEC (Lakehill Resort City)
- FLAGSHIP E: SENAI-SKUDAI**
  - Senai International Airport
  - Senai Cargo Hub
  - Senai High-Tech Park
  - Sedanak Industrial Park
  - MSC Cyberport City
  - Johor Technology Park
  - Johor Premium Outlets®

Iskandar Malaysia's five Flagship Zones

# LOW CARBON SOCIETY KULAI 2025

**Kulai** is located at the northern part of Iskandar Malaysia. Several of the development Flagships of Iskandar Malaysia are located in this district. The area of Kulai region includes the sub-districts of Kulai, Senai, Sedenak and Bukit Batu. The main sectors in Kulai includes agriculture sector especially in oil palm and rubber plantation. Most of the locals work in small retail shops, which are located along the trunk road. Felda Taib Andak located in Kulai is one of the first of FELDA's (Federal Land Development Agency) settlements to plant oil palm in the country.



**Population** in Kulai is expected to increase from 182,018 (2010) to 325,900 (2025) (1.79 times compared to 2010). While the number of household in Kulai region will increase from 41,460 (2010) to 80,407 (2025). The GDP per capita of Kulai region is expected to increase from RM 41,293 (2010) to RM 86,968 (2025).

### Smart Integrated Logistic Hub

It is envisioned that by 2025, the key economic activities in Kulai include distribution and logistics, airport and air cargo activities, high tech industries aviation and aerospace industries. The hub will promote green goods handling activities that take place between regional corridors and clusters. This concept also aims to cater to sustainable worldwide logistics development towards have growth of global good flows.

## KEY FEATURES OF KULAI



**Johor Premium Outlet (JPO)** officially opened on December 2011. JPO is Johor finest shopping outlet features more than 80 leading designers and branded stores.



**Senai International Airport** is the only international airport serving the Iskandar Malaysia area. The airport is able to handle up to 3.5 million passengers and 80,000 tonnes of cargo per annum



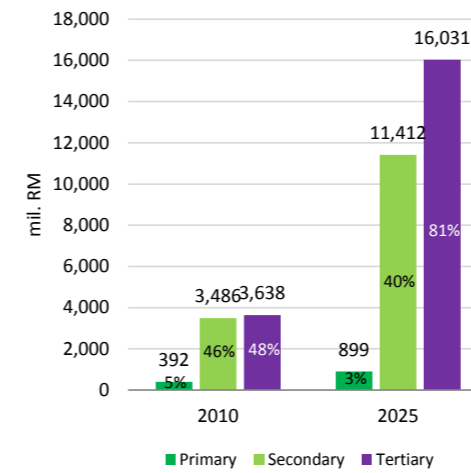
**Senai Duty Free Zone** is dedicated industrial area gazette with free zone status. It is planned to cater for regional distribution and warehousing activities, logistic provider and export oriented manufacturing base.



**MSC Cyberport** is to be developed on a 140 acre freehold land in Indahpura, Kulai. It is designed to have world-class infrastructure and a clustering effect that will create an environment to nurture techno-preneurs and growing businesses

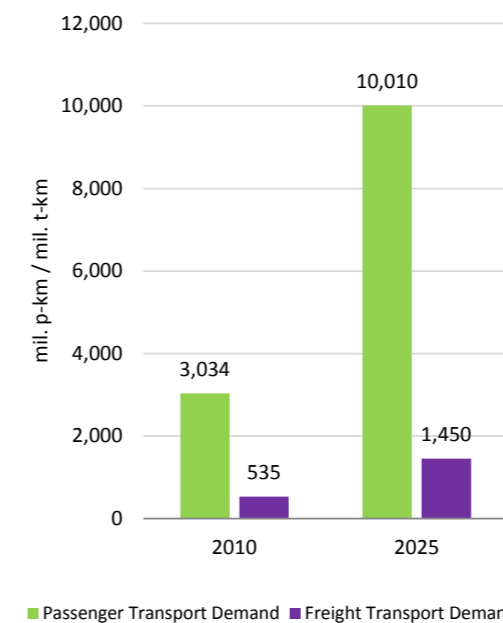
## Economic Structure

Gross Domestic Product (GDP) of Kulai in 2025 is expected to be RM 28,343 mil. (3.77 times of the performance in 2010). Tertiary industry sector is the key economic activities in Kulai where its contribution will increase from 48% in 2010 to 57% in 2025. The share of future primary industry structure in Kulai will decrease from 5% (2010) to 3% (2025). Secondary industry structure also is expected to decrease from 46% (2010) to 40% (2025).

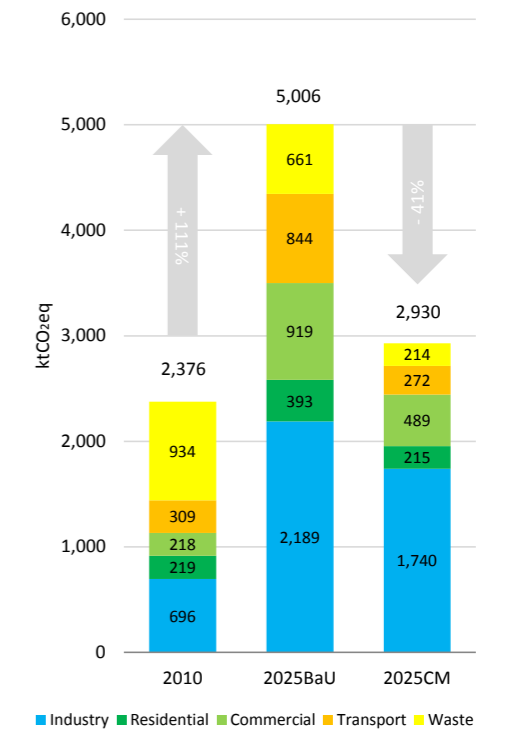


## Transportation Structure

Passenger transport demand in Kulai will increase from 3,034 million passenger-kilometres (2010) to 10,010 million passenger-kilometres (2025). While freight transport demand will increase from 535 million tonne-kilometres (2010) to 1,450 million tonne-kilometres (2025).



## Greenhouse Gas (GHG) Emissions



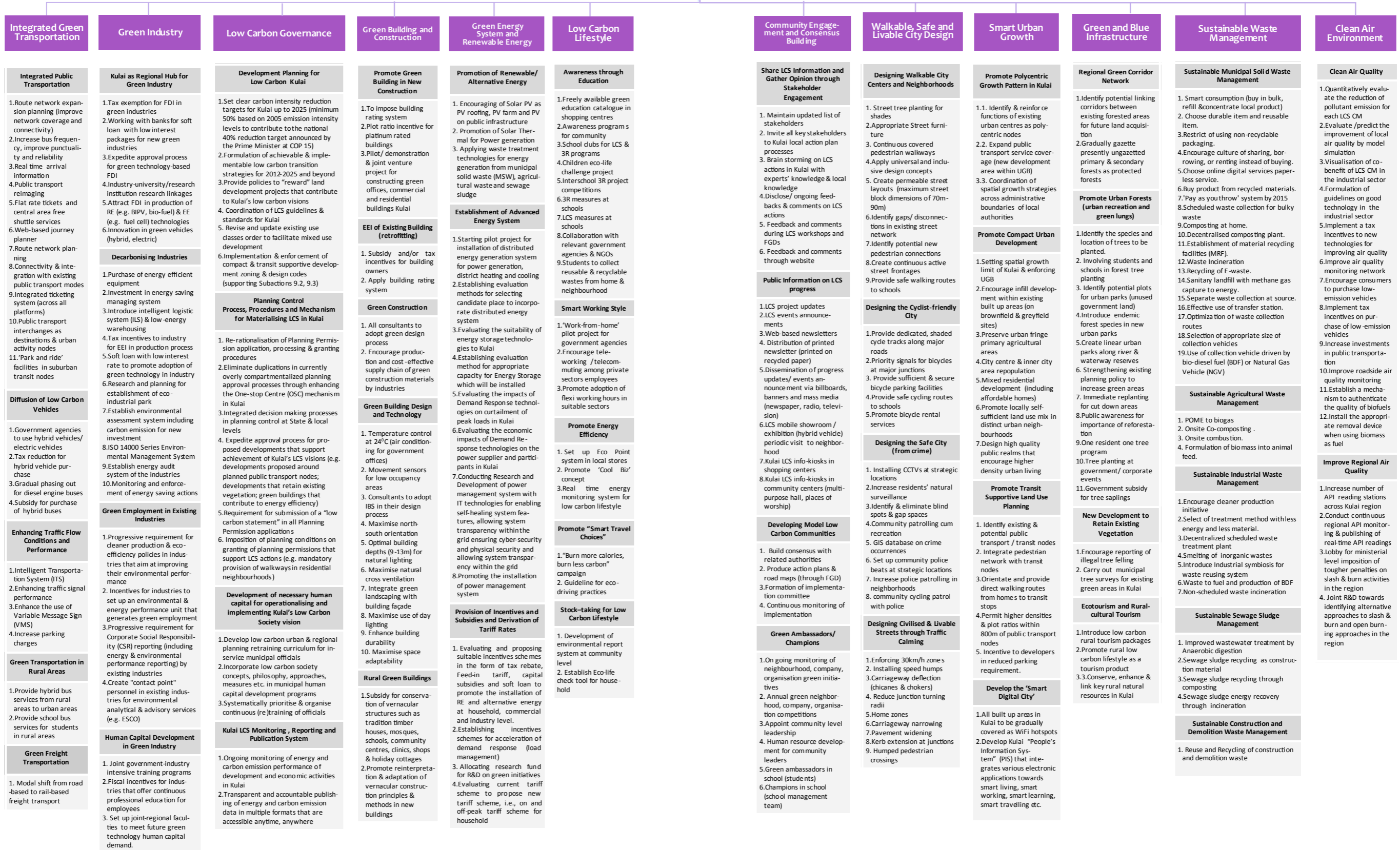
The figure above shows the total of carbon emission of Kulai according to the sectors in 2010 (base year), 2025BaU (Business as Usual) and 2025CM (Counter Measures). The total GHG emission of Kulai region in year 2010 is about 2,376 KtCO<sub>2</sub>eq, the value will increase 111% to 5,006 KtCO<sub>2</sub>eq in year 2025 if no mitigation measures are taken. However, the scenario will be better if mitigation measures are introduced. An expected of 41% reduction (-2,076 KtCO<sub>2</sub>eq) could be achieved as compared to 2025BaU.

Specifically the carbon emission from the waste sector can be reduced up to 68% (-447 KtCO<sub>2</sub>eq) while the transport sector is 68% (-572 KtCO<sub>2</sub>eq), commercial sector 47% (-430 KtCO<sub>2</sub>eq), residential sector 45% (-178 KtCO<sub>2</sub>eq) and industry sector 21% (-449 KtCO<sub>2</sub>eq).

Unit	2010	2025 BaU	2025 CM	2025BaU /2010	2025CM /2010	2025CM /2025BaU
Final energy demand (ktoe)	340	1,050	734	3.09	2.16	0.70
GHG emissions (KtCO <sub>2</sub> eq)	2,376	5,006	2,930	2.11	1.23	0.59
Per capita CO <sub>2</sub> emission (tCO <sub>2</sub> eq)	13.1	15.4	9.0	1.18	0.69	0.58
GHG Intensity (ktCO <sub>2</sub> eq / mil. RM)	0.32	0.18	0.10	0.56	0.33	0.59



Low Carbon Society Kulai 2025  
SMART INTEGRATED LOGISTIC HUB



# 01 INTEGRATED GREEN TRANSPORTATION



Strong economic development and population growth of Kulai lead to higher passenger and freight transportation demand. In order to mitigate the carbon emission level of the projected increase transportation demand, development of an integrated green transportation system in Kulai is highly essential. This calls for five (5) strategies of: (1) integrated public transportation; (2) diffusion of low carbon vehicles; (3) enhancing traffic flow conditions and performance (4) green transportation in rural areas; and (5) green freight transportation. Under these strategies, 26 potential programs are listed for the implementation of integrated green transportation.

The diagram in the next page shows the list of key projects in and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Integrated Public Transportation</b>				
1. Route network expansion planning (improve network coverage and connectivity)		High	High	MPKu, SPAD, Enterprises ,PPMJ
2. Increase bus frequency, improve punctuality and reliability		High	High	MPKu, SPAD, Enterprises ,PPMJ
3. Real time arrival information		High	High	MPKu, SPAD, Enterprises ,PPMJ
4. Public transport reimagining		High	High	MPKu, SPAD, Enterprises ,PPMJ
5. Flat rate tickets and central area free shuttle services		High	High	MPKu, SPAD, Enterprises ,PPMJ
6. Web-based journey planner		High	High	MPKu, SPAD, Enterprises ,PPMJ
7. Route network planning		High	High	MPKu, SPAD, Enterprises ,PPMJ
8. Connectivity & integration with existing public transport modes		High	High	MPKu, SPAD, Enterprises ,PPMJ
9. Integrated ticketing system (across all platforms)		High	High	MPKu, SPAD, Enterprises ,PPMJ
10. Public transport interchanges as destinations & urban activity nodes		High	High	MPKu, SPAD, Enterprises ,PPMJ
11. 'Park and ride' facilities in suburban transit nodes		High	High	MPKu, SPAD, Enterprises ,PPMJ
<b>Diffusion of Low Carbon Vehicles</b>				
1. Government agencies to use hybrid vehicles/ electric vehicles		High	High	MPKu, SPAD
2. Tax reduction for hybrid vehicle purchase		High	High	MPKu, SPAD
3. Gradual phasing out for diesel engine buses		High	High	MPKu, SPAD
4. Subsidy for purchase of hybrid buses		High	High	MPKu, SPAD
<b>Enhancing Traffic Flow Conditions and Performance</b>				
1. Intelligent Transportation System (ITS)		High	High	MPKu, SPAD
2. Enhancing traffic signal performance		High	High	MPKu, SPAD
3. Enhance the use of Variable Message Sign (VMS)		High	High	MPKu, SPAD
4. Increase parking charges		High	High	MPKu, SPAD
<b>Green Transportation in Rural Areas</b>				
1. Provide hybrid bus services from rural areas to urban areas		High	High	MPKu, SPAD
2. Provide school bus services for students in rural areas		High	High	MPKu, SPAD
<b>Green Freight Transportation</b>				
1. Modal shift from road-based to rail-based freight transport		High	High	MPKu, SPAD

Importance level

High Medium Low

# 02 GREEN INDUSTRY



In 2025BaU, industry sector in Kulai is projected to be the largest contributor of GHG emission. Therefore, introducing green industry is particularly important for LCS Kulai 2025. This action includes four (4) major strategies: (1) Kulai as regional hub for green industry; (2) decarbonising industries; (3) green employment in existing industries and (4) human capital development in green industry. A total of 23 potential projects have been identified for green industry in Low Carbon Society of Kulai. Implementation of programs under these strategies are expected to begin from 2015 onwards.

The diagram in the next page shows the list of key projects in and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Kulai as a Regional Hub for Green Industry</b>				
1. Tax exemption for FDI in green industries	High			MPKu, KeTTHa, UTM, MIDA, PTG, and PTD
2. Working with banks for soft loan with low interest packages for new green industries		High		MPKu, KeTTHa, UTM, MIDA, PTG, and PTD
3. Expedite approval process for green technology-based FDI		High		MPKu, KeTTHa, UTM, MIDA, PTG, and PTD
4. Industry-university/research institution research linkages		High		MPKu, KeTTHa, UTM, MIDA, PTG, and PTD
5. Attract FDI in production of RE (e.g. BIPV, bio-fuel) & EE (e.g. fuel cell)		High		MPKu, KeTTHa, UTM, MIDA, PTG, and PTD
6. Innovation in green vehicles (hybrid, electric)		High		MPKu, KeTTHa, UTM, MIDA, PTG, and PTD
<b>Decarbonising Industries</b>				
1. Purchase of energy efficient equipment		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
2. Investment in energy saving managing system		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
3. Introduce intelligent logistic system (ILS) & low-energy warehousing		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
4. Tax incentives to industry for EEI in production process		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
5. Soft loan with low interest rate to promote adoption of green technology in industry		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
6. Research and planning for establishment of eco-industrial park		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
7. Establish environmental assessment system including carbon emission for new investment		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
8. ISO 14000 Series Environmental Management System		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
9. Establish energy audit system of the industries		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
10. Monitoring and enforcement of energy saving actions		High		MPKu, KeTTHa, Green Tech, DOE-GIVC.
<b>Green Employment in Existing Industries</b>				
1. Progressive requirement for cleaner production & eco-efficiency policies in industries that aim at improving their environmental performance		High		SEDA, KeTTHa, Green Tech, Citizen
2. Incentives for industries to set up an environmental & energy performance unit that generates green employment		High		SEDA, KeTTHa, Green Tech, Citizen
3. Progressive requirement for Corporate Social Responsibility (CSR) reporting (including energy & environmental performance reporting) by existing industries		High		SEDA, KeTTHa, Green Tech, Citizen
4. Create "contact point" personnel in existing industries for environmental analytical & advisory services (e.g. ESCO)		High		SEDA, KeTTHa, Green Tech, Citizen
<b>Human Capital Development in Green Industry</b>				
1. Joint government-industry intensive training programs		High		SEDA, KeTTHa, Green Tech, Citizen
2. Fiscal incentives for industries that offer continuous professional education for employees		High		SEDA, KeTTHa, Green Tech, Citizen
3. Set up joint-regional faculties to meet future green technology human capital demand		High		SEDA, KeTTHa, Green Tech, MPKu

Importance level

High Medium Low

# 03 LOW CARBON URBAN GOVERNANCE



At the local level where decisions about urban form and structure are made, low carbon urban governance is indispensable. Low carbon urban governance measures and programs are essential to the effective implementation of vital CO<sub>2</sub> emission reduction measures and programs related to integrated green transportation; green building and construction; walkable, safe and livable city design; smart urban growth; and green and blue infrastructure.

### Development Planning for Low Carbon Kulai

Development planning plays an indispensable role in guiding development on the ground and shaping the urban future. Once low carbon targets and policies are in place in the development plan, all developments in Kulai will statutorily need to comply with the plans in order to obtain planning permission as well as other development approvals. This will contribute to ensuring Kulai's continuous growth while meeting the carbon reduction targets.

### Planning Control Process, Procedures and Mechanism for Materialising LCS in Kulai

Department must look into carbon reduction as an overarching element for development approval.

### Development of necessary human capital for operationalising and implementing Kulai's Low Carbon Society vision

Officers in local authority must implement the Federal and State policies and regulations. Hence, it is important for officers in the planning departments in local level to have sufficient knowledge, appreciation and technical knowhow about low carbon society.

### Kulai LCS Monitoring , Reporting and Publication System

Ongoing monitoring of the progression towards LCS targets.

In this action there are a total of 17 programmes. The diagram in the next page shows the list of key projects in and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Development Planning for Low Carbon Kulai</b>				
1. Set clear carbon intensity reduction targets for Kulai up to 2025 (minimum 50% based on 2005 emission intensity levels to contribute to the national 40% reduction target announced by the Prime Minister at COP 15)				MPKu, JPBD
2. Formulation of achievable & implementable low carbon transition strategies for 2015-2025 and beyond				MPKu, JPBD
3. Provide policies to "reward" land development projects that contribute to Kulai's low carbon visions				MPKu, JPBD
4. Coordination of LCS guidelines & standards for MPKu				MPKu, JPBD
5. Revise and update existing use classes order to facilitate mixed use development		High		MPKu, JPBD
6. Implementation & enforcement of compact & transit supportive development zoning & design codes (supporting Subactions 9.2, 9.3)		High		MPKu, JPBD
<b>Planning Control Process, Procedures and Mechanism for Materialising LCS in Kulai</b>				
1. Re-rationalisation of Planning Permission application, processing & granting procedures				MPKu, JPBD
2. Eliminate duplications in currently overly compartmentalised planning approval processes through enhancing the One-stop Centre (OSC) mechanism in Kulai				MPKu, JPBD
3. Integrated decision making processes in planning control at State & local levels		High		MPKu, JPBD
4. Expedite approval process for proposed developments that support achievement of Kulai's LCS visions (e.g. developments proposed around planned public transport nodes; developments that retain existing vegetation; green buildings that contribute to energy efficiency)				MPKu, JPBD
5. Requirement for submission of a "low carbon statement" in all Planning Permission applications				MPKu, JPBD
6. Imposition of planning conditions on granting of planning permissions that support LCS actions (e.g. mandatory provision of walkways in residential neighbourhoods)				MPKu, JPBD
<b>Development of necessary human capital for operationalising and implementing Kulai's Low Carbon Society vision</b>				
1. Develop low carbon urban & regional planning retraining curriculum for in-service municipal officials				MPKu
2. Incorporate low carbon society concepts, philosophy, approaches, measures etc. in municipal human capital development programs				MPKu
3. Systematically prioritise & organise continuous (re)training of officials		High		MPKu
<b>Kulai LCS Monitoring , Reporting and Publication System</b>				
1. Ongoing monitoring of energy and carbon emission performance of development and economic activities in Kulai				MPKu, JPBD
2. Transparent and accountable publishing of energy and carbon emission data in multiple formats that are accessible anytime, anywhere				MPKu, JPBD

Importance level  
 High   
  Medium   
  Low

# 04 GREEN BUILDING AND CONSTRUCTION



With the strong economy implication from Iskandar Malaysia, building and construction sector of Kulai is increasingly significant. This action aims to bring the stakeholders in the building industry towards creating a LCS Kulai. Communication amongst the stakeholders, planners, architects, engineers, contractors, developers, manufactures and the local authorities is vital to create common goals. In order to achieve green building and construction in Kulai there are five (5) major strategies: (1) promoting green building in new construction; (2) energy efficiency Improvement of existing buildings (retrofitting); (3) green construction in existing industries (4) green building design and technology and (5) rural green buildings. There are a total of 19 identified potential projects for green building and construction in Low Carbon Society of Kulai.

The diagram on the next page shows the list of key projects and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Promote Green Building in New Construction</b>				
1. To impose building rating system				MPKu, Green Tech, Enterprises, LAM, BEM
2. Plot ratio incentive for platinum rated buildings				MPKu, Green Tech, Enterprises, LAM, BEM
3. Pilot/ demonstration & joint venture project for constructing green offices, commercial and residential buildings in Kulai				MPKu, Green Tech, Enterprises, LAM, BEM
<b>EEl of Existing Building (retrofitting)</b>				
1. Subsidy and/or tax incentives for building owners				MPKu, Green Tech, Enterprises, LAM, CIDB, and SEDA
2. Apply building rating system				MPKu, Green Tech, Enterprises, LAM, CIDB
<b>Green Construction</b>				
1. All consultants to adopt green design process				MPKu, Green Tech, Enterprises, CIDB
2. Encourage production and cost-effective supply chain of green construction materials by industries				MPKu, Green Tech, Enterprises, CIDB
<b>Green Building Design and Technology</b>				
1. Temperature control at 24°C (air conditioning for government offices)				MPKu, Green Tech, LAM, BEM, UTM
2. Movement sensors for low occupancy areas				MPKu, Green Tech, LAM, BEM, UTM
3. Consultants to adopt IBS in their design process				MPKu, Green Tech, LAM, BEM, UTM
4. Maximise north-south orientation				MPKu, Green Tech, LAM, BEM, UTM
5. Optimal building depths (9-13m) for natural lighting				MPKu, Green Tech, LAM, BEM, UTM
6. Maximise natural cross ventilation				MPKu, Green Tech, LAM, BEM, UTM
7. Integrate green landscaping with building facade				MPKu, Green Tech, LAM, BEM, UTM
8. Maximise use of day lighting				MPKu, Green Tech, LAM, BEM, UTM
9. Enhance building durability				MPKu, Green Tech, LAM, BEM, UTM
10. Maximise space adaptability				MPKu, Green Tech, LAM, BEM, UTM
<b>Rural Green Buildings</b>				
1. Subsidy for conservation of vernacular structures such as tradition timber houses, mosques, schools, community centres, clinics, shops & holiday cottages				MPKu, Green Tech, LAM, BEM, UTM
2. Promote reinterpretation & adaptation of vernacular construction principles & methods in new buildings				MPKu, Green Tech, LAM, BEM, UTM

**Importance level**

High
  Medium
  Low

# 05 GREEN ENERGY SYSTEM AND RENEWABLE ENERGY



Energy system is an important development driver in Kulai. By ensuring a more efficient and sustainable energy system, it helps in reducing the impact of development towards the environment. Key strategies and programs in this action which have been identified for implementation are (1) promotion of renewable and alternative energy; (2) establishment of advanced energy system and (3) provision of incentives and subsidies and derivation of tariff rates. A total of 15 identified potential projects for green energy system and renewable energy in Low Carbon Society of Kulai.

The diagram on the next page shows the list of key projects and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Promotion of Renewable/Alternative Energy</b>				
1. Encouraging of Solar PV as PV roofing, PV farm and PV on public infrastructure				MATRADE, KeTTHa, SEDA, Suruhanjaya Tenaga, UTM, Enterprises
2. Promotion of Solar Thermal for Power generation				MATRADE, KeTTHa, SEDA, Suruhanjaya Tenaga, UTM, Enterprises
3. Applying waste treatment technologies for energy generation from municipal solid waste (MSW), agricultural waste and sewage sludge				MATRADE, KeTTHa, SEDA, Suruhanjaya Tenaga, UTM, Enterprises
<b>Establishment of Advanced Energy System</b>				
1. Starting pilot project for installation of distributed energy generation system for power generation, district heating and cooling				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
2. Establishing evaluation methods for selecting candidate place to incorporate distributed energy system				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
3. Evaluating the suitability of energy storage technologies to Kulai				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
4. Establishing evaluation method for appropriate capacity for Energy Storage which will be installed				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
5. Evaluating the impacts of Demand Response technologies on curtailment of peak loads in Kulai				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
6. Evaluating the economic impacts of Demand Response technologies on the power supplier and participants in Kulai				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
7. Conducting Research and Development of power management system with IT technologies for enabling self-healing system features, allowing system transparency within the grid ensuring cyber-security and physical security and allowing system transparency within the grid				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
8. Promoting the installation of power				KeTTHa, Green Tech, SEDA, Suruhanjaya Tenaga
<b>Provision of Incentives and Subsidies and Derivation of Tariff Rates</b>				
1. Evaluating and proposing suitable incentives schemes in the form of tax rebate, Feed-in tariff, capital subsidies and soft loan to promote the installation of RE and alternative energy at household, commercial and industry level.				KeTTHa, Green Tech, SEDA, MPKu
2. Establishing incentives schemes for acceleration of demand response (load management)				KeTTHa, Green Tech, SEDA, MPKu
3. Allocating research fund for R&D on green initiatives				KeTTHa, Green Tech, SEDA, MPKu
4. Evaluating current tariff scheme to propose new tariff scheme, i.e., on and off-peak tariff scheme for household				KeTTHa, Green Tech, SEDA, MPKu

Importance level  
 High   
  Medium   
  Low

# 06 LOW CARBON LIFESTYLE



Low carbon lifestyle refers to living and working in a sustainable way of life. This means that having a living pattern that reduces carbon foot print per person. Low carbon lifestyle promotes low energy consumption through using appliances with higher energy efficiency and adopting energy saving practices, opting for lower energy transportation mode, and switching to a healthier lifestyle. Low carbon lifestyle calls for involvement from individuals of all levels, communities, government offices, and private businesses to support low carbon development in Kulai, giving a minimum impact to the environment without compromising the quality of life.

### Awareness Through Education

Raising awareness through education (public education and formal education at schools) needs the involvement of government agencies, non-governmental organisations (NGOs), schools and local communities.

### Smart Working Style

Is about finding good practices on more flexible arrangement and alternative working style. By sharing the knowledge on how we can reduce working hours, it can save our energy and lead a good life.

### Promote Energy Efficiency

To promote spending less, consuming less and emitting less CO<sub>2</sub> will eventually lead to the society towards a low carbon lifestyle.

### Promote “Smart Travel Choices”

Making individuals feel good, smart and socially rewarding travelling on foot, riding bicycle, using public transport, practicing car-pooling as well as eco-driving.

### Stock-taking for Low Carbon Lifestyle

Calculating CO<sub>2</sub> emission from residents and communities.

The diagram in the next page shows the list of key projects in and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Awareness through Education</b>				
1. Freely available green education catalogue in shopping centres				MPKu, Schools, JPNJ <sup>1</sup>
2. Awareness programs for community				MPKu, Schools, JPNJ <sup>1</sup>
3. School clubs for LCS & 3R programs				MPKu, Schools, JPNJ <sup>1</sup>
4. Children eco-life challenge project				MPKu, Schools, JPNJ <sup>1</sup>
5. Interschool 3R project competitions				MPKu, Schools, JPNJ <sup>1</sup>
6. 3R measures at schools				MPKu, Schools, JPNJ <sup>1</sup>
7. LCS measures at schools				MPKu, Schools, JPNJ <sup>1</sup>
8. Collaboration with relevant government agencies & NGOs				MPKu, Schools, JPNJ <sup>1</sup>
9. Students to collect reusable & recyclable wastes from home & neighbourhood				MPKu, Schools, JPNJ <sup>1</sup>
<b>Smart Working Style</b>				
1. ‘Work-from-home’ pilot project for government agencies				MPKu, Government agencies,
2. Encourage tele-working / telecommuting among private sectors employees				MPKu, Government agencies,
3. Promote adoption of flexi working hours in suitable sectors				MPKu, Government agencies,
<b>Promote Energy Efficiency</b>				
1. Set up Eco Point system in local stores		High		MPKu, GreenTech Malaysia, businesses
2. Promote ‘Cool Biz’ concept		High		MPKu, GreenTech Malaysia, businesses
3. Real time energy monitoring system for low carbon lifestyle		High		MPKu, GreenTech Malaysia, businesses
<b>Promote “Smart Travel Choices”</b>				
1. “Burn more calories, burn less carbon” campaign				MPKu, GreenTech Malaysia, businesses, Communities
2. Guideline for eco-driving practices				MPKu, GreenTech Malaysia, businesses, Communities
<b>Stock-taking for Low Carbon Lifestyle</b>				
1. Development of environmental report system at community level			High	MPKu, SPAD, communities, schools
2. Establish Eco-life check tool for household			High	MPKu, SPAD, communities, schools

Importance level  
 High  
  Medium  
  Low

# 07 COMMUNITY ENGAGEMENT AND CONSENSUS BUILDING



This action engages with the community through consensus building to develop LCS for Kulai. The process of moving towards LCS involves various stakeholders in Kulai. Strong collaboration among these stakeholders are needed to work as a whole. Community engagement aims at building an on-going and strong partnership among stakeholders or communities in Kulai moving towards LCS. The formation of relationship is for the benefits of the communities involved.

Consensus building is to create mutual agreement to meet the interests of all stakeholders and to raise awareness among all parties who are relevant in creating LCS. It is a process to help mediate conflict between stakeholders, remove misunderstanding,

clarify interests and establish common grounds between concerned parties based on negotiations. Both community engagement and consensus building are long-term process and on-ongoing efforts for related parties, supporting low carbon development in Kulai

This can be achieved through (1) sharing LCS information and gathering opinion through stakeholder engagement, (2) public information on LCS progress, (3) developing model for low carbon communities and (4) appointing green ambassadors or champions. There are 24 potential projects identified for this action.

Key projects	2015	2020	2025	Potential Actors
<b>Share LCS Information and Gather Opinion through Stakeholder Engagement</b>				
1. Maintain updated list of stakeholders				MPKu, Government agencies, NGOs, communities
2. Invite all key stakeholders to Kulai developments plan processes				MPKu, Government agencies, NGOs, communities
3. Brain storming on LCS actions in Kulai with experts' knowledge & local knowledge				MPKu, Government agencies, NGOs, communities
4. Disclose/ ongoing feedbacks & comments on LCS actions				MPKu, Government agencies, NGOs, communities
5. Feedback and comments during LCS workshops and FGDs				MPKu, Government agencies, NGOs, communities
6. Feedback and comments through website				MPKu, Government agencies, NGOs, communities
<b>Public Information on LCS progress</b>				
1. LCS project updates				MPKu, Media, NGOS
2. LCS events announcements				MPKu, Media, NGOS
3. Web-based newsletters				MPKu, Media, NGOS
4. Distribution of printed newsletter (printed on recycled paper)				MPKu, Media, NGOS
5. Dissemination of progress updates/ events announcement via billboards, banners and mass media (newspaper, radio, television)				MPKu, Media, NGOS
6. LCS mobile showroom / exhibition (hybrid vehicle) periodic visit to neighborhood				MPKu, Media, NGOS
7. Kulai LCS info-kiosks in shopping centers				MPKu, Media, NGOS
8. Kulai LCS info-kiosks in community centers (multi-purpose hall, places of worship)				MPKu, Media, NGOS
<b>Developing Model Low Carbon Communities</b>				
1. Build consensus with related authorities				MPKu, UTM, communities
2. Produce action plans & road maps (through FGD)				MPKu, UTM, communities
3. Formation of implementation committee				MPKu, UTM, communities
4. Continuous monitoring of implementation				MPKu, UTM, communities
<b>Green Ambassadors/ Champions</b>				
1. On going monitoring of neighbourhood, company, organisation green initiatives				MPKu, Communities, government agencies, NGOs schools
2. Annual green neighborhood, company, organisation competitions				MPKu, Communities, government agencies,
3. Appoint community level leadership				MPKu, Communities, government agencies, NGOs schools
4. Human resource development for community leaders				MPKu, Communities, government agencies,
5. Green ambassadors in school (students)				MPKu, Communities, government agencies, NGOs schools
6. Champions in school (school management team)				MPKu, Communities, government agencies, NGOs schools

Importance level

High
  Medium
  Low



# 08 WALKABLE, SAFE AND LIVABLE CITY DESIGN



A low carbon city should offer its inhabitants a high quality, healthy and safe living environment while contributing to mitigate GHG emissions. Designing walkable and livable cities is therefore an important facet of a low carbon society. It is to induce a voluntary modal shift from motorised vehicles to walking and cycling for short to medium distance trips while creating world-class environments to live, work, learn and play in. Walkable and livable city design is crucial to ensure that Kulai to be the choice location to invest, live and work in. The actions and programs to be implemented in Kulai are: (1) designing walkable city centres and neighborhoods; (2) designing the cyclist-friendly city; (3) designing the safe city (from crime) and (4) designing civilised and livable streets through traffic calming.

Source of Image : MPKu

Key projects	2015	2020	2025	Potential Actors
<b>Designing Walkable City Centers and Neighborhoods</b>				
1. Street tree planting for shades	High	High	High	MPKu, Developers
2. Appropriate Street furniture	High	High	High	MPKu, Developers
3. Continuous covered pedestrian walkways	Medium	High	High	MPKu, Developers
4. Apply universal and inclusive design concepts	High	High	High	MPKu, Developers
5. Create permeable street layouts (maximum street block dimensions of 70m-90m)	Medium	High	High	MPKu, Developers
6. Identify gaps/ disconnections in existing street network	High	High	High	MPKu, Developers
7. Identify potential new pedestrian connections	High	High	High	MPKu, Developers
8. Create continuous active street frontages	Medium	High	High	MPKu, Developers
9. Provide safe walking routes to schools	High	High	High	MPKu, Developers
<b>Designing the Cyclist-friendly City</b>				
1. Provide dedicated, shaded cycle tracks along major roads	High	High	High	MPKu, Police
2. Priority signals for bicycles at major junctions	High	High	High	MPKu, Police
3. Provide sufficient & secure bicycle parking facilities	Medium	High	High	MPKu, Police
4. Provide safe cycling routes to schools	High	High	High	MPKu, Police
5. Promote bicycle rental services	Medium	High	High	MPKu, Police
<b>Designing the Safe City (from crime)</b>				
1. Installing CCTVs at strategic locations	High	High	High	MPKu, IRDA,JPBD,JKR
2. Increase residents' natural surveillance	High	High	High	MPKu, IRDA,JPBD,JKR
3. Identify & eliminate blind spots & gap spaces	High	High	High	MPKu, IRDA,JPBD,JKR
4. Community patrolling cum recreation	High	High	High	MPKu, IRDA,JPBD,JKR
5. GIS database on crime occurrences	High	High	High	MPKu, IRDA,JPBD,JKR
6. Set up community police beats at strategic locations	High	High	High	MPKu, IRDA,JPBD,JKR
7. Increase police patrolling in neighborhoods	High	High	High	MPKu, IRDA,JPBD,JKR
8. community cycling patrol with police	High	High	High	MPKu, IRDA,JPBD,JKR
<b>Designing Civilised &amp; Livable Streets through Traffic Calming</b>				
1. Enforcing 30km/h zones	High	High	High	MPKu, JKR
2. Installing speed humps	Medium	High	High	MPKu, JKR
3. Carriageway deflection (chicanes & chokers)	High	High	High	MPKu, JKR
4. Reduce junction turning radii	Medium	High	High	MPKu, JKR
5. Home zones	High	High	High	MPKu, JKR
6. Gateway design into traffic calmed areas	Medium	High	High	MPKu, JKR
7. Community landscaping program	High	High	High	MPKu, JKR
8. Carriageway narrowing	Medium	High	High	MPKu, JKR
9. Pavement widening	High	High	High	MPKu, JKR
10. Kerb extension at junctions	High	High	High	MPKu, JKR
11. Humped pedestrian crossings	Medium	High	High	MPKu, JKR

Importance level



# 09 SMART URBAN GROWTH



Due to the rapid economic growth and development of Kulai, its population is expected to increase from 182,018 in 2010 to 325,900 in 2025. Supporting and managing rapid growth while keeping energy demand and GHG emissions at bay becomes a critical issue. Smart urban growth strategies could reduce average number of trips, trip distance and vehicle mile travel (VMT) and at the same time increase the use of public transport by providing a spatial framework for sustainable growth.

Smart urban growth strategies consist of: (1) promoting a polycentric growth pattern; (2) promoting compact urban development; (3) promoting transit supportive land use planning; and (4) developing the 'Smart Digital City'. Under this action there are 17 potential programs listed in order to carry out Low Carbon Society Kulai.

Key projects	2015	2020	2025	Potential Actors
<b>Promote Polycentric Growth Pattern in Kulai</b>				
1. Identify & reinforce functions of existing urban centres as polycentric nodes	High			JPBD Johor, MPKU
2. Expand public transport service coverage (new development area within UGB)	High			JPBD Johor, MPKU, PPMJ
3. Coordination of spatial growth strategies across administrative boundaries of local authorities	High			JPBD Johor, MPKU
<b>Promote Compact Urban Development</b>				
1. Setting spatial growth limit of Kulai & enforcing UGB	High			MPKu, JPBD Johor, Developers
2. Encourage infill development within existing built up areas (on brown-field & greyfield sites)	High	Medium		MPKu, JPBD Johor, Developers
3. Preserve urban fringe primary agricultural areas	High			MPKu, JPBD Johor, Developers
4. City centre & inner city area repopulation	High			MPKu, JPBD Johor, Developers
5. Mixed residential development (including affordable homes)	High			MPKu, JPBD Johor, SUK Johor, Developers
6. Promote locally self-sufficient land use mix in distinct urban neighbourhoods	High			MPKu, JPBD Johor, Developers
7. Design high quality public realms that encourage higher density urban living	High			MPKu, JPBD Johor, Developers
<b>Promote Transit Supportive Land Use Planning</b>				
1. Identify existing & potential public transport / transit nodes	High			MPKu, JPBD Johor, PPMJ
2. Integrate pedestrian network with transit nodes	High	Medium		MPKu, JPBD Johor, Developers
3. Orientate and provide direct walking routes from homes to transit stops	High	Medium		MPKu, JPBD Johor, Developers
4. Permit higher densities & plot ratios within 800m of public transport	High	Medium		MPKu, JPBD Johor
5. Incentive to developers in reduced parking requirement	High			MPKu, JPBD Johor
<b>Develop the 'Smart Digital City'</b>				
1. All built up areas in Kulai to be gradually covered as WiFi hotspots	High			MPKu, MSC, Cyberport, Business, MCMC
2. Develop an Kulai "People's Information System" (PIS) that integrates various electronic applications towards smart living, smart working, smart learning, smart travelling etc.	High			MPKu, MSC, Cyberport, Business, MCMC

**Importance level**

High Medium Low

# 10 GREEN AND BLUE INFRASTRUCTURE



Green and blue infrastructure includes the natural environmental components and green and blue spaces that lie within and between our cities and town. It helps to sequestrate and store excessive CO<sub>2</sub> from the atmosphere, moderating high temperature in the cities (large trees, lakes and water courses) and reducing GHG emissions by conserving energy used for space cooling. Kulai has abundant of green infrastructure exist that should be managed wisely in term of safeguarding, creating, enhancing, maintaining and promoting.

There are four (4) major strategies in promotion for green and blue infrastructure of Kulai: (1) regional green corridor network; (2) promote urban forests (urban recreational and green lungs); (3) new development to retains existing vegetation and (4) ecotourism and rural cultural tourism. There are a total of 18 potential projects have been identified for green and blue infrastructure in Low Carbon Society of Kulai.

The diagram in the next page shows the list of key projects and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Regional Green Corridor Network</b>				
1. Identify potential linking corridors between existing forested areas for future land acquisition				PTNJ, MPKu, WWF, NRE, JPNJ <sup>2</sup>
2. Gradually gazette presently ungazetted primary & secondary forests as protected forests				PTNJ, MPKu, WWF, NRE
<b>Promote Urban Forests (urban recreation and green lungs)</b>				
1. Identify the species and location of trees to be planted.				PTNJ, MPKu, WWF, NRE, JPNJ <sup>1</sup>
2. Involving students and schools in forest tree planting				PTNJ, MPKu, WWF, NRE, JPNJ <sup>1</sup>
3. Identify potential plots for urban parks (unused government land)				PTNJ, MPKu, WWF, NRE, JLN, FRIM
4. Introduce endemic forest species in new urban parks				PTNJ, MPKu, WWF, NRE, JLN, FRIM
5. Create linear urban parks along river & waterway reserves				PTNJ, MPKu, WWF, NRE, JLN, FRIM
6. Strengthening existing planning policy to increase green areas				PTNJ, MPKu, WWF, NRE, JLN, FRIM
7. Immediate replanting for cut down areas				PTNJ, MPKu, WWF, NRE, JPNJ, JLN, FRIM
8. Public awareness for importance of reforestation				PTNJ, MPKu, WWF, NRE, JPNJ <sup>1</sup> , JLN, FRIM
9. One resident one tree program				PTNJ, MPKu, WWF, NRE, JPNJ, JLN, FRIM
10. Tree planting at government/ corporate events				PTNJ, MPKu, WWF, NRE, JPNJ, JLN, FRIM
11. Government subsidy for tree saplings				PTNJ, MPKu, WWF, NRE, JPNJ <sup>1</sup> , JLN, FRIM
<b>New Development to Retain Existing Vegetation</b>				
1. Encourage reporting of illegal tree felling				MPKu, FAMA, MOA, DOA, FRIM, FELDA
2. Carry out municipal tree surveys for existing green areas in Kulai				MPKu, FAMA, MOA, DOA, FRIM, FELDA
<b>Ecotourism and Rural-cultural Tourism</b>				
1. Introduce low carbon rural tourism packages				PTNJ, JPNJ <sup>3</sup> , MPKu
2. Promote rural low carbon lifestyle as a tourism product				PTNJ, JPNJ <sup>3</sup> , MPKu
3. Conserve, enhance & link key rural natural resources in Kulai				PTNJ, JPNJ <sup>3</sup> , MPKu

Importance level  
 High   
 Medium   
 Low

# 11 SUSTAINABLE WASTE MANAGEMENT



Sustainable waste management can reduce waste generation and enhance material and energy recovery of solid waste in order to fulfil the challenge of building both low carbon and material recycling society. Five (5) sub-actions and 35 programs were considered in Kulai context which are: (1) sustainable municipal solid waste management; (2) sustainable agricultural waste management; (3) sustainable industrial waste management; (4) sustainable sewage sludge management and (5) sustainable construction and demolition.

Diagram below shows the sub-actions, programs, implementation year and potential actors for the programs.

Key projects	2015	2020	2025	Potential Actors
<b>Sustainable Municipal Solid Waste Management</b>				
1. Smart consumption (buy in bulk, refill & concentrate local product)				MPKu, JPSPN, Johor, SW Corp., SWM.
2. Choose durable item and reusable item				MPKu, JPSPN, Johor, SW Corp., SWM.
3. Restrict of using non-recyclable packaging				MPKu, JPSPN, Johor, SW Corp., SWM.
4. Encourage culture of sharing, borrowing, or renting instead of buying				MPKu, JPSPN, Johor, SW Corp., SWM.
5. Choose online digital services paperless service		High		MPKu, JPSPN, Johor, SW Corp., SWM.
6. Buy product from recycled materials				MPKu, JPSPN, Johor, SW Corp., SWM.
7. 'Pay as you throw' system				MPKu, JPSPN, Johor, SW Corp., SWM.
8. Scheduled waste collection for bulky waste				MPKu, JPSPN, Johor, SW Corp., SWM.
9. Composting at home				MPKu, JPSPN, Johor, SW Corp., SWM.
10. Decentralised composting plant		High		MPKu, JPSPN, Johor, SW Corp., SWM.
11. Establishment of material recycling facilities (MRF)				MPKu, JPSPN, Johor, SW Corp., SWM.
12. Waste Incineration				MPKu, JPSPN, Johor, SW Corp., SWM.
13. Recycling of E-waste		High		MPKu, JPSPN, Johor, SW Corp., SWM.
14. Sanitary landfill with methane gas capture to energy				MPKu, JPSPN, Johor, SW Corp., SWM.
15. Separate waste collection at source				MPKu, JPSPN, Johor, SW Corp., SWM.
16. Effective use of transfer station				MPKu, JPSPN, Johor, SW Corp., SWM.
17. Optimization of waste collection routes				MPKu, JPSPN, Johor, SW Corp., SWM.
18. Selection of appropriate size of collection vehicles				MPKu, JPSPN, Johor, SW Corp., SWM.
19. Use of collection vehicle driven by bio-diesel fuel (BDF) or Natural Gas Vehicle (NGV)				MPKu, JPSPN, Johor, SW Corp., SWM.
<b>Sustainable Agricultural Waste Management</b>				
1. POME to biogas		High		MPKu, MOA, FELDA
2. Onsite Co-composting		High		MPKu, MOA, FELDA
3. Onsite combustion		High		MPKu, MOA, FELDA
4. Formulation of biomass into animal feed		High		MPKu, MOA, FELDA
<b>Sustainable Industrial Waste Management</b>				
1. Encourage cleaner production initiative				MPKu, DOE Johor, MIDA
2. Select of treatment method with less energy and less material				MPKu, DOE Johor, MIDA
3. Decentralized scheduled waste treatment plant				MPKu, DOE Johor, MIDA
4. Smelting of inorganic wastes				MPKu, DOE Johor, MIDA
5. Introduce Industrial symbiosis for waste reusing system				MPKu, DOE Johor, MIDA
6. Waste to fuel and production of BDF				MPKu, DOE Johor, MIDA
7. Non-scheduled waste incineration				MPKu, DOE Johor, MIDA
<b>Sustainable Sewage Sludge Management</b>				
1. Improved wastewater treatment by Anaerobic digestion				MPKu, DOE, JPSPN, SPAN
2. Sewage sludge recycling as construction material				MPKu, DOE, JPSPN, SPAN
3. Sewage sludge recycling through composting				MPKu, DOE, JPSPN, SPAN
4. Sewage sludge energy recovery through incineration				MPKu, DOE, JPSPN, SPAN
<b>Sustainable Construction and Demolition Waste Management</b>				
1. Reuse and recycling of construction and demolition waste				MPKu, CIDB

Importance level  
 High Medium Low

# 12 CLEAN AIR ENVIRONMENT



Air pollution issue in Kulai is mainly caused by the emissions of particulate matter (PM), SO<sub>2</sub>, NO<sub>x</sub>, CO and VOC from vehicles in transportation, industrial activity, and trans-boundary pollution by biomass burning, which is known as “Haze”. There are many good strategies to improve local air quality under the Low Carbon Society policies.

### Clean Air Quality

In order to introduce a suitable countermeasure that is effective for the emission reduction of both GHG and air pollutants, such as SO<sub>2</sub>, NO<sub>x</sub>, PM, CO and VOC, it is necessary to reflect the quantitative evaluation of co-benefit of each countermeasure during the policymaking process. To quantify the co-benefit of each LCS CMs, it is required the detail spatial and temporal emission estimation by using Geographical Information System (GIS). Then, air pollution model and exposure model are used to evaluate the impact to human health and eco-system. Then, the effect of air pollution abatement potential of each LCS CMs have to be visualized simply and intelligibly.

### Improve Kulai Air Quality

Continuous monitoring and realtime publishing of Air Pollutant Index (API) information is important for achieving good air quality in Kulai. Air quality monitoring stations are necessary for Kulai air quality management to attain the national ambient air quality standards (NAAQS). Air pollution monitoring network brings the possibility of controlling of emissions from large point sources, such as power plant and big industrial sites.

The main contents are establishment of comprehensive air quality management system, installation of air quality monitoring station and pollutant emission control device in the industry sector. Green passenger, freight transportation, cross-border cooperation is also considered. A total of 17 projects have been identified for this action.

The diagram in the next page shows the list of key projects and targeted year of implementation.

Key projects	2015	2020	2025	Potential Actors
<b>Clean Air Quality</b>				
1. Quantitatively evaluate the reduction of pollutant emission for each LCS CM				MPKu, DOE Johor, UTM, CVLB, JPJ
2. Evaluate /predict the improvement of local air quality by model simulation				MPKu, DOE Johor, UTM, CVLB, JPJ
3. Visualisation of co-benefit of LCS CM in the industrial sector				MPKu, DOE Johor, UTM, CVLB, JPJ
4. Formulation of guidelines on good technology in the industrial sector				MPKu, DOE Johor, UTM, CVLB, JPJ
5. Implement a tax incentives to new technologies for improving air quality				MPKu, DOE, UTM,
6. Improve air quality monitoring network				MPKu, DOE Johor, UTM, CVLB, JPJ
7. Encourage consumers to purchase low-emission vehicles				MPKu, DOE Johor, UTM, CVLB, JPJ
8. Implement tax incentives on purchase of low-emission vehicles				MPKu, DOE Johor, UTM, CVLB, JPJ
9. Increase investments in public transportation				MPKu, DOE Johor, UTM, CVLB, JPJ
10. Improve roadside air quality monitoring				MPKu, DOE Johor, UTM, CVLB, JPJ
11. Establish a mechanism to authenticate the quality of biofuels				MPKu, DOE Johor, UTM, CVLB, JPJ
12. Install the appropriate removal device when using biomass as fuel				MPKu, DOE Johor, UTM, CVLB, JPJ
<b>Improve Kulai Air Quality</b>				
1. Increase number of API reading stations across Kulai				MPKu, NRE, MOFA, UTM
2. Conduct continuous regional API monitoring & publishing of real-time API readings				MPKu, NRE, MOFA, UTM
3. Malaysia-Singapore-Indonesia joint surveillance of regional open burning hotspots particularly during the Southwest monsoon season				MPKu, NRE, MOFA, UTM
4. Lobby for ministerial level imposition of tougher penalties on slash & burn activities in the region				MPKu, NRE, MOFA, UTM
5. Joint R&D towards identifying alternative approaches to slash & burn and open burning approaches in the region				MPKu, NRE, MOFA, UTM
<b>Importance level</b>				
	High	Medium	Low	

## ACRONYMS AND ABBREVIATIONS

3R	Reduce, Reuse and Recycle	MATRADE	Malaysia External Trade Development Corporation
API	Air Pollutant Index		
BEM	Board of Engineers Malaysia	MCMC	Malaysian Communications and Multimedia Commissions
BIPV	Building-integrated Photovoltaic		
CCTV	Closed-circuit television	MPKu	Kulai Municipal Council
CIDB	Construction Industry Development Board	MIDA	Malaysian Investment Development Authority
CM	Counter Measure	MOFA	Ministry of Foreign Affairs, Malaysia
CO	Carbon Monoxide	MOA	Ministry of Agriculture and Agro-based Industry, Malaysia
CO <sub>2</sub>	Carbon Dioxide		
DOA	Department of Agriculture	MSC	Multimedia Super Corridor
DOE Johor	Department of Environment Johor	NGOs	Non-governmental organisations
DOE-GIVC	Department of Environment - Green Industry Virtual Centre	NOx	Nitrogen Oxide
		NRE	Ministry of Natural Resources and Environment
EC	Energy Commission		
EE	Energy Efficiency	PPAJ	Johor Public Transport Corporation
EEL	Energy Efficiency Improvement	PTD	District Office
ESCO	Energy Service Company	PTG	Land and Mines Office
E-waste	Electronic waste	PTNJ	Johor National Park Corporation
FAMA	Federal Agricultural and Marketing Authority	PV	Photovoltaic
FDI	Foreign Direct Investment	R&D	Research and Development
FELDA	Federal Land Development Authority	RE	Renewable Energy
FRIM	Forest Research Institute of Malaysia	SEDA	Sustainable Energy Development Authority
GIS	Geographical Information System	SIRIM	Standards and Industrial Research Institute of Malaysia
GDP	Gross Domestic Product		
GreenTech	Malaysian Green Technology Corporation	SO <sub>2</sub>	Sulfur Dioxide
IBS	Industrialised Building System	SPAD	Land Public Transport Commission
IRDA	Iskandar Regional Development Authority	SPAN	National Water Service Commission
ISO	International Organization for Standardisation	SUKJ	State Secretary of Johor
IWK	Indah Water Konsortium Sdn Bhd	SWCorp	Solid Waste Management and Public Cleansing Corporation Johor
IM	Iskandar Malaysia		
JKR	Malaysian Public Works Department	SWM	Southern Waste Management Environment Sdn Bhd
JLN	National Landscape Department		
JPBD Johor	Town and Country Planning Department of Johor	UGB	Urban growth boundary
JPBDSM	Federal Department of Town and Country Planning Department Peninsular Malaysia	UTM	Universiti Teknologi Malaysia
		VOC	Volatile organic compound
JPBD Johor	Town and Country Planning Department of Johor	WiFi	Wire free internet
		WWF	World Wide Fund for Nature
JPJ	Road Transport Department Malaysia		
JPNJ <sup>1</sup>	Education Department of Johor	<b>UNIT</b>	
JPNJ <sup>2</sup>	Forestry Department of Johor		
JPNJ <sup>3</sup>	Tourism Department of Johor	km <sup>2</sup>	kilometre squared
JPSPN	Department of National Solid Waste Management	KtCO <sub>2</sub> eq	kilotonne carbon dioxide equivalent
		ktoe	kilotonne oil equivalent
KeTTHa	Ministry of Energy Green Technology and Water	mil. p-km	million passenger-kilometres
		mil. RM	million Ringgit Malaysia
LAs	Local Authorities	mil t-km	million tonne-kilometres
LCS	Low Carbon Society	tCO <sub>2</sub> eq	tonne carbon dioxide equivalent

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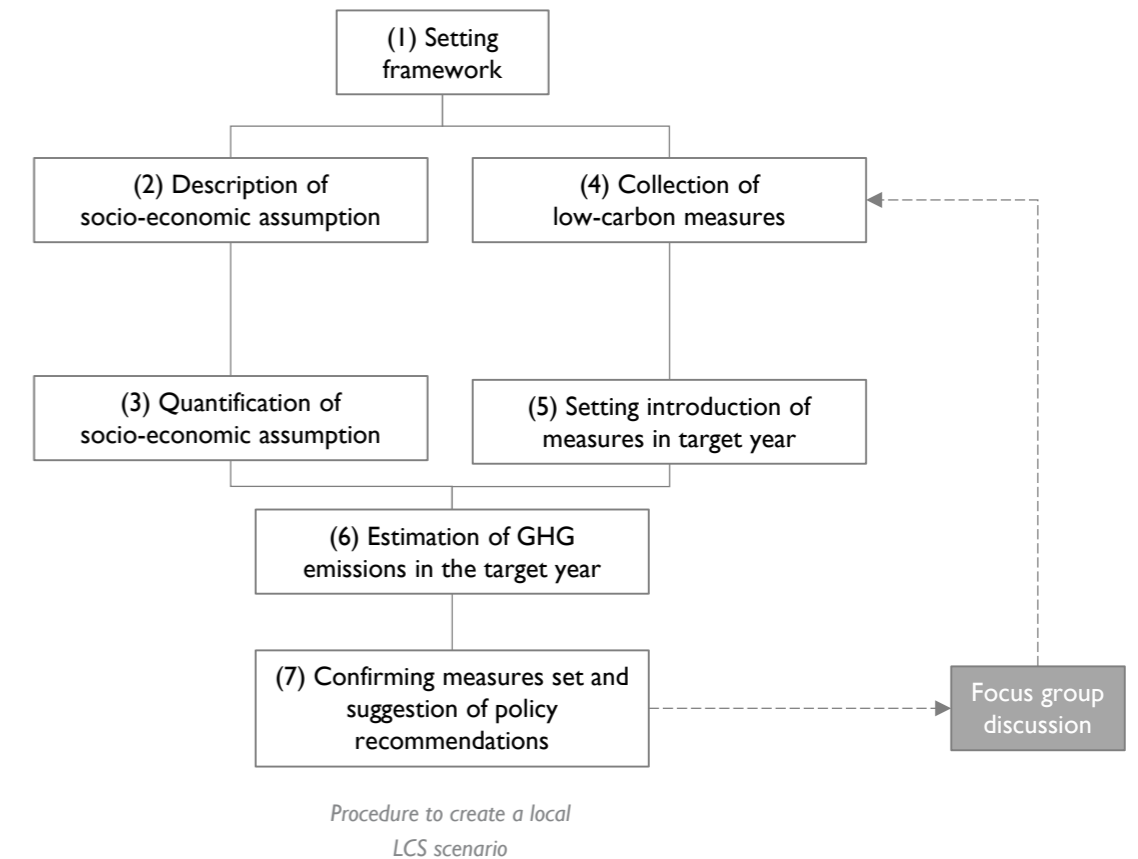
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## Method of Low Carbon Society Scenarios Development

The method is based on the idea of “back casting” to create a local low-carbon society scenario.



### (1) Setting framework

Aspects included in a LCS scenario framework are: the target area, base year, environmental targets and a number of scenarios. The target year is compared with base year. In Iskandar Malaysia, the target year for GHG emission reduction is 2025.

### (2) Description of socioeconomic assumptions

Qualitative future image of lifestyle, economy, industry, land use and other related aspects should be written (based on assumptions from IM's CDP and other key official documents).

### (3) Quantification of socioeconomic assumptions

Values of exogenous variables and parameters are set in order to estimate the future image of (2). Then, using these values, ExSS calculates key socio-economic indices of the target year.

### (4) Collection of low carbon measures

Counter measures which are thought to be available in the target year are collected. Meanwhile, technical data that are required to estimate their effects on GHG emission reduction are gathered.

### (5) Setting introduction of measures in target year

Suitable framework and level of introduction of low carbon measures are recommended considering technological parameters related to energy efficiency that have been defined.

### (6) Estimation of GHG emissions in target year

GHG emissions are calculated based on target year socioeconomic indices (for BaU scenario) and level of introduction of low carbon measures (for low carbon scenario). GHG emission results and proposed LCS policy package are shared with stakeholders in FGD for evaluation and feedback.

### (7) Confirming measures set and suggestion of policy recommendations

Suitable LCS measures and policy package are confirmed and proposed. Suitability of the policy should be in accordance with specific socioeconomic and environmental contexts of the local authority area in order to yield an optimal reduction potential of measures.

# APPENDIX

## Method of Project Evaluation through FGD

Three rounds of Focus Group Discussions (FGD) have been conducted between March and October 2015 corresponding to stages prior to, during and after the preparation of the Draft Low Carbon Society Action Plan 2025 each local authority (LA). The purpose of the first round of FGD has been to present and explain to LA officials in detail LCS programs in the LCSBP-IM2025 and get buy-in, support and preliminary ideas from the officials for the preparation of the LCS Action Plan 2025 for their LA area. Based on the outcome of the first FGD, the Draft Low Carbon Society Action Plan 2025 was prepared outlining specific LCS programs proposed for implementation in the LA area and their projected GHG reduction potentials. The second round of FGD has been aimed at gathering direct feedback, views and comments from LA officials on the priority, suitability and feasibility of every LCS project to be proposed in the Draft LCS Action Plan (see below). Based on the second FGD, the Final Draft LCS Action Plan was prepared with a refined list of LCS programs and their respective implementation timeline and agencies, and updated GHG reduction results. The Final Draft LCS Action Plan was sent to the LAs for final review and evaluation in the third FGD, which led to this current Low Carbon Society Action Plan 2025 document.

During the second FGD, every potential project for the development of LCS for the LA is evaluated based on three (3) main criteria: i) priority, ii) suitability and iii) feasibility.

### Priority

measures the extent to which proposed LCS Projects are in line with institutional policy directions and prioritisation as may have been outlined in the LA's official policy documents (e.g. the Johor Bahru and Kulai District Local Plan, the LA's strategic plan and

other sectorial policies). It is usually closely associated with the project's contribution towards the LA's current policy direction. Participants are encouraged consider purely the dimension of priority for implementation (not suitability and feasibility, see below) with respect to their LA's vision and policy direction.

### Suitability

measures the appropriateness of the proposed projects to fit into the LA's local geographic setting and political-cultural context. This may be characterised by the acceptability and readiness of the local community, businesses/enterprises and industries in the LA area (e.g. Car Free Day Program; New Development to Retain Existing Vegetation). Here, participants are to only consider the suitability dimension for implementation (not priority and feasibility) of the proposed projects with respect to the LA's geographic and socio-cultural contexts.

### Feasibility

measures the "implementability" of the proposed projects with respect to the LA's financial capacity and human capital, as well as local technology and material resource availability to develop, manage and operate the projects (e.g. Citywide Photovoltaic and LED Street/Public Lighting; Centralised Utility Provider in Industrial Parks). Participants are to evaluate each proposed project based only on its feasibility for implementation (not priority and suitability).

LA officials have been requested to assign a rating to each proposed LCS project for the above three criteria according to three (3) levels, which are Low (L), Medium (M) and High (H) (see example in table below).

Programs	PRIORITY			SUITABILITY			FEASIBILITY		
	Institutional Vision / Policy Direction			Local Geography Setting / Socio-cultural			Finance / Human Capital / Local Technology / Material		
	L	M	H	L	M	H	L	M	H
Route network expansion planning			✓			✓			✓
Increase bus frequency, improve punctuality and reliability			✓			✓			✓
Real time arrival information			✓			✓			✓
Public transport reimagining			✓			✓			✓
Flat rate tickets and central area free shuttle services			✓			✓	✓		
Web-based journey planner			✓			✓			✓

The resultant rating levels for each proposed LCS program according to the criteria of priority, suitability and feasibility are then analysed using the 'weighted scoring method', involving: i) the allocation of weights to each of the evaluation criteria to reflect their relative importance and ii) the allocation of scores to each rating level to reflect each LCS project's performance in relation to each criterion. The result is a single weighted score for each criterion, which may be summed across each proposed LCS projects being evaluated. The sum weighted score indicates the overall performance of the potential project that combines all three criteria of priority, suitability and feasibility.

### 1) Weight the criteria to reflect their relative importance

The weights of the criteria are decided to reflect group consensus about the relative importance of each of the criteria. Justification for the weights ascribed are recorded to ensure the basis of the weights assigned is fully understood and accepted. In this LCS Action Plan 2025, weights for three (3) criteria are expressed in percentages, which is most common approach and readily comprehended, as follows:

Priority – 40%  
 Suitability -20%  
 Feasibility - 40%

Both criteria of priority and feasibility are given highest and same weights because they are considered the most important criteria compared to suitability. All the weights sum to 100.

### 2) Score the levels to reflect how each option performs against each criterion

The next step is to score each level against each criterion on a suitable scale. The ordinal scale is used in this analysis for simplicity of operation, where a score value of 1, 2 or 3 is assigned correspondingly to a rating level of L, M or H. This can be simply explained via table below:

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

### 3) Calculate the weighted scores

This simply involves multiplying each score by the weight of each criterion for every LCS project. The resulted weighted scores are summed to obtain an aggregate weighted score for each potential project (see table below):

Programs	PRIORITY (40%) Institutional Vision / Policy Direction	SUITABILITY (20%) Local Geography Setting / Socio-cultural Context	FEASIBILITY (40%) Finance / Human Capital / Local Technology / Material	Weighted Score
Route network expansion planning	3	3	2	87
Increase bus frequency, improve punctuality and reliability	3	3	2	87
Real time arrival information	3	3	2	87
Public transport reimagining	3	3	2	87
Flat rate tickets and central area free shuttle services	3	3	1	73
Web-based journey planner	3	3	3	100

### 4) Interpret the results

The results are then interpreted carefully to guide decisions on each LCS project's overall level of importance for implementation, which integrates the project's priority, suitability and feasibility for implementation in the LA area. The results also translate into the implementation timeline of each proposed LCS project.

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



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