



Research  
Low Carbon Society Scenarios for Asian Regions



Summary for Policymakers

# LOW CARBON SOCIETY

# BLUEPRINT Third Edition

FOR ISKANDAR MALAYSIA 2025  
WITH 10 IMPLEMENTATION PLANS





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**FOR ISKANDAR MALAYSIA 2025  
WITH 10 IMPLEMENTATION PLANS**

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

## Low Carbon Society Blueprint for Iskandar Malaysia 2025 - Summary for Policymakers

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# Foreword



Y.A.B. Dato' Sri Mohd Najib Tun Abdul Razak  
Prime Minister of Malaysia  
Co-Chairman of Iskandar Regional Development Authority

The global concern over issues of climate change, global warming and the management of our environment calls for informed and co-ordinated actions by every nation, state and citizen in ensuring that the next generations will inherit a place that is not only fit for human habitation, but conducive for future growth and prosperity.

Therefore, the initiative by Iskandar Regional Development Authority (IRDA) in setting targets for low carbon footprint in the economic development corridor of Iskandar Malaysia in South Johor, Malaysia, as well as the nurturing of a green economy through increased investments in environmental assets and green technology and production, is indeed a commendable one, and should serve as a working model for the development of similar efforts at national, state or regional levels.

# Foreword



Y.A.B. Dato' Seri Mohamed Khaled Nordin  
Menteri Besar of Johor  
Co-Chairman of Iskandar Regional Development Authority

The issuance of the Low Carbon Society Blueprint for Iskandar Malaysia is indeed an initiative taken by Iskandar Regional Development Authority (IRDA) to meet the world community demands for concrete action and timeframe in protecting and sustaining the environment.

In the State of Johor and Iskandar Malaysia, we understand that astute and careful management of natural resources is the key to sustainable growth and 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. The policies must be sound and substantial, supported by solid 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.

# Foreword



Y.Bhg Datuk Ismail Ibrahim  
Chief Executive of Iskandar Regional Development Authority

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

Through the Low Carbon Society research project (2011-2015), Malaysian and Japanese research teams have produced substantive research findings that have been translated into workable and bankable development policies and programmes. This Low Carbon Society Blueprint for Iskandar Malaysia, with its 12 Actions and over 280 programmes, will be implemented in a timely and proactive manner, with IRDA performing the leading role.

I wish to thank Universiti Teknologi Malaysia and Japanese researchers from Kyoto University, the National Institute for Environmental Studies (NIES) and Okayama University; and the funders for the project, namely Japan International Co-operation Agency (JICA) and Japan Science and Technology Agency (JST), for their invaluable research efforts, diligence, support and continuing commitment to the growth of Iskandar Malaysia. This is a major contribution towards the realisation of IRDA's vision in making Iskandar Malaysia a strong and sustainable metropolis of international standing.

# Preface



**Ho Chin Siong**  
Project Manager

Professor  
Universiti Teknologi Malaysia



**Yuzuru Matsuoka**  
Project Leader

Professor  
Kyoto University

Malaysia is experiencing rapid urbanisation and transformation. The government is aiming to become a high income nation that is both inclusive and sustainable by 2020. Hence, 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 society blueprint for regional and local authorities is one of the approaches to develop climate resilient growth strategies to reduce emissions of greenhouse gases (GHGs) at local and regional level.

This new and expanded edition builds upon the second edition of the Low Carbon Society Blueprint and addendum on 10 implementation projects outlined as the priority projects to be implemented within the next 3 years. It is structured to help readers understand the 12 main actions which are translated into sub actions, measures and implementable projects. It also includes 10 priority projects selected for immediate implementation. This report is the outcome of the strong partnership with Iskandar Regional Development Authority (IRDA) to outline realistic policy initiatives and cost effective solution by involving diverse stakeholders through focus group discussion with the local non-governmental organisations (NGOs) and business community. The new edition blueprint for Iskandar Malaysia aims to guide development towards climate resilient urban development for Iskandar Malaysia and also support the vision of building Iskandar Malaysia a strong sustainable metropolis of International Standing.

This updated version of blueprint is one of 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 universities 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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# Low Carbon Iskandar Malaysia at a Glance

The question that is often asked is: “How do we define a low carbon society (LCS)?” Following from this, how can LCS in Iskandar Malaysia (IM) be attained with dual objectives of planned social and economic development? A Low carbon society aims to minimise carbon emission in all sectors, shift to a simpler and quality life and coexistence with nature. This Blueprint contains future society scenarios based on major socioeconomic development variables, quantitative modelling of CO<sub>2</sub> emission and “12 major Actions” that come under Triple Bottom Line (TBL) pillars, namely Green Economy, Green Community and Green Environment. The 12 actions are then detailed into specific measures and programs which IRDA and other stakeholders can adopt and implement directly. It 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 environmental quality.

## Future Socio-economic, Energy Demand and CO<sub>2</sub> Emission Scenario of IM in 2025

The Comprehensive Development Plan Review of Iskandar Malaysia (2012) projected an economic growth of 8.0% p.a. and population growth of 4.1% p.a. for the 2005-2025 period with significant investments in the infrastructure, industry and housing sectors. By using model simulation, a scenario of the future image of society and development of IM in 2025 as a low-carbon society is forecast based on socioeconomic and technological potential variables.

Table 1: Projected main socio-economic variables

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

Table 1 shows the projected main socioeconomic scenarios variables and Table 2 shows the energy demand, GHG emission and intensity in year 2005 and 2025. The result shows that it is possible to achieve a 58% reduction of GHG emission intensity and a 40% emission reduction from BaU (business as usual) by 2025 using 2005 as a base year.

## The GHG Emission by Sectors in Iskandar Malaysia

Figure 1 shows the result of total GHG emission by sectors in Iskandar Malaysia. The total GHG emission in year 2005 is estimated to be 11.4 MtCO<sub>2</sub>eq and this is projected to increase to 31.3 MtCO<sub>2</sub>eq in 2025BaU. With the introduction of countermeasures, the emissions are able to be lowered to 18.9 MtCO<sub>2</sub>eq in 2025CM (countermeasure). As Iskandar Malaysia is a fast developing urbanised region, the industry sector will remain the highest emission sector contributing to more than 30% of the total emissions in IM in the years 2005, 2025BaU and 2025CM.

These emission reductions by sectors are estimated based on the types of counter measures which are viable and can be introduced in the Iskandar Malaysia region within the target year. Most of the countermeasures are based on technologies such as use of energy efficient equipment in all sectors, photovoltaic (PV) power generation, biomass utilisation and energy efficient buildings. It also involves urban planning policies such as modal shift, compact city policy and promoting behaviour change of the community through education and awareness campaigns.

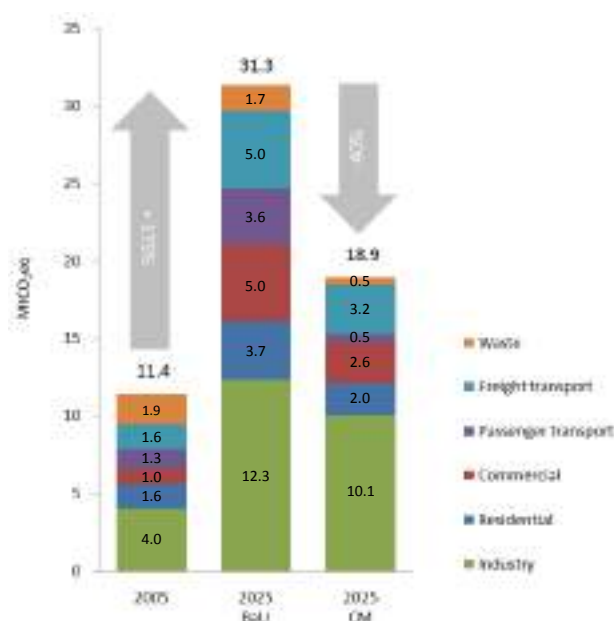


Figure 1: GHG emissions by sectors

### Translating Countermeasures into Implementable Programs

When these emission reduction countermeasures are identified by the researchers, the countermeasures are then translated into feasible actions based on concrete programs which can be implemented by IRDA and the Local Authorities in Iskandar Malaysia. In order to ensure the proposals are appropriate and feasible to the local community, a series of Focus Group Discussions (FGDs) were organised by Universiti Teknologi Malaysia (UTM) and IRDA. These FGDs were attended by various stakeholders (local authorities, business communities, NGOs, NPOs, interest groups and individuals) in this region who are involved in various development sectors. Through a series of consensus building exercises, 3 major pillars with 12 Actions consisting of 52 Sub-actions, 97 Measures and about 281 Programs were formulated to transform IM into a low carbon society.

### Contribution of Direct Effects to Emission Reduction by Actions

Figure 2 shows the estimated emission reduction share by 12 actions. Action 5 - Green Energy and Renewable Energy System (21%), Action 6 - Low Carbon Lifestyle (21%), and Action 1 - Integrated Green Transportation (15%) are the top 3 actions accounting for about 57% of the total reduction. Table 3 shows the detailed GHG reduction of the 12 Actions by the 3 main pillars. Green Economy (54%) is the major pillar in GHG reduction followed by Green Environment (25%) and Green Community (21%). Some of the Actions (e.g. Action 3 - Low Carbon Urban Governance, Action 7 - Community Engagement and Action 12 - Clean Air Environment) do not have direct emission reductions, but their

contributions are included in other Actions' emission reduction because the programs will enable or enhance implementation of programs in other Actions.

### Planning, Implementation and Monitoring

The development of a Low-carbon society is inevitably a long-term project. Once the plan is determined and the programs are launched, the authorities are required to make an effort to continuously implement and monitor progress of the programs and GHG emissions. Continuous data collection and inventory of development, energy consumption and CO<sub>2</sub> emission are important in the planning and monitoring work. This blueprint also contains the framework of planning, implementation and monitoring of the Actions and emissions based on the PDCA (Plan-Do-Check-Act) cycle.

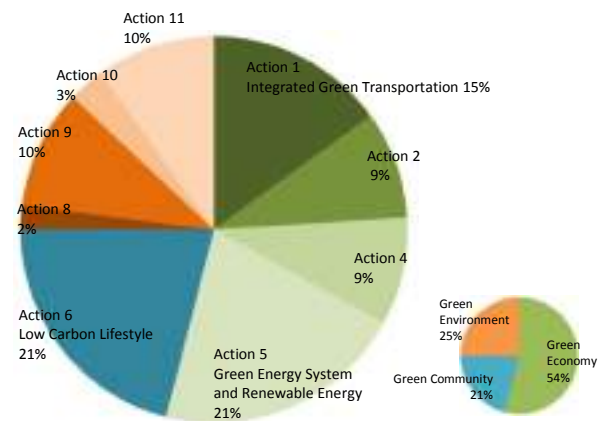


Figure 2: Contribution of Direct Effects to Emission reduction by the three pillars

Table 2: Energy demand, GHG emissions and emission intensity

	Unit	2005	2025 BaU	2025 CM	2025BaU /2005	2025CM /2005	2025CM/ 2025BaU
<b>Final energy demand</b>	Mtoe	2.5	7.6	5.2	3.11	2.14	0.69
<b>GHG emissions</b>	MtCO <sub>2</sub> eq	11.4	31.3	18.9	2.74	1.66	0.60
<b>Per capita CO<sub>2</sub> emissions</b>	tCO <sub>2</sub> eq	8.4	10.4	6.3	1.24	0.75	0.60
<b>GHG intensity</b>	kgCO <sub>2</sub> eq/mill. RM	0.32	0.22	0.13	0.69	0.42	0.60

Table 3: Contribution of 3 main themes and 12 actions

Actions	Contribution* (ktCO <sub>2</sub> eq)	Share
<b>Green Economy</b>	<b>6,937</b>	<b>54%</b>
Action 1 Integrated Green Transportation	1,916	15%
Action 2 Green Industry	1,094	9%
Action 3 Low Carbon Urban Governance**	-	-
Action 4 Green Building and Construction	1,203	9%
Action 5 Green Energy System and Renewable Energy	2,725	21%
<b>Green Community</b>	<b>2,727</b>	<b>21%</b>
Action 6 Low Carbon Lifestyle	2,727	21%
Action 7 Community Engagement and Consensus Building**	-	-
<b>Green Environment</b>	<b>3,094</b>	<b>25%</b>
Action 8 Walkable, Safe and Livable City Design	263	2%
Action 9 Smart Urban Growth	1,214	10%
Action 10 Green and Blue Infrastructure and Rural Resources	392	3%
Action 11 Sustainable Waste Management	1,224	10%
Action 12 Clean Air Environment**	-	-
<b>Total</b>	<b>12,758</b>	<b>100%</b>

\*Contribution to GHG emission reduction from 2025BaU to 2025CM \*\* Action 3, 7 and 12 does not have direct emission reduction, but their effect is included in other Actions. \*\*\* Since contribution of Action 10 includes carbon sink by forest conservation and urban tree planting, the total of contribution of the 12 Actions is greater than difference of the GHG emissions between 2025BaU and 2025CM in Figure 2 and Table2.

# Introduction

This *Summary for Policymakers* (SPM) offers a concise synopsis of the *Low Carbon Society Blueprint for Iskandar Malaysia 2025* (the Blueprint). It is aimed at facilitating quick and convenient reference to the Blueprint’s 12 low carbon society (LCS) actions and the potential carbon emission reductions achievable from the implementation of the actions in Iskandar Malaysia. 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 Iskandar Malaysia, 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 Iskandar Malaysia’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 Iskandar Malaysia.

To provide an effective framework for guiding development in Iskandar Malaysia towards a low carbon society by 2025, the Blueprint adopts the ‘work breakdown structure’ (WBS) approach that collapses each of the 12 LCS actions into sub-actions and, in turn, into measures and detailed programs (Figure 3), which are all explained in detail in the Blueprint. 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 Iskandar Malaysia into a low carbon society, readers should consult the master Blueprint document.

## Low Carbon Society Blueprint for Iskandar Malaysia 2025

The *Low Carbon Society Blueprint for Iskandar Malaysia 2025* is a written document that presents comprehensive climate change mitigation (carbon emission reduction) policies (LCS actions and sub-actions) and detailed strategies (measures and programs) to guide development of Iskandar Malaysia towards achieving its vision of ‘a *strong, sustainable* metropolis of international standing’ by 2025. The integration of two competing goals – *strong* and *sustainable* – in a single development vision poses a great challenge to Iskandar Malaysia’s growth policies and development planning. On one hand, the urban region needs to develop a prosperous, resilient, robust and globally competitive *economy* (the ‘strong’ dimension); on the other (the ‘sustainability’ dimension), it needs 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. This calls for a holistic and integrated approach, involving policies and strategies on *green economy, green community* and *green environment*, to decouple rapid growth and development from carbon emission intensity in Iskandar Malaysia. Meeting this challenge has been the primary goal and underlying philosophy of the Blueprint.

Essentially, the Blueprint comprises two principal components: 1) narratives on policy scenarios, targets, necessary measures and programs; and 2) scenario-based modeling and projection of carbon emission reductions achievable.

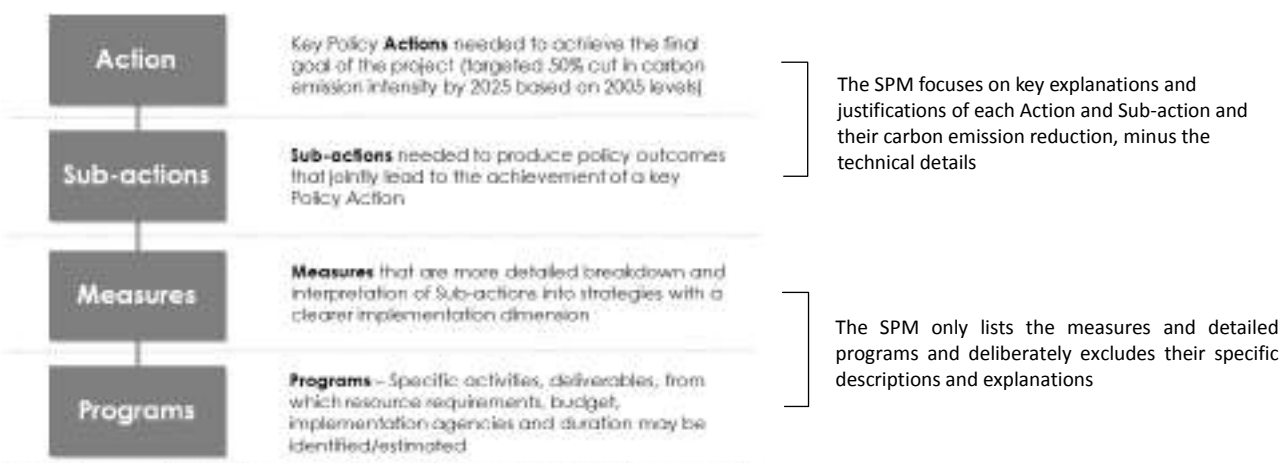


Figure 3: Work Breakdown Structure of Iskandar Malaysia’s 12 LCS Actions

In line with above, the objectives of the *Low Carbon Society Blueprint for Iskandar Malaysia 2025* are to:

- 1) Formulate a low carbon society roadmap for Iskandar Malaysia;
- 2) Apply a scientific approach to the carbon emission baseline and future scenarios study;
- 3) Promote awareness among the State government, regional authority, local authorities, industries, businesses and the community at large of climate change and its mitigation; and
- 4) Lead to the materialisation of a low carbon Iskandar Malaysia by 2025.

### Iskandar Malaysia

Iskandar Malaysia is a visionary economic region in Johor that was established in 2006 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>), it is the largest single development project ever to be undertaken within the Southeast Asia region. Strategically located at the southernmost tip of Mainland Asia to tap on a vast market of about 1 billion people within a 6-hour flight radius, Iskandar Malaysia is set to become an integrated global node that synergises with growth of the global City-state of Singapore and Indonesia (Figure 5). To that end, it has been projected that population in the urban region will more than double from 1.35 million in 2005 to over 3 million by 2025, supported by a stable 7-8% annual GDP growth that is primarily driven by five existing and four new strategic sectors in services and manufacturing (Figure 4). Towards strengthening the existing economic cluster and diversifying growth, five Flagship Zones have been proposed as key focal points for developments in Iskandar Malaysia (Figure 6).

Geographically, Iskandar Malaysia covers the entire Districts of Johor Bahru and Kulaijaya, and several sub-districts of Pontian. In terms of local administration, the urban region covers five local authorities, namely the Johor Bahru City Council (MBJB), Johor Bahru Tengah Municipal Council (MPJBT), Pasir Gudang Municipal Council (MPPG), Kulaijaya Municipal Council (MPKu) and part of the Pontian District Council (MDP).



Figure 4: Iskandar Malaysia’s nine strategic economic sectors (pillars) that build on a strong support system over a good social, physical and institutional foundation  
Source: Adapted from the SJER CDP 2006-2025



Figure 5: Iskandar Malaysia’s strategic location and projected growth indicators  
Source: Adapted from Invest Logistics Iskandar Malaysia Brochure (2011)

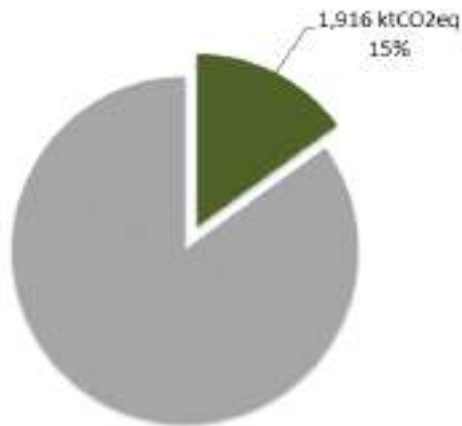


Figure 6: Iskandar Malaysia’s Five Flagship Zones  
Source: Adapted from the SJER CDP 2006-2025



# 01 Integrated Green Transportation

## Greenhouse Gases Reduction



With the targeted strong growth in the economy and population in Iskandar Malaysia, rapid growth in intra- and inter-regional freight and passenger transportation demand is inevitable. If left unchecked, growth in the transportation sector is expected to add to Iskandar Malaysia’s carbon emission by 8,584 ktCO<sub>2</sub> (27% of total BaU emission) by 2025. In order to mitigate the carbon emission level of the projected increased transportation demand, development of an integrated green transportation system in Iskandar Malaysia is highly essential. This calls for a four-prong strategy of: (1) promoting a shift to more energy efficient passenger and freight transportation modes; (2) enhancing Iskandar Malaysia’s intercity connectivity through energy efficient high-speed rail; (3) promoting energy efficiency improvement (EEI) in motorised vehicles; and (4) improving flow and performance conditions in both the passenger and freight transport sectors. Implementation of the relevant sub-actions and measures below is projected to reduce carbon emission in Iskandar Malaysia by 1,916 ktCO<sub>2</sub> equivalent (15% of total emission reduction) in 2025.

Sub-actions		Measures
1	Integrated Public Transportation	Public transport system improvement
		Introduce rail based and water based public transport
		Efficient/ seamless inter-modal transfer (interchange) facilities
2	Improvement of JB - Singapore, JB-KL Connectivity	Intercity High Speed Rail Transit (HSRT)
3	Diffusion of Low Carbon Vehicles	Promote use of low carbon vehicles
4	Enhancing Traffic Flow Conditions and Performance	Transportation Demand Management (TDM)
5	Green Transportation in Rural Areas	Improve public transport services & use in rural areas
6	Green Freight Transportation	Modal shift to greener freight transport modes
		Promote green/ hybrid freight transport

## Integrated Public Transport

The aim of an integrated public transportation system in Iskandar Malaysia is to induce a shift in the passenger transportation mode from the private car and motorcycle to the public bus and proposed light rail transit (LRT) system. The target is to reduce the private modes' share in trip making from 75% (2005) to 35% (2025) while increasing the public modes' share from 15% (2005) to 40% (28% bus, 12% rail, 2025). The remaining trips made by walking and cycling are discussed under *Section 3.8 Walkable and Livable City Design*. In order to achieve the above targets, implementation of the following measures and programs is vital:

Measure 1: Public transport system improvement
Programs: - Route network expansion planning (improve network coverage and connectivity) - Increase bus frequency, improve punctuality and reliability - Real time arrival information - Public transport reimaging - Flat rate tickets and central area free shuttle Services - Web-based journey planner
Measure 2: Introduce rail-based and water-based public transport
Programs: - Route network planning - Connectivity & integration with existing public transport modes
Measure 3: Efficient & seamless inter-modal transfer (interchange) facilities
Programs: - Integrated ticketing system (across all platforms) - Public transport interchanges as destinations & urban activity nodes - 'Park and Ride' facilities in suburban transit nodes

## Improvement of Singapore and JB-KL Connectivity

With the projected increase in passengers (daily commuters, business and frequent travellers) travelling between Kuala Lumpur, Iskandar Malaysia and Singapore, providing an energy efficient high-speed rail transit (HSRT) system linking the three cities is vital. This will help reduce intercity private car trips into Iskandar Malaysia and lend further support to public transport use in the region. To achieve this, the measure and programs below are essential:

Measure 1: Intercity High-speed Rail Transit (HSRT)
Programs: - Integrate Singapore MRT (SMRT) system with Iskandar Malaysia light Rail Transit (IMLRT) & bus systems - JB Sentral as HSRT-SMRT-IMLRT hub

## Diffusion of Low Carbon Vehicles

While it is expected that significant carbon emission reduction would already be attained through inducing modal shifts to public transport, further carbon emission can be reduced through EEI in motorised vehicles, i.e. through promoting low carbon vehicles for necessary private car use and also for the projected increased bus use in Iskandar Malaysia. Aiming for a diffusion rate of 50% private cars and 50% buses being hybrid and/or electric by 2025, the necessary measure and programs are as follows:

Measure 1: Promoting use of low carbon vehicles
Programs: - Government agencies to use hybrid vehicles/ electric vehicles - Tax reduction for hybrid vehicle purchase - Gradual phasing out for diesel engine buses - Subsidy for the purchase of hybrid buses

## Enhancing Traffic Flow Conditions and Performance

Towards improving effective mileage of motorised vehicles in Iskandar Malaysia, thus further reducing carbon emissions due to idle running and frequent braking and acceleration of vehicles in traffic congestion, transport demand management (TDM) measures are vital for improving traffic flow conditions and performance especially of primary arterial routes. The measure and programs below are needed:

Measure 1: Transportation Demand Management (TDM)
Programs: - Intelligent Transportation System (ITS) - Enhancing traffic signal performance - Enhance the use of Variable Message Signs (VMS) - Tidal flow and contra-flow along primary radial routes - Increase parking charges

## Green Transportation in Rural Areas

While absolute trip numbers in rural areas may be less significant compared with urban areas, trip distances are relatively longer and proportion of older, less efficient vehicles used is higher, which translate into higher trip carbon emission. To reduce rural area transportation emission, rural public transport services need to be improved. This also helps to better social and economic connection, which is an essential dimension of a low carbon society. The following measure and programs are essential:

Measure 1: Improve public transport services & use in rural areas
Programs: - Provide hybrid bus services from rural areas to urban areas - Provide school bus services for students in rural areas - Subsidise rural area hybrid bus services

## Green Freight Transportation

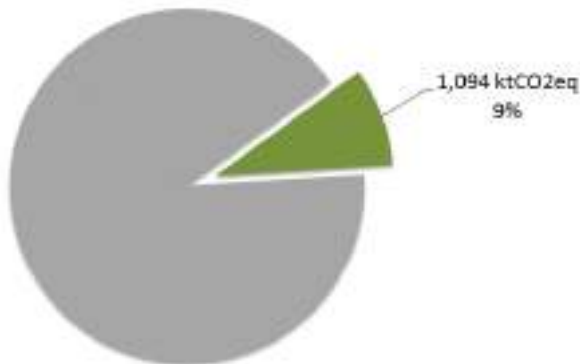
In line with Iskandar Malaysia's emphasis on industrial sector growth, freight transportation demand is projected to increase over 3 times to 26 billion ton-km in 2025, accounting for 5,012 ktCO<sub>2</sub> (17% of BaU) emission. As rail freight is more energy efficient than road freight, the 2005 share of 99:1 between trucks and train will be improved to 95:5 by 2025. Incentives for truck/lorry operators are needed to increase the use of hybrid freight vehicles to 50% by 2025. A reduction of 1,804 ktCO<sub>2</sub> emission is expected from the following measures and programs:

Measure 1: Modal shift to greener freight transport modes
Programs: - Modal shift from road-based to rail-based freight transport - Modal shift to ship-freight transport
Measure 2: Promote green/ hybrid freight transport
Programs: - Tax incentives for freight operators in acquisition of hybrid freight vehicles



# 02 Green Industry

## Greenhouse Gases Reduction



As nations and cities around the world increasingly commit themselves to tackling global climate change, it is expected that there will be a steady surge in demand for green industrial products that are more energy efficient (EE); renewable energy (RE) sources and alternative fuels that are zero-carbon or have low-carbon intensity; and environmental analytical and advisory services that seek to help services continuously monitor, maintain and/or improve their energy and resource efficiency. Such industries' goods or services can reduce GHG emissions of its customers or the society in general, and named "Green Industry" in this blue print. Four main strategies can be introduced for the promotion of green industry: (1) IM as global hub for green industry, (2) decarbonising industries, (3) green employment in existing industries and (4) human capital development in green industry. Implementation of measures and programs under these strategies is projected to reduce carbon emission in Iskandar Malaysia by 1,094 ktCO<sub>2</sub> equivalent (9% of total emission reduction) in 2025.

Sub-actions		Measures
1	IM as Global Hub for Green Industry	Tax incentives & fiscal measures to attract green industries
		Promotion of R&D in strategic sectors
2	Decarbonising Industries	Reducing energy intensity of industrial production process
		Carbon reduction and environmental standards/ rules/ regulation
3	Green Employment in Existing Industries	Promote the ecological & economic benefits of greening existing industries
		Promotion of environmental analytical & advisory services towards improving resource & energy efficiency in existing industries
4	Human Capital Development in Green Industry	Upgrading/ retraining existing pool of professional & semi-professional workers
		Regional education hub for green industry



## Iskandar Malaysia as Global Hub for Green Industry

The needs of low-carbon goods and services will be further increasing in the next decades since global effort of mitigating climate change picks up speed and many countries have declared their own emission reduction targets towards 2020 and beyond. Thus, as a primary economic corridor in Malaysia, accumulating such industries is a reasonable option for Iskandar Malaysia. Example of candidates of green industries in Iskandar Malaysia are as follows.

- Biomass & biofuel;
- Nanotechnology;
- Smart Community (cities/villages); and
- Energy services (e.g. ESCOs).

Measure 1: Tax incentives & fiscal measures to attract green Industries
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Tax exemption for FDI in green industries</li> <li>- Working with banks for soft loan with low interest packages for new green industries</li> <li>- Expedite approval process for green technology-based FDI</li> </ul>
Measure 2: Promotion of R&D in strategic sectors
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Industry-university/research institution research linkages</li> <li>- Attract FDI in production of RE (e.g. BIPV, bio-fuel) and EE (e.g. fuel cell) technologies</li> <li>- Innovation in green vehicles (hybrid, electric)</li> </ul>

## Decarbonising Industries

Energy efficiency improvement (EEI) is one of the quickest ways to conserve energy and reduce carbon emissions, and Low Carbon Society in Iskandar Malaysia. While renewable energy efficiency system requires slight modification of the current energy system, application of energy efficiency appliances and equipment however does not require major modification and therefore, it is the simplest way for energy conservation. The industrial sectors are the main contributors to the total energy consumption in Iskandar Malaysia and shares more than 40% of total final energy demand. In industries, there are many methods for energy conservation. First of all, the most obvious method is to replace and upgrade existing equipment with equipment which has better performance and efficiency. Other options include implementation of an energy management system for peak shedding and through process integration which requires the process of the industry to be modified for better performance and energy conservation. Combining those Measures, around 10% improvement of EE is expected.

Measure 1: Reducing energy intensity of industrial production process
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Purchase of energy efficient equipment</li> <li>- Investment in energy saving managing system</li> <li>- Introduce intelligent logistic system (ILS) &amp; low-energy warehousing</li> <li>- Tax incentives to industry for EEI in production process</li> <li>- Soft loan with low interest rate to promote adoption of green technology in industry</li> <li>- Research and planning for establishment of eco-industrial park</li> </ul>

Measure 2: Carbon reduction and environmental standards/ rules/ regulation

- Programs:
- Establish environmental assessment system including carbon emission for new investment
  - ISO 14000 Series Environmental Management System
  - Establish energy audit system of the industries
  - Monitoring and enforcement of energy saving actions

## Green Employment in Existing Industries

Apart from macro-economic and ecological objectives, one important socioeconomic objective of greening existing industries is that of job and income creation. Towards measures and programs are required to quantify the economic, ecological and socioeconomic benefits of greening existing industries and to provide services support towards improving resource and energy efficiency in all kind of new and existing industries.

Measure 1: Promote the ecological & economic benefits of greening existing industries

- Programs:
- Progressive requirement for cleaner production & eco-efficiency policies in industries that aim at improving their environmental performance
  - Incentives for industries to set up an environmental & energy performance unit that generates green employment

Measure 2: Promotion of environmental analytical & advisory services towards improving resource & energy efficiency in existing industries

- Programs:
- Progressive requirement for Corporate Social Responsibility (CSR) reporting (including energy & environmental performance reporting) by existing industries
  - Create "contact point" personnel in existing industries for environmental analytical & advisory services (e.g. ESCO)

## Human Capital Development in Green Industry

In bringing in green industries to Iskandar Malaysia, a good and reliable supply of competent, "carbon literate" workforce that matches the needs of these industries is fundamental. This will include workers across all levels, including the highest level management group; middle-level managers; engineers; knowledge and creative workers in specialised fields; and skilled production and operational/technical level workers.

Measure 1: Upgrading/ retraining existing pool of professional and semi-professional workers

- Programs:
- Joint government-industry intensive training programs
  - Fiscal incentives for industries that offer continuous professional education for employees

Measure 2: Regional education hub for green industry

- Programs:
- Set up joint-regional faculties to meet future green technology human capital demand



# 03 Low Carbon Urban Governance

The strategic importance of cities and urban and regional planning in tackling global climate change has been well articulated. Being areas of high concentration of physical assets and geographic epicenters of social and economic functions, cities and urban regions are massive consumers of resources and energy, generators of wastes and emitters of CO<sub>2</sub>. However, the same asset concentration and functional intensity also mean that any effective LCS measures would go far in mitigating CO<sub>2</sub> emissions. Key to this is the cities and regions’ overall form and internal structuring. 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 and Rural Resources.

## Development Planning for Low Carbon Iskandar Malaysia

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 plans, all developments in Iskandar Malaysia 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 Iskandar Malaysia’s continuous growth while steadily progressing towards meeting the region’s carbon reduction targets. As such, the current development planning system needs to be transformed, which would encompass two measures, namely ‘Institutionalisation of low carbon vision & carbon reduction targets in all statutory plans’ and ‘designing clear low carbon zoning and urban design codes’ that are geared towards Iskandar Malaysia’s smart growth.

Sub-actions		Measures
1	Development Planning for Low Carbon Iskandar Malaysia	Institutionalisation of low carbon vision & carbon reduction targets in all statutory plans (Johor Bahru District Local Plan and IM Comprehensive Development Plan) Design clear low carbon zoning and urban design codes that are geared towards Iskandar Malaysia’s smart urban growth
2	Planning Control Process, Procedures and Mechanism for Materializing LCS in Iskandar Malaysia	Reform and streamline currently fragmented planning approval processes Enhance Substantive (Content) Aspects of Development Planning Approval
3	Development of Necessary Human Capital for Operationalising and Implementing Iskandar Malaysia’s Low Carbon Society Vision	Progressive retraining of planners, architects, engineer and other built environment professional and semi-professional in state and local planning authorities
4	Iskandar Malaysia LCS Monitoring , Reporting and Publication System	Setting up of a Low Carbon Monitoring Unit in All Local Authorities in Iskandar Malaysia

<p>Measure 1: Institutionalisation of low carbon vision &amp; carbon reduction targets in all statutory plans (Johor Bahru District Local Plan and IM Comprehensive Development Plan)</p>
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Set clear carbon intensity reduction targets for IM 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)</li> <li>- Formulation of achievable &amp; implementable low carbon transition strategies for 2012-2025 and beyond</li> <li>- Provide policies to “reward” land development projects that contribute to IM’s low carbon visions</li> </ul>
<p>Measure 2: Design clear low carbon zoning and urban design codes that are geared towards Iskandar Malaysia’s smart urban growth</p>
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Coordination of LCS guidelines &amp; standards for all local authorities in IM</li> <li>- Revise and update existing use classes order to facilitate mixed use development</li> <li>- Implementation and enforcement of compact &amp; transit supportive development zoning &amp; design codes</li> </ul>

### Planning Control Process, Procedures and Mechanism for Materializing LCS in Iskandar Malaysia

In assessing a development proposal, various departments involved will provide their comments and/or recommendations based on their respective departmental guidelines, policies and standards. As yet, there is no department that looks into carbon reduction as an overarching element for development approval and the overall development approval process is fragmented in terms of absence of “content cross-cutting”, particularly for allowing content cross-cutting across various departments. Hence it is vital to reform and streamline the currently fragmented planning approval process and enhance the substantive aspects of the process, as follows:

<p>Measure 1: Reform and streamline currently fragmented planning approval processes</p>
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Re-rationalization of Planning Permission application, processing &amp; granting procedures</li> <li>- Eliminate duplications in currently overly compartmentalized planning approval processes through enhancing the One-stop</li> <li>- Integrated decision making processes in planning control at State &amp; local levels</li> <li>- Expedite approval process for proposed developments that support achievement of IM’s LCS visions (e.g. developments proposed around planned public transport nodes; developments that retain existing vegetation; green buildings that contribute to energy efficiency)</li> </ul>
<p>Measure 2: Enhance Substantive (Content) Aspects of Development Planning Approval</p>
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Requirement for submission of a “Low Carbon Statement” in all Planning Permission applications (outlining the developer’s commitment and design approach to reducing energy and CO<sub>2</sub> emission intensity and clear reduction projections of the proposed development)</li> <li>- Imposition of planning conditions on granting of planning permissions that support LCS actions (e.g. mandatory provision of walkways in residential neighborhoods)</li> </ul>

### Development of Necessary Human Capital for Operationalising and Implementing Iskandar Malaysia’s Low Carbon Society Vision

Human capital development in State and local government departments that are directly and indirectly related to the shaping and production of the built environment is an important aspect in achieving Low Carbon Iskandar Malaysia. Officers in the Federal and State planning departments are mainly responsible for formulating planning policies and regulations while officers in the local authorities are the implementers of the Federal and State policies and regulations. Hence it is important for officers in the planning departments from the national to the local level to have sufficient knowledge, appreciation and technical knowhow about low carbon society and how urban development should be structured and shaped to materialise such a society. Low carbon society is a relatively new concept and as such, systematic and progressive retraining of existing government officers and professionals in the private sector is vital while university curriculum should be updated to produce new generations of professionals who are “carbon literate”.

<p>Measure 1: Progressive retraining of planners, architects, engineer and other built environment professional and semi-professional in state and local planning authorities</p>
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Develop low carbon urban &amp; regional planning retraining curriculum for in-service municipal officials</li> <li>- Incorporate low carbon society concepts, philosophy, approaches, measures etc. in municipal human capital development programs</li> <li>- Systematically prioritise &amp; organise continuous (re)training of officials</li> </ul>

### Iskandar Malaysia LCS Monitoring, Reporting and Publication System

An effective monitoring, assessment and publication system on the progress and achievement of carbon reduction targets and low carbon society is indispensable. Government buildings in Iskandar Malaysia should lead the way in voluntarily submitting monthly environmental and energy performance data to IRDA, which would then compile an inventory and publish such data for public access. The same exercise should be gradually extended to major commercial buildings and complexes, industrial factories and individual homes in Iskandar Malaysia. The data would also be vital for ongoing monitoring of the progression towards, and achievement of, the set carbon reduction targets and would inform the periodic review of development plans and policies in Iskandar Malaysia.

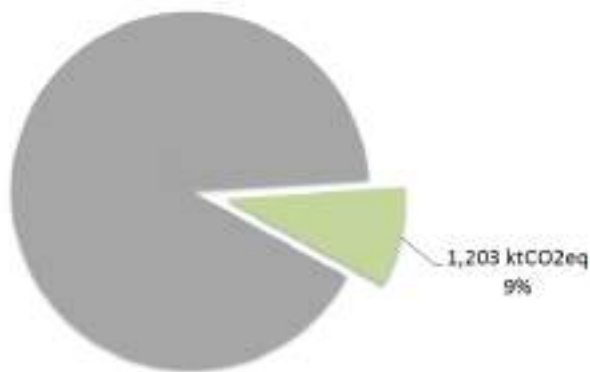
<p>Measure 1: Setting up of a Low Carbon Monitoring Unit in All Local Authorities in Iskandar Malaysia</p>
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Ongoing monitoring of energy and carbon emission performance of development and economic activities in Iskandar Malaysia</li> <li>- Transparent and accountable publishing of energy and carbon emission data in multiple formats that are accessible anytime, anywhere</li> </ul>



# 04

## Green Building and Construction

### Greenhouse Gases Reduction



For IM to materialize its goal of LCS, all the stakeholders in the building industry should work together. Communication amongst the stakeholders, planners, architects, engineers, contractors, developers, manufactures and the local authorities is vital to create common goals. The professional fraternity and the general community must bring about changes in practice and behaviour to lay the foundation and to sustain LCS lifestyle.

Action 4 constitutes designing “Green Building and constructions”. It aims to bring the stakeholders in the building industry towards creating a LCS. The five main measures of Green Building and construction are (1) promoting green buildings in new developments, (2) energy efficiency improvement of existing buildings, (3) green Construction, (4) green building design technology, and (5) rural green buildings. This Action is expected to reduce the CO<sub>2</sub> emission in 2025 by 1,203 ktCO<sub>2</sub>eq.

Sub-actions		Measures
1	Promoting Green Building in New Construction	Expedite approval process for green buildings Showcase/prototype of a green building in IM
2	Energy Efficiency Improvement of Existing Buildings (Retrofitting)	Identify candidate buildings (commercial and offices) for retrofitting demonstration project
3	Green Construction	Developers to promote green design Use of recyclable and low embodied energy building materials
4	Green Building Design and Technology	Introduce Building Energy Management System (BEMS) & Industrialised Building System (IBS) Climatically responsive building design “Built to last” buildings - longer building lifespan
5	Rural Green Buildings	Conservation & promotion of vernacular, climatically adapted architecture in rural areas

The green building programme and implementation will be made successful if the administrative practices are put into place, the incentives are offered and the awareness and education is provided to the professionals, stakeholders and community. The targets are: (i) more than one-third of all new and existing buildings to be green, sustainable & energy efficient buildings and (ii) 50% of the materials & equipment used in the commercial buildings to be energy efficient type.

### Promoting Green Buildings in New Developments

A number of actions can be taken in various fields to materialize green buildings. Different stakeholders have different roles to play. It is essential for IRDA to become a partner in green development and assist in promoting the low carbon initiative in IM. IRDA should show support and commitment towards Green Design, Green Development and green construction. IRDA can take the following initiatives to address green development in Iskandar Malaysia:

Measure 1: Expedite approval process for green buildings
Programs: - To impose building rating system - Plot ratio incentive for platinum rated buildings
Measure 2: Showcase prototype of a green building in IM
Programs: - Pilot/ demonstration & joint venture project for constructing green offices, commercial and residential buildings in IM

The green tool provider, such as GBI and CASBEE can play their part by encouraging, giving assistance and monitoring the pilot project. The tool provider may give incentives by not charging any fee for the pilot projects and view the long-term benefits instead.

### Energy Efficiency Improvement of Existing Buildings (Retrofitting)

Almost all of our existing building stock is not designed according to the 'green standards'. Subsequently, these buildings consume a large amount of electricity and hence are not energy efficient. The Energy Efficiency Index of existing residential, commercial and office buildings, for the purpose of retrofitting, must be given due consideration.

Measure 1: Identify candidate buildings (commercial and offices ) for retrofitting demonstration projects
Programs: - Subsidy and/or tax incentives for building owners - Apply building rating system

### Green Construction

Parallel to the rapid economic growth and urbanization in Malaysia, environmental impacts from the construction industry are increasingly becoming a major issue in the design process, construction management and implementation of 'green design'. Greening building stock carries the highest potential for improved energy efficiency because buildings are responsible for almost 40 percent of all energy

use, greenhouse gases and waste generation. A 'green revolution' is taking place all over the world, and it is about time to transform the marketplace for buildings, homes and communities. It is part of a larger sustainability revolution that will transform just about anything we know, do, and experience over the next few decades.

Measure 1: Developers to promote green design
Programs: - All consultants to adopt green design process
Measure 2: Use of recyclable and low embodied energy building materials
Programs: - Encourage production and cost-effective supply chain of green construction materials by industries

### Green Building Design Technology

Green technology is known as environmentally friendly Technology because it reduces adverse impacts on the environment through technology. It is the application of human knowledge to enhance the current practices and lifestyle to prevent, reduce and mitigate impacts on the environment resulting for development processes and consumption patterns.

Measure 1: Introduce Building Energy Management System (BEMS ) & Industrialised Building System (IBS).
Programs: - Temperature control at 24°C (air conditioning for government offices) - Movement sensors for low occupancy areas - Consultants to adopt IBS in their design process.
Measure 2: Climatically responsive building design
Programs: - Maximise north-south orientation - Optimal building depths (9-13m) for natural lighting - Maximise natural cross ventilation - Integrate green landscaping with building facade - Maximise use of day lighting
Measure 3: "Built to last" buildings – longer building lifespan
Programs: - Enhance building durability - Maximise space adaptability

### Rural Green Buildings

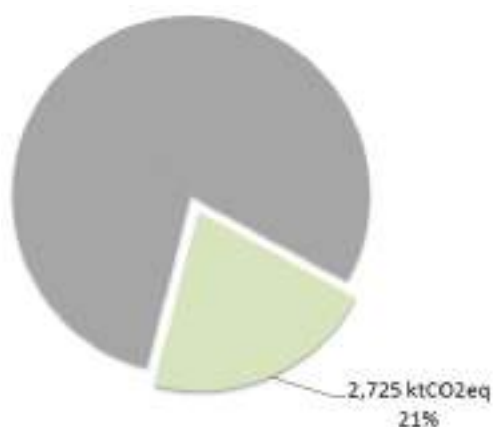
Vernacular architecture is an area of architectural theory that studies the structures made by empirical builders without the intervention of professional architects. Architecture is a major part in creating identity or character of the city and influencing the quality of life of city community. Cultural context implies a sound respect to the traditional knowledge of place, technology and local materials.

Measure 1: Conservation & promotion of vernacular, climatically adapted architecture in rural areas
Programs: - Subsidy for conservation of vernacular structures such as tradition timber houses, mosques, schools, community centres, clinics, shops & holiday cottages - Promote reinterpretation & adaptation of vernacular construction principles & methods in new buildings



# 05 Green Energy System and Renewable Energy

## Greenhouse Gases Reduction



Energy supply is the main driver of development as well as the largest emitter of greenhouse gases (GHG). In Iskandar Malaysia, increasing energy demand and carbon emission over the years is inevitable due to the rapid growth in economic. Hence, low carbonisation of the energy supply is therefore one of the key factors toward the realisation of Low Carbon Society in Iskandar Malaysia. Three strategies are therefore presented: (1) promotion of renewable and alternative energy utilisation such as solar energy, biomass, biogas, waste, hydrogen, etc.; (2) establishment of advance energy system such as smart grid and decentralised electricity generation which incorporate both the supply and demand side for a more sustainable, cleaner, reliable, secure, robust and efficient system; (3) provision of incentives and subsidies and derivation of tariff rate to promote the utilisation renewable and alternative energy. Through this action, it is expected, up to 2,725 ktCO<sub>2</sub>eq of GHG will be reduced by 2025 (21% of the total emission reduction).

Sub-actions		Measures
1	Promotion of Renewable/ Alternative Energy	Harnessing solar energy
		Utilisation of energy from waste
		Hydrogen utilization
2	Establishment of Advanced Energy System	Employing of distributed energy system
		Widespread use of energy storage
		Diffusion of demand response technologies
		Incorporation of power management system (IT Technologies)
3	Provision of Incentives and Subsidies and Derivation of Tariff Rates	Incentives for green energy initiative
		Tariff for future grid

## Promotion of Renewable/ Alternative Energy

The main objective of promoting the utilisation of renewable/alternative energy in Iskandar Malaysia is to reduce heavy reliance of fossil fuels for energy supply especially for power generation and subsequently reduces the GHG emission from fossil fuel use. Based on the available renewable/alternative energy in Iskandar Malaysia, it is targeted that by 2025 a total of 888MW of supply capacity which equivalent to 10% of IM’s power demand will be contributed by biomass and biogas, MSW, solar energy and hydrogen.

The success of achieving the targets is ensured by the following measures and programs:

Measure 1: Harnessing solar energy
Programs: - Encouraging of Solar PV as PV roofing, PV farm and PV on public infrastructure - Promotion of Solar Thermal for Power generation
Measure 2: Waste to energy conversion
Programs: - Applying waste treatment technologies for energy generation from municipal solid waste (MSW), agricultural waste and sewage sludge
Measure 3: Hydrogen utilisation
Programs: - Research and development of hydrogen technologies - Establishing infrastructure for hydrogen supply - Producing and promoting utilisation of hydrogen

## Establishment of Advanced Energy System

The advanced energy system is a vital component to achieve a decarbonised energy supply. In a system where RE and EE are heavily featured, advanced energy system is required to allow the integration of RE into the existing energy system as well as to ensure efficient energy management of the grid. Several major benefits of advanced energy system include reduction of greenhouse gases, ensuring energy sustainability by employing RE based distributed energy generation for power generation, heating and cooling, grid reliability enhancement through energy storage systems, self-healing system, demand responses and efficient utilisation of energy through a dynamic IT-driven grid. Based on the implementation of advanced energy system, it is targeted that up to 10% (450 MW) of power demand can be avoided by 2025.

The measures and programs to ensure the establishment of the smart grid are as follows:

Measure 1: Employing distributed energy system
Programs: - Starting pilot project for installation of distributed energy generation system for power generation, district heating and cooling. - Establishing evaluation methods for selecting candidate place to incorporate distributed energy system

Measure 2: Widespread use of energy storage
Programs: - Evaluating the suitability of energy storage technologies to IM - Establishing evaluation method for appropriate capacity for Energy Storage which will be installed
Measure 3: Diffusion of demand response technologies
Programs: - Evaluating the impacts of Demand Response technologies on curtailment of peak loads in IM - Evaluating the economic impacts of Demand Response technologies on the power supplier and participants in IM
Measure 4: Incorporation of power management system (IT Technologies)
Programs: - Conducting Research and Development of power management system with IT technologies for enabling self-healing system features, ensuring cyber-security and physical security and allowing system transparency within the grid - Promoting the installation of power management system

## Provision of Incentives and Subsidies and Derivation of Tariff Rates

Incentives, subsidies and reasonable tariff rates are the key drivers in acceleration of low carbon energy resources for energy supply system. Liberal energy market also accelerate diffusion of RE and Alternative energy to IM. Incentives and subsidies are important to increase the profitability of RE so that it can compete with the price/cost of fossil fuel on the same ground. Apart from the existing incentives and subsidies established by the Malaysian Government, addition incentive can be made available in Iskandar Malaysia to promote other form of RE and initiatives. As for the tariff rates, reasonable tariff rates should be set up not only to ensure the economical sustainability of the system, and also to shape a new energy consumption profile beneficial to energy supply and utilisation.

The measures and programs are as highlighted:

Measure 1: Incentives for green energy initiatives
Programs: - Evaluating and proposing suitable incentive 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. - Establishing incentives schemes for acceleration of demand response (load management) - Allocating research fund for R&D on green initiatives
Measure 2: Tariff for the future grid
Programs: - Evaluating current tariff scheme to propose new tariff scheme, i.e., on and off-peak tariff scheme for household.



# 06 Low Carbon Lifestyle

## Greenhouse Gases Reduction



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 Iskandar Malaysia, giving a minimum impact to the environment without compromising the quality of life.

The low carbon lifestyle action is the third largest contributor towards the emission reduction in Iskandar Malaysia. It contributes about 2,727 ktCO<sub>2</sub>eq in total emission reduction.

Sub-actions		Measures
1	Awareness through Education	Enhancing general public awareness
		Enhancing school children awareness
2	Smart Working Style	Work from home
		Staggered working hour
3	Promote Energy Efficiency	Promote sales and use of energy efficient appliances
		Promote energy saving practices
		Incentives for green energy initiatives
4	Promote "Smart Travel Choices"	Public information on "Smart Travel Choices"
5	Stock-taking for Low Carbon Lifestyle	Promote self management of lifestyle to monitor CO <sub>2</sub> emission and expenditure in residential and community



## Awareness through Education

Awareness among residents is important to achieve LCS in IM. Green education or environmental education is a learning process that increases people’s knowledge and awareness about the environment and associated challenges; develops the necessary skills and expertise to address the challenges; fosters attitudes, motivations, and commitments to make informed decisions and take responsible actions. By conducting programs in the measures below, at least 30% of the general public and students will *be aware and* continue to live a low carbon lifestyle. Raising awareness through education (public education and formal education at schools) needs the involvement of government agencies, non-governmental organizations (NGOs), schools and local communities.

Measure 1: Enhancing general public awareness
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Freely available green education catalogue in shopping centres</li> <li>- Awareness programs for community</li> </ul>
Measure 2: Enhancing school children awareness
<p>Programs:</p> <ul style="list-style-type: none"> <li>- LCS education across curriculum<sup>1</sup></li> <li>- School clubs for LCS &amp; 3R programs</li> <li>- Children Eco-life challenge<sup>2</sup> project</li> <li>- Interschool 3R project competitions</li> <li>- 3R measures at schools</li> <li>- LCS measures at schools</li> <li>- Collaboration with relevant government agencies &amp; NGOs</li> <li>- Students to collect reusable &amp; recyclable wastes from home &amp; neighbourhood</li> </ul>

## Smart Working Style

Smart working style is about finding good practices on more flexible arrangement and alternative working style. By sharing the knowledge on how can we reduce working hours, it can save our energy and lead a good life. The measures and programs as following:

Measure 1: Work from home
<p>Programs:</p> <ul style="list-style-type: none"> <li>- ‘Work-from-home’ pilot project for government agencies</li> <li>- Promote private SOHO development in IM</li> <li>- Encourage tele-working / telecommuting among private sectors employees</li> </ul>
Measure 2: Staggered working hour
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Promote adoption of flexi working hours in suitable sectors</li> </ul>

<sup>1</sup> LCS education across curriculum means no specific stand-alone subject taught in LCS , but LCS elements are infused in existing syllabus.

<sup>2</sup> Children Eco-life challenge is a project that teaches children about the connection of their daily actions with global warming.

<sup>3</sup> ‘Cool Biz’ is a concept about wearing casual and comfortable clothing (instead of formal, thick clothing) in government and private offices, setting a comfortable room temperature (not too cold), and sharing cool place.

<sup>4</sup> Eco-life check tool is a tool to record current household energy consumption and provide options (methods) for users to reduce energy consumption as well as cost savings.

## Promote Energy Efficiency

This idea of energy efficiency practice is to promote spending less, consuming less and emitting CO<sub>2</sub> less will eventually lead the society towards a low carbon lifestyle. The government should promote energy saving consumption and practice among community. By these efforts are expected will be able to raise awareness and at least 20% of the total of households in Iskandar Malaysia will be committed to sustainable living practices by year 2025. The measures and programs needed to implement are including:

Measure 1: Promote Sales and use of energy efficient appliances
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Set up Eco Point system in local stores</li> </ul>
Measure 2: Promote energy saving practices
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Promote ‘Cool Biz’<sup>3</sup> concept</li> <li>- Promote the engagement of Energy Saving Advisors (Environmental Concierge)</li> <li>- Real time energy monitoring system for low carbon lifestyle</li> </ul>
Measure 3: Incentives for green energy initiatives
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Subsidies for energy efficient appliances in residential</li> </ul>

## Promote “Smart Travel Choices”

In line with the measures and programs in (Action 1) Integrated Green Transportation and (Action 8) Walkable, Safe, Liveable City Design which induce voluntary modal shift in travelling options by the residents, promoting “Smart Travel Choices” focuses on the end user, by providing information about low carbon options and their benefits to individuals. It is about making individuals feel good, smart and socially rewarding travelling on foot, riding bicycle, using public transport, practicing car-pooling as well as eco-driving.

Measure 1: Public information on “Smart Travel Choices”
<p>Programs:</p> <ul style="list-style-type: none"> <li>- “Burn more calories, burn less carbon” campaign</li> <li>- Guideline for eco-driving practices</li> </ul>

## Stock-taking for Low Carbon Lifestyle

Stock-taking for low carbon lifestyle is made available by calculating CO<sub>2</sub> emission from residents and communities. Sharing these information (CO<sub>2</sub> emission) with stakeholders is important. Government agencies should lead and implement the following measures and programs:

Measure 1: Promote self management of lifestyle to monitor CO <sub>2</sub> emission and expenditure in residential and community
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Development of environmental report system at community level</li> <li>- Establish Eco-life check tool<sup>4</sup> for household</li> </ul>



# 07 Community Engagement and Consensus Building

A society is built from various communities. Apart from developing the environment to create direct impact inducing change in lifestyle among people, strong connection among people or communities forms an indirect support for those impact. This is vital in promoting and sustaining all initial efforts in LCS development.

This action engages with the community through consensus building to develop LCS for IM. The process of moving towards LCS involves various stakeholders in Iskandar Malaysia. Strong collaborations 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 Iskandar Malaysia 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 processes and on-going efforts for related parties, supporting low carbon development in IM. This can be achieved through (1) sharing LCS information and gathering opinion through stakeholder engagement, (2) Public information on LCS progress, (3) developing model low carbon communities, and (4) appointing green ambassadors or champions.

Sub-actions		Measures
1	Share LCS Information and Gather Opinion through Stakeholder Engagement	Periodic LCS workshops and focus group discussion (FGD) with stakeholders in IM Ongoing feedback and comments on LCS actions
2	Public Information on LCS Progress	LCS progress through mass media Mobile LCS media center
3	Developing Model Low Carbon Communities	Choose, plan & implement LCS initiatives
4	Green Ambassadors/ Champions	Appoint individuals as neighbourhood, company, organization green ambassadors/ champions Appoint ambassadors/ champions in schools

## Share LCS Information and Gather Opinion through Stakeholder Engagement

Stakeholders are commonly defined as those people who have an interest in a particular decision, either as individuals or representatives of a group. The potential stakeholders include government agencies, non-governmental organizations (NGOs), public (residents, local communities), private sectors (corporates, industries) and researchers (scientists) who play their role individually or collectively in the development of a certain area.

Stakeholders are also empowered to make decisions based on common grounds and to implement them (to move towards LCS). Through workshops and discussions, related stakeholders have an opportunity to build new connections in order to share expertise, pool resources and prevent counterproductive competition. Thus greater effectiveness can be achieved with the collaboration among them.

Measure 1: Periodic LCS workshops and Focus Group Discussion (FGD) with stakeholders in IM
<b>Programs:</b> - Maintain updated list of stakeholders - Invite all key stakeholders to IM CDP & blueprints processes - Brain storming on LCS actions in IM with experts' knowledge & local knowledge - Disclose/ ongoing feedbacks & comments on LCS actions
Measure 2: Ongoing feedback and comments on LCS actions
<b>Programs:</b> - Feedback and comments during LCS workshops and FGDs - Feedback and comments through website

## Public Information on LCS Progress in IM

Public information serves as a medium to introduce LCS to the society. The purpose of public information is to explain the current issues or phenomena that are happening in Iskandar Malaysia. The updates of IM LCS (progress of low carbon actions) need to be disseminated to the public to provide opportunities for them to engage and participate in the building of LCS in their community. These can be done through mass media and mobile media centres. websites, newsletters, banners, media, mobile showrooms and kiosks.

Measure 1: LCS Progress through mass media
<b>Programs:</b> - LCS project updates - LCS events announcements - Web-based newsletters - Distribution of printed newsletter (printed on recycled paper) - Dissemination of progress updates/ events announcement via billboards, banners, newspaper, radio, television, web, live streaming, DVD etc.
Measure 2: Mobile LCS media centre
<b>Programs:</b> - LCS mobile showroom / exhibition (hybrid vehicle) periodic visit to neighbourhood - IM LCS info-kiosks in shopping centers - IM LCS info-kiosks in community centers (multi-purpose halls, places of worship)

## Developing Model Low Carbon Communities

Developing models of low carbon communities is one of the effective strategies to build up practical solutions that could set up communities on a journey to low carbon living. This initiative involves developing a few pioneer low carbon community models of villages and residential neighbourhoods in Iskandar Malaysia. It aims to establish the appropriate methodology for producing roadmap in developing low carbon communities. Low carbon community model incorporates the application of low carbon mitigation measures which include the practice of energy saving, bio-mass of palm oil, 3-Rs (reduce, reuse and recycle), production of green goods and reduce the use of private transportation. The low carbon community is most effective when focused on the formulation of community action plan and community participation to inculcate low carbon behaviours among local communities.

Measure 1: Choose, plan & implement LCS initiatives
<b>Programs:</b> - Build consensus with related authorities - Produce action plans & road maps (through FGDs) - Formation of implementation committee - Continuous community level monitoring of implementation

## Green Ambassadors/ Champions

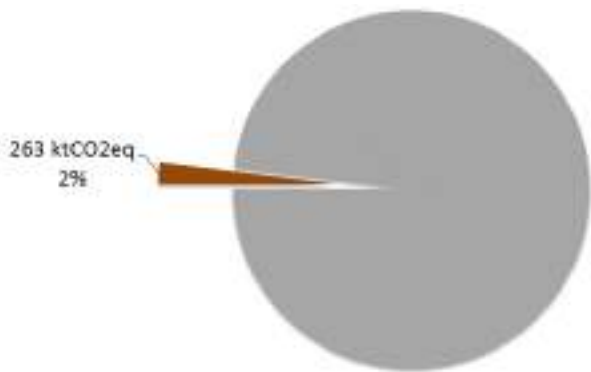
LCS Ambassadors or Champions are individuals in communities and schools who support LCS initiatives and live a low carbon lifestyle. IM can engage with at least 30% of the leaders, public and students through schools, residential committees, village committees, religious organisations, governmental agencies and companies under the following measures. These leaders serve as change agents to influence members of the respective communities to adopt a low carbon lifestyle, supporting Iskandar Malaysia's low carbon development.

Measure 1: Appoint individuals as neighbourhood, community, organisation green ambassadors/ champions
<b>Programs:</b> - On going monitoring of neighbourhood, company, organisation green initiatives - Annual green neighbourhood, company, organisation competitions - Appoint community level leadership - Human resource development for community leaders
Measure 2 : Appoint ambassadors/ champions in schools
<b>Programs:</b> - Green ambassadors in school (students) - Champions in school (school management team)



# 08 Walkable, Safe, Livable City Design

## Greenhouse Gases Reduction



A low carbon city should offer its inhabitants a high quality, healthy and safe living environment while contributing to mitigating CO<sub>2</sub> emission. Designing walkable and livable cities is therefore an important facet of a low carbon society. Its main purpose with respect to Iskandar Malaysia 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. Specifically, the targets are to increase walking from 7% of all trips in 2005 to 20% by 2025 and cycling from 3% of all trips in 2005 to 5% by 2025 in Iskandar Malaysia, yielding a total reduction of 263 ktCO<sub>2</sub> equivalent. While this amounts to just 2% of total CO<sub>2</sub> emission reduction, walkable and livable city design is crucial to ensure that Iskandar Malaysia continues to be the choice location to invest, live and work in. This calls for the following inter-related sub-actions and measures to be implemented.

Sub-actions		Measures
1	Designing Walkable City Centers and Neighborhoods	Providing comfortable walkways
		Interconnected pedestrian network
2	Designing the Cyclist-friendly City	Providing safe, comfortable, cycling network
3	Designing the Safe City (from crime)	Crime prevention through environmental design (CPTED )
		Increase police presence
4	Designing Civilised & Livable Streets through Traffic Calming	Reduce vehicle speed
		Street environmental enhancement
		Reclaiming pedestrian space

## Designing Walkable City Centres and Neighbourhoods

In an unfavourable climatic condition widely thought of as too warm all year, the humid tropics, increasing walking activities is hugely dependent on the provision of comfortable walkways within an interconnected pedestrian network that is permeable and continuous; and which offers route choices. This calls for the implementation of the following measures and programs within urban centres and neighbourhoods in Iskandar Malaysia:

Measure 1: Providing comfortable walkways
Programs: - Street tree planting for shades - Appropriate street furniture - Continuous covered pedestrian walkways - Apply universal and inclusive design concepts
Measure 2: Interconnected pedestrian network
Programs: - Create permeable street layouts (maximum street block dimensions of 70m-90m) - Identify gaps/ disconnections in existing street network - Identify potential new pedestrian connections - Create continuous active street frontages - Provide safe walking routes to schools

## Designing the Cyclist-friendly City

The key measure towards increasing cycling in a traditionally bicycle-unfriendly urban environment due to climate, emphasis on motorised traffic, lack of safety features in terms of both bicycle theft and traffic hazards and priority is the provision of safe and comfortable cycling network. The correspondent programs are as follows:

Measure 1: Providing safe and comfortable cycling network
Programs: - Provide dedicated, shaded cycle tracks along major roads - Priority signals for bicycles at major junctions - Provide sufficient & secure bicycle parking facilities - Provide safe cycling routes to schools - Promote bicycle rental services

## Designing Safe City (from Crime)

The ongoing safe city initiatives have to be reinforced in terms of both crime prevention through environmental design (CPTED) in the long-term and target hardening measures such as increasing police presence in crime prone areas for immediate effects in improvement of safety in Iskandar Malaysia. The measures and programs that are needed are listed below:

Measure 1: Crime prevention through environmental design (CPTED)
Programs: - Installing CCTVs at strategic locations - Increase residents' natural surveillance - Identify & eliminate blind spots & gap spaces - Community patrolling cum recreation - GIS database on crime occurrences

Measure 2: Increase police presence
Programs: - Set up community police beats at strategic locations - Increase police patrolling in neighbourhoods - Community cycling patrol with police

## Designing Civilised and Livable Streets through Traffic Calming

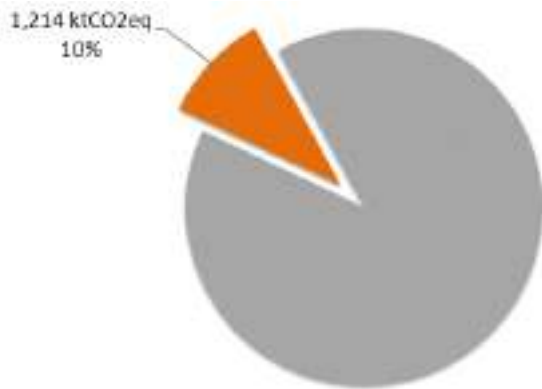
The “livability” of streets decline as the traffic volumes and speeds increased. Streets become more livable when motorists become more “civilised” with lower traffic volumes and speeds. Residents are more likely to walk, bike, and play along such traffic calmed streets. Traffic calming is accomplished through measures that reduce vehicular speeds, enhance neighbourhood street environments and return street spaces to human activities. The correspondent programs are as follows:

Measure 1: Reduce vehicle speed
Programs: - Enforcing 30km/h zones - Installing speed humps - Carriageway deflection (chicanes & chokers) - Reduce junction turning radii
Measure 2: Street environmental enhancement
Programs: - Home zones - Gateway design into traffic calmed areas - Community landscaping program
Measure 3: Reclaiming pedestrian space
Programs: - Carriageway narrowing - Pavement widening - Kerb extension at junctions - Humped pedestrian crossings



# 09 Smart Urban Growth

## Greenhouse Gases Reduction



As the population in Iskandar Malaysia will more than double from to 3 million and GDP almost quadruple to RM141.4 billion in 2025, supporting and managing rapid growth while keeping energy demand and CO2 emissions at bay becomes a critical issue. Key to this is the way in which Iskandar Malaysia’s spatial growth is managed through ‘smart urban growth’ strategies. Smart urban growth aims to reduce average number of trips, trip distance and vehicle mile travel (VMT) and at the same time increase the use of public transport in Iskandar Malaysia by providing a spatial framework for sustainable growth, specifically in: (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’. These are achieved while quality of life and the natural environment in Iskandar Malaysia are preserved and enhanced. Measures and programs related to the above strategies are expected to reduce Iskandar Malaysia’s CO2 emission by 1,214 ktCO2 equivalent (10% of total emission reduction) by 2025.

Sub-actions		Measures
1	Promote Polycentric Growth Pattern in IM	Gradual urban function reconcentration in polycentric nodes connected by public transportation
2	Promote Compact Urban Development	Urban growth boundary (UGB) for Iskandar Malaysia
		Higher density mixed use development
3	Promote Transit Supportive Land Use Planning	Transit Oriented Development (TOD) & Station Area Planning (SAP)
4	Develop the ‘Smart Digital City’	Information and Communication Technology (ICT)

## Promotion of Polycentric Growth Pattern in Iskandar Malaysia

As cities grow into large urban regions, a more complex hierarchy of centres tends to emerge; some of these centres were old villages and towns that have been gradually subsumed into the growing cities while others are new centres and sub-centres within planned new towns. These have been found to reduce average travel distances, reduce peak time congestion on radial routes into the city centre and facilitate the expansion of public transport coverage; offsetting various disadvantages of urban sprawl. It is thus essential that established and thriving centres and sub-centres within Iskandar Malaysia are identified and functionally reinforced, especially those located along existing and planned public transport corridors. To that end, the following measure and programs are necessary:

Measure 1: Gradual urban function reconcentration in polycentric nodes connected by public transport
Programs: - Identify & reinforce functions of existing urban centres as polycentric nodes - Expand public transport service coverage (new development area within UGB) - Coordination of spatial growth strategies across administrative boundaries of local authorities

## Promote Compact Urban Development

Building upon the polycentric spatial framework of Iskandar Malaysia, compact development should be promoted within existing built up areas, especially established centres and public transport nodes. Compact developments integrate 5Ds – diversity (mixed uses), density, design (high quality urban environment), destinations and distance (to transit, local centres) – towards ensuring that most new growths take place within existing urban areas where environmental, economic, accessibility and community needs can be efficiently met. By intensifying developments primarily along high-frequency bus routes within polycentric nodes in Iskandar Malaysia, reliance on private vehicles as a primary mode of transportation could be reduced; encroachment onto greenfield sites could be avoided; primary agriculture lands and forested areas would be preserved; . This would reduce traffic congestion, as well as create other indirect improvements in quality of life for residents, such as lower air pollution and related respiratory health problems and healthier community living. Relevant measures and programs include:

Measure 1: Urban Growth Boundary (UGB) for Iskandar Malaysia
Programs: - Setting spatial growth limit of Iskandar Malaysia and enforcing UGB - Encourage infill development within existing built up areas (on brownfield & greyfield sites) - Preserve urban fringe primary agricultural areas
Measure 2: Higher density mixed use development
Programs: - City centre and inner city area repopulation - Mixed residential development (including affordable homes) - Promote locally self-sufficient land use mix in distinct urban neighbourhoods - Design high quality public realms that encourage higher density urban living

## Promote Transit Supportive Land Use Planning

Transit oriented developments (TODs) should have clear land use structures for these are closely related to energy demand and carbon emission levels of the urban area. Transit stations should be planned to effectively increase quality of place by creating a vibrant mix of activities related to their urban contexts. Through effective station area planning (SAP), successful station areas may be built with a rich mix of land uses which can bring a diversity of people, choices and opportunities which are essential for a vital station area, neighbourhood, and transportation system. This will bring liveliness and vibrancy to the station and its surrounding area, contributing to improving sense of security of the area, making the whole area more inviting and pleasant to get to, and may eventually lead to an increase in public transport ridership in the area. The measures and programs that need to be implemented are :

Measure 1: Transit Oriented Development (TOD) & Station Area Planning (SAP)
Programs: - Identify existing & potential public transport / transit nodes - Integrate pedestrian network with transit nodes - Orientate and provide direct walking routes from homes to transit stops - Permit higher densities & plot ratios within 800m of public transport nodes - Incentives to developers in reduced parking requirement

## Develop the ‘Smart Digital City’

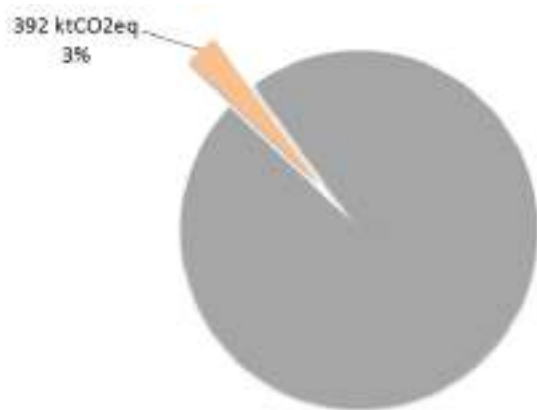
An important facet of smart urban growth is the development of a high-speed digital communication network that is built upon reliable information and communication technology (ICT) infrastructure. ICT infrastructure coupled with extensive electronic applications enable many daily activities to be carried out digitally and efficiently and become the backbone for the operation and functioning of a wide array of urban functions, in the form of a “people’s information system” (PIS). Necessary measures and programs include:

Measure 1: Information and communication technology (ICT) to provide the infrastructure backbone to smart living in Iskandar Malaysia
Programs: - All built up areas in Iskandar Malaysia to be gradually covered as WiFi hotspots - Develop an Iskandar Malaysia “People’s Information System” (PIS) that integrates various electronic applications towards smart living, smart working, smart learning, smart travelling etc.



# 10 Green and Blue Infrastructure and Rural Resources

## Greenhouse Gases Reduction



Green and blue infrastructure includes the natural environmental components and green and blue spaces that lie within and between our cities and towns. Among the services provided by them include sequestering and storing excessive CO<sub>2</sub> from the atmosphere (acting as a regional carbon sink), moderation high temperature in the cities (large trees, lakes and water courses) and reducing GHG emissions by conserving energy used for space cooling. Existing green infrastructure should be better managed for the range of services it provides. Green infrastructure actions, which include safeguarding, creating, enhancing, maintaining and promoting, are an attractive approach to combating climate change. This Action reduces IM’s GHG emissions by 392 ktCO<sub>2</sub>eq or 3% of total GHG emission reductions.

Sub-Actions		Measures
1	Regional Green Corridor Network	Acquisition of land for forest connections Protect existing forests
2	Conservation of Mangrove Forests	Reinforce protection of existing mangrove areas Mangrove area regeneration
3	Promote Urban Forests (urban recreation and green lungs)	Reintroduce endemic forest species into existing urban parks Create new urban parks Increasing green cover Reforestation Ongoing urban tree planting campaign
4	New Development to Retain Existing Vegetation	Enforcement of ACT 172 (Part VA: Trees Preservation Order)
5	Low Carbon Farming in Rural Areas	Promotion of low carbon farming in rural areas
6	Ecotourism and Rural-cultural Tourism	Promotion of natural resource-based and rural cultural tourism



## Regional Green Corridor Network

The first measure to do in this Action is to protect existing forest in IM area. Existing forested area in IM is capable of assimilating about 580 ktCO<sub>2</sub>eq which is approximately 4% of the national level CO<sub>2</sub> uptake by forests. Primary and secondary forests will be identified and subsequently these forests will be gazetted as protected forests. This can ensure the forests are not cleared for other purposes. Further efforts should be undertaken to identify potential land areas that can be converted to forested areas. Large areas of presently non-forested lands can be used for reforestation, planting trees and agro forestry.

Measure 1: Acquisition of land for forest connections
Programs: - Identify potential linking corridors between existing forested areas for future land acquisition
Measure 2: Protect existing forests
Programs: - Gradually gazette presently ungazetted primary & secondary forests as protected forests

## Conservation of Mangrove Forests

Mangrove forest is an important habitat for aquatic and terrestrial fauna. It is also a natural defence against strong wind, waves and tsunamis, protector of soil erosion, play a role in flood mitigation and sequestration of CO<sub>2</sub>. Existing mangrove areas/trees in the IM should be protected under Act 172 (part VA- Trees preservation order). Under this Act, all existing mangroves in Johor (23,676 hectare) must be gazetted as protected forests.

Measure 1: Reinforce protection of existing mangrove areas
Programs: - Gazette all mangrove areas as protected forests - Strict enforcement against illegal mangrove clearing - Ongoing mangrove species audit
Measure 2: Mangrove area regeneration
Programs: - Corporate sectors adoption of mangrove regeneration projects - Involving students and schools in mangrove trees planting

## Promote Urban Forests (urban recreation and green lungs)

Planting trees (any kind of woody plant vegetation) within the city is known as urban forest. Like any other forests, urban forests also play a pivotal role in (i) reducing the amount of CO<sub>2</sub> in the atmosphere (ii) managing temperatures by providing evaporative cooling, shading, and allowing air to flow into urban areas. Collectively, a total of 5 million trees are planned to be planted in IM by 2025.

Measure 1: Reintroduce endemic forest species into existing urban parks
Programs: - Identify the species and location of trees to be planted. - Involving students and schools in forest tree planting
Measure 2: Create new urban parks

Programs: - Identify potential plots for urban parks (unused government land) - Introduce endemic forest species in new urban parks - Create linear urban parks along river & waterway reserves
Measure 3: Increasing green cover
Programs: - Strengthening existing planning policy to increase green areas
Measure 4: Reforestation
Programs: - Immediate replanting for cut down areas - Public awareness for importance of reforestation
Measure 5: Ongoing urban tree planting campaign
Programs: - One resident one tree program - Tree planting at government/ corporate events - Government subsidy for tree saplings

## New Development to Retain Existing Vegetation

Act 172 needs to be enforced to encourage reporting of illegal tree logging. But, before that, each Municipality in IM need to undertake surveys that are aimed at developing a database that contains information on green areas in their districts and to continue monitoring on a regular basis.

Measure 1: Enforcement of ACT 172 (Part VA: Trees Preservation Order)
Programs: - Encourage reporting of illegal tree felling - Carry out municipal tree surveys for existing green areas in IM

## Low Carbon Farming in Rural Areas

Low carbon farming practices in rural areas aim to help in reducing greenhouse gases emissions and energy use on farm as well as to improve energy efficiency. Main measure of low carbon farming is through the government promotion programmes.

Measure 1: Promotion of low carbon farming in rural areas
Programs: - To reduce agricultural CH <sub>4</sub> and N <sub>2</sub> O emissions - Plant high quality and fast growing crops and supply to urban area (plant and eat locally to reduce % import food) - Ongoing technical support & training from government

## Ecotourism and Rural-cultural Tourism

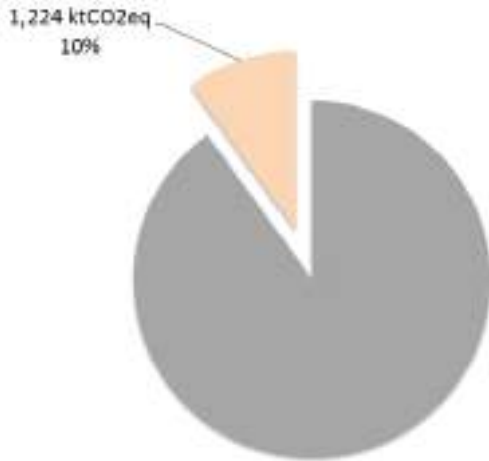
Rural areas in Iskandar Malaysia have natural and cultural richness and uniqueness that are frequently depicted in various tourism product offerings, marketing publications and media. These include natural mangrove areas, rivers, and variety of rural settlements.

Measure 1: Promotion of natural resource-based and rural cultural tourism
Programs: - Introduce low carbon rural tourism packages - Promote rural low carbon lifestyle as a tourism product - Conserve, enhance & link key rural natural resources in IM



# 11 Sustainable Waste Management

## Greenhouse Gases Reduction



The main objective of Sustainable Waste Management is to figure out the best strategies for implementing effective solid waste management (SWM) system in Iskandar Malaysia. The system can reduce waste generation and enhance material and energy recovery of solid waste in order to fulfill the challenge of building both low-carbon and material recycling society. Five sub-actions were considered in the model system of Sustainable Waste Management to achieve the target of 50% reduction of final waste disposal to landfill sites and 50% GHG emission reduction as compare to the business as usual (BaU) scenario. The five sub-actions 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 waste management. Implementation of measures and programs under these sub-actions was projected to reduce carbon emission in Iskandar Malaysia by 1,224 ktCO<sub>2</sub>eq (10% of total emission reduction) in 2025. Total reduction of final waste to landfill is 3,480 kton by year 2025 for CM scenario.

Sub-actions		Measures
1	Sustainable Municipal Solid Waste Management	Reduction at source Recycling of municipal solid waste Extended final disposal Effective waste transportation
2	Sustainable Agricultural Waste Management	Biomass to wealth
3	Sustainable Industrial Waste Management	Scheduled waste reduction and treatment Non-scheduled waste reduction, reuse and treatment
4	Sustainable Sewage Sludge Management	Improved sewage treatment and sludge recycling
5	Sustainable Construction and Demolition Waste Management	Reuse and recycling of construction waste

### Sustainable Municipal Waste Management

In general, the waste composition in the developing countries consist mainly of organic waste and in Iskandar Malaysia. About 40% of the municipal solid waste (MSW) in Malaysia is organic waste. Implementation of household composting and decentralised composting for business sector are highly recommended for this type of waste. Anyhow, the most effective alternative waste treatment towards waste reduction at landfill and GHG emission is incineration, at a price of high initial investment cost compared to other alternatives.

<p><b>Measure 1: Reduction at source</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Smart consumption (buy in bulk, refill &amp; concentrate local product)</li> <li>- Choose durable and reusable item</li> <li>- Restrict of using non-recyclable packaging</li> <li>- Encourage culture of sharing, borrowing or renting instead of buying</li> <li>- Choose online digital services, paperless services</li> <li>- Buy product from recyclable material</li> <li>- "Pay-as-you-throw" system by 2015</li> <li>- Scheduled waste collection for bulky waste</li> </ul>
<p><b>Measure 2: Recycling of municipal solid waste</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Composting at home</li> <li>- Decentralized composting plant</li> <li>- Establishment of material recycling facilities (MRF)</li> <li>- Waste Incineration<sup>1</sup></li> <li>- Recycling of E-waste</li> </ul>
<p><b>Measure 3: Extended final disposal</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Sanitary landfill with methane gas capture<sup>1</sup></li> </ul>
<p><b>Measure 4: Effective waste transportation</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Separate waste collection at source</li> <li>- Effective use of transfer station</li> <li>- Optimization of waste collection routes</li> <li>- Selection of appropriate size of collection vehicle</li> <li>- Use of collection vehicle driven by biodiesel fuel (BDF) or Natural Gas Vehicle (NGV)</li> </ul>

### Sustainable Agricultural Waste Management

Agricultural waste includes all major crops residue and public green waste. The agricultural waste from palm oil plantation covers more than 90% of the total agriculture waste generated and it is 8 times of municipal solid waste. Thus, programs recommended for treating the palm wastes including palm oil mill effluent (POME), empty fruit bunch, and palm kernel shell are the focus of this sub-action. Most programs are also considered as Clean Development Mechanism (CDM) in the crude palm oil and palm oil refinery plants.

<p><b>Measure 1: Biomass to wealth</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- POME to biogas (Anaerobic digestion)<sup>1</sup></li> <li>- Onsite co-composting</li> <li>- Onsite combustion<sup>1</sup></li> <li>- Formulation of biomass into animal feed</li> </ul>
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### Sustainable Industrial Waste Management

In Malaysia, another major challenge for solid waste management is due to the centralization of scheduled industrial waste in one treatment plant for Peninsular Malaysia. In addition, the burden is aggravated by the massive amount of industrial waste generated. With two flagships of IM focusing on industrial development, improved management of industrial waste treatment is crucial. Apart of improvement in the production process through cleaner production, adoption of reusable waste cycle through industrial symbiosis within the industrial area of IM is also an option.

<p><b>Measure 1: Scheduled waste reduction and recovery</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Encourage cleaner production initiative</li> <li>- Select treatment methods with less energy and material</li> <li>- Decentralized scheduled waste treatment plant</li> <li>- Smelting of inorganic wastes</li> </ul>
<p><b>Measure 2: Non-scheduled waste reduction, reuse and recovery</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Encourage cleaner production initiative</li> <li>- Introduce industrial symbiosis for waste reuse system</li> <li>- Waste to fuel and production of biodiesel fuel (BDF)</li> <li>- Non-Scheduled waste incineration<sup>1</sup></li> </ul>

### Sustainable Sewage Sludge Management

The massive generation of sewage sludge is inevitable due to rapid population growth in IM. Improved management of sewage sludge based on anaerobic digestion to capture methane gas for fuel generation is significant for reducing GHG emission. The remaining sewage sludge can be recycled and recovered through composting, recycled into construction material as well as combustion through incineration.

<p><b>Measure 1: Improved sewage treatment and sludge recycling</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Improved wastewater treatment by anaerobic digestion<sup>1</sup></li> <li>- Sewage sludge recycling as construction material</li> <li>- Sewage sludge recycling through composting</li> <li>- Sewage sludge energy recovery through incineration<sup>1</sup></li> </ul>
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### Sustainable Construction and Demolition Waste Management

Due to rapid development in IM, construction and demolition wastes are expected to increase massively. It is proposed that 30% of such wastes can be reused and recycled within 2005 to 2015 and the reduction can increase to 50% within 2015 to 2025. Industrialised Building System (IBS) will be implemented for up to 75% on the new building (from 35% in year 2005). Charging scheme on such wastes is recommended from 2015 as enforced in Hong Kong.

<p><b>Measure 1: Reuse and recycling of construction and demolition waste</b></p> <p>Programs:</p> <ul style="list-style-type: none"> <li>- Reuse and Recycling of construction and demolition waste</li> </ul>
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<sup>1</sup> The program only covers the reduction of solid waste. For Energy recovery system, it will be explained further in Action 5 (refer to page 13 - 14).



# 12 Clean Air Environment

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

A more detailed list of sub-actions and measures which can be implemented in the Iskandar Malaysia Region is as seen in Table below.

## Clean Air Quality

It was reported that the stationary air pollution sources in recent years in the State of Johor accounted approximately for 35% of the total air pollution sources in Malaysia. Therefore, the sustainable development of IM in a local context requires continuous efforts to clean the environment to minimize adverse human health impacts in line with the climate change management issues at the global scale.

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 neces-

sary 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.

Many effective technologies are available for the reduction of GHG and Air Pollutants (AP) in the industrial sector. It is necessary to formulate guidelines to evaluate individual technologies in the context of LCS Policy and air pollution abatement. In addition, the good design of tax incentives and subsidies for new technologies is necessary for further investment to low-carbon industry and low-carbon product.

In addition, the monitoring network is very important. Current air quality monitoring network is not adequate to capture the actual condition of local air quality in wide area of Iskandar Malaysia. Implementation of additional monitoring station is necessary in combination with modelling system.

Sub-actions		Measures
1	Clean Air Quality	Implementation of co-benefit s of approach in policymaking process
		Promote win-win actions in Industry
		Promote low-emission vehicle and public transportation
		Compensate the negative impact of LCS CM on local air quality
2	Improve Regional Air Quality	Continuous monitoring & real-time publishing of Air Pollution Index (API) information
		Strengthen cross-border cooperation towards reducing perennial haze occurrences

In order to control the increasing emission of GHG and air pollutants from private vehicles, it is also important to introduce a low emission vehicle such as Hybrid car, Electric Vehicle and Fuel cell vehicle. To encourage the purchase of low-emission vehicles, tax incentives or subsidies for both automobiles and their fuel must be implemented. Since the emission of PM and NOx from the conventional type busses is very large, per-capita emission of air pollutant can be reduced by the shift of transport demand to a green public transportation such as LRT, BRT and Green Bus. The long-distance trips of private vehicle on the interstate high-way and causeway to Singapore largely contribute the regional anthropogenic emission of pollutant. High-speed trains link to KL and Singapore can reduce both GHG emission and air pollutants.

Actions to decrease the traffic demand is also very important to reduce the emission from transportation. LCS CMs, such as (1) Compact city and (2) Walkable city can decrease the traffic demand. Modal shift of freight transportation from truck to ship contribute largely the reduction of both GHG and air pollutant. In addition, adequate logistic management can reduce the total mileage and emission from freight transportation. Some of LCS CMs have an adverse impact to regional air quality. In this case, adequate compensation measures are necessary to consider. Biomass and biofuel are good alternative to fossil fuel from the viewpoint of low carbon society. However, inadequate combustion of biomass produces a large amount of atmospheric pollutants, such as PM, NOx, VOC and CO. Therefore, it is necessary to install the appropriate removal device when using biomass as fuel. In addition, quality of biofuel, such as biodiesel and bioethanol, should be regulated by the quality standard.

Measure 1: Implementation of co-benefit approach in policymaking process
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Quantitatively evaluate the reduction of pollutant emission for each LCS CM.</li> <li>- Evaluate /predict the improvement of local air quality by model simulation.</li> </ul>
Measure 2: Promote win-win actions in industries
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Visualisation of co-benefit of LCS CM in the industrial sector.</li> <li>- Formulation of guidelines on good technology in the industrial sector.</li> <li>- Implement a tax incentives to new technologies for improving air quality.</li> <li>- Improve air quality monitoring network.</li> </ul>
Measure 3: Promote low-emission vehicle and public transportation
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Encourage consumers to purchase low-emission vehicles</li> <li>- Implement tax incentives on purchase of low-emission vehicles</li> <li>- Increase investments in public transportation</li> <li>- Improve roadside air quality monitoring</li> </ul>
Measure 4: Compensate the negative impact of LCS CM on local air quality
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Establish a mechanism to authenticate the quality of biofuels</li> <li>- Install the appropriate removal device when using biomass as fuel</li> </ul>

## Improve Regional Air Quality

One of targets for achieving the objective of good air quality for IM through pollution reduction is maintaining air quality in IM at the Moderate level (API less than 100) at least 20% of the time, and Good level (API less than 50) at least 80%. This contrasts to the air quality status of Pasir Gudang, reported in 2009, where it was at the moderate level for 74.2%, good level for 24.5% and unhealthy for 1.3 % (Environmental Planning Blueprint for Iskandar Malaysia). In order to achieve this target, continuous monitoring and realtime publishing of Air Pollution Index (API) information is important. Air quality monitoring stations are necessary for regional and urban 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.

Air Pollution Index (API) extracted from continuous monitoring of PM<sub>10</sub>, CO, SO<sub>2</sub>, NO<sub>2</sub> and O<sub>3</sub> is important indicator for residents. It should be published on such as newspaper and website.

In addition to this, one major atmospheric issue is "Haze" caused by the biomass burning in neighbouring nations. Therefore, it is necessary to strengthen crossborder cooperation towards reducing perennial haze occurrences. This haze is mainly caused by land-clearing through open burning in the Borneo and Sumatra Island, Indonesia and Peninsular Malaysia and Indochina peninsula. In 2002, ASEAN Agreement on Trans-boundary Haze Pollution was signed. The best strategy to this problem is strengthening the monitoring network of haze on the ground and from satellite, and establishing the system to perform quick actions based on the agreement with neighbouring nations.

To avoid the slash & burn and open burning in the region, it is necessary to launch joint R&D towards identifying alternative approaches to slash & burn and open burning approaches in the agriculture, plantation, forestry and related industries.

Measure 1: Continuous monitoring & real-time publishing of Air Pollution Index (API) information
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Increase number of API reading stations across the Iskandar Region</li> <li>- Conduct continuous regional API monitoring &amp; publishing of real-time API readings</li> </ul>
Measure 2: Strengthen cross-border cooperation towards reducing perennial haze occurrences
<p>Programs:</p> <ul style="list-style-type: none"> <li>- Malaysia-Singapore-Indonesia joint surveillance of regional open burning hotspots particularly during the Southwest monsoon season</li> <li>- Lobby for ministerial level imposition of tougher penalties on slash &amp; burn activities in the region</li> <li>- Joint R&amp;D towards identifying alternative approaches to slash &amp; burn and open burning approaches in the region</li> </ul>

# Policy Context of the Low Carbon Society Blueprint

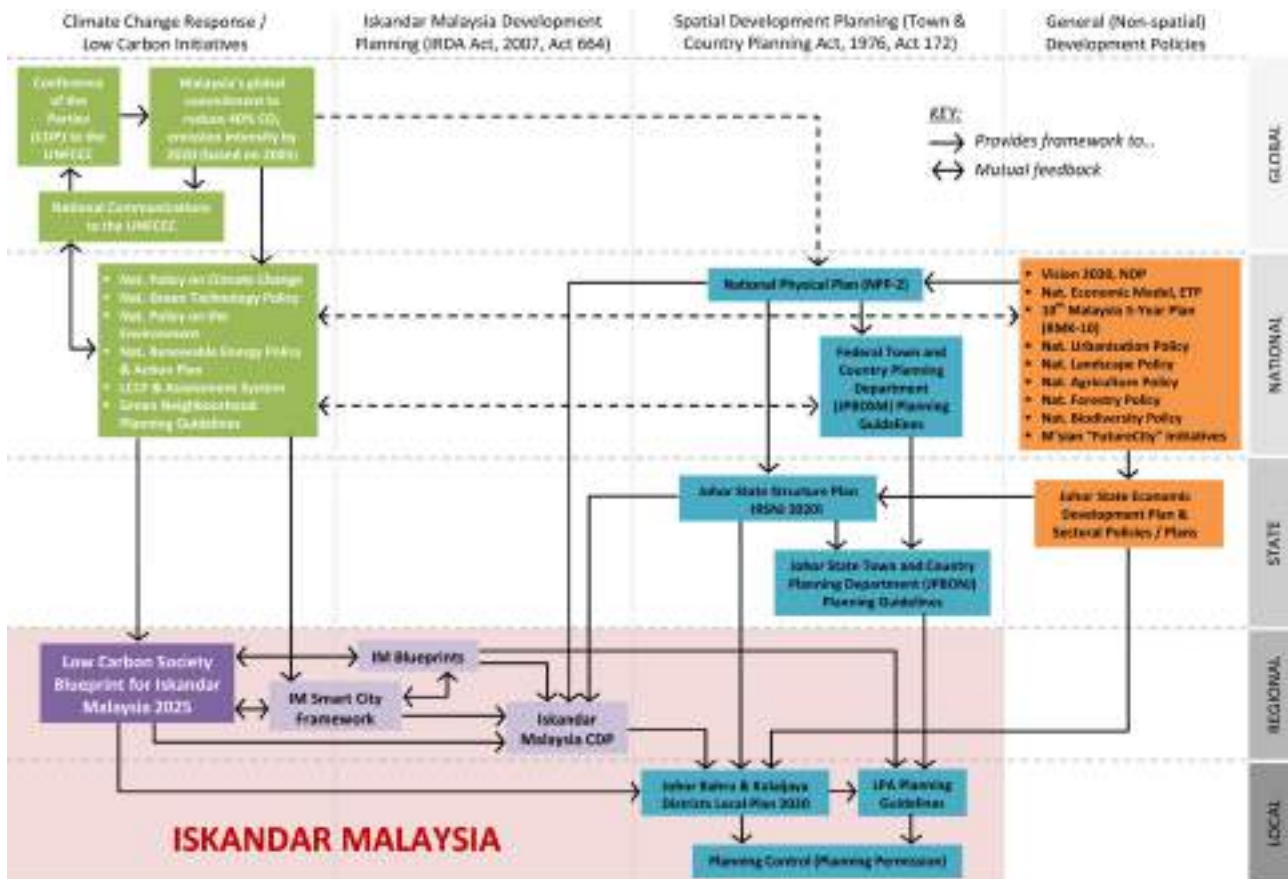


Figure 7: Positioning the *Low Carbon Society Blueprint for Iskandar Malaysia 2025* within the context of existing national, state and local development policies and plans

Since its inception in 2006, development in Iskandar Malaysia has been governed by various policies, plans and guidelines at the national, state and local levels. Specifically, Iskandar Malaysia has a statutory *Comprehensive Development Plan* (CDP) as provided for under the Iskandar Regional Development Authority Act, 2007 (Act 664) and a series of blueprints covering various development aspects of the urban region; the blueprints gain statutory status by means of adoption by the Johor State Planning Committee (SPC). The main function of the CDP and blueprints is to provide a development coordination framework by which all government entities within Iskandar Malaysia are to legally abide. Since the honourable Prime Minister of Malaysia made the pledge of voluntary reduction of the country's carbon emission intensity at COP 15 in 2009, a series of national-level climate change responses and low carbon initiatives have emerged in the forms of policies, framework and guidelines. However, these policies and guidelines have yet to find their way into the lower-level development policies, plans and guidelines that are more effective and detailed in guiding and regulating physical-spatial development.

Being a premier growth corridor in the country, it is only appropriate that Iskandar Malaysia lead the way in contributing to honouring Malaysia's pledge to reduce its carbon emission intensity by 40% (based on 2005 emission levels) by 2020. It is in this light that the *Low Carbon Society Blueprint for Iskandar Malaysia 2025* is formulated to provide the *crucial policy link* between the country's global and national climate change responses and Iskandar Malaysia's regional- and local-level development plans and policies. The Blueprint also takes special cognisance of the recently launched *Iskandar Malaysia Smart City Framework* that sets out the general characteristics of Iskandar Malaysia as a smart city, which include elements of reducing carbon emission and emphasis on development of ICT infrastructure. Once adopted by the SPC, the Blueprint shall provide a statutory policy framework for the CDP, which is currently under review, and serve as the "umbrella blueprint" for the existing blueprints which need to be progressively revised to incorporate relevant LCS policies. These would then trickle down to the Local Plan and LPA Planning Guidelines, and take effect through the granting of Planning Permissions.

# 10 Implementation Plans for a Low Carbon Future

Low Carbon Society Blueprint Iskandar Malaysia 2025 (LCSBPIM 2025) is the first cut look at how Iskandar Malaysia can grow into a low carbon emission region and shifting to a better quality of life. The programmes that have been listed to be implemented form the main bulk of the work in Iskandar Malaysia. This book entitled “Iskandar Malaysia's Actions for a Low Carbon Future” is the first of a series that details out 10 out of the 281 programmes of the LCSBPIM and shows how actions supported by science can be used to ensure reduction in carbon emission. In fact, before the adoption of the LCSBPIM, IRDA has already been implementing many projects and programmes recommended by its 24 adopted Blueprints. The inter-connection of the LCSBPIM and the IRDA's Blueprint, lies in the fact that the LCSBPIM further strengthens the existing blueprints through allowing for a scientific approach to measure the programmes implemented. Such implementations are envisioned to attain a low carbon green growth region, and thus achieve the Iskandar Malaysia vision of a “Strong and Sustainable Metropolis of International Standing” by 2025.

The book “Actions for a Low Carbon Future” describes the 9 programmes being implemented with a special feature on Pasir Gudang, a heavy industry area in the south-eastern region of Iskandar Malaysia. Each chapter will explain what the programme is all about, its relation to the LCS, what the intended outcomes are, and the stakeholders that are involved. Among others, it is expected that the book can reach out to a wider audience on what IRDA is working towards, in collaboration with other agencies.

The programmes are as follows:

1. Integrated Green Transportation – Mobility Management System
  2. Green Economy Guidelines
  3. Eco-life Challenge Schools Project
  4. Portal on Green Technology
  5. Trees for Urban Parks
  6. Responsible Tourism and Biodiversity Conservation
  7. Bukit Batu Eco-Community
  8. GAIA (Green Accord Initiative Award)
  9. Low Carbon Eco Village FELDA Taib Andak
- Special Feature: Smart City-Nafas Baru Pasir Gudang- Green and Healthy City



The cover for Actions for a Low Carbon Future



Yang Amat Berhormat Dato' Seri Mohd Najib bin Tun Abdul Razak, Prime Minister of Malaysia launched Actions for a Low Carbon Future during Memorandum of Agreement (MoA) on 6<sup>th</sup> November



Launching of the LCSBPIM Roadmap and LCS Booklet “Actions for a Low Carbon Future” - COP19 Warsaw, 2013



# ONE Integrated Green Transportation: Mobility Management System



## What is Mobility Management System?

The Iskandar Malaysia Mobility Management System (IMMMS) promotes sustainable transport and manages the demand for car use by changing travelers' attitudes and behaviour. MMS coordinates information, services and activities to optimise the effectiveness of urban transportation. It is an innovative approach in managing and delivering coordinated transportation services to customers, including the elderly, people with different abilities and low income population. It is an online platform accessible through computers and smartphones connecting citizens to the various modes of travelling within Iskandar Malaysia.

## What are the Features of MMS?

- I. Trip / Journey Planner
- II. Ride Sharing
- III. Para-transit
- III. School Bus
- IV. Lifestyle
- V. Social media integration
- VI. Event Transit Planner
- VII. Green Lifestyle Reward Points

## What do We Hope to Achieve?

The MMS aspires to shape the way in which people travel by focusing on trip optimisation, thus leading to carbon reductions. It will increase public awareness on climate change and global warming, measures to reduce their carbon footprints and in turn promotes a healthier planet. The MMS will enhance public understanding on the roles they must play in order for Iskandar Malaysia to achieve a Low Carbon Society by 2025. The MMS is seen as an integrator and coordinator of various transportation modes and travel activities and a core component in the list of counter-measures identified under Action 1: Integrated Green Transportation.

The MMS is being developed and implemented within Iskandar Malaysia to enhance the efficiency and effectiveness of other counter measures including: I.) Bus Rapid Transit System along with supporting initiatives such as route expansion and rationalization, service level and infrastructure improvement, park n ride and transfer facilities; II.) Use of low carbon vehicles such as hybrid and electric cars; III.) Transport Demand Management focusing on Traffic Zoning, Intelligent Parking System, Intelligent Transport System and more.





# TWO

## Green Economy Guidelines



### What is Green Economy Guidelines?

Green Economy is defined as “fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies” (OECD, 2011) and “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP 2011). Both definitions are in line with what IRDA belief which is that sustainable development is an ultimate objective and green growth or a green economy is seen as a means to reinforce its economic and environmental pillars without ignoring social aspects. In the short run, green growth policies are most likely to produce local benefits in improved environmental management through sustainable waste treatment,

better access to water and energy, and more desirable health outcomes from controlled pollution. Environmental protection can contribute directly to the economic growth because the environment, which can be considered as a natural capital, is an input to the production function and environmental conservation can increase the natural capital eventually leading to a boost in income.

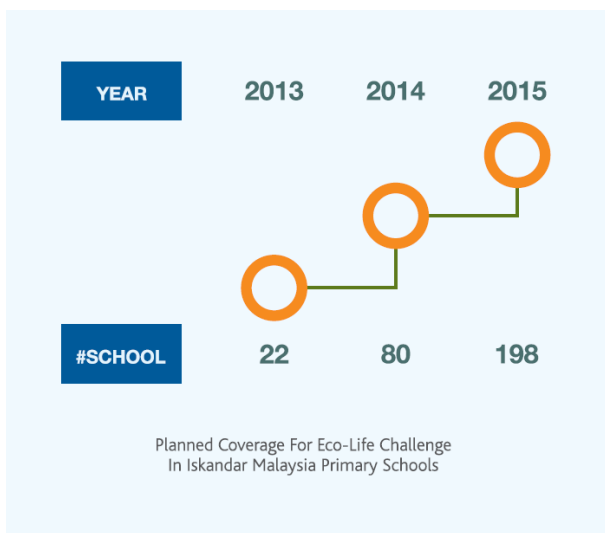
### What do We Hope to Achieve?

The Green Economy Guidelines will look into areas of procurement, operations, supply chain management for businesses in order to minimise its impact on the environment. The government will have to look into the prospect of developing, adapting or revising current policies to support green growth through tax breaks, reducing perverse incentives, and promoting and rewarding of good practices for going green. Within communities, a low carbon lifestyle will be promoted through clear actions on reducing, reusing and recycling in tandem with the Local Agenda 21 programme.

This will greatly support the act of managing sustainable waste system and ensuring cleaner air in the environment as well as promoting conservation of forest areas or green lungs within Iskandar Malaysia. This will lead to sustainable urban growth with higher quality of life for all. Once it has been adopted by the various sectors within Iskandar Malaysia, the Green Economy Guidelines will help to enhance economic growth of this economic region. This will be in line with the environmental protection and conservation supported by a green work force i.e. informed communities which will generate a positive impact towards achieving Iskandar Malaysia's vision as well as contributing to a significant reduction in GHG emissions in Iskandar Malaysia.



# THREE Eco-Life Challenge Schools Project



### What is Iskandar Malaysia Eco-Life Challenge?

The Children's Eco-life Challenge project (ELC) is an eco-household accounting project designed for students. Eco-household accounting includes recording and evaluating household energy usage such as electricity, water and gas (Utaka et al., 2009). In Japan, Children's Eco-Life Challenge project was first introduced by KIKO Network in 2005 to students of 4th grade to 6th grade in primary school in Kyoto City. As of today, Children's Eco-Life Challenge project is conducted in all 173 primary schools in Kyoto City. It has been proven to be successful in increasing the awareness about climate change issues among school children and also educates students on how individual contribution is vital to mitigate the effects of climate change by making conscientious changes in the daily life. The accelerated

introduction of the Eco-Life Challenge in Iskandar Malaysia was made possible in collaboration with KIKO Network and the support of Kyoto City. In total, there are 198 primary schools in Iskandar Malaysia with a student population of over 184,000. The overall strategy is to prepare the primary schools for a much larger agenda aligned with the UNESCO Associated Schools Project Network, or ASPnet for short. It is a programme established to encourage schools worldwide to educate students on issues pertaining to international understanding. The first batch of 22 Iskandar Malaysia-based ASPnet primary schools - pioneers for primary schools category in Malaysia ran the ELC project in a competition format. This is now being scaled up by incorporating ELC as part of the lesson component in all planned 198 ASPnet (UNESCO Schools) Primary schools in Iskandar Malaysia.

### What do We Hope to Achieve Further?

The introduction of ELC in competition format is consistent with the interschool competition agenda stated in LCS Blueprint for Iskandar Malaysia 2025. A comprehensive study has been commissioned to evaluate the effectiveness of Eco-Life Challenge in raising awareness on LCS among school students and teachers with the following objectives: 1. Produce Eco-Life Challenge module and lesson plans for 2015 rollout; 2. Conduct Eco-Life Challenge to 22 pilot primary schools in Iskandar Malaysia; 3. Train 50 school counsellors to conduct Eco-Life Challenge; 4. Measure the LCS awareness of students before and after conducting ELC; 5. Measure the LCS awareness of counsellors/ teachers before and after conducting ELC; and 6. Evaluate the effectiveness of ELC in inculcating LCS among school students and teachers in Iskandar Malaysia. Subsequently, the data from the comprehensive study will be used to design and implement a region-wide rollout of ELC.



# FOUR

## Portal on Green Technology



### What is Iskandar Malaysia Green Portal?

The Green Portal is a website or an online platform where communities, government, private businesses, developers, investors and the public can access for information related to green technology and the natural environment. The portal is a one-stop centre providing the latest news and information on green technology and green-related topics, strategies, policies and guidelines on the natural environment. It is also a website where a “carbon literate” workforce is made available for employment to meet the growing needs of local, national and international industries, notably those located within Iskandar Malaysia. The portal contains both historical and recent information on the natural environment such as policies on spatial/land use, shoreline planning, energy, waste management which

will improve the knowledge of viewers and industry practitioners in both green technology and natural environment. The Green Portal will be found through IRDA's Iskandar Malaysia current website.

### What is the Content of Iskandar Malaysia Green Portal?

#### I. Home Page

The Home page contains important information and further updates on news and events within and outside Iskandar Malaysia.

#### II. Resources

The Portal offers downloadable versions of blueprints and guidelines, policies relating to green technology and green industry.

#### III. Human Capital Development

The portal provides information on green technology related education, incentives, lists of companies and experts in the green industry.

#### IV. Green Directory

The green directory offers a variety of attributes including a list of experts in green technology, information on green technologies and products, service providers.

### What do We Hope to Achieve?

Continuing engagements and consultations with various government agencies, businesses, NGOs and the public are important in order to continually improve the green portal. It is critical that the information displayed in the portal is updated frequently so that it can truly provide much-needed one-stop service to users. The information in the portal will be updated daily, with continuous structural improvements of the website from time to time. With a full-fledged Green portal, IRDA aims to increase public awareness on environmental issues and green technology and indirectly encourage the public to shift towards a more low carbon lifestyle.



# FIVE Trees for Urban Parks



### What are Trees for Urban Parks?

The 'Trees for Urban Parks' is one of the 281 programmes under Green and Blue Infrastructure of the Actions For A Low Carbon Future. The aim is to retain as well as reintroduce endemic tree species in urban parks and forests in the Iskandar Malaysia region, in order to ensure continuing existence of such parks. It is felt that many parks and urban trees are lost through road and other developments, the re-use of previously zoned areas as green spaces on residential developments, and the emergence of non-endemic species in our parks which are essentially ornamental. The proposed tree planting programme also aims to cover urban forests such as Hutan Bandar (City Forest) and Taman Merdeka in the Johor Bahru city limits.

Trees play a significant role in the following ways:

1. As green lungs for our cities and urban areas;
2. As places for people to visit, exercise, rest and relax; and
3. As places for attracting birds and small animals back into urban settings.

IRDA has carried out a fairly comprehensive documentation effort to identify tree and plant species that are endemic to Johor and particularly to Iskandar Malaysia (sources: FRIM data; on site surveys; TPOs by LAs [PG and MPJBT]). Ultimately, it is felt that such reintroduction of endemic trees will attract birds and other small species to return to urban settings. This proposal is tied to greener urban settings, reducing temperatures and heat islands and provides more conducive urban living. The reintroduction of such species could ultimately contribute to heat reduction in Iskandar Malaysia's urban environments, especially when these areas are coupled with water areas. It will also be important to protect existing trees, especially through enacted Tree Preservation Orders, and the protection of large green and blue areas, to assist in carbon reduction.

### What do We Hope to Achieve?

Several million trees have already been planted through the '1 Malaysian 1 Tree' project, a central government campaign to plant trees for each person to mark the Nation's 26 million people in 2010. Johor State's commitment was 1.6 million trees and to date some 1 million has already been planted. The State Government, IRDA and others will continue to work together to complete the campaign, and on top of that, IRDA continues to advise developers and others that more endemic trees should be planted in existing urban parks and forests as well as encourage developers to plant more trees in their current and new developments.



# SIX

## Responsible Tourism and Biodiversity Conservation



### What is Responsible Tourism Development and Biodiversity Conservation?

IRDA plans to go green in terms of tourism development in Iskandar Malaysia. The overall theme is eco-tourism under the label of 'Responsible Tourism' by involving businesses, agencies and in particular local communities in developing and promoting tourism under 4 main objectives:

- Biodiversity conservation
- Environmental education
- Community-led projects
- Promotion of a strong and resilient local economy

Following the successes of the Eco-Tourism summits and related events in 2012 and 2013, IRDA working closely with local communities, is now looking at various ways to get the communities actively involved in projects, especially those will benefit them directly. IRDA's aim to promote community-led projects is to try and ensure that such communities become champions of their areas. Local communities know their areas intimately and ultimately they should be the ones who must conserve and protect their areas. IRDA, working together with agencies such as the Department of the Environment and the Forestry Department as well as local authorities, will play a role to ensure that the villagers' aspirations are realised and that their economic livelihood continues and is sustained. Starting as an IRDA-led project through by focusing on birding, by taking advantage of the migratory birds' session between Sept-March, the project has taken its own momentum, which local villagers look forward to each year. The broader aims of the tourism development through biodiversity conservation are to raise awareness of locals within IM, and promotion of community-led projects.

### What do We Hope to Achieve?

The success of previous events is a strong indication that local communities are beginning to take stronger responsibility and pride in their natural environment, viewing it more than just a source of livelihood. Similarly, local authorities and agencies can now see a stronger and lasting potential of protecting such areas not only keeping their outstanding natural beauty for our future generations but also the fact that such permanent preservation will ensure continuing carbon sinks for a fast developing economic region.



# SEVEN

## Bukit Batu Eco-Community



### What is Eco-Community?

The Eco-Community concept is a way to show how village communities carry out economic activities within a low carbon society context. Kulai Eco-Community aims to improve villagers' life styles and financials within and surrounding the Kulai District in a sustainable manner via employment, entrepreneurship and co-owning the business. The area will implement sustainable green technologies and blueprints recommendation and become a showcase for similar developments in other areas of Iskandar Malaysia. The Eco-Community facility is strategically located, surrounding the PLUS Expressway's Sedenak Toll Plaza at KM 40, first exit into Iskandar Malaysia (IM) and last exit out of Iskandar Malaysia. The proposed facility is about 3,000 acres currently planted with

oil palm and rubber trees, and surrounded by predominantly oil palm oil plantations and scattered villages. Phase 1 of the proposal is 10 acres.

### General Development Strategies

The area will be developed in phases. Each phase will have specific goals to be achieved before moving on to the next phase. The development will mainly be complementary and not compete directly with existing players such as Johor Premium Outlets and Legoland Malaysia. It is intended that the facility must benefit villagers surrounding the area in terms of:

- Employment and continuous training opportunities
- Outlets for Small and Medium Enterprises (SMEs) to provide quality products and services. The SMEs will also be linked to various agencies for funding and training to bring up their level
- No loss of land ownership
- Improved quality way of life

### What do We Hope to Achieve?

#### Equilibrium of Horizons

In the development of IM, IRDA is tasked in balancing the THREE (3) horizons of:

- Economy
- Social
- Environment

This Eco-Community project is an effort to provide positive points to all 3 horizons concurrently. The development to embrace low carbon society and green technologies and uses as many relevant IRDA blueprints recommendations as possible. Educational and awareness for various target groups (university students, PBTs, property developers, foreign interested parties, etc.) of these IRDA blueprints as the implementation is on the ground for all to see.



# EIGHT GAIA

## Green Accord Initiative Award



### What is GAIA?

The Green Accord Initiative Award or GAIA is an innovative initiative to recognise and award worthy companies and businesses operating within Iskandar Malaysia that have practised being green in its operation. In general most companies comply with the required environmental regulations or social requirements but several companies have initiated to look beyond regulatory compliance. This effort includes in the area of corporate social responsibility i.e. working with local communities in sectors of health and wellbeing, alleviating poverty and conserving the environment besides tackling carbon footprints.

In this initial phase, GAIA will be looking specifically at green building development and companies that have adopted efficient energy system and implementing renewable energy approaches. The GAIA will be awarded to worthy development projects and buildings that have met local and international codes on building especially green building design, and the application of green technology in its construction. GAIA is a soft incentive that will be tied to local and international rating tools such as Malaysia's Green Building Initiative (GBI), Japan's CASBEE and Singapore's Green Mark as well as other known assessment tools (e.g. LEED and BREEAM) to evaluate and recognize green buildings in Iskandar Malaysia. This effort through GAIA will be a way or means to create awareness in businesses and communities that development can be done in a sustainable or green manner.

### What do We Hope to Achieve?

The outcome from GAIA can be described as creating awareness among construction and building industry players on green development and the importance of sustainability. In recognition of their efforts, a plaque and certificate with due mention will be awarded. IRDA is committed in ensuring wide coverage by press and media to highlight such achievements in this industry to the local and international communities. In the long term, this will contribute to lowering the carbon emission. GAIA will help transform Iskandar Malaysia into a sustainable metropolis of international standing through a green-focused agenda of green buildings and the promoting low carbon green growth. This effort will lead to healthier living and will improve the quality of life of its residents.



# NINE

## Low Carbon Eco-Village Felda Taib Andak



### What is Low Carbon Eco-Village Felda Taib Andak?

Low carbon community model incorporates the application of low carbon mitigation measures, which includes the practise of energy-saving, biomass of palm oil, 3Rs (reduce, reuse and recycle), production of green goods and reduce the use private transportation. A model of low carbon community is one of the effective strategies to build up practical solutions that could set the communities on a journey to low carbon living. The low carbon eco-village initiative involved developing a few pioneer low carbon community models of villages and residential neighbourhoods in Iskandar Malaysia.

### What do We Hope to Achieve?

Low carbon mitigation measures and low carbon lifestyle in a village community including the practise of energy saving, 3Rs (reduce, reuse and recycle), creation of green products and others. This project, which started in 2012, is an initiative under Action 7 of Actions For A Low Carbon Future to develop a model of low carbon community. It focuses on community involvement in the formulation of a low carbon action plan or blueprint and their subsequent involvement in the implementation and promotion of low carbon lifestyle among the rural communities. Using the LCSBPIM as a guide, the local community formulated a blueprint of "A Dozen Actions" to achieve their combined vision of creating Felda Taib Andak as a model village for the rural communities that is environmentally-friendly and low carbon.

The Dozen Actions are as follow:

1. Effective Microorganism (EM) / composting project
2. Plantation of '*buluh madu*' bamboo
3. Provision of recycling bin at each blocks
4. Mosque energy saving (solar system) and housing energy saving project
5. Promotion of the use of bicycle
6. Control air pollution from factories
7. River rehabilitation project
8. Organic farming - livestock and vegetables
9. Social awareness programme
10. Provision of pedestrian path
11. Zero open burning
12. Rain water harvesting for domestic use





# Special Feature

## Smart City: Nafas Baru Pasir Gudang



### Rejuvenating Pasir Gudang via Smart City Framework

Nafas Baru literally means 'new breath'. It is a programme mooted by IRDA together with Majlis Perbandaran Pasir Gudang (Municipal Council) with the aim to rejuvenate Pasir Gudang to become a Green and Healthy City by 2025. Nafas Baru is in line with both the Low Carbon Society Blueprint and the Iskandar Malaysia Smart City Framework. The objective is to create smarter residents, in terms of resource planning and management through community action where residents, municipal council, industry and others work towards transforming Pasir Gudang into a clean, green, healthy and vibrant city.

The aim is therefore to reduce carbon intensity emissions by focusing on the three LCSBPIM pillars of Green Economy, Green Community and Green Environment. As such, 4 main initiatives have been identified to be carried out in 2013-2015 period.

#### I. Green Industry

To establish framework in addressing gaps between what's in for industry and current available programmes/ initiatives by various agencies.

#### II. Green Community Programme

This programme aims to promote green community and green lifestyle among residents of Pasir Gudang. It also aims to increase the level of awareness of the public and through encouraging them to live a more low carbon lifestyle.

#### III. Integrated Solid Waste Management (Waste to Energy)

To ensure that all operation and maintenance of sewerage system in the area is under the supervision of MPPG. Application include " Waste to Energy ", solid waste management and sewerage management

#### IV. Carbon Sequestration of Tree Preservation Order (TPO)

Carbon sequestration and a TPO tree's monetary value will be identified in order to assess the carbon sink and the tree value. In the future, tree-planting and urban landscape design in the municipality will be based on these values as a priority to reduce the carbon emission.

# Acronyms and Abbreviations

<b>3R</b>	Reduce, Reuse and Recycle	<b>ILS</b>	Intelligent Logistic System
<b>AP</b>	Air Pollution	<b>IM</b>	Iskandar Malaysia
<b>API</b>	Air Pollution Index	<b>IMLRT</b>	Iskandar Malaysia Light Rapid Transit
<b>ASEAN</b>	Association of Southeast Asian Nations	<b>IMMMS</b>	Iskandar Malaysia Mobility Management System
<b>ASPnet</b>	Associated Schools Project Network	<b>IRDA</b>	Iskandar Regional Development Authority
<b>BaU</b>	Business as Usual	<b>ISO</b>	International Organization for Standardization
<b>BDF</b>	Biodiesel Fuel	<b>IT</b>	Information Technology
<b>BEMS</b>	Building Energy Management System	<b>ITS</b>	Intelligent Transportation System
<b>BIPV</b>	Building Integrated Photovoltaic	<b>JB</b>	Johor Bahru
<b>BREEAM</b>	Building Research Establishment Environmental Assessment Methodology	<b>JICA</b>	Japan International Cooperation Agency
<b>BRT</b>	Bus Rapid Transit	<b>JST</b>	Japan Science and Technology Agency
<b>CASBEE</b>	Comprehensive Assessment System for Built Environment Efficiency	<b>JPBD</b>	Town and Country Planning Department
<b>CBD</b>	Central Business District	<b>KL</b>	Kuala Lumpur
<b>CDM</b>	Clean Development Mechanism	<b>LA</b>	Local Authority
<b>CIQ</b>	Customs, Immigration and Quarantine	<b>LCS</b>	Low Carbon Society
<b>CCTV</b>	Closed Circuit Television	<b>LCSBPIM</b>	Low Carbon Society Blueprint Iskandar Malaysia
<b>CDP</b>	Comprehensive Development Plan	<b>LCCF</b>	Low Carbon Cities Framework
<b>CH<sub>4</sub></b>	Methane	<b>LEED</b>	Leadership in Energy and Environmental Design
<b>CM</b>	Countermeasure	<b>LPA</b>	Local Planning Authority
<b>CO</b>	Carbon Monoxide	<b>LRT</b>	Light Rail Transit
<b>COP</b>	Conference of the Parties	<b>MBJB</b>	Johor Bahru City Council
<b>COP15</b>	Fifteen Session of the Conference of the Parties	<b>MDP</b>	Pontian District Council
<b>CPTED</b>	Crime Prevention Through Environmental Design	<b>MMS</b>	Mobility Management System
<b>CO<sub>2</sub></b>	Carbon Dioxide	<b>MoA</b>	Memorandum of Agreement
<b>CSR</b>	Corporate Social Responsibility	<b>MPJBT</b>	Johor Bahru Tengah Municipal Council
<b>EE</b>	Energy Efficiency	<b>MPKu</b>	Kulaijaya Municipal Council
<b>EEl</b>	Energy Efficiency Improvement	<b>MPPG</b>	Pasir Gudang Municipal Council
<b>ELC</b>	Eco-life Challenge	<b>MSW</b>	Municipal Solid Waste
<b>EM</b>	Effective Microorganism	<b>NDP</b>	National Development Plan
<b>ESCO</b>	Energy Service Company	<b>NIES</b>	National Institute for Environmental Studies
<b>FDI</b>	Foreign Direct Investment	<b>NGO</b>	Non-Governmental Organisation
<b>FELDA</b>	Federal Land Development Authority	<b>NGV</b>	Natural Gas Vehicle
<b>FGD</b>	Focus Group Discussion	<b>NO</b>	Nitrogen Monoxide
<b>FRIM</b>	Forest Research Institute Malaysia	<b>NO<sub>2</sub></b>	Nitrogen Dioxide
<b>GAIA</b>	Green Accord Initiative Award	<b>N<sub>2</sub>O</b>	Nitrous Oxide
<b>GB</b>	Green Building	<b>NPO</b>	Non-Profit Organisation
<b>GBI</b>	Green Building Index	<b>NPP</b>	National Physical Plan
<b>GDP</b>	Gross Domestic Product	<b>O<sub>3</sub></b>	Ozone
<b>GHG</b>	Greenhouse Gas	<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>GIS</b>	Geographic Information System	<b>p.a.</b>	Per Annum
<b>HSRT</b>	High Speed Rail Transit	<b>PBT</b>	<i>Pihak Berkuasa Tempatan</i>
<b>IBS</b>	Industrialised Building System	<b>PDCA</b>	Plan-Do-Check-Act
<b>ICT</b>	Information and Communication Technology	<b>PG</b>	Pasir Gudang
		<b>PIS</b>	People`s Information System

# Acronyms and Abbreviations

<b>PLUS</b>	<i>Projek Lebuhraya Utara Selatan</i>
<b>PM<sub>10</sub></b>	Particulate Matter 10 Microns
<b>POME</b>	Palm Oil Mill Effluent
<b>PQ</b>	Power Quality
<b>PTP</b>	Port of Tanjung Pelepas
<b>PV</b>	Photovoltaic
<b>PM</b>	Particulate Matter
<b>RE</b>	Renewable Energy
<b>R&amp;D</b>	Research and Development
<b>RM</b>	Ringgit Malaysia
<b>RSNJ</b>	Johor State Structure Plan
<b>SAP</b>	Station Area Planning
<b>SATREPS</b>	Science and Technology Research Partnership for Sustainable Development Program
<b>SILC</b>	Southern Industrial and Logistics Cluster
<b>SJER</b>	South Johor Economic Region
<b>SME</b>	Small and Medium Enterprise
<b>SMRT</b>	Singapore Mass Rapid Transit
<b>SO<sub>2</sub></b>	Sulfur Dioxide
<b>SOHO</b>	Small Office Home Office
<b>SPC</b>	State Planning Committee
<b>TBL</b>	Triple Bottom Line
<b>TDM</b>	Transport Demand Management
<b>TOD</b>	Transit Oriented Development
<b>TPO</b>	Tree Preservation Order
<b>UGB</b>	Urban Growth Boundary
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>UNEP</b>	United Nations Environment Programme
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>UTM</b>	Universiti Teknologi Malaysia
<b>VMS</b>	Variable Message Signs
<b>VMT</b>	Vehicle Mile Travel
<b>VOC</b>	Volatile Organic Compound

## UNIT

<b>Bill. RM</b>	Billion Ringgit Malaysia
<b>KgCO<sub>2</sub>eq</b>	Kilogram Carbon Dioxide Equivalent
<b>km</b>	Kilometer
<b>km<sup>2</sup></b>	Kilometer Squared
<b>KtCO<sub>2</sub></b>	Kiloton Carbon Dioxide
<b>KtCO<sub>2</sub>eq</b>	Kiloton Carbon Dioxide Equivalent
<b>Kteq</b>	Kiloton Equivalent
<b>Mil. passenger-km</b>	Million Passenger Kilometer
<b>Mill. ton-km</b>	Million Ton Kilometer
<b>Mtoe</b>	Million Ton Oil Equivalent
<b>MtCO<sub>2</sub>eq</b>	Million Ton Carbon Dioxide Equivalent
<b>MW</b>	Mega Watts
<b>tCO<sub>2</sub>eq</b>	Ton Carbon Dioxide Equivalent

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For Iskandar Malaysia 2025 With 10 Implementation Plans

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