



Low Carbon Society Blueprint

for Iskandar Malaysia 2025

November 2012



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Summary for Policymakers | November 2012

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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Foreward

The global concern over our planet means that Iskandar Regional Development Authority (IRDA) must play its part in ensuring that the Iskandar Malaysia economic development region in Southern Johor, Malaysia, is developed in a sensible, timely and sustainable manner. In that regard, issues of climate change and global warming, setting targets for a low carbon footprint and positive support and promotion of a green economy through increased investments in environmental assets and green technology and production must all be properly planned and handled.

IRDA's approach in the development of Iskandar Malaysia is through a Green-focused Agenda, whereby the Authority has made a commitment that a green and sustainable environment is the focus. IRDA strongly believes that the astute management of natural resources is the most important aspect of sustainable development; and sets the context within which all other factors – from land use proposals and development to social engineering, service provision and economic prosperity – must be considered. Without 'the green', there is no sustainable development. Through strong policies (backed by research), IRDA will plan, manage and develop our region through close collaboration with all stakeholders and especially the local communities, whose knowledge and intimate experiences of their environment are critical to a well-planned economic region.

The green-focused agenda that IRDA is now implementing is very much addressing the global issues of today. It means looking at Iskandar Malaysia within the context of the planet. Our approach is to look at the environment, economic development and society holistically. Through the Low Carbon Society research project (2011-2015), our Malaysian and Japanese research teams have come up with substantial research findings that IRDA has now interpreted into policies that can be implemented – policies and proposals that are both workable and bankable.

The production of this Low Carbon Society Blueprint for Iskandar Malaysia is timely. Timely because it is being launched at COP18 Doha, where the global community is once again gathered to address and tackle climate change. Timely also because many countries are now re-focusing their economic visions towards a green economy and low carbon green growth. IRDA intends to adopt a similar approach in the development of the Iskandar Malaysia region. This Blueprint, with its 12 Actions, must be implemented in a timely and proactive manner by all, and IRDA, as the regional authority, will play a lead role in ensuring that the Actions are carried out. UTM and our research partners from Japan will continue to play key roles in the implementation of these Actions, in which they are the main instigators. The achievement of these Actions is directly relevant in realising our vision of a **“strong and sustainable metropolis of international standing”**.

It is my honour to thank UTM, Kyoto University, NIES and Okayama University; and the project's funders JICA and the Japan Science and Technology Agency, for all your generosity, strong support and continuing commitment to Iskandar Malaysia.

Finally, I hope that this LCS Blueprint will be the rallying call for all Malaysians as well as our foreign friends and partners to play a proactive part in applying the Actions so that we will achieve a society that is low carbon, and a development region that is based on a green economy, and sustainable and green economic growth.

With great appreciation.

YBhg Datuk Ismail Ibrahim
Chief Executive
Iskandar Regional Development Authority

Preface

The Malaysian government recognised that climate change and its adverse consequences arising from it are real and has taken positive policy actions to address climate change. A comprehensive ecosystem for environmental sustainability framework has been proposed to protect the environmental quality of life and caring for the planet while pursuing economic growth and development towards a high income nation. In order to operationalize this agenda, there is a need to increase the awareness of all Malaysians that environmental sustainability is a shared responsibility to attain a low carbon society.

In addition, as Malaysia is experiencing rapid urbanisation, it is important to develop low carbon, vibrant and liveable cities or conurbation/ 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.

The Low carbon society blueprint for Iskandar Malaysia not only complements and updates the earlier Sustainable Iskandar Malaysia 2025 Report (2009) but also embraces the 12 Actions Plan to guide development towards climate resilient urban development for Iskandar Malaysia. This will support the vision of building a strong sustainable metropolis of International Standing.

This blueprint is one of major 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.

The collaborative research approach in this project is unique because it gathers both international and local experts/ scientists to provide scientific findings and quantitative modelling of carbon dioxide emissions to Iskandar Malaysia Development Authority (IRDA) who are the policy makers. The other unique feature is that the blueprint consists of 12 proposed actions which are based on the active participation and consensus building of major stakeholders in Iskandar Malaysia. This will ensure that the detailed proposed measures and programme will be aligned to the local community needs.

In line with the Malaysian Government's effort to achieve a 40% voluntary reduction of CO₂ emission intensity by 2020, the implementation of the blueprint will facilitate the low carbon development for ISKANDAR MALAYSIA. Being one of the fastest growing regions in Malaysia; it demonstrates the realisation of a Low carbon society can be achieved by decoupling CO₂ emissions and economic growth.

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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 socio economic development variables, quantitative modelling of CO₂ emission and “12 major Actions” in Triple Bottom Line (TBL) pillars, namely Green Economy, Green Community and Green Environment. The 12 actions are then detailed into specific programs and measures 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, life style change, education and awareness, governance, forest conservation, waste management and air environmental quality.

Future Socio-economic, Energy Demand and CO₂ 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 year 2005-2025 with significant investment of infrastructure, industries and housing sectors. By using a model simulation, a scenario of the future image of society and development of IM in 2025 as a low-carbon society is forecasted based on socio-economic and technological potential variables.

Table 1: Projected main socio-economic variables

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

Table 1 shows the projected main socio economic 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 56% 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 of GHG emission by sectors in Iskandar Malaysia. The total GHG emission in year 2005 is estimated to be 10.5 MtCO₂eq and this is forecasted to increase to 30.2 MtCO₂eq in 2025BaU. With the introduction of counter measures, the emissions are able to be lowered to 18.3MtCO₂eq in 2025CM (Countermeasure). As Iskandar Malaysia is a fast developing urbanised region, the industry sector will remain the highest emission sector contributing more than 60% 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 counter measures are based on technologies such as use of energy efficient equipment in all sectors, photovoltaic (PV) power generation, biomass utilization and energy efficient building. It also involves urban planning policy such as modal shift, compact city policy and promoting behaviour change of the community through education and awareness campaign.

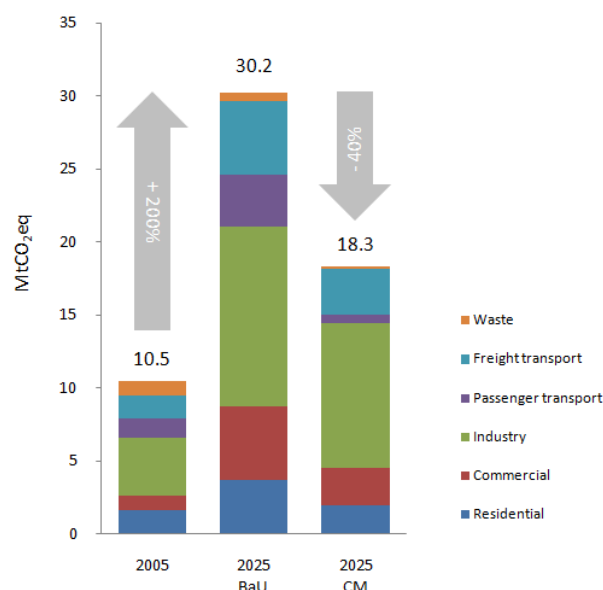


Figure 1: GHG emissions by sectors

Translating Countermeasures into Implementable Programs

When these emission reduction countermeasures are identified and proposed by the researchers, this idea is then converted into feasible actions based on concrete programs which can be implemented by IRDA and the Local authorities in the Iskandar Malaysia Region. In order to ensure the proposal are appropriate and feasible to local community, a series of Focus Group Discussions (FGDs) were organised by Universiti Teknologi Malaysia (UTM) and IRDA. These FGDs were attended by the various stakeholders (local authorities, business community, NGO, NPO, interest group and individuals) in this region who are involved in the various development sectors. Through a series of consensus building, 3 major pillars with 12 Actions consisting of 53 sub-actions, 96 Measures and about 300 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. The Action 5 - Green Energy and Renewable energy system (24%), Action 6 -Low Carbon lifestyle (21%) and Action 1 -Green Transportation (15%) are the Top 3 actions comprising about 60% of the total emission reduction. Table 3 shows the detail CO2 reduction of 12 actions by the 3 main pillars. The Green Economy (59%) is the major pillar in CO₂ reduction followed by Green Community (21%) and Green environment (20%) . 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 CO₂ emission are important in the planning and monitoring work. This BP also contains the framework of planning, implementation and monitoring of the Actions and emissions based on PDCA(Plan-Do-Check-Act) cycle.

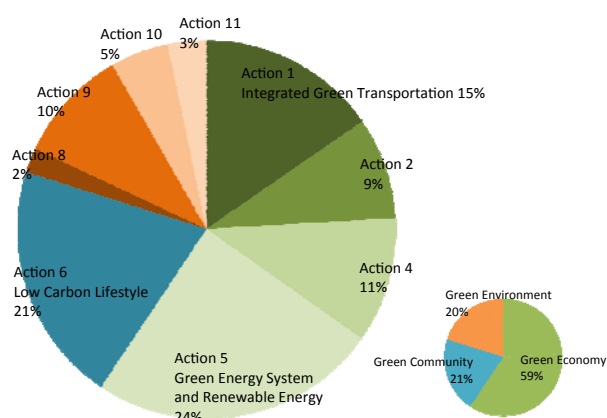


Figure 2: Contribution of Direct Effects to Emission reduction by three pillars

Table 2: Energy demand, GHG emissions and emission intensity

	Unit	2005	2025 BaU	2025 CM	2025BaU /2005	2025CM /2005	2025CM/ 2025BaU
Final energy demand	Mtoe	2.5	7.6	5.2	3.11	2.14	0.69
GHG emissions	MtCO ₂ eq	10.5	30.2	18.3	2.88	1.74	0.60
Per capita CO₂ emissions	tCO ₂ eq	7.7	10.1	6.1	1.30	0.78	0.60
GHG intensity	kgCO ₂ eq/RM	0.29	0.21	0.13	0.73	0.44	0.60

Table 3: Contribution of 3 main themes and 12 actions

Actions	Contribution* (ktCO ₂ eq)	Share
Green Economy	7,401	59%
Action 1 Integrated Green Transportation	1,916	15%
Action 2 Green Industry	1,085	9%
Action 3 Low Carbon Urban Governance**	-	-
Action 4 Green Building and Construction	1,338	11%
Action 5 Green Energy System and Renewable Energy	3,061	24%
Green Community	2,557	21%
Action 6 Low Carbon Lifestyle	2,557	21%
Action 7 Community Engagement and Consensus Building**	-	-
Green Environment	2,510	20%
Action 8 Walkable, Safe and Livable City Design	264	2%
Action 9 Smart Urban Growth	1,214	10%
Action 10 Green and Blue Infrastructure and Rural Resources	620	5%
Action 11 Sustainable Waste Management	412	3%
Action 12 Clean Air Environment**	-	-
Total	12,467***	100%

*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.

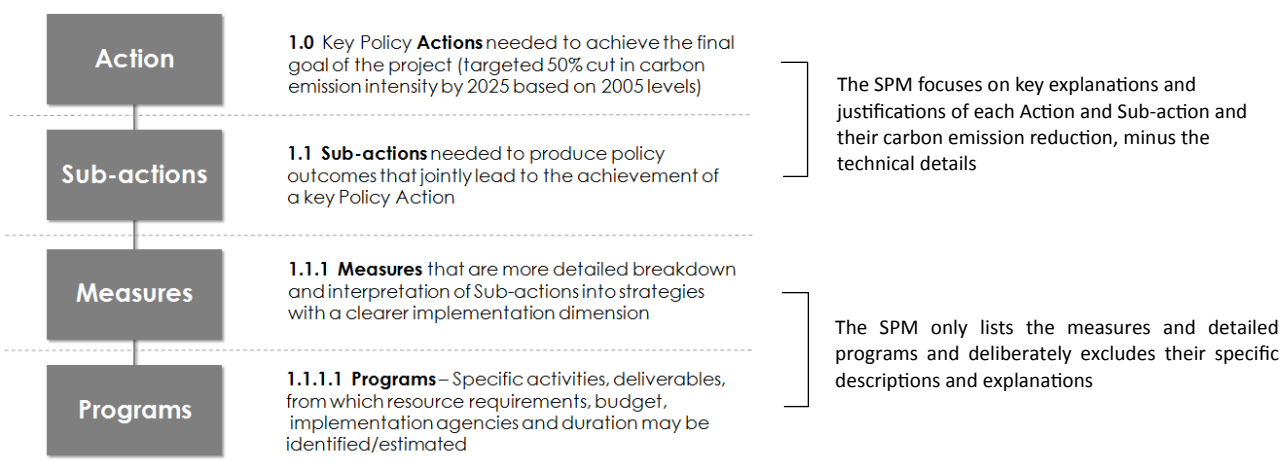


Figure 3: Work Breakdown Structure of Iskandar Malaysia’s 12 LCS Actions

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 base-line 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 km²), 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).

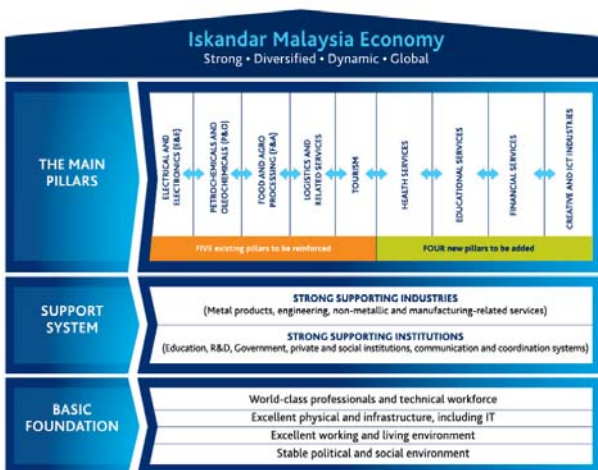


Figure 4: Iskandar Malaysia’s nine strategic economic sectors (pillars) that build on a strong support system over a good social, physical and institutional foundation
Source: Adapted from the SJER CDP 2006-2025



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

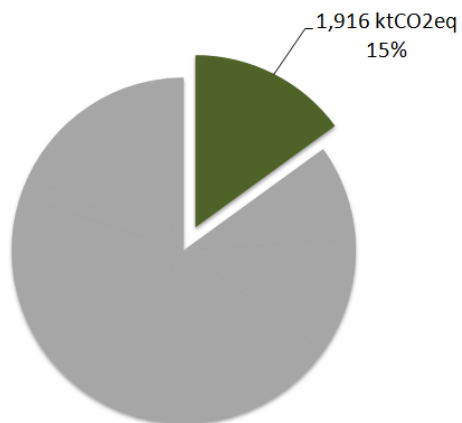


Figure 6: Iskandar Malaysia’s Five Flagship Zones
Source: Adapted from the SJER CDP 2006-2025



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 ktCO₂ (29% 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 ktCO₂ 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	Improve JB - Singapore, JB-KL Connectivity	Intercity High Speed Rail Transit (HSRT)
3	Diffusion of Low Carbon Passenger 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
<p>Programs:</p> <ul style="list-style-type: none"> - 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
<p>Programs:</p> <ul style="list-style-type: none"> - Route network planning - Connectivity & integration with existing public transport modes
Measure 3: Efficient & seamless inter-modal transfer (interchange) facilities
<p>Programs:</p> <ul style="list-style-type: none"> - 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)
<p>Programs:</p> <ul style="list-style-type: none"> - 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 the use of low carbon vehicles
<p>Programs:</p> <ul style="list-style-type: none"> - 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)
<p>Programs:</p> <ul style="list-style-type: none"> - 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
<p>Programs:</p> <ul style="list-style-type: none"> - 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

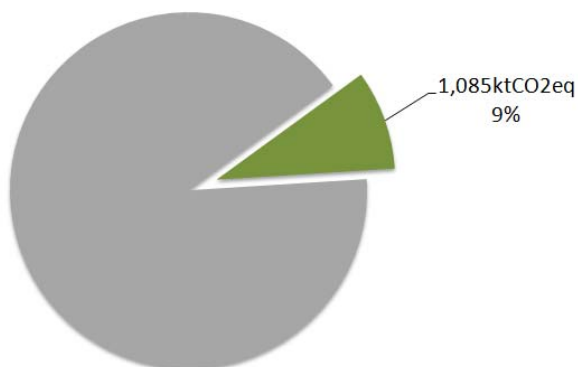
In line with Iskandar Malaysia's emphasis on industrial sector growth, freight transportation demand is projected to increase over 3 times to 26 billion ton-km in 2025, accounting for 5,012 ktCO₂ (17% of BaU) emission. As rail freight is more energy efficient than road freight, the 2005 share of 99:1 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 ktCO₂ emission is expected from the following measures and programs:

Measure 1: Modal shift to greener freight transport modes
<p>Programs:</p> <ul style="list-style-type: none"> - Modal shift from road-based to rail-based freight transport - Modal shift to ship-freight transport
Measure 2: Promote green/hybrid freight transport
<p>Programs:</p> <ul style="list-style-type: none"> - 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 servicees 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. They are four main strategies can be introduce 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 1,085 ktCO₂ 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
Programs: - Tax exemption for FDI in green industries - Working with banks for soft loan with low interest packages for new green industries - Expedite approval process for green technology-based FDI
Measure 2: Promotion of R&D in strategic sectors
Programs: - Industry-university/research institution research linkages - Attract FDI in production of RE (e.g. BIPV, bio-fuel) and EE (e.g. fuel cell) technologies - Innovation in green vehicles (hybrid, electric)

Decarbonizing Industries

Energy efficiency is one of the quickest ways to conserve energy and reduce carbon emissions, and Low Carbon Society in Iskandar Malaysia. While certain energy efficiency system requires slight modification of the current energy system (application of energy storage for efficient usage of energy), application of energy efficiency appliances and equipment however does not require any modification and therefore, it is the simplest way for energy conservation. Compared to all other sectors, the industrial sectors are the main contributors to the total energy consumption in Iskandar Malaysia. 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.

Measure 1: Reducing energy intensity of industrial production process
Programs: - Purchase of energy efficient equipment - Investment in energy saving managing system - Introduce intelligent logistic system (ILS) & low-energy warehousing - Tax incentives to industry for EEI in production process - Soft loan with low interest rate to promote adoption of green technology in industry - Research and planning for establishment of eco-industrial park

Measure 1: 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

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: 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)

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: 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 CO₂. However, the same asset concentration and functional intensity also mean that any effective LCS measures would go far in mitigating CO₂ 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 CO₂ emission reduction measures and programs related to Integrated Green Transportation; Green Buildings and Construction; Walkable, safe and Livable City Design; Smart Urban Growth; and Green and Blue Network 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 & 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"> - 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) - Formulation of achievable & implementable low carbon transition strategies for 2012-2025 and beyond - Provide policies to “reward” land development projects that contribute to IM’s low carbon visions
<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"> - Coordination of LCS guidelines & standards for all local authorities in IM - Revise and update existing use classes order to facilitate mixed use development - Implementation and enforcement of compact & transit supportive development zoning & design codes

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"> - Re-rationalization of Planning Permission application, processing & granting procedures - Eliminate duplications in currently overly compartmentalized planning approval processes through enhancing the One-stop - Integrated decision making processes in planning control at State & local levels - 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)
<p>Measure 2: Enhance Substantive (Content) Aspects of Development Planning Approval</p>
<p>Programs:</p> <ul style="list-style-type: none"> - 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 CO₂ emission intensity and clear reduction projections of the proposed development) - Imposition of planning conditions on granting of planning permissions that support LCS actions (e.g. mandatory provision of walkways in residential neighborhoods)

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"> - Develop low carbon urban & regional planning retraining curriculum for in-service municipal officials - Incorporate low carbon society concepts, philosophy, approaches, measures etc. in municipal human capital development programs - Systematically prioritise & organise continuous (re)training of officials

Iskandar Malaysia LCS Monitoring and Publication System

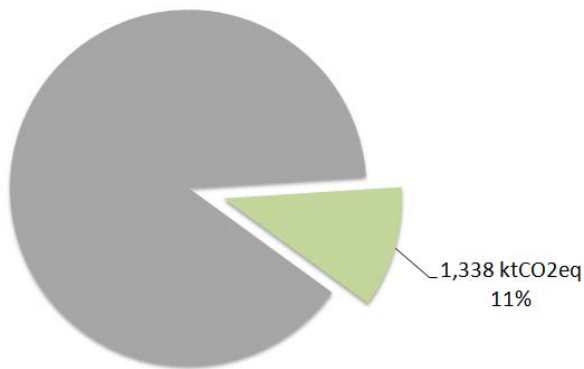
An effective monitoring, assessment and publication system on the progress and achievement of carbon reduction targets and low carbon society is indispensable. Government buildings in Iskandar Malaysia should lead the way in voluntarily submitting monthly environmental and energy performance data to 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"> - Ongoing monitoring of energy and carbon emission performance of development and economic activities in Iskandar Malaysia - Transparent and accountable publishing of energy and carbon emission data in multiple formats that are accessible anytime, anywhere



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) EEI of Existing Buildings, (3) Green Construction, (4) Green Building Design Technology, and (5) Rural Design Buildings. This Action is expected to reduce the CO₂ emission in 2025 by 1,338ktCO₂eq.

Sub-actions		Measures
1	Promote Green Building in New Construction	Expedite approval process for Green Buildings
		Showcase/prototype of a green building in IM
2	EEI of Existing Building (retrofitting)	Identify candidate buildings (commercial and offices) for retrofitting demonstration project
3	Green Construction	Use of recyclable and low embodied energy building materials
4	Green Building Design and Technology	Introduce Building Energy Management System (BEMS)
		Climatically responsive building design
		“Built to last” buildings
5	Rural Green Buildings	Conservation & promotion of vernacular, climatically adapted architecture in rural areas as well as adoption of certain design features.

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 community. The targets are: (i) more than one-third of all new and existing buildings to be energy efficient buildings and (ii) 50% of the 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 and the local approving authority plays a very important part; such as approval process.

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 and Green Development. 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.

EEl 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: Use of recyclable and low embodied energy building materials
Programs: - Reuse construction wastes - Promote green construction industry

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 / Home Energy Management System (BEMS / HEMS)
Programs: - Temperature control at 24°C (air conditioning for government offices) - Movement sensors for low occupancy areas - Movement sensors for elevators & escalators
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 façade - Maximise use of day lighting - Insulation & passive shading of west-facing facades
Measure 3: "Built to last" buildings – longer building lifespan
Programs: - Enhance building durability - Maximise space adaptability

Rural Green Buildings

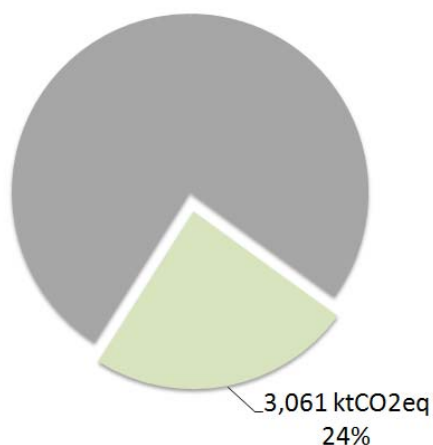
Vernacular architecture is an area of architectural theory that studies the structures made by empirical builders without the intervention of professional architects. Architecture is a major part in creating identity or character of the city and influencing the quality of life of city community. Cultural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

Measure 2: 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



Power is the main driver of development as well as the largest emitter of greenhouse gases (GHG). In Iskandar Malaysia, increasing power demand over the years is inevitable due to rapid growth and GHG emission is expected to escalate if left unchecked. Low carbonization of the energy sector is therefore one of the key factors toward the realization of the goal of achieving Low Carbon Society in Iskandar Malaysia. Three strategies to greenify the energy sector are therefore presented: (1) promotion and encouragement of renewable and clean energies utilization such as solar energy, biomass, biogas, waste, hydrogen, etc.; (2) establishment of advanced energy system such as the SMART Grid which incorporate both the supply and demand side for a more sustainable, cleaner, reliable, secure, robust, and efficient system; (3) promotion and encouragement of energy efficiency initiatives to reduce the overall power demand in Iskandar Malaysia.

Sub-actions		Measures
1	Promotion of Renewable/Alternative Energy	Harnessing solar energy
		Waste to energy conversion
		Hydrogen utilization
2	Establishment of the SMART Grid	Incorporation of distributed energy system
		Incorporation of energy storage
		Incorporation of demand response
		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

Action 5 consists of three sub-actions; (1) promotion of renewable and alternative energy in Iskandar Malaysia; (2) establishment of the SMART Grid; (3) provision of incentives and subsidies and derivation of tariff rates for Iskandar Malaysia. Through the measures and programs under these sub-action, it is expected that the up to 3061 ktCO₂eq of GHG will be reduced by 2025 (25% of the total emission reduction).

Promotion of Renewable/Alternative Energy

The main objective of promoting the utilization of renewable/alternative energy in Iskandar Malaysia is to reduce the reliance of fossil fuels for power generation and subsequently reduces the GHG emission from fossil fuel power plants. Based on the available renewable/alternative energy in Iskandar Malaysia, it is set that by 2025 a total of 888MW of supply capacity will be contributed by biomasses and biogases, MSW, solar energy and hydrogen so that 10% of the power demand in IM is met by renewable..

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

Measure 1: Harnessing Solar Energy
Programs: - Implementation of Solar PV as: PV roofing PV farm PV on public infrastructure - Implementation of Solar Thermal for: Residential/commercial heating Industrial heating Power generation
Measure 2: Waste to Energy Conversion
Programs: - Applying municipal solid waste (MSW) as fuel - Applying agricultural waste as fuel - Applying sewage sludge as fuel
Measure 3: Hydrogen Utilization
Programs: - Producing and promoting utilization of hydrogen

Establishment of the SMART Grid

The SMART Grid is a vital component to achieve a decarbonized power industry. Especially in a system where RE and EE is heavily highlighted, SMART Grid are required to allow integration of RE to the existing grid as well as to ensure efficient energy management of the grid. Several major benefit of SMART Grid are such as reduction of greenhouse gases and ensuring energy sustainability by increasing RE utilization, grid reliability enhancement through energy storage systems, self-healing system, and demand responses, and efficient utilization of energy through a dynamic IT-driven grid. Based on the implementation of SMART Grid, 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: Incorporation of Distributed Energy System
Programs: - Distributed energy system for ensuring energy sustainability and security
Measure 2: Incorporation of Energy Storage
Programs: - Balancing energy mismatch within the grid
Measure 3: Incorporation of Demand Response
Programs: - Curtailment of peak loads - Addressing load variability from intermittent resources
Measure 4: Incorporation of Power Management System (IT Technologies)
Programs: - Enable self-healing system features - Ensuring cyber-security and physical security - Allowing system transparency within the grid

Provision of Incentives and Subsidies and Derivation of Tariff Rate

Incentives, subsidies and reasonable tariff rates are the driver to select the type of resources for power generation. Incentives and subsidies are important to increase the profitability of RE so that it can compete with the cheaper fossil fuel on the same ground. Apart from the existing incentives and subsidies established by the Malaysian Government, additional incentive will 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, but also to shape a new energy consumption profile beneficial to power supply and utilization.

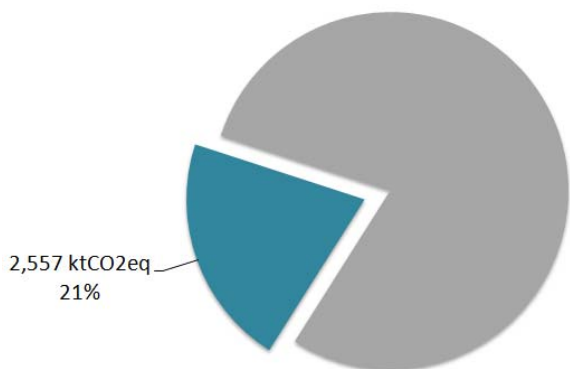
The measures and programs are as highlighted:

Measure 1: Incentives for Green Energy Initiatives
Programs: - Providing incentives for RE and clean energy - Providing feed-in Tariffs for RE and clean energy - Providing incentives for EE and power quality (PQ) for industries - Providing subsidies for EE in residential - Providing incentives for demand response (load management)
Measure 2: Tariff for the Future Grid
Programs: - Provide on- and off-peak tariff - Creating a liberal energy market for RE



06 Low Carbon Lifestyle

Greenhouse Gases Reduction



Low carbon lifestyle refers to working and living in a sustainable way of daily life. This means that having a low cost working/ living that comprises less carbon foot print per person, a pure, healthy and natural environment. Low carbon lifestyle promotes low energy usage, low consumption and expenses, as well cutting CO₂ emission. Low carbon lifestyle indicates the behaviours and utilization of resources by governmental offices, private offices, public spaces/buildings, and schools, an individual, organization or community that produce low carbon emission and give a minimum impact to the environment and enhance low carbon development of Iskandar Malaysia.

The low carbon lifestyle action is the third highest contributor towards the emission reduction in Iskandar Malaysia. It contributes about 2,557ktCO₂eq in total emission reduction. The measures taken towards achieving this targeted emission reduction is seen in table 1 and it is explained below.

Sub-actions		Measures
1	Awareness and Education	Enhancing general public awareness
		Enhancing school awareness
2	Smart Working Style	Work from home
		Staggered working hour
3	Green Ambassadors/Champion	Appoint individuals as neighbourhood, company, organization green ambassadors / champion
		Appoint schools as ambassadors / champion
4	Promote Energy Efficiency	Promote sales and use of energy efficient appliances
		Promote energy saving practices
		Incentives for green energy initiatives
5	Environmental Accounting and Carbon Offset	Environmental accounting
		Carbon offset

Awareness and Education

Awareness and education are important to achieve LCS in Iskandar Malaysia by involving governmental agencies, non-governmental organizations (NGOs), schools and local communities. Green education or environmental education (EE) 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 all the programs in the measures below, at least 30% of the general public and students will continue to live a low carbon lifestyle.

Measure 1: Enhancing general public awareness
Programs: - Freely available green education catalogue in shopping centres - Awareness programs for community
Measure 2: Enhancing school awareness
Programs: - LCS education through curriculum - School clubs for LCS & 3R programs - Children eco-life challenges project - Interschool 3R project competitions - 3R measures at schools - LCS measures at schools - Collaboration with relevant government agencies & NGOs - Students to collect reusable & recyclable wastes from home & neighbourhood

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
Programs: - ‘Work-from-home’ pilot project for government agencies - Promote private SOHO development in IM - Encourage tele-working / telecommuting among private sectors employees
Measure 2: Staggered working hour
Programs: - Promote adoption of flexi working hours in suitable sectors

Green Ambassadors/ Champion

LCS Ambassadors or Champions are individuals in community 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.

Measure 1: Appoint individuals as neighbourhood, community , organisation green ambassadors/ champions
Programs: - On going monitoring of neighbourhood, company, organisation green initiatives - Annual green neighbourhood, company, organisation competitions - Appoint community level leadership
Measure 2 : Appoint schools as ambassadors/champions
Programs: - Green ambassador in school - Champion in school (school management team)

Promote Energy Efficiency

This idea of energy efficiency practice is to promote spending less, consuming less and emitting CO2 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
Programs: - Eco Point
Measure 2: Promote energy saving practices
Programs: - ‘Cool Biz’ - Environmental Concierge
Measure 3: Incentives for green energy initiatives
Programs: - Subsidies for EE in residential

Environmental Accounting and Carbon Offset

Environmental accounting and carbon offset are technical tool to share good activities and information with stakeholders outside through e.g. environmental report. Government should lead to develop those systems and promote carbon trade.

Measure 1: Environmental accounting
Programs: - Development of environmental accounting system - Disclose information of environment accounting
Measure 2: Carbon offset
Programs: - Development of carbon offset tool - Carbon trade



07 Community Engagement and Consensus Building

This action engages with the community through consensus building to develop LCS for IM. The process of moving towards Low Carbon Society (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 the 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 from related parties.

Table below shows the sub-actions and the measures which will contribute towards the Emission reduction in this action.

Input from Stakeholders and LCS Information Sharing with Stakeholders in IM

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 local communities, government agencies, non-governmental organizations (NGOs), public (residents, 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.

Sub-actions		Measures
1	Input from Stakeholders and LCS Information Sharing with stakeholders in IM	Periodic LCS Workshops and FGD with Stakeholders in IM
2	Management of the Low Carbon Actions	Dissemination and checking whole action plans
3	Public Information on LCS progress	LCS progress newsletters by IRDA
		Mobile LCS Media Center by IRDA
4	Developing Model Low Carbon Community	Choose, Plan & Implement LCS Initiatives

Measure 1: Periodic LCS workshops and Focus Group Discussion (FGD) with stakeholders in IM
Programs: - 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

Management of the Low Carbon Actions

12 action plans for IM need keep be disseminated and checked. Experts analyze the progress of each actions reported by reporting implementators. Opinion leaders point issues out and share them by website or media centre, calculating reduction of CO2 and cost for awareness rising.

Measure 1: Dissemination and Checking
Programs: - Dissemination of progress updates/ events announcement via billboards, banners and mass media (newspaper, radio, television)

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 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 websites, newsletters, banners, media, mobile showrooms and kiosks.

Measure 1: LCS Progress newsletters
Programs: - LCS project updates - LCS events announcements - Web-based newsletters - Distribution of printed newsletter (printed on recycled paper)
Measure 2: Mobile LCS Media Centre by IRDA
Programs: - 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 hall, places of worship)

Developing Low Carbon Community

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. This initiative involved 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, biomass of palm oil, 3-Rs (reduce, reuse and recycle), production of green goods and reduce the use of private transportation. It

focuses on the formulation of community action plan and community participation to inculcate low carbon behaviours among local communities.

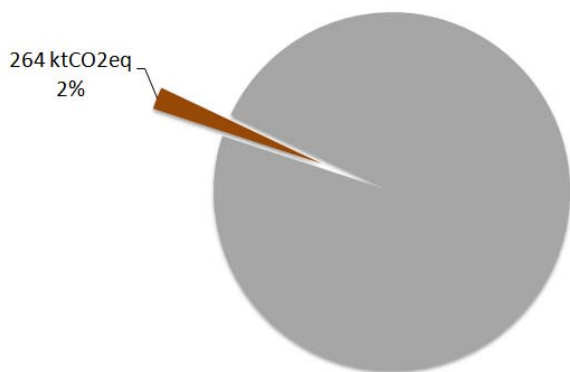
Measure 1: Choose, plan & implement LCS initiatives
Programs: - Build consensus with related authorities - Produce action plans & road maps (through FGD) - Formation of implementation committee - Continuous monitoring of implementation



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 CO₂ 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 264ktCO₂ equivalent. While this amounts to just 2% of total CO₂ 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 interrelated 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 widely thought to be unfavourable climatic conditions of the all-year-long warm, humid tropics, increase in 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

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

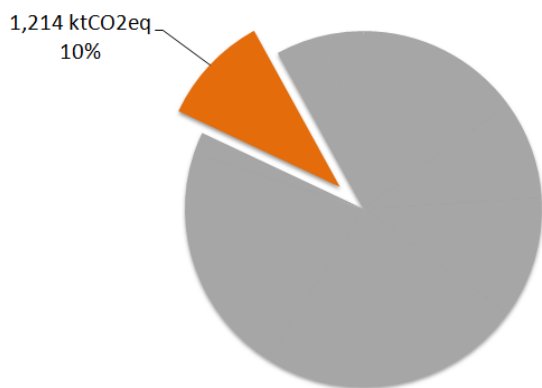
The "livability" of streets decline as the traffic volumes and speeds increased. Streets become more livable when motorists become more "civilised" with lower traffic volumes and speeds. Residents are more likely to walk, bike, and play along such traffic calmed streets. Traffic calming is accomplished 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 population in Iskandar Malaysia is set to more than double from to 3 million and GDP to almost quadruple to RM141.4 billion in 2025, supporting and managing rapid growth while keeping energy demand and CO₂ emissions at bay become 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 at reducing average trip making, trip distances and vehicle mile travel (VMT) and at the same time increasing the use of public transport in Iskandar Malaysia through 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
		Gradual extension & reconnection of forests & regional green spines
2	Promote Compact Urban Development	Urban growth boundary (UGB) for IM
		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
<p>Programs:</p> <ul style="list-style-type: none"> - 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
<p>Programs:</p> <ul style="list-style-type: none"> - 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
<p>Programs:</p> <ul style="list-style-type: none"> - 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 and 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 relating to their urban contexts. Through effective station area planning (SAP), successful station areas may be built upon a rich mix of land uses which can bring a diversity of people, choices and opportunities that 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 measure and programs that need to be implemented are:

Measure 1: Transit Oriented Development (TOD) & Station Area Planning (SAP)
<p>Programs:</p> <ul style="list-style-type: none"> - 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’

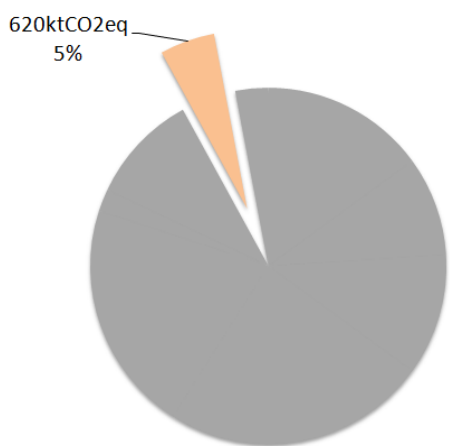
An important facet of smart urban growth is the development of a high-speed digital communication network that is built upon reliable information and communication technology (ICT) infrastructure. ICT infrastructure coupled with extensive electronic applications enable many daily activities to be carried 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 measure and programs include:

Measure 1: Information and communication technology (ICT) to provide the infrastructure backbone to smart living in Iskandar Malaysia
<p>Programs:</p> <ul style="list-style-type: none"> - 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 CO₂ from the atmosphere (acting as a regional carbon sink), moderating 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 it, are an attractive approach to combating climate change. This Action reduces IM’s GHG emissions by 620ktCO₂eq or 5% 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 sequestering about 262 ktCO₂eq per year. 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
Measure2: 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 CO₂. 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 CO₂ 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 - Street planting - 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 ₄ and N ₂ 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

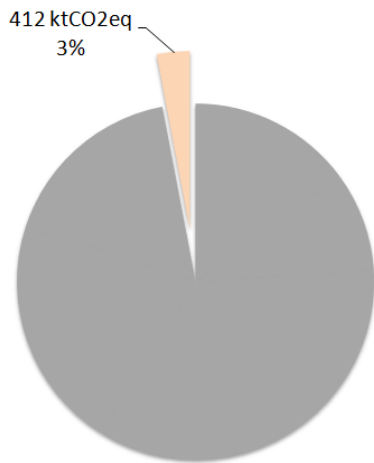
Rural areas in Iskandar Malaysia have natural and cultural richness and uniqueness that are frequently depicted in various tourism product offerings, marketing publications and media. These include natural mangrove areas, rivers, and variety of rural settlements such as the *Orang Asli* village, Malay traditional villages, and FELDA Schemes. Promotion of tourism in rural areas integrates eco-tourism and rural-cultural tourism concept and enhances the hospitality and communication skills among village people.

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



Main objective of Sustainable Waste Management is to figure out alternatives solid waste management (SWM) system that can prevent waste generation and enhance material and energy recovery – SWM that fulfill the challenge of building both low-carbon and sound material cycle society. Four sub-actions were considered in the model of Sustainable Waste Management to achieve the target of half reduction of final waste sent to landfill site and half GHG emission from alternative methods, compare to business as usual (BaU) scenario. The actions are (1) Sustainable municipal solid waste management, (2) Sustainable agricultural waste management, (3) Sustainable industrial waste management, (4) Sustainable waste water management and (5) Sustainable construction and demolition waste management. Implementation of measures and programs under these sub-actions projected to reduce carbon emission in Iskandar Malaysia by 412ktCO₂ equivalent (3% of total emission reduction) in 2025. Total reduction of final waste to landfill is 2500kton/year.

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 Waste Water Management	Better waste treatment and sludge recycling
5	Sustainable Construction and Demolition Waste Management	Effective construction waste treatment

Sustainable Municipal Waste Management

In general waste composition of developing country is mainly of organic waste and in Iskandar Malaysia 40% of its MSW is food waste. Implementation of household composting and decentralized composting for business sector is the best solution for this type of waste. Anyhow, the most effective alternative waste treatment towards reduction of final landfill amount and GHG emission is incineration.

Measure 1: Reduction at source
Programs: - Smart consumption (buy in bulk, refill & concentrate local product) - Choose durable and reusable item - Restrict of using non-recyclable packaging - Encourage culture of sharing, borrowing or renting instead of buying - Choose online digital services, paperless services - Buy product from recyclable material - Pay-as-you-throw" system by 2015 - Scheduled waste collection for bulky waste
Measure 2: Recycling of municipal solid waste
Programs: - Composting at home - Decentralized composting plant - Centralized organic waste recycle center - Establishment of material recycling facilities (MRF) - Incineration for energy recovery - Recycling of e-waste
Measure 3: Extended final disposal
Programs: - Sanitary landfill with methane gas capture to energy
Measure 4: Effective waste transportation
Programs: - Separate waste collection at source - Effective use of transfer station - Optimization of waste collection routes - Selection of appropriate size of collection vehicle - Use of collection vehicle driven by biodiesel fuel (BDF) or Natural Gas Vehicle (NGV)

Sustainable Agricultural Waste Management

Agricultural waste included all major crops residue and public green waste, but waste from palm oil plantation covers more than 90% of total generated agriculture waste and it is 8 times of municipal solid waste. Thus, programs on reducing and treatment of palm oil mill effluent (POME), empty fruit bunch, and palm kernel shell are focus of this sub-actions. All the programs focus on utilizing Clean Development Mechanism to crude palm oil and oil palm biomass factory.

Measure 1: Biomass to wealth
Programs: - POME to biogas - Onsite co-composting - Centralized organic waste centers - Formulation of biomass into animal feed

Sustainable Industrial Waste Management

In Malaysia as general, another major challenge in industrial waste management besides its massive generation amount is centralization of schedule waste into one treatment plant for Peninsular Malaysia. With two flagships focusing on industrial development, the management of industrial waste treatment is crucial. Besides improvement in production process through cleaner production, improvement of reusable waste cycle through industrial symbiosis within Iskandar Malaysia industrial area is also another option in reducing amount of total waste generation.

Measure 1: Scheduled waste reduction and treatment
Programs: - Encourage cleaner production initiative - Select of treatment method with less energy and less material - Decentralized scheduled waste treatment plant - Smelting of inorganic wastes
Measure 2: Non-scheduled waste reduction, reuse and treatment
Programs: - Encourage cleaner production initiative - Introduce industrial symbiosis for waste reusing system - Waste to fuel and production of bio-diesel fuel - Incineration for energy recovery

Sustainable Waste Water Management

Sewage sludge massive generation is inevitable due to the major increase in population within Iskandar Malaysia. With better management of sewage sludge could improve GHG emission from this sector such as anaerobic digestion for methane gas production. Shifting from individual septic tank to centralized mechanical sewerage system is also another option.

Measure 1: Better waste water treatment and sludge recycling
Programs: - Design of better wastewater treatment - Sewage sludge recycling & recovery (Anaerobic digestion for methane recovery)

Sustainable Construction and Demolition Waste Management

As cities within Iskandar Malaysia expand rapidly, waste from building and facilities construction also generated massively. In term of waste reduction, 70% (2025) from 35% (2005) IBS implementation is set for newly constructed building in Iskandar Malaysia. As for material recovery almost 90% of waste from construction area is reuse and recyclable.

Measure 1: Effective construction and demolition waste treatment
Programs: - Recycling of construction and demolition waste



12 Clean Air Environment

Air pollution issue in current Iskandar Malaysia is mainly caused by the emission of particulate matter (PM), SO₂, NO_x, 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 SO₂, NO_x, 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 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	Quantification of co-benefit s of LCS CM
		Promote win-win actions in Industry
		Promote low-emission vehicle and public transportation
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 automobile and its fuel are necessary to implement. Since the emission of PM and NOx from the conventional type bus is very large, the per capita emission of air pollutant can be reduced by the shift of a transport demand to a green public transportation such as LRT, BRT and Green Bus. The long-distance trip of private vehicle on the inter-state highway 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"> - Quantitatively evaluate the reduction of pollutant emission for each LCS CM. - Evaluate /predict the improvement of local air quality by model simulation.
Measure 2: Promote win-win actions in industries
<p>Programs:</p> <ul style="list-style-type: none"> - Visualisation of co-benefit of LCS CM in the industrial sector. - Formulation of guidelines on good technology in the industrial sector. - Implement a tax incentives to new technologies for improving air quality. - Improve air quality monitoring network.
Measure 3: Promote low-emission vehicle and public transportation
<p>Programs:</p> <ul style="list-style-type: none"> - Encourage consumers to purchase low-emission vehicles - Implement tax incentives on purchase of low-emission vehicles - Increase investments in public transportation - Improve roadside air quality monitoring
Measure 4: Compensate the negative impact of LCS CM on local air quality
<p>Programs:</p> <ul style="list-style-type: none"> - Establish a mechanism to authenticate the quality of biofuels - Install the appropriate removal device when using biomass as fuel

Improve Regional Air Quality

One of targets in achieving the objective of good air quality for IM is 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% of the time. In contrast to the air quality status of Pasir Gudang reported in 2009, where it was in 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 Pollutant Index (API) extracted from continuous monitoring of PM₁₀, CO, SO₂, NO₂ and O₃ is important indicator for residents. It should be published on such as newspaper and website.

In addition this, one of the major atmospheric issue is "Haze" caused by the biomass burning in neighbouring nations. Therefore, it is necessary to strengthen cross-border cooperation towards reducing perennial haze occurrences. The haze was mainly caused by land clearing via open burning in the Borneo and Sumatra Island, Indonesia and Peninsula 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 action based on the agreement with neighbouring nations.

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

Low Carbon Society Blueprint With Relevant Existing Policies

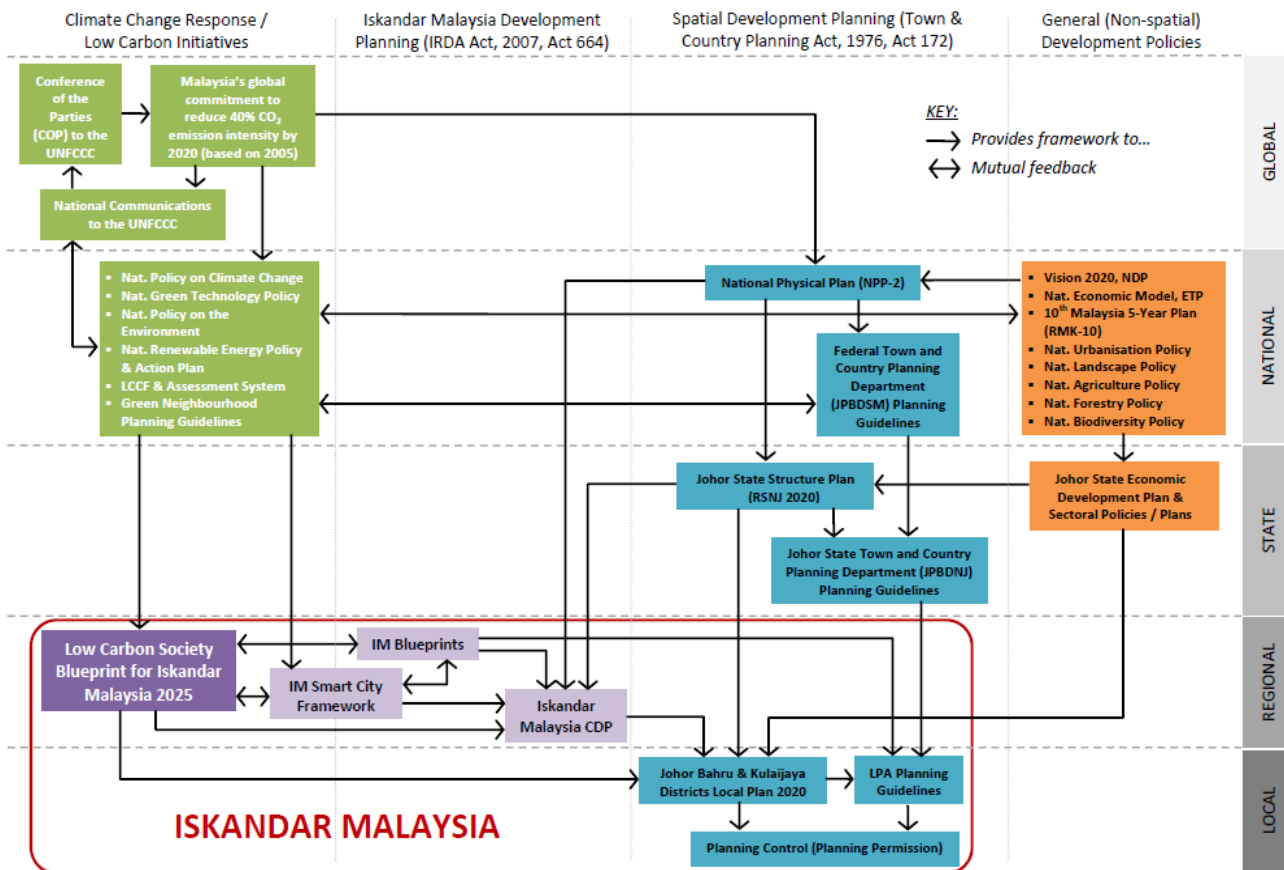


Figure 7: Positioning the *Low Carbon Society Blueprint for Iskandar Malaysia 2025* within the context of existing national, state and local development policies and plans

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 24 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. To that end, the Blueprint sets a carbon emission intensity reduction target of 50% by 2025, based on the 2005 emission level. The target would be achieved through implementing 12 LCS actions set under three main themes: *Green Economy, Green Community and Green Environment*. 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.

Acronyms and Abbreviations

3R	Reduce, Reuse and Recycle	RE	Renewable Energy
AP	Air Pollution	R&D	Research and Development
API	Air Pollution Index	SATREPS	Science and Technology Research Partnership for Sustainable Development Program
ASEAN	Association of Southeast Asian Nations	SO2	Sulfur Dioxide
BaU	Business as Usual	SOHO	Small Office Home Office
BEMS	Building Energy Management System	UTM	Universiti Teknologi Malaysia
BIPV	Building Integrated Photovoltaic	VOC	Volatile Organic Compound
BRT	Bus Rapid Transit		
CDP	Comprehensive Development Plan		
CH4	Methane		
CM	Counter Measure		
CO2	Carbon Dioxide		
CSR	Corporate Social Responsibility		
EE	Energy Efficiency		
EEl	Energy Efficiency Improvement		
ESCO	Energy Service Company		
FDI	Foreign Direct Investment		
FELDA	Federal Land Development Authority		
FGD	Focus Group Discussion		
GB	Green Building		
GBI	Green Building Index		
GDP	Gross Domestic Product		
GHG	Greenhouse Gas		
GIS	Geography Information System		
IBS	Intelligent Building System		
ILS	Intelligent Logistic System		
IM	Iskandar Malaysia		
IRDA	Iskandar Regional Development Authority		
IT	Information Technology		
JICA	Japan International Cooperation Agency		
JST	Japan Science and Technology Agency		
Kteq	Kiloton equivalent		
LCS	Low Carbon Society		
LRT	Light Rapid Transit		
Mteq	Million ton equivalent		
MSW	Municipal Solid Waste		
NIES	National Institute for Environmental Studies		
NGO	Non-Governmental Organization		
NO	Nitrogen Monoxide		
N2O	Nitrous Oxide		
NGO	Non-Governmental Organization		
PDCA	Plan Do Check Action		
PQ	Power Quality		
PV	Photovoltaic		
PM	Particular Matter		

Bibliography

- Charles Levy (2010) A 2020 Low Carbon Economy. The Work Foundation, London.
- C40 Cities Climate Leadership Group (2011) Climate Action in Megacities: C40 Cities Baseline and Opportunities.
- Department for Environment, Food and Rural Affairs (2007) Achieving a Sustainable Low Carbon Society. Department for Environment, Food and Rural Affairs, United Kingdom.
- Energy White Paper (2003) Our Energy Future: Creating a Low Carbon Economy. The Stationery Office, Norwich.
- Ho, C.S., Ahmad, S., Muhammad Hussein, M.Z.S., Chau, L.W., Matsuoka, Y., Kurata, G., Fujiwara, T., Shimada, K., Gomi, K., Yoshimoto, K. and Janice, J.S. (2009) Low Carbon City 2025: Sustainable Iskandar Malaysia. Available online: http://2050.nies.go.jp/report/file/lcs_asialocal/iskandarlcs.pdf (Accessed on July 20 2012)
- Khazanah Nasional (2006) Comprehensive Development Plan for South Johor Economic Region 2006-2025. Khazanah Nasional, Kuala Lumpur.
- Khazanah Nasional (2010) Opportunities and Risks Arising From Climate Change for Malaysia, Khazanah Nasional, Kuala Lumpur.
- Ministry of Energy, Green Technology and Water Malaysia (2011) Low Carbon Cities Framework and Assessment System, Ministry of Energy, Green Technology and Water, Putrajaya.
- Ministry of Energy, Green Technology and Water Malaysia (2011) National Green Technology Policy, Ministry of Energy, Green Technology and Water Malaysia, Malaysia.
- Ministry of Natural Resources and Environment Malaysia (2010) National Policy on Climate Change, Ministry of Natural Resources and Environment Malaysia, Putrajaya.
- Ministry of Natural Resources and Environment Malaysia (2011) Second National Communication to the UNFCC. Ministry of Natural Resources and Environment Malaysia, Putrajaya.
- National Institute for Environmental Studies (2006) Developing Visions for a Low Carbon Society through Sustainable Development. National Institute for Environmental Studies, Japan.
- Skea, J. and Nishioka, S. (2008) Policies and Practices for Low Carbon Society. Climate Policy (8) S5-S16., Earthscan. Available online: http://www.fao.org/fileadmin/user_upload/rome2007/docs/Policies%20and%20practices%20for%20a%20low-carbon%20society.pdf. (Accessed on July 20 2012)
- The Climate Group (2010) Low Carbon Cities: An International Perspective. Available online: http://www.theclimategroup.org.cn/publications/2010-08-Low_Carbon_Cities_An_International_Perspective-en.pdf (Accessed on 15 May 2012)
- The Economic Planning Unit (2010) Tenth Malaysia Plan 2011 – 2015. The Economic Planning Unit, Prime Minister's Department, Putrajaya.
- The World Bank (2010) Cities and Climate Change: An Urgent Agenda. World Bank, Washington.
- The World Bank (2010) World Development Report 2010: Development and Climate Change. World Bank, Washington.
- United Nations Human Settlements Programme (2011) Cities and Climate Change: Global Report on Human Settlements 2011. Earthscan, London.

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