



Green City Action Plan

A Framework for
GrEEEn Actions
Melaka, Malaysia



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14 April 2014



Master Plan on ASEAN Connectivity Implementation (RETA 8040)

Green City Action Plan: A Framework for GrEEEn Actions Melaka, Malaysia

Final (14 April 2014)

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Asian Development Bank

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Foreword



YAB Datuk Seri Ir. Hj. Idris bin Hj. Haron, Chief Minister of Melaka

It is with great pleasure that I introduce the Green City Action Plan for Melaka. This plan reflects Melaka's long-term commitment to pursue low carbon growth, improve environmental quality and strengthen economic competitiveness. Doing so will support the Prime Minister's pledge at the United Nations Climate Change Conference in Copenhagen in 2009 (COP15) to reduce greenhouse gas emissions in Malaysia.

As the flagship project for the Indonesia-Malaysia-Thailand Growth Triangle's (IMT-GT) Green Cities Initiative, Melaka worked closely with the Center for IMT-GT and the Asian Development Bank, as well as with the PM's Economic Planning Unit in developing the GCAP. We value the support and guidance provided, and for the trust they have placed in Melaka for taking a leading role in this important regional initiative. The continued support of these agencies will be invaluable as Melaka looks to implement the GCAP.

Melaka is already famous as a World Heritage City. Through innovation, technological improvements and adjustments in our urban development practices, we also seek recognition as a leader in urban sustainability. In the future, we will take climate change into consideration, look at renewable energy for our energy needs, and continue to pursue the award-winning transformation of the Melaka River. We will also take a comprehensive look at tourism and will work hard to reduce problems such as traffic congestion that can risk Melaka's competitiveness as a tourist destination.

The GCAP provides us with strategic guidance to pursue long-term integrated development in Melaka. We now need strong support and active participation from the private sector, residents and other stakeholders. In the coming years, together, we will make a green Melaka, and enhance livability for all our residents!



Datuk Dr. Rahamat Bivi Yusoff
Director General, Economic Planning Unit (EPU)

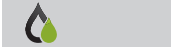






I want to congratulate Melaka and the Chief Ministers and Governors Forum (CMGF) in pursuing a new initiative for Green Cities in IMT-GT. The Tenth Malaysian Plan for 2011-15 recognizes that livable and sustainable urban regions are important to Malaysia's aspirations of becoming a high-income nation. Not only do cities contribute greatly to the Malaysia's economy, they also attract top talent and are rich sources of innovation. The GCAP for Melaka charts a path towards urban sustainable development and provides an exceptional example that can be replicated across Malaysia and the IMT-GT region. I am eager to provide continued support to this endeavor.



Mr. Pairote Potivong
Director, The Center for IMT-GT Subregional Cooperation (CIMT)

The CIMT is honored to be leading the Green Cities Initiative aimed at promoting sustainable urban development in the IMT-GT region. We have worked closely with Melaka to prepare the GCAP and look forward to pursuing similar efforts in Songkhla and Medan. The CIMT has already enacted some of the recommendations of the GCAP including a commitment to establish a Green Cities Knowledge Center in Melaka. The Knowledge Center will be responsible for conducting research and developing knowledge products in green city practices. By demonstrating and learning from three diverse urbanizing areas, we are very interested to make the Green Cities Initiative one of the flagship programs of the IMT-GT. Doing so would promote balanced investments in environmental quality improvements, economic competitiveness and equitable growth, and enhance livability in the region that is host to nearly 70 million residents.

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List of Abbreviations

ADB	Asian Development Bank
CDM	Clean Development Mechanism
CIIPP	City Infrastructure Investment Programming and Prioritization Toolkit
CIMT	Center for Indonesia-Malaysia-Thailand Growth Triangle
CM	Chief Minister
DID	Department of Irrigation and Drainage
DOA	Department of Agriculture
DOE	Jabatan Alam Sekitar / Department of Environment
DRM	Disaster Risk Management
EE	Energy efficiency
EEE	Environment, Economy, Equity
EPU	Economic Planning Unit, Prime Minister Department
ESA	Environmentally Sensitive Area
GCAP	Green City Action Plan
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GreenTech	Perbadanan Teknologi Hijau Melaka
IMT-GT	Indonesia-Malaysia-Thailand Growth Triangle
JPBD	Jabatan Perancangan Bandar dan Desa
JPJ	Jabatan Pengangkutan Jalan
KeTTHA	Kementerian Tenaga, Teknologi Hijau dan Air
MBMB	Majlis Bandaraya Melaka Bersejarah
MPAG	Majlis Perbandaran Alor Gajah
MPHTJ	Majlis Perbandaran Hang Tuah Jaya
MPJ	Majlis Perbandaran Jasin
NGO	Nongovernmental organization
PPP	Public-private partnership
PPSPPA	Perbadanan Pengurusan Sisa Pepejal Dan Pembersihan Awam
RE	Renewable energy
SEDA	Sustainable Energy Development Authority
SME	Small and medium enterprises
SPAD	Suruhanjaya Pkhidmatan Awam Darat
SPAN	Suruhanjaya Perkhidmatan Air Negara
STP / WTP	Sewage Treatment Plant / Wastewater Treatment Plant
SWM	SWM Environment Sdn Bhd
TIF	Tax Increment Finance
TNB	Tenaga Nasional Berhad
TOR	Terms of References
TVET	Technical Vocational Education and Training
UEA	Urban Environmental Accords
UMP	Urban Management Partnership
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPEN	Unit Perancang Ekonomi Negeri Melaka

BACKGROUND

Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT)

The Indonesia-Malaysia-Thailand Growth Triangle is a sub-regional economic cooperation program aimed at spurring economic development in participating provinces and states in the three countries. The IMT-GT focuses on enhancing trade and investment opportunities, tourism, strengthening infrastructure links and institutional arrangements, amongst others, to achieve a vision of “a seamless, progressive, prosperous and peaceful subregion with improved quality of life.”¹ Sustainable urban development in the form of green cities is seen as a priority in the region. In mid-2012, the IMT-GT network requested the ADB to assist the cities of Melaka (in Malaysia), Songkhla (in Thailand) and Medan (in Indonesia) to develop a comprehensive green city action plan (GCAP). Melaka’s is the first GCAP as part of this initiative and will set an example that will be emulated by other cities within the subregion.



Figure 1. The Indonesia-Malaysia-Thailand Growth Triangle (Source www.kssc.com.my)

Asian Development Bank’s focus on Green Cities

Globally, cities consume nearly 75 percent of total resource use and are responsible for more than 75 percent of greenhouse gas (GHG) emissions. Urbanization has been linked to environmental degradation and social challenges, such as polluted air and contaminated rivers, and rising inequalities. In addition, higher concentrations of people now live in hazard prone areas due to rapid urbanization, and are increasingly susceptible to the adverse effects of climate change. Cities in Asia reflect these trends.

Recognizing that urban regions are key drivers of economic growth, ADB’s Urban Operational Plan 2012-2020 emphasizes balanced urban development in an effort to promote livable cities across Asia (“cities that are competitive, socially inclusive, and environmentally attractive”). A regional capacity development technical assistance (TA 8314) specifically advances integrated urban development and environment planning in the Southeast Asia region.² TA 8314 will develop GCAPs for select cities in Viet Nam, Myanmar, Indonesia and the Philippines and provides opportunities for adopting lessons and cross learning for the application of the green city process in the IMT-GT region (including Melaka). TA 8314 also sets up an urban management partnership program as a mechanism to promote peer-to-peer learning on green cities.

“Urbanization is one of the defining trends of Asia’s transformation. With approximately 75% of gross domestic product (GDP) today coming from the urban areas, the quality and efficiency of Asian cities will determine the region’s long-term productivity and”

Source: ADB. 2011. *Asia 2050: Realizing the Asia Century*. Manila.

What is a Green City, and what is a Green City Action Plan (GCAP)?

A green city can be defined as, a city that is resilient, inclusive, manages its natural resources well, and promotes low carbon growth to remain competitive and enhance livability for all its residents.³

2. Asian Development Bank. *Technical Assistance Report. Regional: Green Cities, A sustainable Urban Future for Southeast Asia*. (TA 8314-REG). Manila.

3 Ibid.

1. <http://www.imtgt.org/> [Accessed 31 March, 2014]

Current urbanization trends have come at a high environmental and social cost

In recent decades, Asian cities have provided increased economic opportunities and raised the standard of living for millions of residents. However, these opportunities have come at very high environmental and social costs.

- Unfettered land development has led to the loss of valuable land resources such as prime agricultural areas, wetlands, or large forests.
- Rapid increase in water consumption associated with population growth and improved lifestyles has put greater pressure on water resources and has led to problems such as shrinking aquifers or increasing conflicts amongst water users.
- Greater affluence, increasing distances, land use patterns and lack of public transit options have led to an increase in the use of personal cars and motorcycles, that in turn have become a major cause for air pollution and greenhouse gases associated with transportation.
- Increased reliance on air conditioning and artificial lighting have made buildings one of the largest consumers of electricity in urban areas. This is a problem when electricity is produced from non-renewable sources such as coal, another major source of GHG emissions.
- High land prices in city centers and prime locations have pushed lower income residents to the periphery reducing their accessibility to job opportunities, or to marginal lands that increases their vulnerability to hazards.
- Large concentrations of people now live in hazard-prone areas and increasingly face higher risks from climate change related impacts.
- Urban development practices such as increased impervious surfaces associated with buildings, roads and parking areas have increased flooding risk, further compounding vulnerability to disasters.
- Human health has been impacted due to increased pollution. Greater incidences of asthma have been associated with air pollution, and long-term exposure to some pesticides that are used to improve productivity of agricultural lands or control pests have been linked to birth defects, nerve damage and even cancer.
- Cities now produce large amounts of waste that are polluting land, rivers, lakes and other water bodies, and contributing to GHG emissions.

Business-as-usual threatens urban competitiveness

Due to limited financial resources, need to constantly update policies, and low implementation capacities, city governments have been unable to manage growth or provide infrastructure at the pace of urban development. Further, sectorial boundaries have hampered coordination between departments, and decisions are often made in an uncoordinated manner that has further limited the efficient use of resources.

Letting urbanization continue in the current manner is no longer an option. For cities to thrive economically, challenges such as traffic congestion, water shortages, or flood risks have to be reduced. Under the business-as-usual scenario, if urban development is left to continue unchecked and without regard to environmental or social costs, livability in cities will likely worsen. Further, economic productivity will suffer as was in the case of Bangkok during and after severe flooding in 2011.



Floods in Thailand have caused many factories to close, limited hard drive supplies globally. (Source: http://s4.reutersmedia.net/resources/r/?m=02&d=20111011&t=2&i=513951980&w=580&fh=&fw=&ll=&pl=&r=2011-10-11T053948Z_01_BTRE79A0FQG00_RTROPTP_0_THAILAND-FLOODS) [Accessed 1 March 2014]

The experience of Thailand (in 2011) illustrates the greater cost of doing nothing. The huge industrial estates just north of Bangkok sit on land that was once heavily cultivated for rice, precisely because the land floods regularly. The factories were swamped in the flooding. As a result, at the end of 2011 Thailand suffered its biggest quarterly contraction in GDP (9% year-on-year) since the Asian financial crisis of 1997-98... Some companies are now contemplating a move to higher ground. That will add to their costs, but could spare them next time. Thailand's government is urgently reviewing its policies too. ”

Source: The Economist. "Asia and Its floods: Save our cities." The Economist 17 March 2012 (Bangkok and Jakarta).

The Green City approach: Focusing on integrated and balanced growth

The ADB, through a green city approach seeks to realize a city that is livable for all its residents. Equal emphasis is placed on environment, economic competitiveness and equity (the 3Es), to move away from business-as-usual practices and achieve balanced growth.

Key Elements: The green city approach promotes a paradigm shift where, cities make a concerted effort to pursue integrated urban development and environmental planning in response to rapid urbanization and associated challenges. With regards to environment, the focus is on managing land, water and air in an efficient manner to maintain the long term sustainability of these natural resources, pursuing low carbon technologies and practices to reduce greenhouse gas emissions, and reducing vulnerabilities to natural hazards and climate change impacts by enhancing resilience and managing disaster risks.

To achieve economic competitiveness, cities seek to expand municipal infrastructure, improve efficiency of service delivery, and ensure that operations and maintenance are carried out effectively. To do so, cities consider innovative financing mechanisms, through engaging with the private sector and seeking new opportunities for revenue generation. Cities also promote entrepreneurship and jobs, with particular focus on green industries.

To ensure equitable outcomes, cities partner with civil society, residents, private sector, institutions of learning, and other stakeholders to identify and implement solutions aimed at improving livability for all residents.

Enablers: A green city approach requires several enablers to be in place, including policies, strategies, sector plans and regulations that require and promote integrated development. Further, appropriate institutions are necessary to ensure coordination across sectors, and to facilitate civil society and private sector participation in urban governance.

Process: The process of moving from business-as-usual towards a livable city is based on an assessment of existing conditions. Equally important is to conceptualize a concise vision for the future of the city, similar to what Melaka has done as part of the Green Technology Blueprint and seek consensus amongst the various stakeholders so that there is broad ownership of the urban transformation processes.

Outputs: Through a multi-criteria analysis key actions are prioritized and encapsulated in a Green City Action Plan that identifies an investment program and financing mechanisms to achieve balanced growth in a community. Also, the ADB has set up an innovative partnership program to promote peer-to-peer learning. The Urban Management Partnerships engage mentors from cities that showcase successful examples of urban transformation to share knowledge and practices, and is aimed at developing core capacities, skills and knowledge

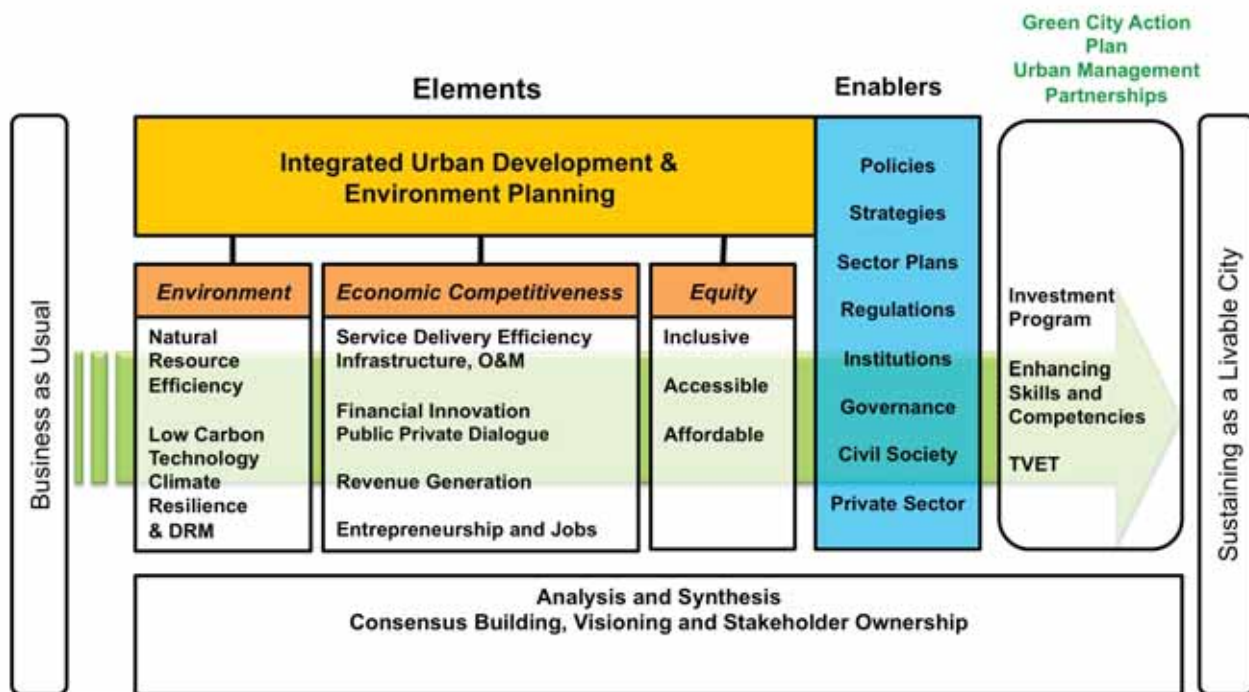


Figure 2: Conceptual representation the Green City Approach. Source: Asian Development Bank. 2014 (forthcoming). Enabling Green Cities: An Operational Framework for Secondary Cities in Southeast Asia. Sandhu, S. and Singru. R. ADB Policy Briefs. Manila.

EXECUTIVE SUMMARY

Melaka Green City Action Plan

- Melaka is well recognized as a world heritage city that receives millions of visitors annually.
- Melaka is a growing community and expects to add more than 120,000 residents between 2011 and 2020.
- Manufacturing is strong, and was responsible for approximately 45 percent of Melaka's GDP, and nearly 29 percent of the jobs in 2011.
- Nearly two-third of Melaka is categorized as Environmentally Sensitive Areas due to ecological reasons such as rich biodiversity.
- Agriculture is still prominent as a land use and occupies half of the land in Melaka.
- Portions of Melaka, particularly the historic part, reflect green design characteristics such as walkable neighborhoods, and mixed use developments that reduce the need for auto use.
- By transforming the Melaka River from a drainage channel to a popular and award-winning cultural amenity, Melaka has already demonstrated its leadership in successfully implementing an integrated project.
- By implementing one solar farm project with a second one already in preparation, Melaka is on its way towards large scale production of renewable energy
- Malaysia and Melaka have a policy framework supporting sustainable urban development.

Yet key challenges threaten environmental quality and economic competitiveness:

- Coastal development continues without an assessment of risk related to climate change related impacts
- Traffic congestion is worsening and can threaten Melaka's popularity with tourists
- The heritage area needs continued improvements and effective management to ensure that tourism goals, heritage priorities and interests of residents can be balanced
- Continued expansion at the urban periphery comes at the cost of environmental resources
- Without a strong constituency, green activities continue in an ad-hoc manner and only result in minor improvements
- Increasing population and greater affluence leads to an increase in resource consumption and GHG emissions



Traffic Congestion (Source: www.citris-uc.org)

Aspirations towards Green City Status

The state of Melaka aspires to become a Green Technology City State by 2020. This aspiration stems from emphasis towards environmental sustainability at the national level. In 2009, the Prime Minister Datuk Seri Najib Tun Abd Razak declared in Copenhagen, "that Malaysia is adopting an indicator of a voluntary reduction of up to 40% in terms of emissions intensity of GDP by the year 2020 compared to 2005 levels." The Tenth Malaysia Plan, the national government's flagship development strategy for the years 2010-2015, also seeks to attain high-income status for the country by 2020 while recognizing the need to be inclusive and environmentally sustainable. YAB Datuk Seri Ir. Hj. Idris bin Hj. Haron, the current Chief Minister, along with Datuk Seri Hj. Mohd. Ali bin Mohd. Rustam, the previous Chief Minister and other senior leaders endorse the drive to transform Melaka into a green state.

Melaka has already embarked on a path towards sustainable urban growth. Efforts include government led policies and projects, as well as private sector and citizen initiatives, that seek to enhance livability in Melaka. Melaka took a first step in preparing a comprehensive approach towards urban sustainability, when it adopted the Green Technology Blueprint in 2011 and formalized a vision to transform Melaka into a Green Technology City State by 2020. In addition, Melaka established the Green Technology Council for the purposes of overseeing efforts to achieve the vision and adopted United Nations Urban Environmental Accords ratings method to assess their green city performance.

The Green City Action Plan is a next step towards helping Melaka reaching its vision. It is based on the underlying premise that **integrated and comprehensive approaches will lead to a greener Melaka**. Five types of actions are recommended to promote such integrated and comprehensive approaches:

- **'Process-oriented actions'** that institutionalize coordination, stakeholder engagement and cross-disciplinary decision-making during implementation and monitoring;
- **'Planning actions'** that require a comprehensive view of a topic to identify follow up actions (examples include, a Watershed Plan or an Energy Plan);
- **'Feasibility studies'** that require a detailed multi-criteria evaluation of a specific intervention before proceeding with large investments;
- **'Specific government programs'** aimed at achieving specific outputs that require recurring government engagement to further integrated development; and
- **'Demonstration projects'** that consist of specific activities that showcase best practices to raise awareness and build capacities towards achieving a greener Melaka.

The GCAP provides a set of recommendations that are aimed at maintaining Melaka's competitiveness as a popular tourist and investment destination, keeping environmental challenges to a minimum, and establishing the state as a role model for livability in the region.

About Melaka

Melaka is the smallest of 14 states in Malaysia and home to Melaka city, a rich center of heritage that was recently listed as a UNESCO World Heritage Site. Melaka was a prominent trading center in the 16th century that attracted traders from all over eastern and western Asia including India and China. Strategically located on the Malaysian Peninsula and along the narrowest portion of the Malacca Strait, Melaka attracted a lot of interest from European settlers, who sought to control movement of ships between the Indian Ocean and the South China Sea. Today, Melaka's history is reflected in its archi-



Figure 3. Regional Melaka (Source: http://langkawiinfo.blogspot.com/2011_09_01_archive.html) [Accessed 1 February 2014]

texture, local culture and multiethnic cuisine, which bring millions of tourists to visit every year.

Urban Characteristics

Melaka state consists of four municipal districts – Alor Gajah, Jasin, Melaka Tengah, and Hang Tuah Jaya. Melaka Tengah is the most built out, with the highest urban density, and includes the historic Melaka center. Alor Gajah and Jasin are still predominantly agricultural districts, while Hang Tuah Jaya is a newly created planned district that has become the new state government center.

The population of Melaka is projected to grow from 830,900 in 2011 to 952,500 in 2020 (annual growth rate of 1.5 percent). Manufacturing and services are the two dominant economic sectors. Manufacturing is mostly steady, but the service sector (medical and cultural tourism related) continues to grow at a rapid rate.



Figure 4. Key districts of Melaka

Key Assets - Natural Asset Advantage

- **Melaka is rich in natural areas**

The state of Melaka occupies 1,663 km² of land. Less than 10 percent is used for urban or industrial uses, with the remaining either devoted to agriculture (49 percent), forests, or other uses. A considerable portion of the land (66%) is categorized as Environmentally Sensitive Areas. ESAs refer to areas that are of critical importance in terms of goods, services and for the life-support systems they provide such as water purification, as well as for their biodiversity. Development within ESAs is controlled depending on the sensitivity of the resource (further discussion is provided in the Chapter on Urban Nature). Within Melaka, most of the ESA areas are located in Alor Gajah and

some in Jasin.¹ As a result, these two districts have significantly lower densities compared to Melaka Tengah (Alor Gajah has 276 persons, Jasin has 200 persons and Melaka Tengah has 1,703 persons per hectare).²

- **Local food production**

Nearly half the land in Melaka is used for agriculture. Additionally, Melaka's extended coastline has allowed the fisheries to flourish in the past. Although employment in this sector has been declining, proximity to farms provides opportunities to increase local food production and reduce transportation costs in the future. Melaka is making a concerted effort to develop agriculture and agro-based industry, as well as the agro-tourism industry. Tours of rubber plantations, fruit plantations and oil-palm plantations are now offered in an effort to expand tourism opportunities in the state.³

Assets for Competitive Growth

- **Melaka is a prominent tourist destination**

Melaka, along with Penang, are recognized as World Heritage Cities for their multi-cultural heritage and tradition. Melaka's popularity as a tourist destination grows on an annual basis. In 2012, approximately 13.7 million tourists visited Melaka, a significant increase from approximately 12.4 million tourists who visited the previous year. Tourists visit from within Malaysia and from international destinations including Singapore, China, Korea and India. In addition to its rich heritage, Melaka also offers recreational opportunities (such as forested areas for eco-tourism, a zoo, a beach, and golf courses) as well as shopping malls, which are gaining popularity with tourists. The New York Times listed Melaka as one of the 45 destinations to visit in 2012.⁴



Historic centre of Melaka

1 ESAs are categorized with three designations. ESA Rank 1 is the most sensitive and ESA Rank 3 is the least. In Melaka, approximately 80% of the ESA areas are categorized as ESA Rank 3.

2 Atkins Report, 2013

3 http://www.melakacom.net/agro_tourism/main.htm [Accessed 1 February 2014]

4 <http://www.nytimes.com/2012/01/08/travel/45-places-to-go-in-2012.html> [Accessed 1 February 2014]

“ *With its lantern-lighted canals and silent, narrow streets lined with decades-old ornate temples and shop houses, few places in Southeast Asia conjure romantic images of the past as effectively as Malacca, Malaysia’s oldest city. A former Portuguese, Dutch and British colony, this UNESCO World Heritage site is now attracting record numbers of tourists lured by its unusual architecture and cuisine, which reflect centuries of foreign influences.* ”

Source: The New York Times (<http://www.nytimes.com/2012/01/08/travel/45-places-to-go-in-2012.html>).

- **Melaka is a popular manufacturing hub**

Located 148 kilometers southeast of the capital city, Kuala Lumpur, Melaka is a hub for small-, medium- and large industries, and attracts foreign direct investments that have spurred its manufacturing sector. Twenty-three industrial areas are located in the state and include approximately 500 factories with links to America, Germany, Japan, Taiwan and Singapore. Products manufactured in the state include high-technology automotive components, weaponry, electronics, and computer components.⁵

Some of the reasons for Melaka’s growth in manufacturing stem from factors such as political stability in the country, which are applicable to Malaysia in general, and Melaka’s reputation as a progressive state for business. Melaka is also well connected by road to Kuala Lumpur International Airport located within 1.5 hours of driving distance to the north, Singapore approximately 3 hours to the south, and the ports of Klang to the west and Johor to the south. Other factors that may contribute to Melaka’s popularity include, lower costs of living and land compared to Kuala Lumpur, its history as a bustling trading center, its popularity as a tourist destination with great emphasis placed on high quality services for outsiders, as well as increasing recognition for medical services offered by private and state owned hospitals.

- **Melaka has shown leadership with successful implementation of integrated urban development**

Pursuing an integrated approach towards urban development is not new for Melaka. The state has successfully begun the transformation of the Melaka River from a backyard drainage channel to a popular and highly successful cultural amenity. Initial transformation has required an integrated effort and nearly a decade to construct wastewater infrastructure, adopt historic preservation and placemaking measures, and pursue economic development strategies to create a an urban waterfront with a riverwalk and river cruise experience that has become a popular tourist attraction.

5 http://www.invest-melaka.com.my/v2/index.php?option=com_content&view=article&id=53&Itemid=63 [Accessed 1 Feb 2014]

Manufacturing contributed nearly 45 percent of Melaka’s GDP of 16.125 million Ringgit in 2011; Services contributed another 47 percent. Also, manufacturing sector employed 87,143 persons in 2010 (28.6% of total employment) and the services sector (wholesale, retail, hotel and restaurant) employed 85,159 employees (27.9%), although employment in the services sector is growing much more rapidly than in the manufacturing sector. (Source: Atkins Report, 2013.)

Similarly, Melaka has recently pursued an integrated approach to plan Hang Tuah Jaya Green City that is being developed as a pilot under the Low Carbon Cities Framework (A Federal Government ratings system for Green City). The city is under development and requires all buildings to have a certification similar to LEED or GBI.

- **Melaka has already initiated production of renewable energy (Solar Photovoltaic)**

Melaka has already embarked on production of renewable energy. The state inaugurated a 5 megawatts solar farm in 2013, and is on its way to develop a second solar farm with a capacity to generate 2 megawatts. Further, the state has an ambitious vision to “to become a world-class solar city ... by 2025.”⁶ For this purpose, it has set up a Melaka World Solar Valley, an area of 7,248 hectares, where a cluster of green technology industries specializing in solar energy will be created.



Melaka was awarded a “green Apple” award by a UK based environmental non-profit organization for the Melaka River Transformation Project (the award is given to projects that reflect environmental best.) Source: <http://www.thegreenorganisation.info/index.php/about-us> [Accessed 1 March 2014]

6 Brochure for Melaka World Solar Valley produced by the Planning Department, Alor Gajah Municipal Council

- **Melaka and Malaysia have an enabling policy framework focusing in sustainable development**

Development planning in Malaysia is guided by the National Physical Plan-2 (NPP2), which is aimed at establishing an efficient, equitable and sustainable national spatial strategy to guide the overall development of the country towards achieving developed and high-income status by 2020. The NPP2 has strong provisions for environmental protection, stewardship of natural resources and sustainable use of land.

State and local physical planning procedures are based on the provisions of the Town and Country Planning Act 1976. There are several specific planning guidelines and circulars with specific green city provisions including the following:

- Planning Guideline on Environmentally Sensitive Areas
- Green Neighborhood Planning Guideline
- Planning Guideline for Roof Top Gardens
- The Circular from the Secretary General, Ministry of Housing and Local Government on Rain Water Harvesting System, 1999

Additionally, the Federal Department of Town and Country Planning has initiated a number of research program focusing on green cities:

- Green Neighborhood Index
- Sustainable Development Indicators - Malaysia Urban and Rural Indicator Network for Sustainable Development (MURNInets)
- LUPAr (Landuse Appraisal for Risk Areas) Programme
- Action Plan for Environmental Sensitive Areas
- Planning Methods in application – Sustainability Assessment (SA) application in plan making process

Numerous agencies (and their policies) focus on environmental quality, economic competitiveness and equity considerations in Melaka. The agencies are listed below.

ENABLING FRAMEWORK (AGENCIES)	Agencies that focus on environmental quality, economic competitiveness and equity in Melaka	
	<ul style="list-style-type: none"> • Economic Planning Unit, Prime Minister Department (EPU) • Unit Perancangan Ekonomi Negeri (UPEN) • Department of Environment or Jabatan Alam Sekitar (DOE or JAS) • Perbadanan Teknologi Hijau Melaka (Melaka GreenTech) • Kementerian Tenaga, Teknologi Hijau dan Air (KeTTHA) • Perbadanan Pengurusan Sisa Pepejal Dan Pembersihan Awam (PPSPPA) • Majlis Bandaraya Melaka Bersejarah (MBMB) 	<ul style="list-style-type: none"> • Majlis Perbandaran Hang Tuah Jaya (MPHTJ) • Majlis Perbandaran Alor Gajah (MPAG) • Majlis Perbandaran jasin (MPJ) • Department of Irrigation and Drainage (DID) • Department of Agriculture (DOA) • Jabatan Perancangan Bandar dan Desa (JPBD) • SWM Environment Sdn Bhd (SWM) • Tenaga Nasional Berhad (TNB) • Sustainable Energy Development Authority (SEDA) • Suruhanjaya Pkhidmatan Awam Darat (SPAD) • Suruhanjaya Perkhidmatan Air Negara (SPAN)

“Business-as-usual” and why moving towards a Green City is necessary

Melaka is a growing state with an ambition to become more affluent (a “developed state”) by 2020. In addition to population, per capita income is also projected to increase. Under a “business-as-usual” scenario, increasing population and affluence are likely to increase the amount of resource consumption, as well as the greenhouse gas emissions from activities in the state. Further, current challenges, such as traffic congestion, poor water quality in urban rivers, or difficulty in maintaining historic properties, will likely worsen.

Melaka has initiated numerous green initiatives and has already done award-winning work in pursuit of green. However, as discussed below, a number of challenges remain. Most of the major challenges in Melaka stem from lack of a comprehensive approach that takes into consideration the linkages between different activities and their consequences on environment, competitiveness or inclusiveness. The GCAP provides such a comprehensive approach. Applying the green city concept to Melaka, there is a common thread in the recommendations – of promoting integrated decision-making through more robust planning. Three key topics associated with the three Es of the green city concept are discussed below in an effort to convey why a more concerted shift away from business-as-usual is necessary. The remaining document provides a more detailed discussion of these and other topics.



Environment (the first 'E')

Think holistically about water:

Melaka owes its presence to water. However, the same geography that historically made Melaka a leading trading center can now become a concern. Rising temperatures and sea level rise is increasing the risk of hazards in coastal communities. In this century, Peninsular Malaysia is expected to see increasing variability in rainfall and a potential increase of up to 3°C in average temperature⁷. Sea level is also expected to rise. These factors could exacerbate problems such as monsoonal and coastal flooding, as well as put greater pressure on water supply sources. Melaka has made a considerable effort to develop its waterfront, including transforming portions of the Melaka River into a highly successful cultural amenity. Flooding associated with increasing rainfall variability, sea level rise, and tidal activity could jeopardize the successful transformation of the waterfront.

Under “business-as-usual” conditions, practices such as land reclamation along the shoreline, paving over farmland and other open surfaces, and development in riparian areas and

other ESAs will continue. As evident in Palau Melaka, reclamation is expensive and can be hampered by environmental challenges (such as land subsidence). While a considerable portion of urban development in Melaka has been a result of successful land reclamation, a more thorough understanding of the increasing risks along the coastline is needed in the future.

Urban development also affects water quality. Some of Melaka’s rivers are already classified as poor or moderate by the Department of Environment. Growing city and tourist population, increasing demand from other users, increase in rainfall variability and any potential changes in land uses in the vicinity of dams and rivers that supply Melaka could further threaten the quality of water. Additionally, Melaka’s efforts to manage pollution in its rivers could be hampered by actions outside its boundaries. Infrastructure shortfalls related to wastewater and wastewater treatment (which requires large investments) further compounds the problem of water quality. Some of the activities that will help Melaka approach water is a holistic and integrated manner include the following:

- a. Promote an assessment of the risks associated with climate change and anticipated sea level rise, particularly for coastal areas
- b. Undertake a comprehensive planning effort at the watershed scale to understand hydrological changes resulting from urban development and from activities of other users, and develop policies for improved and coordinated decision-making and long term management of water
- c. Promote urban development practices that are sensitive to ecological considerations.

These are discussed in greater detail in the Chapter on Water Management.



Environmental risks should be appropriately addressed as part of shoreline projects.

⁷ Malaysian Meteorological Department. Climate Change Scenarios for Malaysia: 2001-2099. Scientific Report. January 2009. (<http://www.met.gov.my/images/pdf/nwp/climate-scenarios.pdf>) [Accessed 1 February 2014]

Pursue low carbon growth:

Melaka has to pursue low carbon growth to ensure that the PM's vision of reducing carbon emissions is realized. In Malaysia, a considerable amount of GHG emissions come from electricity generation (more than 90 percent is generated using non-renewable sources), and transportation (burning of fossil fuels). Other contributors include landfills (release of methane) and land use changes (conversion of forested areas to farmland, and conversion of farmland to built up areas).

Under "business-as-usual" conditions, Melaka is likely to see an increase in energy consumption. The State has started some commendable initiatives such as setting up a solar farm, pursuing energy efficiency in public buildings, and promoting green ratings for buildings. However, energy consumption related to growth in population and affluence, increasing number of tourists, rising use of motorized vehicles, growing public facilities and infrastructure, and expanding industries may increase, rather than decrease, overall consumption. The recent hike in rates of electricity will help to reduce consumption, however, a comprehensive and multi-sectoral strategy is needed to address GHG emissions emitting from electricity generation, electricity consumption, transportation, solid waste, as well as land use changes.

The Chapters on *Energy Efficiency and Renewables*, *Green Transportation*, *Zero Waste*, and *Urban Agriculture and Forestry* provide greater details on how to approach low carbon growth.



Economy (the second 'E')

Enhance tourism experiences and opportunities:

Melaka is at risk from its own success. The state's popularity as a tourist destination continues to rise, but there are challenges that can reduce Melaka's ability to attract large numbers of tourists in the future. Traffic congestion on the Toll Road during peak tourist season and weekends can cause up to two hour delays, overcrowding of tourists in the heritage area, and concerns with upkeep of historic properties, are some of the factors that can impede the growth of the tourism industry in Melaka.

Under "business-as-usual" conditions, the reasons for some of the challenges faced will continue to be addressed in a piecemeal manner. Traffic congestion is likely to get worse unless a comprehensive approach is taken to address all the reasons that contribute to the problem. Reasons that include increase in the usage of motorized vehicles by Melaka residents, heavy reliance on personal automobiles to access Melaka from other regions, large scale and sprawling land development in outlying areas, and limited transit opportunities. A more thorough approach towards maintaining and enhancing the heritage area is also needed. Lack of financing towards the maintenance of historic buildings, that are the main draw for tourists, and idling tour buses and parking challenges in the heritage area that can cause back-ups and contribute to overcrowding, are some of the factors that need to be

addressed differently.

Some of the activities associated with a green approach that will help Melaka continue to enhance tourism experiences and opportunities include the following:

- a. Promote a comprehensive strategy to manage transportation in the state
- b. Prepare a comprehensive strategy to ensure the long-term sustainability of the tourism industry
- c. Provide opportunities for innovative financing to support improvements of historic properties

The Chapters on *Green Transportation and Cultural Heritage and Tourism* provide more details about this topic.



The Prime Minister with the Chief Minister on a recent visit to Melaka



Equity or Inclusive Growth (the third 'E')

Build a constituency that supports greener activities:

Although, Melaka and Malaysia have a policy framework that supports sustainable urban development, progress on implementation has been slow. Factors include lack of awareness or capacity amongst government officials, sectoral boundaries that limit integrated decision-making, limited financing, and lack of engagement with residents or the private sector.

Melaka is unlike other cities where a significantly pressing environmental challenge has led to a groundswell of interest to move towards a more integrated and balanced urban development. Under "business-as-usual" scenario, sustainable practices will be pursued, but probably in a piecemeal manner where implementation will depend on the capacity of individuals within government departments or of individual citizens who may be concerned about one or two aspects of the green agenda.

The GCAP provides an opportunity to build a strong constituency for sustainable development in Melaka. With support from the IMT-GT, ADB and the national government, and under

the leadership of the Chief Minister, Melaka can institutionalize a process that engages with multiple stakeholders to build support for integrated and balanced growth.

Some of the activities that will help to build a constituency include the following:

- a. Develop a database to measure environmental performance and validate the need for a greener approach
- b. Promote capacity building efforts
- c. Institutionalize a process to engage residents and the private sector in urban governance
- d. Provide a platform for coordination and to ensure cross-sectoral synergies

The Chapter on *Implementation* provides more details on this subject. Additionally, each chapter identifies indicators that will form the basis of data collection and for monitoring progress towards greening Melaka.

Urban Environmental Accords and Green Technology Blueprint

Melaka became a signatory to the United Nations Urban Environmental Accords (UEA) and adopted the Green Technology Blueprint in 2011 with a vision to transform Melaka into a Green Technology City State by 2020. The UEA provides a series of implementable goals that can be adopted at the city level to achieve urban sustainability, promote healthy economies, advance social equity and protect the world's ecosystem. The UEA build on and continue the legacy of the 1972 Stockholm Conference on the Human Environment, the 1992 Rio Earth Summit, the 1996 Istanbul Conference on Human Settlements, the 2000 Millennium Development Goals and the 2002 Johannesburg World Summit on Sustainable Development.

The UEA recommend implementing an action plan across seven thematic areas (energy, waste, urban design, urban nature, transportation, environmental health and water). Accordingly, Melaka's Blueprint identifies actions and indicators across these recommended thematic areas (see Annex). As mentioned below, some of these actions have already been initiated in Melaka.

List of Projects and Programs already initiated in Melaka (see Blueprint for additional details):

- Energy Efficiency (EE) in select streetlights and select public buildings
- Melaka Solar Valley
- Melaka Biodiesel Program
- Melaka Green Seal
- Clean Air Plan for Small Cities
- Melaka Green Practices Certification
- Electric Car Charging Station
- Application of Low Carbon Cities Framework in
- Hang Tuah Jaya and Green City

Institutional Framework for the GCAP

Once adopted, the GCAP will become the overarching document for sustainable urban development in Melaka, and the Blueprint will become a subset document. The Blueprint is a short-term strategy with the main purpose of achieving the status of Green Technology City State by 2020. The GCAP provides a broader and longer-term framework that encompasses and engages with multiple governmental departments and promotes better coordination and decision-making to achieve integrated development in Melaka. The proposed actions identified in the GCAP complement and, to some extent, provide the justification for the actions initiated under the Blueprint.

Figure 5. below illustrates the institutional arrangement to pursue implementation of the GCAP and the Blueprint. As proposed in the Implementation Chapter, a Green City Action Plan Committee will be established to manage the implementation of the GCAP.

Process to Prepare the GCAP

The process to prepare the GCAP involved interviews and workshops with key stakeholders as well as field visits and study tours over a period of nearly two years. The project team met with senior officials (including the Chief Minister) to gather information and to build consensus for the proposed actions. A study tour was also organized to demonstrate successful urban transformation processes and enhance buy-in towards a green city approach. The federal government, IMT-GT and the ADB provided support to Melaka in preparing the GCAP.

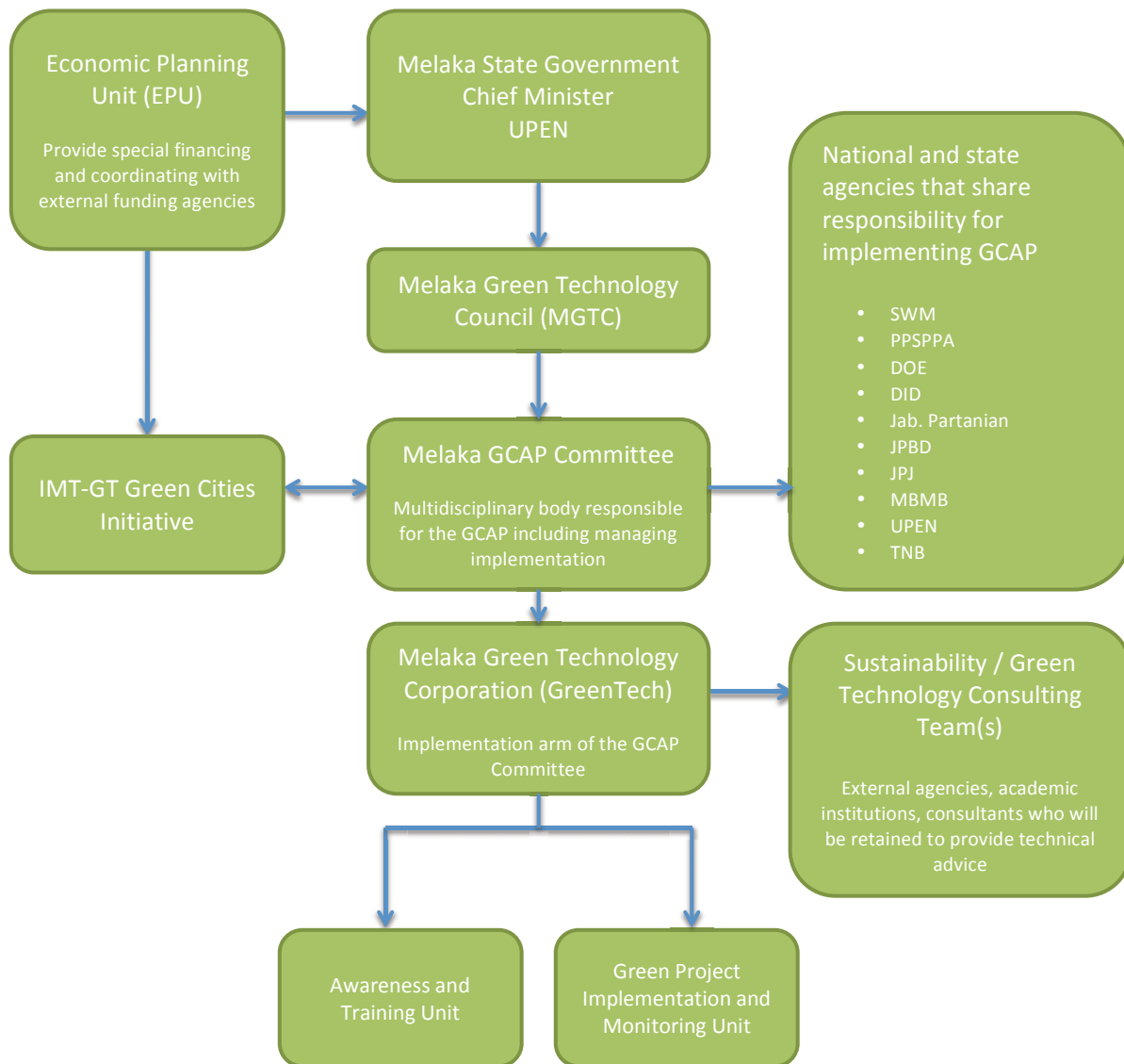


Figure 5. Lines of communication between stakeholders for planning, execution, monitoring, measurement and reporting activities related to the GCAP

Summary of Proposed Actions

The attached table summarizes the key actions that will support Melaka in moving towards a more livable state. Further details are provided in the next chapters.



Custom Categories (Achieving E.E.E.)

The GCAP operationalizes the 3E approach through the following thematic areas that are discussed in more detail in the subsequent chapters.



1 WATER MANAGEMENT

Goal: Protect and enhance the quality of surface and groundwater bodies in Melaka



2 ENERGY EFFICIENCY & RENEWABLE ENERGY

Goal: Reduce GHG emissions through efficiency and increase in use of renewables in the generation and usage



3 GREEN TRANSPORTATION

Goal: Increase opportunities for alternative modes of transportation and reduce GHG emissions resulting from vehicular use



4 ZERO WASTE

Goal: Put Melaka on the path to become a “zero-waste” state and reduce waste-related GHG emissions



5 CULTURAL HERITAGE & TOURISM

Goal: Promote sustainable tourism to balance the needs of visitors with those of residents while ensuring preservation of cultural heritage



6 URBAN FORESTRY & AGRICULTURE

Goal: Protect forests and areas with rich biodiversity, and improve agricultural practices



Green City Action Plan

Melaka, Malaysia

The proposed actions listed in this summary table are aimed at moving Melaka towards a more livable state by addressing issues related to environmental quality, economic competitiveness and equity. While environmental quality and economic competitiveness are directly addressed, equity is discussed as a co-benefit of proposed actions. Additional information regarding priority of actions, timeline, rough cost estimates, and government agencies that may be responsible for undertaking each action is also provided. Details about each proposed action is available in the main document.

FIRST STEPS TO INSTITUTIONALIZE THE GCAP



The following are the key actions necessary to start and institutionalize the GCAP process in Melaka. Each is considered high priority and should be implemented immediately.

PROPOSED ACTIONS	PUBLIC COST (USD)	KEY AGENCIES
1. Establish a Green City Action Plan Committee (GCAP Comm.) to manage the implementation of the GCAP	\$-	CM's Office / GreenTech
2. Set up a baseline database, and monitoring requirements to track implementation and outcomes of actions.	\$\$	GCAP Comm.
3. Set up Urban Management Partnership	\$	ADB / CIMT / GCA Comm.
4. Develop a long-term public awareness program	\$	GCAP Comm.
5. Organize public forums on the GCAP	\$	GCAP Comm. / GreenTech
6. Set up a project website	\$	GCAP Comm. / GreenTech
	* Recurring	

Priority of Actions

Proposed actions have been categorized as high (H), or medium (M) priority based on the following criteria:

1. Potential impact of the action/project on addressing pressing environmental, competitiveness and/or equity challenges in the city
2. Actions that should be undertaken immediately, before other actions can be undertaken
3. Actions that have the potential to raise public awareness and awareness about the city's pursuit of the green agenda ("glamorous projects")
4. Actions that may occur regardless of the GCAP



PROPOSED ACTIONS

Cost estimates



Cost estimates are provided as a range and are based on a basic understanding of the effort required to undertake an action. These estimates are rough order-of-magnitude costs and can only be finalized after a detailed term of reference (TOR) is developed. Further, some costs are fixed costs while others are recurring.

\$ < 100 000 USD
 \$ \$ 100 000 - 500 000 USD
 \$ \$ \$ 500 000 - 2 000 000 USD
 \$ \$ \$ \$ > 2 000 000 USD

5 Types Of Proposed Actions

The Green City Action Plan is a step towards helping Melaka reaching its vision to become a Green City. It is based on the underlying premise that integrated and comprehensive approaches will lead to a greener Melaka. Five types of actions are recommended to promote this integrated and comprehensive approach:

'Process-oriented actions' that institutionalize coordination, stakeholder engagement and cross-disciplinary decision-making during implementation and monitoring.

'Planning actions' that require a comprehensive view of a topic to follow up actions.

'Feasibility studies' that require a detailed multi-criteria evaluation of a specific intervention before proceeding with large investments.

'Specific government programs' aimed at achieving specific outputs that require recurring government engagement to further integrated development, and

'Demonstration projects' that consist of specific activities that showcase best practices to raise awareness and build capacities towards achieving a greener Melaka.

Timeline of Actions

Short-Term Actions: Start within a three-year (0-3) period

Typically these are based on best practices and are well recognized as leading to improved environmental quality, competitiveness or inclusiveness. These actions don't require detailed data analysis, or are based on existing plans and can consist of incremental activities or demonstration projects.

Medium-Term Actions: Start within a three-five year (3-5) period

Typically, these could be scaling up of demonstration projects or actions that require the appropriate enablers to be in place before they can be implemented. These could also be actions that require specific data before they can be developed further.

Long-Term Actions: Start after five years (5+)

Typically, these require appropriate enablers to be in place and are based on assessment of gathered data. Examples include large-scale infrastructure projects and large investments that will need to be undertaken in a phased manner.

Responsibilities

The summary table identifies the appropriate government agencies that should undertake an action. The agencies assigned to each action need to be confirmed by CIMT, GreenTech and the relevant agency.

List of Agencies:

GreenTech	Perbadanan Teknologi Hijau Melaka
EPU	Economic Planning Unit (PM's Office)
SWM	SWM Environment SDN. BHD.
PPSPPA	Perbadanan Pengurusan Sisa Pepajal Dan Pembersihan Awam
DOE or JAS	Department of Environment (Jabatan Alam Sekitar)
GCAP Comm.	Green City Action Plan Committee
DID	Department of Irrigation and Drainage
Lab. Pertanian	Department of Agriculture
JPBPD	Jabatan Perancangan Bandar dan Desa
JPJ	Jabatan Pengangkutan Jalan
MBMB	Majlis Bandaraya Melaka Bersejarah
UPEN	Unit Perancangan Ekonomi Negeri
TNB	Tenaga Nasional Berhad



ENVIRONMENTAL QUALITY

Expected Outcome: Environmental quality is enhanced

Main Challenges





- Natural Resource Management:** Poor water quality, declining air quality, land development in risk prone or environmentally sensitive areas, loss of biodiversity, ambient noise
- Low Carbon Growth:** GHG emissions from electricity generation/consumption, GHG emissions from transportation, GHG emissions from loss of green areas and tree canopies
- Climate Resilience and Disaster Risk Management:** Monsoonal flooding, coastal flood risk due to sea level rise, health impacts from severe heat waves

Themes

 WATER MANAGEMENT	 ENERGY EFFICIENCY AND RENEWABLES	 GREEN TRANSPORTATION	 ZERO WASTE	 URBAN FORESTRY AND AGRICULTURE	 CULTURAL HERITAGE AND TOURISM
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- Decision-making about water management at the watershed level improves
- Centralized wastewater collection is expanded
- Water recycling increases
- Vulnerability to flooding is reduced
- Wetlands and floodplain areas are protected
- Per capita GHG emissions from the energy sector decreases
- Proportion of energy from renewable sources increases
- Per capita electricity usage decreases
- Per capita GHG emissions from the transportation sector decreases
- Vehicle kilometers traveled per capita decreases
- Public transit opportunities and per capita ridership increases
- The amount of solid waste per capita decreases
- Compositing of organic waste increases
- Opportunity for energy generation from waste increases
- Disposal of hazardous waste is better managed
- Rate of recycling increases
- Heritage is preserved
- Infrastructure related to water quality and flooding is improved
- Data about sensitive environmental resources improves
- Sensitive lands are protected
- Recreational opportunities increase
- Tree canopy and use of native plant species increases

Outcomes

THEME	SHORT - TERM ACTIONS	POTENTIAL ENVIRONMENTAL BENEFITS	POTENTIAL CO-BENEFITS ECONOMIC COMPETITIVENESS	POTENTIAL CO-BENEFITS EQUITY	PRIORITY	PUBLIC COST (USD)	KEY AGENCIES
 ACTION 1	1. Prepare a GIS-based spatial database with detailed information on sensitive ecological resources in Melaka	Protect wetlands, habitats, and other environmentally sensitive resources	Improve decision-making regarding development is ESAs		H	\$ \$	JPBD / PBT
 ACTION 1	2. Prepare a watershed plan	Improve water quality Improve land management to protect water resources	Improve returns on investments by reducing environmental risks Improve decision-making regarding management/allocation of water for municipal needs, industry and agriculture		H	\$ \$	DID
 ACTION 2	3. Prepare comprehensive energy plan to identify specific actions to increase RE consumption and EE	Reduce GHG emissions	Improve technology and potentially reduce long-term operating costs related to energy use	New green jobs Reduce future impacts of climate change (CC) on vulnerable populations	H	\$ \$	TNB
 ACTION 1	4. Prepare a GHG emissions inventory for the state	Establish baseline to prioritize actions and measure long term improvements	Efficient use of resources	Reduce future impacts of CC on vulnerable populations	H	\$	GreenTech
 ACTION 1	5. Prepare a waste management plan	Reduce disposal of organic waste and GHG emissions	Improve information and lead to better decision-making Identify technologies for waste management		H	\$ \$	TNM / SWM / PPSPPA
 ACTION 3	6. Prepare a Feasibility Study to undertake a Smart City demonstration project	Facilitate EE and use of RE amongst residential and commercial	Innovation and introduction of new technologies	New green jobs Reduce future impacts of CC on vulnerable populations	M	\$	GreenTech / TNB
 ACTION 2	7. Conduct vulnerability assessment and prepare an adaptation plan related to climate change	Reduce risks to people and infrastructure from flooding and heat waves	Improve return on investments by reducing environmental risks	Improve public safety	H	\$	DID / JPBD

* Recurring

\$ \$ < 100 000 USD \$ \$ \$ 500 000 - 2 000 000 USD

\$ \$ 100 000 - 500 000 USD \$ \$ \$ \$ > 2 000 000 USD

ENVIRONMENTAL QUALITY

THEME	SHORT - TERM ACTIONS	POTENTIAL ENVIRONMENTAL BENEFITS	POTENTIAL CO-BENEFITS ECONOMIC COMPETITIVENESS	POTENTIAL CO-BENEFITS EQUITY	PRIORITY	PUBLIC COST (USD)	KEY AGENCIES
ACTION 3	8. Develop policies and demonstration projects promoting demand management strategies such as recycling gray water, rainwater harvesting and green roofs	Reduce heat island effect by reducing paved surfaces Improve stormwater management and reduce risk of flooding	Increase public awareness Reduce demand for portable water and reduce cost of infrastructure		M	\$	GreenTech
ACTION 3	9. Develop a program to start converting public fleet to fuel-efficient vehicles	Improve water quality Reduce GHG emissions	Increase public awareness	Reduce future impacts of CC on vulnerable populations	H	\$	JPJ / UPEN
ACTION 2	10. Undertake a demonstration project reduce organic waste from a produce market	Air quality benefits Reduce GHG emissions	Increase purchase of fuel efficient vehicles Increase public awareness		H	\$	GreenTech
ACTION 2	11. Undertake a demonstration project to install a green roof in two select government buildings	Reduce GHG emissions	Reduce waste that goes to landfills Introduction of new technologies		H	\$	GreenTech
MEDIUM - TERM ACTIONS							
ACTION 5	12. Implement an anti-idling regulation, particularly for buses in the heritage area	Reduce GHG emissions	Reduce fuel consumption	Reduce risk to public health	M	\$	JPJ
ACTION 6	13. Prepare subarea plans to promote urban density that supports a walkable environment in new urban centers	Reduce vehicular trips by improving opportunities for pedestrians Reduce electricity consumption and related GHG emissions	Reduce congestion and fuel consumption Potential long-term cost savings Increase in public awareness	Reduce future impacts of CC on vulnerable populations	H	\$	JPBD
ACTION 4	14. Scale up demonstration projects (EE street lighting, retrofit official and heritage buildings, energy audit of schools and improvements)	Reduce GHG emissions	Potential long-term cost savings Increase in public awareness	Reduce future impacts of CC on vulnerable populations	H	\$*	CIMT / GreenTech / MBMB / Schools
ACTION 6	15. Establish a program to encourage large private facility owners to identify opportunities for EE and RE	Reduce GHG emissions	Potential long-term cost savings Increase in public awareness	New green jobs Reduce future impacts of CC on vulnerable populations	M	\$*	GreenTech / TNB
ACTION 4	16. Prepare a transit plan for the state	Reduce use of personal automobiles / reduce GHG emissions	Reduce traffic congestion	Improve accessibility for elderly, children and low income residents	H	\$\$	JPJ
ACTION 5	17. Prepare an open space plan to enhance recreational opportunities, increase tree canopies and protect sensitive environmental resources	Reduce heat island effect by improving micro-climate Increase carbon sequestration	Increase land values by adding open space in dense urban areas	Increase access to green areas	H	\$*	JPBD / PBT
LONG - TERM ACTIONS							
ACTION 8	18. Create a program in partnership with SWM and DOE to upgrade existing Sewage Treatment Plants	Improve water quality		Reduce risks to public health from water-borne diseases	H		SWM / PPSPPA / DOE
ACTION 7	19. Expand centralized sewerage system and assess the feasibility of locating a sludge treatment facility in Melaka	Improve water quality		Reduce risks to public health from water-borne diseases	H		SWM / PPSPPA / DOE

* Recurring

\$ < 100 000 USD

\$ \$ \$ 500 000 - 2 000 000 USD

\$ \$ 100 000 - 500 000 USD

\$ \$ \$ \$ > 2 000 000 USD

ECONOMIC COMPETITIVENESS

Expected Outcome: Economic Competitiveness is Strengthened

Main Challenges


- Municipal Services:** Infrastructure shortfalls, lack of awareness regarding demand management, non-compliance with regulations, increasing demand due to increasing populations/visitors
- Tourism Industry:** Lack of a comprehensive strategy, maintenance challenges for historic properties, traffic congestion
- Knowledge:** Limited knowledge regarding green industries, shortage of skills related to green jobs

Themes



WATER MANAGEMENT

- Investments in low-lying areas are based on better information about flood risks
- Industrial wastewater management improves
- SMEs are increasingly engaged in wastewater related services



ENERGY EFFICIENCY AND RENEWABLE

- Innovation, investments, and number of jobs in renewable energy industries increase
- Electricity interruptions are eliminated



GREEN TRANSPORTATION

- Tourism related congestion is alleviated
- Opportunities to walk or bicycle in a safe environment improve in and around the heritage area
- Transit system provides improved mobility options



ZERO WASTE

- Coverage of solid waste collection expands
- Investments and number of employees in the waste management industries increase



URBAN FORESTRY AND AGRICULTURE

- Investment in high risk areas (related to environmental factors) decrease



CULTURAL HERITAGE AND TOURISM

- Tourism opportunities for visitors increase
- Decision-making about tourism in the heritage area improves
- Infrastructure for visitors, particularly related to mobility, is enhanced

Outcomes

THEME	SHORT - TERM ACTIONS	POTENTIAL ECONOMIC COMPETITIVENESS BENEFITS	POTENTIAL CO-BENEFITS ENVIRONMENT	POTENTIAL CO-BENEFITS EQUITY	PRIORITY	PUBLIC COST (USD)	KEY AGENCIES
 ACTION 1	1. Prepare a waste management plan (verify waste-to-energy project)	Long-term financial benefits from reducing waste / selling energy innovation and introduction of new technologies	Increase opportunity for RE production Reduce GHG emissions	New green jobs Reduce future impacts of CC on vulnerable populations	H	\$	TNM / SWM / PPSPPA
 ACTION 3	2. Create a waste reduction and recycling program in government offices	Waste reduction and efficient use of solid waste services	Reduce GHG emissions	New green jobs	H	\$*	GCAP Comm. / SWM / PPSPPA
 ACTION 4	3. Prepare a feasibility study to develop an Eco-Park	Create opportunities for developing a recycling products industry Increase in public awareness	Integrated land development Efficient use of environmental resources	New green jobs	H	\$\$\$	JPBD / CIMT / Green Tech
 ACTION 1	4. Prepare a comprehensive transportation plan related to tourism activities	Opportunity to create a recycling industry cluster	Reduce congestion and GHG emissions	Improve accessibility for elderly, children and low income residents	H	\$	JPJ
 ACTION 2	5. Install traffic-calming measures and establish a connected and safe pedestrian/bicycle system in and around the heritage area	Improve traffic flow related to tourism activities	Improve infrastructure related to environmental quality				
 ACTION 1	6. Develop a tourism plan with particular focus on managing tourist activities in the heritage area	Improve traffic flow in the heritage area Enhance tourism opportunities Enhance competitiveness of cultural heritage tourism Improve decision-making and management of heritage area Expand tourism opportunities in the state			H	\$\$	MBMB / UPEN / GCAP Comm.

* Recurring

\$ < 100 000 USD \$\$\$ 500 000 - 2 000 000 USD
 \$\$ 100 000 - 500 000 USD \$\$\$\$ > 2 000 000 USD

ECONOMIC COMPETITIVENESS

THEME	SHORT - TERM ACTIONS	POTENTIAL ECONOMIC COMPETITIVENESS BENEFITS	POTENTIAL CO-BENEFITS ENVIRONMENT	POTENTIAL CO-BENEFITS EQUITY	PRIORITY	PUBLIC COST (USD)	KEY AGENCIES
ACTION 2	7. Prepare a feasibility study to set up a tax increment financing district in the heritage area	Enhance financing opportunities to preserve private properties and undertake beautification on public areas			(M)	\$	EPU / JPBD
ACTION 14	8. Establish ADB support for credit guarantees for infrastructure projects aimed at improving economic competitiveness	Enhance access to financing for large infrastructure projects	Improve quality of urban environment	New green jobs	(H)	\$ \$	EPU
ACTION 15	9. Establish ADB technical support to develop public private partnership (PPP) projects	Enhance opportunities for private sector financing in green projects	Improve quality of urban environment	New green jobs	(H)	\$ \$	EPU
► MEDIUM - TERM ACTIONS							
ACTION 4	10. Establish a knowledge center regarding pesticide use	Capacity building	Improve water quality	Reduce public health risks	(M)	\$	CIMT / GreenTech
ACTION 13	11. Establish a Green City fund	Improve innovation in urban farming	Improve quality of urban environment	New green jobs	(H)	\$ \$ \$	EPU
ACTION 5	12. Establish a program to facilitate large-scale production of electricity from solar energy in the state	Provide seed funding for entrepreneurs in green industries	Reduce GHG emissions	New green jobs	(M)	\$*	GreenTech / TNB
ACTION 3	13. Set up a comprehensive program to offer incentives to encourage conservation of private properties in the heritage area	Increase in public awareness	Facilitate financing for improvement of historic properties areas		(H)	\$	EPU / JPBD
ACTION 7	14. Create a capacity building program in partnership with DOE to improve monitoring and enforcement capabilities	Improve management of resources	Improve water and air quality	Reduce risks to public health	(M)	\$	GreenTech / DOE
ACTION 4	15. Create a program in partnership with DID to implement green infrastructure	Potential for reduced costs compared to traditional infrastructure	Improve stormwater management and reduce risk of flooding	Potential for increase in open space amenities accessible to all residents	(H)	\$ \$ \$	GCAP Committee / DID
ACTION 6	16. Organize a trade fair to boost knowledge about recycled products	Innovation and increase in public awareness	Improve water quality	New green jobs	(M)	\$	GreenTech
ACTION 3	17. Set up a comprehensive program to offer incentives to encourage conservation of private properties in the heritage area	Enhance competitiveness by improving historic properties			(M)	\$	MBMB / UPEN
ACTION 4	18. Prepare a program to upgrade infrastructure and utilities in the heritage area	Enhance competitiveness by addressing infrastructure shortfalls	Improve water quality		(H)	\$	MBMB
ACTION 5	19. Create a program in partnership with SWM and DOE to promote on site wastewater treatment plants for large industrial areas	Enhance corporate social responsibility	Improve water quality	Reduce risks to public health from water-borne diseases	(M)	\$ \$	SWM / PPSPPA / DOE

* Recurring




\$ < 100 000 USD

\$ \$ \$ 500 000 - 2 000 000 USD

\$ \$ 100 000 - 500 000 USD

\$ \$ \$ \$ > 2 000 000 USD

ECONOMIC COMPETITIVENESS

	MEDIUM - TERM ACTIONS	POTENTIAL ECONOMIC COMPETITIVENESS BENEFITS	POTENTIAL CO-BENEFITS ENVIRONMENT	POTENTIAL CO-BENEFITS EQUITY	PRIORITY	PUBLIC COST (USD)	KEY AGENCIES
 ACTION 6	20. Create a program in partnership with DOE to increase participation of small businesses in maintenance of septic tanks	Create opportunities for small business development	Improve water quality	Reduce risks to public health from water-borne diseases New green jobs	H	\$ \$ \$	SWM / PPSPPA / DOE
 ACTION 5	21. Create a program in partnership with SWM to engage commercial and industrial facilities in waste reduction programs	Waste reduction and efficient use of solid waste services Create opportunities for developing a recycling products industry Increase in public awareness	Reduce GHG emissions	New green jobs	M	\$*	GCAP Comm. / SWM / PPSPPA
	LONG - TERM ACTIONS						
 ACTION 12	22. Establish a program to enhance participation of commercial banks in green projects	Enhance access to financing for green improvements	Improve quality of urban environment	New green jobs	H	\$	EPU

* Recurring

\$ < 100 000 USD

\$ \$ \$ 500 000 - 2 000 000 USD

\$ \$ 100 000 - 500 000 USD

\$ \$ \$ \$ > 2 000 000 USD

A. WATER MANAGEMENT

Goal: Protect and enhance the quality of surface and groundwater bodies in Melaka and protect vulnerable populations and infrastructure from flooding

Clean water

Clean water is a necessity for the sustenance of all living beings. Humans need water to drink, for cooking food, and to eliminate unhygienic conditions that can lead to the spread of water-borne diseases. Good quality water is also necessary to maintain aquatic life, for swimming, or to provide a visual amenity in an urban landscape. Maintaining a healthy balance amongst the use of water in cities, agriculture, industries and the power sector is necessary to ensure long-term sustainability of the resource.

Low flood risk

Urban flooding is a significant problem in Asian cities and is predicted to become worse with climate change. Increase in impervious surfaces associated with urban development can lead to flooding in downstream areas particularly when drainage systems are designed to remove stormwater quickly from urban areas. Flooding can also occur when urban development takes place in flood prone areas such as floodplains or wetlands, or when debris (such as household waste) restricts the flow of water in drainage channels.



OUTCOMES

Environmental quality is enhanced:

- Decision-making about water management at the watershed level improves
- Centralized wastewater collection is expanded
- Water recycling increases
- Vulnerability to flooding is reduced
- Wetlands and floodplain areas are protected and enhanced

Economic competitiveness is strengthened:

- Investments in low-lying areas are based on better information
- Industrial wastewater management improves
- SMEs are increasingly engaged in wastewater related services

Resilience is improved (equitable outcome):

- Threats from flooding are reduced, particularly for low income and elderly residents living in low lying areas
- Risks to public health from water-borne diseases are reduced

PROPOSED ACTIONS

Short-Term

ACTION 1: Prepare a watershed plan

ACTION 2: Conduct vulnerability assessment, prepare an adaptation plan related to climate change and create a framework plan for development of the reclaimed coastal areas

ACTION 3: Develop policies and demonstration projects promoting demand management strategies such as recycling graywater, rainwater harvesting and green roofs

Medium and Long-Term

ACTION 4: Create a program to implement green infrastructure

ACTION 5: Set up a program to promote onsite wastewater treatment plants for large industrial areas

ACTION 6: Create a program to increase participation of small businesses in maintenance of septic tanks

ACTION 7: Expand centralized sewerage system /assess feasibility of locating a sludge treatment facility

ACTION 8: Upgrade existing Sewage Treatment Plants

The above proposed actions will be incorporated into the UEA Action Plan indicated in the Blueprint of Melaka Green City State 2020

Key Issues

- **Water Quality:** Several water bodies in Melaka are in moderate to poor conditions. These include Merlimau and Seri Melaka rivers (classified in poor condition), as well as groundwater, coastal waters and estuaries.¹

Amongst the main causes for the impairment include waters received from upstream tributaries, agricultural activities (leaching or run-off of fertilizers used in the oil palm and rubber plantations located in the watersheds), sewage and wastewater discharges from STPs and septic tanks, and discharge of untreated sewage. Additionally, there are no dedicated STPs for industrial uses, nor licenses issued to industries to allow effluent to be discharged to the centralized sewerage system.

- **Flooding:** In Malaysia, floods are characterized as flash floods and monsoonal floods. Melaka often experiences localized flash floods. In December 2006, it experienced a severe monsoonal flood that required evacuation of 13 thousand residents and damages were estimated at approximately 54 million ringgit (approx. 16.5 million USD). Flash floods occur when heavy rainfall events occur during a very short period and the existing drainage system is not able to handle the volume of runoff that is generated. This situation is worse during high tide (the Melaka River is a tidal river). Most of the flooding occurs in low-lying areas along the river system and coastal area.

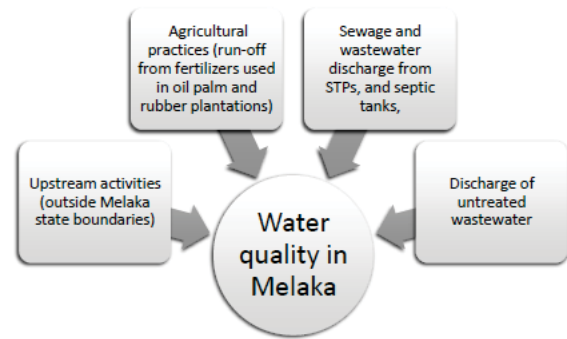


Figure 6. Issues affecting water quality in Melaka



Figure 7. Flood-hit areas in 2006 (Source: Dept. of Irrigation)



Coastal lands and the Melaka River waterfront are some of Melaka's most valuable assets

¹ <http://www.doe.gov.my/webportal/en/penerbitan-jas/> [Accessed 1 February 2014]



Indicators and Targets for 2020

INDICATOR

1. Measure of dissolved oxygen, water temperature, pH level, levels of E.coli, nitrates, electrical conductivity, and transparency for each water body
2. Area of wetlands
3. Condition of wetlands
4. Amount of water that is recycled
5. Percentage of population with centralized wastewater collection
6. Number of STPs that don't comply with environmental regulations
7. Volume of industrial wastewater that does not meet industrial wastewater discharge requirements
8. Average number of households and individuals exposed to annual floods (loss of shelter, livelihoods)
9. Average economic impacts related to flooding

TARGET

- According to the DOE's Water Quality Index
- Protect all existing wetlands
- Restore 20% of degraded wetlands
- Increase to 20% of potable water supply
- Increase coverage by 10%
- Reduce number by 20%
- Reduce number by 20%
- Reduce by 50%
- Reduce by 50%

Table 1. Suggestive indicators and targets to measure improvements in urban water resources management. These will be finalized during the preparation of a baseline study as discussed in the Implementation Section.

Potential Actions

▶ SHORT TERM ACTIONS

ACTION 1: Prepare a watershed plan

Support the Department of Irrigation and Drainage (DID) in preparing a watershed plan that addresses long term management of water resources and pollution in Melaka's rivers, and flooding.

The watershed plan should address the following:

- Watershed hydrology (including information on rainfall, evaporation, stream flows, erosion and sedimentation)
- Groundwater and surface water (description of sources, current use, quantity and quality)
- Water rights (discussion of water allocations and rights of different types of users)
- Population projections and water use (determine current use and future needs)
- Point and non-point polluting sources (sources of pollution by type and location)
- Actions to improve water quality, maintain long-term sustainability of water resources, allocations for various users, and to prevent flooding

Responsible Agencies: DID

Potential Benefits:

- This action has the potential to improve management of water resources;
- Lead to improved water quality;
- Protect sensitive resources from future impacts; and
- Improve allocation of water amongst multiple users.

ACTION 2: Conduct vulnerability assessment, prepare an adaptation plan related to climate change and create a framework plan for development of the reclaimed coastal areas

Melaka is prone to flash floods and hot temperatures. Climate change is expected to increase extreme weather events and could increase the frequency of floods and extreme hot days in Melaka. Further, Melaka's shoreline is prone to coastal erosion, that could be exacerbated due to rising sea level associated with climate change, increasing the vulnerability of public and private infrastructure located along Melaka's coast. Conduct a vulnerability assessment and adaptation plan for Melaka that builds on the work done under the National Coastal

Vulnerability Index (DID, 2007) and the Integrated Shoreline Management Plan (DID 2010) for Melaka. Identify at-risk populations and infrastructure and develop a plan to incorporate climate resilient design measures to reduce vulnerabilities, or if necessary, to relocate them. Further, create a framework plan and adopt regulations to restrict development in high-risk areas.

Responsible Agencies: JPBD, DID

Potential Benefits:

- This action would reduce disaster risks for people and infrastructure
- Improve returns on investments; and
- Improve public safety.

ACTION 3: Develop policies and demonstration projects promoting demand management strategies such as recycling graywater, rainwater harvesting and green roofs

Prepare a demonstration project showcasing demand management strategies such as graywater recycling, rainwater harvesting and a green roof in a government complex and in a residential apartment building. Based on the findings of the project, develop a policy to encourage demand management practices in Melaka. Demand management is an integrated approach aimed at complementing supply-side strategies, with strategies such as water recycling, conservation, leakage control, pricing, mandates for water use, and awareness programs, to reduce the demand for water.

In Chennai, India, rainwater harvesting is mandatory in all three-story buildings. The government can disconnect water supply as a penalty for failing to do so.

- Graywater is water that is collected from shower, bathtub, sink, or clothes washer. It typically contains fats, oils, soaps and chemicals. Graywater is typically safe for use in landscaping or for irrigation. The benefits of recycling graywater include reducing the use of treated/drinkable water for landscaping, and reducing the amount of water that goes into the sewerage system and needs to be cleaned downstream.
- Rainwater harvesting is one of the practices promoted under green infrastructure, where water from rainfall

is captured and used onsite. Such a practice reduces the amount of runoff generated (that can reduce the threat of downstream flooding), reduces water supply demand (as the captured water can meet some of the needs), and can help with recharging groundwater.

- Green roofs can serve multiple purposes. They can help to reduce the amount of paved areas associated with increasing temperatures and heat island effect; they can insulate buildings to reduce energy usage; they can help to reduce the rate of flow of stormwater and reduce potential for flooding in downstream areas; and they can protect the roof membrane and increase its life.

Responsible Agencies: GCAP Committee, DID

Potential Benefits:

- This action would increase water recycling;
- Reduce demand for potable water;
- Increase public awareness about water management; and
- Reduce cost of infrastructure related to water supply and drainage.

▶▶ MEDIUM TERM ACTIONS

ACTION 4: Create a program in partnership with DID to implement green infrastructure

Melaka has an opportunity to become the first state to pursue green infrastructure practices in a holistic manner. The first phase of cleanup and revitalization of the Melaka River already showcases Melaka's capability in undertaking a project that reflects best practices in integrating land management with water resource management. Take this effort a step further by becoming a champion for green infrastructure. Develop a statewide green infrastructure strategy and provide training to government engineers, private developers, architects and residents on green infrastructure. DID has prepared a publication (the Manual Saliran Mesra Alam¹) that supports the green infrastructure approach, and several projects have already been implemented within the state.

Responsible Agencies: GCAP Committee, DID

Potential Benefits:

- This action would improve management of water resources;
- Lead to improved water quality;
- Protect sensitive resources from future impacts;
- Reduce cost of infrastructure;
- Improve stormwater management;
- Reduce risk of flooding; and
- Create open space amenities for residents.

¹ <http://www.water.gov.my/component/content/article/1201-msma-manual?lang=en> [Accessed 1 February 2014]



Green infrastructure is an approach that uses natural landscapes, open spaces, and infrastructure systems that mimic nature, to manage stormwater. Green infrastructure approaches have been applied and the regional to local scale to reduce impervious surface cover in urban setting, clean polluted waters, prevent development in wetlands, serve irrigation needs, or replenish groundwater, goals that are critical to urban water management. Importantly, green infrastructure supports the creation of spaces that are multifunctional and provide added benefits such as preservation of wildlife habitat, or opportunities for recreation.

ACTION 5: Set up a program to promote onsite wastewater treatment plants for large industrial areas

Support private sector investments in WTPs for large industrial areas. DOE currently partners with Invest Melaka to vet new industries seeking to locate in Melaka as part of a one-stop-shop process. Expand this partnership to existing industrial areas and offer incentives (training, tax breaks, environmental awards, etc.) to facilitate private investment in onsite WTPs.

Responsible Agencies: SWM, PPSPPA, DOE

Potential Benefits:

- This action would reduce water pollution; and
- Reduce risk to public health.

ACTION 6: Create a program in partnership with DOE to increase participation of small businesses in maintenance of septic tanks

Develop a program for training and assistance for small businesses to engage in the maintenance of individual septic tanks. Improve public awareness and encourage residents to conduct regular maintenance of septic tanks.

Responsible Agencies: DOE

Potential Benefits:

- This action would protect water resources;
- Improve water quality;
- Improve management of water resources; and
- Create green jobs.

▶▶▶ **LONG TERM ACTIONS**

ACTION 7: Expand centralized sewerage system and assess the feasibility of locating a sludge treatment facility in Melaka

Coordinate with IWK to facilitate expansion of the centralized sewerage system. Melaka could address issues related to land acquisition, and selection of sites to locate infrastructure. Further, coordinate land use plans and urban densities with infrastructure improvements to ensure efficiency. Also, increasing centralized sewerage system will increase the amount of sludge that is generated that can then support a sludge treatment facility in Melaka.

Responsible Agencies: SWM, PPSPPA, DOE

Potential Benefits:

- This action would reduce water pollution; and
- Reduce risk to public health.

ACTION 8: Upgrade existing STPs

All STPs that were built before 2000 are in need of upgrading as they do not meet current national guidelines. Partner with IWK, and the private sector to prepare a strategy to upgrade these STPs. Some may require minimal improvements, while others may need more substantial investments. Seek energy efficiency improvements, when feasible, as part of the improvements.

Responsible Agencies: SWM, PPSPPA, DOE

Potential Benefits:

- This action would reduce water pollution and reduce risk to public health.

Order-of-Magnitude Cost Estimates

The cost estimates below are rough order-of-magnitude costs and based on an understanding of the effort required for consulting services and don't include infrastructure or installation costs in most cases. Detailed costs for consulting services can be developed once a detailed TOR is prepared for each action.



PROPOSED ACTIONS	ESTIMATED COSTS RANGE
<p>ACTION 1: Prepare a watershed plan (Cost estimate is for cost to prepare the plan including data collection on urban hydrology, and set-up an institutional mechanism for coordinated decision-making; there will be subsequent costs related to the actions recommended in the plan)</p>	100,000 – 500,000 USD
<p>ACTION 2: Conduct vulnerability assessment, prepare an adaptation plan related to climate change and a framework plan for development of the reclaimed coastal areas (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)</p>	100,000 – 500,000 USD
<p>ACTION 3: Develop policies and demonstration projects promoting demand management strategies such as graywater recycling, rainwater harvesting, and green roofs (Cost estimate is for preparing and implementing the demonstration projects in one government building and one apartment building)</p>	0 – 100,000 USD
<p>ACTION 4: Create a program to implement green infrastructure (Cost estimate is for developing a program including training materials; there will be additional recurring costs for implementing projects)</p>	0 – 100,000 USD (recurring)
<p>ACTION 5: Set up a program to promote on-site wastewater treatment plants for large industrial areas (Cost estimate is for cost to set up the program and for recurring costs to implement the program)</p>	0 – 100,000 USD (recurring)
<p>ACTION 6: Create a program in partnership with DOE to increase participation of small business in maintenance of septic tanks (Cost estimate is for cost to set up the program and for recurring costs to implement the program)</p>	0 – 100,000 USD (recurring)
<p>ACTION 7: Expand centralized sewerage system and assess the feasibility of locating a sludge treatment facilities in Melaka</p>	No cost estimate for long-term actions
<p>ACTION 8: Upgrade existing STPs</p>	No cost estimate for long-term actions


B. ENERGY EFFICIENCY & RENEWABLE ENERGY

Goal: Reduce GHG emissions through efficiency and increase in use of renewable energy sources

GHG emissions from Energy

Urban areas are large consumers of electricity. Homes, industries, offices, shops, schools, hospitals and infrastructure such as streetlights and water pumps, collectively consume large amounts of electricity. However, electricity generated from non-renewable sources such as coal, natural gas or petroleum is a significant contributor of greenhouse gases, which are responsible for climate change. To reduce GHG emissions

related to electricity requires an increase in the use of renewable sources such as solar and wind in electricity generation, as well as a focus on improving efficiency on the consumption side. Newer technologies and increased awareness can help with both.



**ENERGY
EFFICIENCY &
RENEWABLE
ENERGY**

OUTCOMES

Environmental quality is enhanced:

- Proportion of energy from renewable sources increases
- Per capita electricity usage decreases
- Per capita GHG emissions from the energy sector decreases

Economic competitiveness is strengthened:

- Innovation, investments, and number of jobs in renewable energy industries increase
- Electricity interruptions are eliminated

Vulnerabilities to climate change are reduced (equitable outcome):

- Reduction in GHG emissions can reduce potential impact on populations (such as elderly residents and babies) who are disproportionately vulnerable to increasing temperatures and variable climate related to climate change

PROPOSED ACTIONS

Short Term

ACTION 1: Prepare a GHG emissions inventory for the state
ACTION 2: Prepare a comprehensive energy plan
ACTION 3: Prepare a feasibility study to set up a Smart City demonstration project

Medium and Long Term

ACTION 4: Scale-up demonstration projects
ACTION 5: Establish a program to facilitate large-scale production of electricity from solar energy in the state
ACTION 6: Establish a program to encourage large private facility owners to implement EE measures and increase consumption from RE sources

The above proposed actions will be incorporated into the UEA Action Plan indicated in the Blueprint of Melaka Green City State 2020

Key Issues

In Malaysia, more than 90 percent of electricity is generated using non-renewable sources.¹ In 2012, Melaka consumed 3,873 GWh of electricity. Domestic consumption was at 18 percent, commercial consumption at 28 percent, and industries and other sectors consumed 54 percent of the electricity. State managed facilities (including offices, stadium, water supply systems and public street lighting) consumed nearly 112 GWh of electricity in 2012.² Demand for electricity is projected to increase by three to four percent (3-4%) on an annual basis, with a projected total demand of 5,213 GWh in 2020. Buildings are projected to consume 1,365 GWh of electricity, or 25 percent of projected demand.

Some of the challenges that need to be addressed to shift towards increasing the use of renewables in electricity generation and improve efficiency include the following:

- **Lack of a centralized energy agency in the state:** Melaka does not have a designated agency that is responsible for taking a comprehensive look at improving energy efficiency and use of renewable energy in the state. Efforts are currently being taken in an ad hoc manner, and without the benefit of long term data or monitoring that can track improvements from targeted interventions.
- **Lack of funding:** There is no dedicated financing mechanism for energy efficiency at the state government level or through commercial lending institutions that operate in the state. Government funding is on a project-by-project basis and with a short-term focus. Commercial banks don't have adequate capacity to manage energy efficiency and renewable energy projects and take a traditional approach to such projects.
- **Low electricity tariff:** Electricity tariffs are low when compared to neighboring Thailand and Indonesia and to developed countries where energy prices are market driven and fuel consumption is subject to various taxes. Due to low prices, consumers remain unmotivated to invest in energy efficiency improvements or renewable energy projects. The recent increase in tariffs by the national government are aimed at phasing out subsidies in the energy sector and will help to improve efficiency in the consumption of electricity.
- **Lack of standardized project assessment criteria:** There is no consistent approach to evaluating energy efficiency or renewable energy projects in the state. Municipal and city councils and agencies use their own evaluation criteria, undermining the accuracy of technical and economic feasibility assessments. Further, procurement standards to allow purchase of energy efficient fixtures for public buildings are also lacking.

1 <http://www.iea.org/statistics/statisticssearch/report/?&country=MALAYSIA&year=2011&product=ElectricityandHeat> [Accessed 1 February 2014]

2 Atkins Report 2013.



Indicators and Targets for 2020

The Melaka State government has set a target that renewable sources will provide 20 percent of all electricity that will be consumed in the state in 2020. There is no similar target set for energy efficiency. Table 2 below identifies the baseline data, indicators and targets that will be used to measure Melaka's performance in improving energy efficiency and increasing the use of renewable sources.

INDICATOR	TARGET
1. Total electrical use by user-type and scale of development	None
2. Total electrical use per capita (KWh/year)	Reduce by 20%
3. Percentage of electricity used obtained from renewable energy (RE) sources	20%
4. Average number and length of electrical interruptions per customer per year	Reduce to zero
5. Number of employees in the renewable energy industries	Increase by 20%
6. Total GHG emissions from the energy sector	To be developed

Table 2. Suggestive indicators and targets to measure progress on improving energy efficiency and increasing share of renewable energy sources in Melaka. These will be finalized during the preparation of a baseline study as discussed in the Implementation Section.

Potential Actions

▶ SHORT TERM ACTIONS

ACTION 1: Prepare a GHG emissions inventory for the state

Prepare a greenhouse gas emissions inventory to determine the main sources of emissions from energy use and to establish a baseline carbon footprint of the entire state of Melaka. The inventory would provide valuable information to the government and residents of Melaka about the climate related impacts of various activities in the state. Based on the information, key steps necessary to reduce carbon footprint can be identified.

Responsible Agencies: GreenTech

Potential Benefits:

- This action will provide valuable information to allow Melaka to prioritize actions needed to reduce GHG emissions from the energy sector.

ACTION 2: Prepare a comprehensive energy plan

Building on the GHG emissions inventory, prepare a comprehensive energy plan that addresses production and increase in use of renewable energy from multiple sources, and promotes energy efficiency across the state. Although Melaka is heavily reliant on the national grid for electricity, and currently consumes electricity that is primarily generated from nonrenewable sources, the state can focus on increasing the production of electricity from renewable sources within the state boundaries and increase the efficiency of consumption. The energy plan should also address changes in the transportation sector (as discussed in the section on Green Transportation).

The energy plan should address the following:

- Roles of key institutions engaged in RE/EE in the state;
- Energy audit of public facilities to include water and wastewater infrastructure facilities such as water treatment plants and pumping stations that consume large amounts of electricity.
- Recommendations on the types of RE technologies that should be pursued in Melaka;
- Identify sources of financing and opportunities for private sector involvement;
- Capacity building efforts to develop a workforce trained in green technologies;
- Policies, regulations, codes and standards to

promote adoption of RE sources and EE practices; and,

- Programs aimed at engaging community members in energy efficiency practices.

Responsible Agencies: TNB

Potential Benefits:

- This action has the potential to improve technology and reduce long-term operating costs related to electricity consumption;
- Reduce GHG emissions; and
- Increase the number of green jobs in Melaka.

ACTION 3: Prepare a feasibility study to set up a Smart City demonstration project

Undertake a demonstration energy management system project that uses smart technologies to manage energy demand and supply. Prepare a feasibility study to identify an area suitable for setting up the project, or to identify select representative consumers, and prepare a comprehensive strategy that relies on building energy management systems (BEMS), local renewable energy generation and storage facilities, community engagement, and sharing of real-time information on energy demand and supply, to reduce peak load demands and increase use of electricity from renewable sources. TNB and KeTTHA have already initiated a Smart Meter Pilot Project in MITC that may become the pilot for the Smart City project.

Responsible Agencies: TNB

Potential Benefits:

- This action has the potential to facilitate EE and the use of RE amongst residential and commercial owners;
- Introduce new technologies and innovation;
- Reduce GHG emissions; and
- Increase the number of green jobs in Melaka.



Kitakyushu (Japan) Smart Community Creation Project is an information-technology based (smart) demonstration project to test and showcase renewable energy production and demand management aimed at improving energy efficiency and reducing CO2 emissions.

►► MEDIUM TERM ACTIONS

ACTION 4: Scale-up demonstration projects

As discussed below, Melaka has initiated several demonstration projects aimed at improving energy efficiency in public facilities. The state should plan to scale-up these projects depending on the findings from the demonstration projects.

a. Expand energy efficient street lighting system: as a demonstration project, Melaka is undertaking an energy saving initiative to improve electricity consumption in 20 street light fixtures. Although the state has paid for the initial improvements, an ESCO model is also being explored to include additional fixtures to the initiative.



Managing electricity consumption in street lights. Da Nang (Viet Nam), has established a dimming program where every third light on some of the main roads is switched off from 11 pm onwards to save electricity.

b. Retrofit official and heritage buildings for energy efficiency: Melaka has initiated an energy audit of 10 public buildings with the intention of determining energy efficiency measures. The demonstration project has just been initiated and will be expanded to all public buildings depending on the outcomes from the initial effort.

c. Energy Audit of Schools: Thirty secondary schools have been selected for an energy audit and will be retrofitted to improve efficiency of energy consumption.

Responsible Agencies: CIMT/ GreenTech/ EPU/ MBMB/ Schools

Potential Benefits:

- This action has the potential to facilitate EE and the use of RE amongst government agencies and institutions;
- Introduce new technologies and innovation;
- Increase public awareness; and
- Reduce GHG emissions.

ACTION 5: Establish a program to facilitate large-scale production of electricity from solar energy in the state

Melaka has reasonable potential to generate electricity from solar energy. The national government, through the Sustainable Energy Development Authority (SEDA) has set up a Feed-in Tariff (FIT) program to encourage the development of renewable energy projects in Malaysia. FIT requires electricity providers to purchase electricity from approved renewable energy projects at a favorable price. This project has provided an incentive for private sector companies to set up solar farm projects, including several in Melaka. Between approved and proposed projects, Melaka anticipates that it will receive approximately 293 GWh of electricity from solar farms (or nearly six percent of anticipated demand).

Based on the recommendations of the Energy Plan, the state government should set up a program to facilitate large-scale implementation of solar technologies across Melaka. Not only should the state ensure the successful implementation of solar farm projects, Melaka should also facilitate the large-scale adoption of photovoltaics (PV) in public and private buildings and areas. Incentives that may help include providing rebates towards the purchase of PVs, providing information about technologies and benefits for individuals, or support with installing net meters that allow owners to connect to the national grid and be compensated for the renewable energy that they supply to the grid.

Responsible Agencies: GreenTech/ TNB

Potential Benefits:

- This action has the potential to increase RE production by engaging with the private sector and individuals across the state
- Introduce new technologies and innovation;
- Raise awareness;
- Reduce GHG emissions; and
- Increase the number of green jobs in Melaka.

Responsible Agencies: GreenTech/ TNB

Potential Benefits:

- This action has the potential to facilitate EE and the use of RE in private properties;
- Introduce new technologies and innovation
- Raise awareness
- Reduce GHG emissions; and
- Increase the number of green jobs in Melaka.



Solar panels in walkways in Kitakyushu

ACTION 6: Establish a program to encourage large private facility owners to implement EE measures and increase consumption from RE sources

Melaka has already demonstrated a commitment to improve energy efficiency in public facilities. Although it has little control on how private facilities consume electricity, or the setting of tariffs to influence consumption, the state should facilitate EE measures and increase in the use of RE in private facilities. The state should partner with the Tenaga Nasional Berhad (the electrical utility company) and private owners of large facilities such as hotels, malls, and large industrial facilities to promote EE/RE measures. Melaka could offer incentives such as knowledge sharing programs (including Malaysia's Green Building Index program), tax rebates, energy audit programs, or hosting a trade fair of environmental companies specializing in EE/RE, in an effort to encourage private property owners to shift consumption patterns.

Order-of-Magnitude Cost Estimates

The cost estimates below are rough order-of-magnitude costs and based on an understanding of the effort required for consulting services and don't include infrastructure or installation costs in most cases. Detailed costs for consulting services can be developed once a detailed TOR is prepared for each action.



PROPOSED ACTIONS	ESTIMATED COSTS RANGE
ACTION 1: Prepare a GHG emissions inventory for the state (Cost estimate is for cost to prepare the inventory)	100 – 500,000 USD
ACTION 2: Prepare a comprehensive energy plan (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)	100 – 500,000 USD
ACTION 3: Prepare a feasibility study to set up a Smart City demonstration project (Cost estimate is for cost to prepare the feasibility study; there will be subsequent costs related to the actions recommended in the study)	0 – 100,000 USD
ACTION 4: Scale-up demonstration projects (Cost estimate is for scaling-up demonstration projects on a recurring basis)	0 – 100,000 USD (recurring)
ACTION 5: Establish a program to facilitate large-scale production of electricity from solar energy in the state (Cost estimate is for cost to set up the program and for recurring costs to implement the program)	0 – 100,000 USD (recurring)
ACTION 6: Establish a program to encourage large private facility owners to implement EE measures and increase consumption from RE sources (Cost estimate is for cost to set up the program and for recurring costs to implement the program)	0 – 100,000 USD (recurring)

C. GREEN TRANSPORTATION

Goal: Increase opportunities for alternative modes of transportation and reduce GHG emissions resulting from vehicular use

Accessibility, and increasing GHG emissions/air pollution related to transportation

Vehicles that run on combustion of petroleum-based products (like petrol) emanate carbon dioxide, one of the greenhouse gases associated with climate change. These vehicles also contribute to air pollution and can be a cause of concern for human health. Vehicular traffic has been on the rise in cities. Greater affluence, increasing distances, land use patterns and

lack of public transit options have led to an increase in the use of personal cars and motorcycles. Additionally, truck traffic required to move goods has been on the rise as farms and factories move further and further away from cities. Livability in a city is also affected when lack of viable public transit options limits movement of low-income residents, elderly residents or teenagers, who may not have access to (or be eligible for driving) personal cars or motorcycles.



GREEN
TRANSPORTATION

OUTCOMES

Environmental quality is enhanced:

- Tourism related congestion is alleviated
- Opportunities to walk or bicycle in a safe environment improve in and around the heritage area

Economic competitiveness is strengthened:

- Per capita GHG emissions from the transportation sector decreases
- Vehicle kilometers traveled per capita decreases
- Public transit opportunities and per capita ridership increases

Mobility is enhanced (equitable outcome):

- Improvement in transit system increases travel choices, particularly for non-drivers (such as elderly, children and low income residents), enhancing their opportunities to access jobs, schools, hospitals, government offices and other places

PROPOSED ACTIONS

Short-Term

ACTION 1: Prepare a comprehensive transportation plan related to tourism activities in Melaka

ACTION 2: Install traffic-calming measures and establish a connected and safe network of pedestrian and bicycle paths in and around the heritage area

ACTION 3: Develop a program to start converting public fleet to fuel-efficient vehicles

Medium and Long-Term

ACTION 4: Prepare a transit plan for the state

ACTION 5: Implement an anti-idling regulation for buses in the heritage area

ACTION 6: Prepare subarea plans to promote urban density that supports a walkable environment in new urban centers

The above proposed actions will be incorporated into the UEA Action Plan indicated in the Blueprint of Melaka Green City State 2020

Key Issues

- **Increasing vehicular traffic:** In 2011, there were 33,530 motor vehicles registered in Melaka, an increase of nearly 10 percent from the previous year. In addition, Melaka is visited by millions of tourists annually (approximately 13 million in 2012). The state's location between Kuala Lumpur and Singapore makes it an ideal stop-over for a variety of purposes such as recreation, meetings, shopping and lodging.
 - a. Due to its popularity as a tourist destination, Melaka experiences significant traffic congestion during peak tourist days such as weekends and public holidays. Most of the congestion is experienced along the main routes leading to the town center in Melaka City.
 - b. Localized congestion is experienced in the vicinity of schools, a number of which are also located in the town center area.
 - c. Localized congestion is also experienced in the heritage area, particularly related to tourist buses that stop to offload or pick up tourists in the middle of the narrow, historic streets.
- **Public Transport:** Melaka does not have a coordinated transit system. Buses were privately run but have been taken over by the state recently. The bus routes are not well connected and bus schedules are often unreliable. As a result, ridership is fairly low, and buses are not the preferred choice amongst local residents.



Increasing affluence will shift motorcycle riders towards cars

- **Non-motorized traffic:** Melaka provides some bicycle lanes in isolated locations. However, amongst the residents of Melaka, bicycling as a means of transportation has not gained popularity due to the hot, humid and wet weather. Anecdotal evidence suggests, however, that tourists are willing to utilize bicycles as a means to explore the heritage area and its vicinity.

The heritage area sees a lot of pedestrian activity. The streets and buildings are from an era when walking was the prevalent mode of mobility. In addition, a number of tourism focused projects, such as the Riverwalk along the Melaka River have increased opportunities to explore the historic and town center area on foot.

- **Road Safety:** 14,720 road accidents in 2011, an increase of approximately 4.5 percent from previous year. This increasing trend has been constant since 2002. During the same period, the number of fatalities has remained mostly constant at 235 deaths per year.





大众银行

Indicators and Targets for 2020

INDICATOR	TARGET
1. Km of public transit system per 10,000 people	Increase by 50%
2. Ridership in public transit per 10,000 people	Increase by 100%
3. Vehicle kilometer traveled per capita	Reduce by 20%
4. Transportation injuries/fatalities per 10,000 people	Reduce to zero
5. Km of 'safe' bicycle paths per 10,000 people	Increase by 50%
6. Km of 'safe' pedestrian paths per 10,000 people	Increase by 50%
7. Total GHG emissions from the transportation sector	Reduce by 40%
8. Total number of vehicles in the public fleet that are electric, biodiesel or hybrid	50% Total Public Fleet

Table 3. Suggestive indicators and targets to measure improvements in transportation conditions. These will be finalized during the preparation of a baseline study as discussed in the Implementation Section.

Potential Actions

▶ SHORT TERM ACTIONS

ACTION 1: Prepare a comprehensive transportation plan related to tourism activities in Melaka

Melaka received approximately 13 million tourists in 2012, a figure that is expected to grow in the coming years. To maintain the state's attractiveness for tourists, a comprehensive effort is required to address the congestion that already plagues the local roads during peak tourist days. The state should prepare a comprehensive transportation plan focused on tourist traffic that considers the following:

a. Periodic pedestrianization of the heritage area: Restrict tourism related vehicular traffic from the heritage area on certain days and times (e.g. Friday evening to Sunday afternoon).



Pedestrianized street in Beijing that allows residential and delivery traffic through during limited times of the week.

b. Transfer area for tourists with alternative mode of transportation: Develop a transfer area away from the heritage area and provide tourists with alternative modes of transportation (such as small electric buses) to access the heritage area. Explore whether the transfer area can be established along the Melaka River and if the existing boat fleet could serve as one of the primary modes of bringing tourists to the heritage area.

c. High-density commercial development at the transfer area: Plan for high-density, commercial land development at the transfer area to subsidize the cost of developing alternative transportation infrastructure.

d. Traffic management: Consider traffic management approaches such as signalization coordination, flexible lanes, restricted on-street parking during peak travel periods, and immediate removal of broken down vehicles to reduce congestion.

e. Parking management: Establish parking norms that are aimed at discouraging long term parking on city streets during busy periods. This could be done through establishing parking fees that are higher when demand is high, encouraging use of off street parking areas, etc.

f. Regional connectivity: Tourists heavily rely on personal automobiles and tour buses to access Melaka. Promote increased rail connectivity and regional bus connectivity between Melaka and cities to the north including Kuala Lumpur, as well as with cities to the south including Singapore.

Responsible Agencies: JPJ

Potential Benefits:

- This action has the potential to enhance economic competitiveness by improving traffic flow related to tourism activities particularly in and around the heritage area;
- Provide alternative modes of transportation; and
- Support the reduction of GHG emissions by reducing congestion.

ACTION 2: Install traffic-calming measures and establish a connected and safe network of pedestrian and bicycle paths in and around the heritage area

Incorporate traffic calming measures such as dedicated parking for tourist buses to manage traffic movement in and around the heritage area. Connect the heritage area with hotels and commerce in the surrounding area to promote walkability and use of bicycles amongst tourists. Integrate the Melaka riverwalk and the Trishaws with this network. Provide a safe walking and bicycle environment by clearly demarcating lanes and crosswalks, providing lighting, and restricting encroachment of vehicular traffic. Work with the hotels and commercial establishments to provide bicycles for rent to visitors.

Responsible Agencies: JPJ / MBMB

Potential Benefits:

- This action has the potential to provide a short-term solution to improve traffic flow in and around the heritage area; and
- Enhance tourism opportunities by improving pedestrian and bicycle experience for tourists.

ACTION 3: Develop a program to start converting public fleet to fuel-efficient vehicles

The Chief Minister of Melaka has demonstrated leadership on this issue by choosing a fuel-efficient vehicle for his official use. Others in the state should follow this gesture by acquiring or leasing only fuel-efficient vehicles in the future. By replacing inefficient and aging fleet with fuel-efficient vehicles, Melaka will take an immediate step towards reducing GHG emissions.

Responsible Agencies: GreenTech / JPJ

Potential Benefits:

- This action has the potential to increase public awareness about fuel efficient vehicles;
- Demonstrate Melaka's commitment towards low carbon technologies; and
- Reduce GHG emissions.

►► **MEDIUM TERM ACTIONS**

ACTION 4: Prepare a transit plan for the state

Melaka consists of several established urban centers (such as the heritage area and Hang Tuah Jaya), as well as several areas that are planned for urban expansion (such as the Green City). Promote a coordinated and connected, bus based transit system between the urban centers, as well as the urban centers and their hinterlands. Consider measures such as real-time monitoring of buses and subsidized tariffs initially to encourage the use of transit in the state. Additionally, consider the governance structure of the buses, taxis and hire cars to evaluate whether all can be placed under one regulatory structure for the purposes of improving efficiency.

Responsible Agencies: JPJ

Potential Benefits:

- This action has the potential to offer an alternative to using personal cars and motorcycles and reduce emissions related to vehicles;
- Reduce fuel consumption and GHG emissions; and
- Improve accessibility for elderly, teenagers and low-income residents.

ACTION 5: Implement an anti-idling regulation for buses in the heritage area

Even though air pollution is not a significant problem in Melaka yet, the city can take a proactive stance by targeting polluting vehicles and traffic congestion, as well as industrial pollution to ensure that air quality remains healthy in the future. Adopt an anti-idling regulation that requires tour buses and other large public vehicles to switch off engines when they are parked in a parking area, or offloading zone.

Responsible Agencies: JPJ

Potential Benefits:

- This action has the potential to reduce emissions from vehicles; and
- Reduce fuel consumption.

ACTION 6: Prepare subarea plans to promote urban density that supports a walkable environment

Several new urban centers, such as Hang Tuah Jaya and the Green City have potential for increased density. Prepare subarea plans that provide for increased density and a pedestrian friendly environment with a mix of uses to encourage walkability. Increased density may also have other co-benefits (such as establishing a district cooling plant for energy efficiency purposes).

Responsible Agencies: JPBD

Potential Benefits:

- This action has the potential to reduce personal vehicle trips by improving opportunities for pedestrians; and
- Reduce congestion, fuel consumption and GHG emissions.



Buildings in the green city are designed to be energy efficient. Increased density and a walkable environment will promote additional environmental benefits

Order-of-Magnitude Cost Estimates

The cost estimates below are rough order-of-magnitude costs and based on an understanding of the effort required for consulting services and don't include infrastructure or installation costs in most cases. Detailed costs for consulting services can be developed once a detailed TOR is prepared for each action.



PROPOSED ACTIONS	ESTIMATED COSTS RANGE
<p>ACTION 1: Prepare a comprehensive transportation plan related to tourism activities in Melaka (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)</p>	100 – 500,000 USD
<p>ACTION 2: Install traffic-calming measures and establish a connected and safe network of pedestrian and bicycle paths in and around the heritage area (Cost estimate is for cost to prepare an initial plan and to implement simple measures)</p>	0 – 100,000 USD
<p>ACTION 3: Develop a program to start converting public fleet to fuel-efficient vehicles (Cost estimate is for cost to set up the program; there will be subsequent costs related to actual conversion of fleet)</p>	0 – 100,000 USD
<p>ACTION 4: Prepare a transit plan for the state (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)</p>	100 – 500,000 USD
<p>ACTION 5: Implement an anti-idling regulation for buses in the heritage area (Cost estimate is for cost to set up the program and for engaging with stakeholders to implement the program)</p>	0 – 100,000 USD
<p>ACTION 6: Prepare subarea plans to promote urban density that supports a walkable environment in new urban centers (Cost estimate is for cost to prepare plans)</p>	0 – 100,000 USD

D. ZERO WASTE

Goal: Put Melaka on the path to become a “zero-waste” state and reduce waste-related GHG emissions

Waste as a resource; increasing GHG emissions related to organic waste:

Garbage has been on the rise in cities. Plastics, packaging materials, appliances, construction materials, hazardous materials and organic materials are increasingly finding their way to landfills, water bodies, or abandoned along roadsides. Waste originates from homes, as well as commercial and

industrial facilities. In landfills, organic materials decompose to release methane, an extremely potent greenhouse gas. Treating recyclable materials as garbage wastes energy and resources, as an increased number of trucks, personnel and more land are required to dispose waste. Improper disposal of hazardous materials becomes an environmental and human health problem.



ZERO WASTE

OUTCOMES

Environmental quality is enhanced:

- The amount of solid waste per capita decreases
- Composting of organic waste increases
- Opportunity for energy generation from waste increases
- Disposal of hazardous waste from industries, homes and commercial facilities is better managed
- Rate of recycling increases

Economic competitiveness is strengthened:

- Coverage of solid waste collection expands
- Investments and number of employees in the waste management industries increase

Public health risks are reduced (equitable outcome):

- Improvements in management of waste (including industrial and hazardous waste) will reduce risks to public health
- Reduction in GHG emissions can reduce potential impact on populations (such as elderly residents and babies) who are disproportionately vulnerable to increasing temperatures and variable climate related to climate change

PROPOSED ACTIONS

Short Term

- ACTION 1:** Prepare a waste management plan
- ACTION 2:** Undertake a demonstration project to manage organic waste from a select produce market
- ACTION 3:** Establish a waste reduction and recycling program in government offices
- ACTION 4:** Prepare a feasibility study to develop an Eco-Park

Medium and Long Term

- ACTION 5:** Set up a program in partnership with SWM to engage commercial and industrial facilities in waste reduction programs
- ACTION 6:** Organize a trade fair focused on recycled products

The above proposed actions will be incorporated into the UEA Action Plan indicated in the Blueprint of Melaka Green City State 2020

Key Issues

- **Limited infrastructure to manage waste:** It is estimated that residents in Melaka generate between 670 and 1,000 tons (approximately) of waste per day. In addition, approximately 400 and 700 tons of waste is generated from commercial and industrial premises. There are no material sorting facilities in Melaka, and all waste is sent to the landfill site in Krubong. While no data was available on the type of waste that is received at the landfill, stakeholder interviews suggest that approximately 60 to 70 percent of the waste consists of food waste/organics. The remainder consists of plastic (5-10 percent), paper and cardboard (5-10 percent), metals (2 percent) and glass (2 percent).

SWM is a private concessionaire responsible for managing waste in several peninsular states in Malaysia including Melaka. SWM recently introduced a 2+1 Program where it collects food and other waste on two days of the week, and recyclables, bulky items and garden waste on one day of the week. This is a first step towards recovering recyclables from waste but depends entirely on public participation in segregating waste at source. The remaining waste, collected on two of the days, ends up in the landfill since there is no facility to compost organic waste or for sorting recyclables. The Krubong landfill will be closed in the next two-three years and will be replaced by a new facility that is under construction at Sungai Udang.

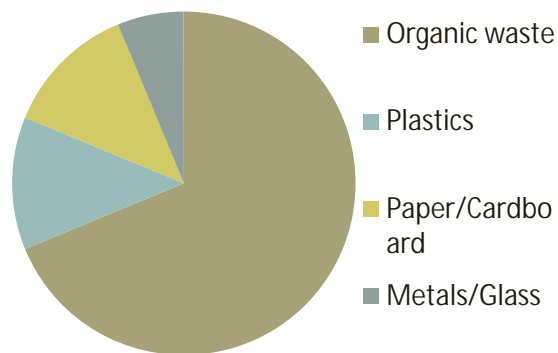


Figure 8. Solid waste in Melaka

- **Lack of public awareness regarding waste management:** There is very limited awareness amongst residents, businesses or industries about recycling or waste segregation in Melaka. SWM's new 2+1 program is aiming to change that in the future.
- **Landfill leachates and GHG Emissions:** Landfills such as Krubong produce methane, a powerful greenhouse gas (GHG). Even though the landfill will be closed in the near future, it will continue to generate methane for many years to come. In addition, the landfill is not lined to prevent leachate

and may be a contributor to water pollution in the Melaka River due to proximity.

- **Littering and blocking storm drains:** Melaka also suffers from blocked drainage channels. Littering in urban streets and illegal disposal of waste in open areas often ends up clogging drainage channels. In addition to becoming an aesthetic problem, clogged drains fail to function effectively during rain events and can lead to localized flooding.
- **Increased waste due to population increase:** Ongoing population growth in Melaka will contribute to increased waste generation.

Indicators and Targets for 2020



INDICATOR	TARGET
1. Data regarding total solid waste output per year by type (biomass, plastics, glass, metals, electronics, mine, construction materials and hazardous materials)	None
2. Per capita waste output	Reduce by 20%
3. Percentage of population with regular solid waste collection	Increase to 50%
4. Percentage of city's solid waste that is recycled (by type)	Increase by 100%
5. Total GHG emissions related to solid waste	Reduce by 40%
6. Percentage of labor force in green waste management activities	Increase by 100%

Table 4. Suggestive indicators and targets to measure progress on improving solid waste management. These will be finalized during the preparation of a baseline study as discussed in the Implementation Section.



Potential Actions

▶ SHORT TERM ACTIONS

ACTION 1: Prepare a waste management plan

Melaka needs to take several steps before the goal for a zero waste state can become a reality. As a first step, the state should coordinate with SWM to collect data and prepare a waste management plan. The plan should explore management options including the viability of the following options, (a) building a waste handling facility focused on increasing recycling, (b) building an incinerator to dispose of remaining waste, bringing waste from other states, and generating electricity, (c) cap and rehabilitate the Krubong Landfill to capture trapped gases and generate electricity, and (d) generate renewable energy from plastics using waste from the Krubong Landfill (as proposed by during stakeholder discussions by Syngas <http://www.syngas.com.my/index.html>). The plan should also formulate a public outreach campaign.

Box 1-1: Elements of a waste management plan

Background

- 1 Overall waste problematic in a territory
- 2 EU legislation
- 3 National legislation
- 4 Description of national waste policy and prevailing principles to address Point 1 above, in line with the waste hierarchy
- 5 Description of objectives set in specific areas
- 6 Inputs from the consultation process

Status part

- 1 Waste amounts, e.g.:
 - a) waste streams
 - b) waste sources
 - c) waste management options
- 2 Waste collection and treatment for the above
- 3 Waste shipment
- 4 Organisation and financing
- 5 Assessment of previous objectives

Planning part

- 1 Assumptions for planning
- 2 Forecast in terms of waste generation, total and per waste stream
- 3 Determination of objectives for forecasted:
 - a) waste streams
 - b) waste sources
 - c) waste management options
- 4 Plan of action, including measures for achieving objectives:
 - a) collection systems
 - b) waste management facilities
 - c) responsibilities
 - d) economy and financing

Source: European Commission Directorate-General Environment. *Preparing a Waste Management Plan – A Methodological Guidance Note*. 2012. (http://ec.europa.eu/environment/waste/plans/pdf/2012_guidance_note.pdf) [Accessed 1 March 2014]

Responsible Agencies: TNM/ SWM/ PPSPPA

Potential Benefits:

- This action has the potential to improve information about waste in the state and lead to better decision-making about management options;
- Reduce GHG emissions by reducing disposal of organic waste in landfills; and
- Improve decision-making about location of infrastructure facilities;
- Identify technologies and potential options for waste management.



Shinmoji Incinerator Facility in Kitakyushu (Japan) is focused on recycling waste by combusting refuse at high temperatures. Thermal energy generated during refuse treatment is utilized for electric power generation that is reused in the facility, as well as sold to the local private utility company.

ACTION 2: Undertake a demonstration project to manage organic waste from a select produce market

Melaka is in the process of initiating a demonstration project to capture organic waste from one of its largest fresh produce market. The waste will be composted and sold as manure. Melaka should scale up the organic

waste composting project, and help reduce organic wastes from reaching the landfill. The information gathered through the demonstration project can feed into the waste management plan, and can also raise awareness about managing organic waste.

Responsible Agencies: GreenTech

Potential Benefits:

- This action has the potential to improve awareness about options to manage organic waste; and
- Reduce GHG emissions by reducing disposal of organic waste in landfills

ACTION 3: Establish a waste reduction and recycling program in government offices

The state government can take a proactive stance in establishing a waste reduction and recycling program aimed at all government offices in Melaka. The government should consider requiring each government department to develop a waste reduction and recycling program. Further, Melaka can consider instituting a policy to purchase recycled products (such as stationery) in all government departments. By undertaking these measures, Melaka can demonstrate its strong commitment towards reducing waste in the state.

Responsible Agencies: GCAP Committee / SWM / PPSPPA

Potential Benefits:

- This action has the potential to reduce waste and lead to more efficient use of solid waste management services;
- Create opportunities to develop a recycling products industry and new green jobs;
- Improve public awareness; and
- Reduce GHG emissions
-

ACTION 4: Prepare a feasibility study to develop an Eco-Park

The Solid Waste Management and Public Cleansing Act (Act 672), adopted by the national government in 2011, is an effort to address waste management in a comprehensive manner. Amongst its provisions is a clause that allows the government to establish a “take back system” requiring manufacturers of certain products to take back and recycle or dispose a used product in a responsible manner. In Japan, such a requirement has led to investments in recycling facilities for products such as televisions and home appliances. Melaka should prepare a feasibility study to determine if a cluster of recycling industries can be set up in the state, and if so, what incentives could be offered to facilitate such a cluster. Some incentives could be offering land at a subsidized price to initial investors, and grants to set up research and development laboratories for emerging technologies at the Eco-Park. Melaka has already signed a

MoU with the Ministry of Economy, Trade and Industry (METI) in Japan to learn about Eco-Parks from the city of Kitakyushu. Text Box on Eco-Park in Kitakyushu.

Responsible Agencies: JPBD / CIMT / GreenTech

Potential Benefits:

- This action has the potential for introducing new technologies, investments and green jobs;
- Provide an opportunity to develop a recycling industry cluster;
- Showcase integrated land development;
- Reduce waste



Kitakyushu Ecotown Project is a comprehensive effort to recycle waste through research, technological innovation, education and commercialization, where recycling based industries are co-located with research facilities to establish a waste management network.

▶▶ MEDIUM TERM ACTIONS

ACTION 5: Set up a program in partnership with SWM to engage commercial and industrial facilities in waste reduction programs

A considerable proportion of waste generated in Melaka comes from nonresidential sources. Partnering with SWM, Melaka should engage with commercial and industrial facilities to develop waste reduction programs. Through such programs, the state should highlight potential commercial advantages of recycling, introduce businesses to new waste management technologies, and encourage innovation through grants and favorable funding. Additionally, develop expertise on assessing commercial and industrial waste and preparing recycling plans, and offer this expertise as technical assistance to businesses in an effort to increase recycling amongst private sector operations.

Responsible Agencies: GCAP Committee / SWM / PPSPPA

Potential Benefits:

- This action has the potential to reduce waste and lead to more efficient use of solid waste management services;
- Create opportunities to develop a recycling products industry and new green jobs;
- Improve public awareness; and
- Reduce GHG emissions

ACTION 6: Organize a trade fair focused on recycled products

Organize an annual trade fair to showcase recycled products. The purpose of the fair would be to encourage

awareness about recycled products and increase the purchase of such products in the state. The trade fair may be organized as part of IMT-GT activities and after being organized initially in Melaka, could rotate on an annual basis in the region.

Responsible Agencies: CIMT / GreenTech

Potential Benefits:

- This action has the potential to develop a recycling products industry and new green jobs;
- Improve public awareness; and
- Reduce GHG emissions

Order-of-Magnitude Cost Estimates

The cost estimates below are rough order-of-magnitude costs and based on an understanding of the effort required for consulting services and don't include infrastructure or installation costs in most cases. Detailed costs for consulting services can be developed once a detailed TOR is prepared for each action.



PROPOSED ACTIONS	ESTIMATED COSTS
<p>ACTION 1: Prepare a waste management plan (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)</p>	100 – 500,000 USD
<p>ACTION 2: Undertake a demonstration project to manage organic waste from a select produce market (Cost estimate is for cost to prepare an initial project and to implement simple measures)</p>	0 – 100,000 USD
<p>ACTION 3: Establish a waste reduction and recycling program in government offices (Cost estimate is for cost to set up the program and to support preparation of procurement standards and guidelines to prepare waste recycling and reduction programs for individual offices)</p>	0 – 100,000 USD
<p>ACTION 4: Prepare a feasibility study to develop an Eco-Park (Cost estimate is for cost to prepare the feasibility study; there may be subsequent costs related to the actions recommended in the study)</p>	100 – 500,000 USD
<p>ACTION 5: Set up a program in partnership with SWM to engage commercial and industrial facilities in waste reduction programs (Cost estimate is for cost to set up the program and for engaging with stakeholders to implement the program; any incentives that may be developed as part of the program will be additional costs)</p>	0 – 100,000 USD
<p>ACTION 6: Organize a trade fair focused on recycled products (Cost estimate is for cost of organizing the first trade fair; costs may be reduced through private sponsorships)</p>	0 – 100,000 USD


E. URBAN AGRICULTURE & FORESTRY

Goal: Protect forests and areas with rich biodiversity, and improve agricultural practices

Urbanization and open space

Open spaces in urban areas and in the vicinity of cities provide valuable environmental and health benefits. Proximity to farms reduces transportation costs (and related GHG emissions). Forested areas help to reduce GHG emissions through carbon sequestration, while also providing an opportunity for active recreation. Forested and other natural areas also provide

ecological benefits such as habitat for wildlife and improvements to water quality. Urban development in greenfield and coastal areas can lead to habitat losses or fragmentation of biodiversity corridors.



URBAN FORESTRY AND AGRICULTURE

OUTCOMES

Environmental quality is enhanced:

- Data about sensitive environmental resources improves
- Sensitive lands are protected
- Recreational opportunities increase
- Tree canopy and use of native plant species increases

Economic competitiveness is strengthened:

- Investment in high risk areas (related to environmental factors) decrease

Environmental health risks are reduced (equitable outcome):

- Increase in open space provides opportunity for a healthy lifestyle
- Increase in urban tree canopy reduces heat island effect and reduces risks for residents who are vulnerable to hotter environments
- Reduction in pesticide use reduces risks of associated diseases

PROPOSED ACTIONS

Short Term

ACTION 1: Prepare a detailed GIS-based spatial database of sensitive ecological resources in Melaka
ACTION 2: Prepare a demonstration project to install a green roof in two select government buildings
ACTION 3: Undertake a demonstration project to reduce use of pesticides and increase consumption of organic produce in two government complexes

Medium and Long Term

ACTION 4: Set up a knowledge center regarding pesticide use in Melaka
ACTION 5: Prepare an open space and recreational facilities plan

The above proposed actions will be incorporated into the UEA Action Plan indicated in the Blueprint of Melaka Green City State 2020

Key Concerns

A total of 110,000 hectares of land in Melaka (66% of total area) has been designated as Environmental Sensitive Areas (ESAs). ESAs refer to areas that are of critical importance in terms of goods, services and life-support systems they provide such as water purification, as well as for their biodiversity. Within Melaka, most of the ESA areas are designated as ESA Rank 3 where development is allowed and the type and intensity is strictly controlled depending on the environmental constraint.

- **Loss or fragmentation of natural habitats:** Increasingly, urban development in Melaka is occurring in greenfield areas. Currently, there is very little environmental data regarding the areas that are getting developed. While some environmental factors that are easily observable (such as slope conditions or unique vegetation) may be considered during land development, other factors such as habitats of sensitive plant or animal species, or important ecological corridors, may not be recognized. As a result, the likelihood of habitat losses or fragmentation of biodiversity corridors is very high in Melaka.
- **Loss of shoreline vegetation:** Vegetation along shoreline is an important resource. Not only does it prevent erosion along a coastal area, or provide habitat for animal and fish species, it can also help to reduce the impact of coastal floods. Land reclamation leads to the loss of shoreline vegetation. Currently, the environmental damage due to manipulation of the shoreline is not adequately addressed in land reclamation projects.
- **Loss of wetlands:** Wetlands play an important part in maintaining water quality, providing bio habitats, and reducing risks of damage from flooding. Currently, Melaka does not have a statewide wetlands inventory to identify all the sensitive areas and wetland corridors that need to be protected. As a result, decisions regarding development in wetland areas are made on an ad hoc basis and often without an in-depth understanding of the resulting environmental damage.
- **Urban canopy:** Melaka is quite green in general. Considerable portion of the state consists of either agricultural land or forested areas. Additionally, most major roadways and newly developed areas are lined with trees. There are however, some parts of the state where there is a shortage of open areas and green spaces. Further, most open spaces in urban areas are located as isolated pockets rather than a linked network that can offer a continuous green experience to urban residents. While existing urban greens need to be protected, additional areas are also required to provide Melaka residents with a green environment in the future.
- **Heat island effect:** In urban areas, increasing paved surfaces can result in an increase in average temperature when compared to the average temperature in rural surroundings. This is due to the heat reflected by paved

surfaces on sunny days and due to lack of sufficient amount of urban landscaping and tree canopy. This problem is likely to become more challenges due to climate change, when cities will be faced with an increasing number of extreme heat events.

- **Pesticide use in agricultural and landscaping practices:** Pesticides are commonly used in agricultural and landscaping practices to kill insects, weeds or fungus. However, pesticides can also be harmful to human health. Depending on the pesticide, some can affect the nervous system, while others may irritate the skin or eyes. Some pesticides are also known to be carcinogens (or lead to cancer). Pesticides can also leach into water bodies and lead to contamination. Children, and people engaged in pesticide application, are the most susceptible to harm. Pesticides are commonly used in Melaka, both in farming activities and in urban landscaping. There is currently no central database data on the types of pesticides that are used across the state, nor is there an understanding of the harmful effects of current practices. Further, knowledge regarding the alternative (less harmful) methods that can be used to control pests is also limited.
- **Sedentary lifestyle due to the built environment:** Obesity amongst children and adults is on the rise in Malaysia. Obesity puts people at a higher risk for type II and gestational diabetes. Increasingly sedentary lifestyle is one of the reasons for increasing incidence of obesity. By creating an urban environment where there are fewer areas for children to play, or fewer opportunities to walk, the built environment can contribute to a sedentary lifestyle.



Indicators and Targets for 2020

INDICATOR	TARGET
1. Proportion of natural areas (forested, wetlands, etc.) in Melaka	Minimum of 20%
2. Proportion of ecologically sensitive natural areas that are protected	Increase by 20%
3. Quality of connectivity between natural areas (extent of fragmentation)	Increase connectivity by 20%
4. Length of formal walking trails for passive recreation in natural areas	Increase by 20%
5. Difference between average air temperature in paved settings compared to average air temperature in green areas at the outskirts of the urban area	Reduce by two degrees
6. Pesticide usage in areas under government control, and in schools	Switch to non-harmful applications for pest control in 50 percent of the area
7. Pesticide usage in farms and nurseries	Switch to non-harmful applications for pest control in 20 percent of the areas
8. Organic food consumption in Melaka	Increase consumption of organically grown produce to 20 percent of the food served in government offices and government schools
9. Amount of recreational playgrounds per capita	Increase by 20 percent for all age groups, with one playground located within three km for every resident

Table 5. Suggestive indicators and targets to measure progress on the natural environment. These will be finalized during the preparation of a baseline study as discussed in the Implementation Section.

Potential Actions

▶ SHORT TERM ACTIONS

ACTION 1: Prepare a detailed GIS-based spatial database of sensitive ecological resources in Melaka

Partner with a local university to develop a spatial database of ecological resources in Melaka. The database could be set up using remote sensing imagery and supplemented with specialist surveys. Collect data on location and condition of wetlands, wildlife habitats, coastal vegetation, and other sensitive ecological resources. This data should be taken into consideration in future planning decisions (including the Structure Plan and local district plans). Assess the ESA designations to determine whether existing regulations ensure protection of sensitive resources. Accordingly, develop stringent regulations if needed to manage development in areas that provide long-term ecological benefits.

Responsible Agencies: JPBD / PBT

Potential Benefits:

- This action has the potential to protect wetlands, habitats, and other environmentally sensitive resources;
- Improve decision-making regarding development in ESAs;
- Improve returns on investments by reducing environmental risks for projects.

ACTION 2: Prepare a demonstration project to install a green roof in two select government buildings

Prepare two demonstration projects to install green roofs in government buildings. Develop knowledge products and training related to green roofs using the two demonstration projects as examples. Green roofs can serve multiple purposes. They can help to reduce the amount of paved areas associated with increasing temperatures and heat island effect; they can insulate buildings to reduce energy usage; they can help to reduce the rate of flow of stormwater and reduce potential for flooding in downstream areas; and they can protect the roof membrane and increase its life.

Responsible Agencies: GreenTech

Potential Benefits:

- This action has the potential to reduce heat island effect;
- Improve decision-making regarding development in ESAs;

- Increase public awareness; and
- Reduce cost of infrastructure related to stormwater management

ACTION 3: Undertake a demonstration project to reduce use of pesticides and increase consumption of organic produce in two government complexes

In the short-term, undertake a demonstration project to test alternative pest control methods in landscaping of two government complexes. In the medium-term, depending on the success of the demonstration project, scale up application of alternative non-toxic applications for pest control to additional government complexes and schools. Additionally, explore increasing the consumption of organic foods in government offices. Partner with local producers of organic food to understand production capacity and to identify steps for increasing production in Melaka. In the medium term, depending on the success of the demonstration project, expand the program to increase consumption of organic produce throughout the state.

Responsible Agencies: CIMT / GreenTech

Potential Benefits:

- This action has the potential to reduce the use of pesticide use;
- Improve water quality;
- Reduce public health risks; and
- Increase public awareness.

▶▶ MEDIUM TERM ACTIONS

ACTION 4: Set up a knowledge center regarding pesticide use in Melaka

Partner with a local university to set up a pesticide related knowledge center. The function of the center would be to gather data and monitor pesticide use in Melaka, as well as to prepare knowledge products and demonstration projects regarding alternative non-toxic applications for pest control. This center could be set up as part of a larger center for excellence for green cities discussed under the section on Implementation.

Responsible Agencies: CIMT / GreenTech

Potential Benefits:

- This action has the potential to reduce the use of pesticide use;
- Improve water quality;

- Reduce public health risks; and
- Increase public awareness.

ACTION 5: Prepare an open space and recreational facilities plan

Prepare an open space and recreational plan that documents all accessible open spaces and recreational facilities in Melaka. Conduct an analysis, using Geographic Information System (GIS), to identify areas where there are no open spaces or recreational facilities within a three-kilometer radius. Further, quantify the amount of open space and recreational facilities per capita to identify areas where the urban densities exceed the amount of available open spaces/recreational facilities. Prepare a plan to develop open spaces and recreational facilities where these are lacking and identify potential funding sources for these amenities. As part of the open space plan:

- Engage a horticulturalist to prepare a list of native plants for Melaka. Native plants typically require less maintenance and pesticides. Encourage the use of native plants for new tree plantings and landscape projects throughout Melaka.
- Conduct assessment of connectivity between natural areas to reduce fragmentation and allow for movement of animal species and promulgation of plants. Using the GIS database, determine connectivity between patches of natural areas and seek expert advice to determine sensitive ecological corridors. Incorporate priority corridors and natural habitats into the open space plan.
- Identify opportunities to protect agricultural lands from development. Proximity between urban areas and active farms reduces transportation costs (and related GHG emissions), and strengthens food security during disaster or disruptions in the supply-chain.

Responsible Agencies: JPBD / PBT

Potential Benefits:

- This action has the potential to protect sensitive open space areas;
- Encourage the use of native plant species;
- Provide food security; and
- Provide public health benefits.

3.1 NEW OPEN SPACE FOR PLACES

ACQUIRING NEW LAND FOR OPEN SPACE 'ON-MARKET'
 CREATING NEW OPEN SPACE FROM EXISTING ASSETS
 IMPROVING OR CREATING NEW OPEN SPACE THROUGH DEVELOPMENT CONTRIBUTIONS
 BUYING LAND FROM AN AGENCY OR GOVERNMENT DEPARTMENT FOR NEW OPEN SPACE

3.2 TURNING LAND USE CHALLENGES INTO OPEN SPACE ASSETS

CREATING OPEN SPACE FROM ROAD SPACE
 CREATING OPEN SPACE FROM A ROUNDABOUT
 CREATING OPEN SPACE FROM A DRAINAGE RESERVE
 CREATING OPEN SPACE FROM A QUARRY


3.3 DELIVERING OPEN SPACE IN PARTNERSHIP

DELIVERING ACTIVE AND PASSIVE OPEN SPACE IN PARTNERSHIP
 WORKING WITH COMMUNITIES TO IMPROVE EXISTING OPEN SPACE
 BUILDING COMMUNITIES THROUGH OPEN SPACE DEVELOPMENT
 COUNCIL AND AGENCIES WORKING IN PARTNERSHIP TO DELIVER OPEN SPACE

Types of factors that can be taken into consideration for Open Space planning. Source: Open Space Strategies, State of Victoria through the Department of Transport, Planning and Local Infrastructure 2013. www.dtpli.vic.gov.au [Accessed 1 March 2014]

Order-of-Magnitude Cost Estimates

The cost estimates below are rough order-of-magnitude costs and based on an understanding of the effort required for consulting services and don't include infrastructure or installation costs in most cases. Detailed costs for consulting services can be developed once a detailed TOR is prepared for each action.

	PROPOSED ACTIONS	ESTIMATED COSTS RANGE
	<p>ACTION 1: Prepare a detailed GIS-based spatial database of sensitive ecological resources in Melaka (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)</p>	100 – 500,000 USD
<p>ACTION 2: Prepare a demonstration project to install a green roof in two select government buildings (Cost estimate is for cost to prepare an initial project and to implement simple measures)</p>	0 – 100,000 USD	
<p>ACTION 3: Undertake a demonstration project to reduce use of pesticides and increase consumption of organic produce in two government complexes (Cost estimate is for cost to prepare an initial project and to implement simple measures)</p>	0 – 100,000 USD	
<p>ACTION 4: Set up a knowledge center regarding pesticide use in Melaka (Cost estimate are related to expected operating costs)</p>	0 – 100,000 USD	
<p>ACTION 5: Prepare an open space and recreational facilities plan (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)</p>	0 – 100,000 USD	

F. CULTURAL HERITAGE & TOURISM

Goal: Promote sustainable tourism to balance needs of visitors with those of residents while ensuring preservation of cultural heritage

Tourism challenges

World Heritage Cities are popular tourist destinations, and challenging places to manage. The designation propels cities to the forefront of popularity, and, at the same time, places greater emphasis on preserving the heritage that becomes important to a larger constituency. Communities benefit from

increased revenues, yet tourism also places a greater burden on local residents who end up sharing their city with greater numbers of people. Further, as a place becomes more popular, the challenges of accommodating needs of tourists with preservation efforts, requires greater management capabilities and resources.



CULTURAL HERITAGE AND TOURISM

OUTCOMES

Environmental quality is enhanced:

- Heritage is preserved
- Infrastructure related to water quality and flooding is improved

Economic competitiveness is strengthened:

- Tourism opportunities for visitors increase
- Decision-making about tourism in the heritage area improves
- Infrastructure for visitors, particularly related to mobility, is enhanced

Job opportunities increase (equitable growth):

- Enhanced tourism provides increased job opportunities including for low income and younger residents

PROPOSED ACTIONS

Short-Term

ACTION 1: Prepare a tourism plan

ACTION 2: Prepare a feasibility study to set up a tax increment financing district

Medium and Long-Term

ACTION 3: Set up a comprehensive program to offer incentives to encourage conservation of private properties in the heritage area

ACTION 4: Prepare an integrated, urban infrastructure improvement plan for the heritage area

The above proposed actions will be incorporated into the UEA Action Plan indicated in the Blueprint of Melaka Green City State 2020

Key Issues

- **Rapidly growing tourism:** Melaka's popularity as a tourist destination is growing on an annual basis. In 2013, it received more than 14 million visitors, an increase of 10 percent from the previous year. The designation of a UNESCO World Heritage City has only increased Melaka's popularity (the New York Times listed it as one of 45 destinations to visit in 2012). Tourism is one of the mainstays of the local economy, providing approximately 40 percent of the state's GDP, and services (mostly related to tourism) is the fastest growing sector. Melaka wants to see these trends continue in the future.

However, while tourism has been extremely beneficial to Melaka, increasing number of visitors have not come without problems. One of the biggest challenges has been traffic congestion on access roads and in the heritage areas during peak tourist days, as mentioned under the section on Green Transportation. Other challenges that could worsen with growing tourism, and could end up impacting Melaka's competitiveness to attract tourists, are discussed below.



Melaka World Heritage City

- **Maintenance of historic properties and heritage area:** Because of the UNESCO designation, Melaka now has access to fund such as the World Heritage Fund for maintenance of historic properties. Additionally, the state has set up a Conservation Trust Fund (established in 1993) to support conservation activities, and also receives funding from the national government towards conservation efforts in the heritage area. Despite these measures, maintaining historic areas and properties in the face of growing tourism is an ongoing challenge. Most properties are privately owned and maintenance requires owners to be actively engaged and interested in preserving their properties. That may not be the case in all situations. Further, the public spaces need large investments to provide a quality and authentic environment that visitors expect when they come to Melaka, and to provide infrastructure that can handle large volumes of people.

- **Conflicts between tourism goals, heritage priorities, and interests of residents:** The heritage area in Melaka has a resident community that has lived in this area for generations. While they benefit from growing tourist activities, the interests of residents can sometimes differ from those promoting tourism, and create conflicting situations. Further, the designation of a World Heritage City places a greater responsibility on preserving the historic integrity of the heritage area, which can sometimes be contrary to the priorities of residents or tourism promoters. One such example is an interest to pedestrianize the heritage area to enhance visitor experience. Yet, such a measure may not be popular due to greater inconvenience to residents.



Map of Malacca World Heritage City



Indicators and Targets for 2020

INDICATOR	TARGET
1. Employment in tourism related to cultural heritage	Increase by 20 %
2. Funding dedicated to conservation of individual properties in the heritage area	Increase
3. Funding dedicated to public areas and infrastructure in the heritage area	Increase
4. Attitude of residents towards conservation efforts	Increase
	Increase

Table 6. Suggestive indicators and targets to measure progress on promoting sustainable tourism. These will be finalized during the preparation of a baseline study as discussed in the Implementation Section.

Potential Actions

▶ SHORT TERM ACTIONS

ACTION 1: Prepare a tourism plan

Prepare a tourism plan to ensure that Melaka remains competitive as a tourist destination in the face of growing global competition for tourists, while ensuring that the cultural heritage resources that are the main draw remain well preserved. The tourism plan should address the following:

- Infrastructure needs to sustain large volumes of tourists;
- Diverse experiences that will attract tourists for longer duration to Melaka;
- Preservation and management of cultural heritage in the face of increasing tourism;
- Concerns of residents;
- Visitor satisfaction with the opportunities available in Melaka;
- Other challenges that may be affecting attractiveness of Melaka for tourists;
- Skilled workforce to deliver high quality services;
- Partnership opportunities from the private sector and other stakeholders.

Responsible Agencies: MBMB / UPEN / GCAP Committee

Potential Benefits:

- This action has the potential to enhance economic competitiveness of the cultural heritage based tourism in Melaka;
- Improve decision-making and management of heritage area; and
- Improve infrastructure such as storm drains in the heritage area.

ACTION 2: Prepare a feasibility study to set up a tax increment financing district

In addition to the funds already set up to improve conservation efforts, undertake a feasibility study to set up a tax increment financing (TIF) district in the heritage area. The TIF is a financing instrument that captures increases in property values and channels them for the purposes of improving a specific area for a fixed period of time (see box for how the TIF works). The revenues related to 'tax increment' should be used to improve properties and undertake beautification efforts in the heritage area.

Responsible Agencies: MBMB / UPEN / GCAP Committee

Potential Benefits:

- This action has the potential to enhance economic competitiveness by improving historic properties and the public realm in the heritage area; and
- Improve infrastructure in the heritage area.

Tax Increment Financing explained – “When a Tax Incremental District (TID) is created, the current value of all the taxable property within the defined boundaries is established. This value is the “base value” of the TID ... The taxes collected on this portion of the property value are shared by the overlying taxing jurisdictions, and once the TID is created this portion of the tax collections is allocated as it always has been... Meanwhile, new construction and investment increase the value of the property. All of the taxes collected on the growth in value of the property (or the “value increment”) are turned over to the City as “tax increment” revenue. The City uses this revenue stream only to pay for the improvements that it made to the property(ies) in the TID that are in the approved project plan. (Source: <http://www.revenue.wi.gov/pubs/slf/tif/1-2.pdf>) [Accessed 1 March 2014]

▶▶ MEDIUM TERM ACTIONS

ACTION 3: Set up a comprehensive program to offer incentives to encourage conservation of private properties in the heritage area

The TIF is one potential financial instrument that can be used to provide additional funds to improve properties and beautify the public realm in the heritage area. Based on the recommendations of the tourism plan, consult with the residents, property owners and businesses to prepare a comprehensive set of incentives to encourage conservation in the heritage area.

Responsible Agencies: MBMB / UPEN / GCAP Committee

Potential Benefits:

- This action has the potential to enhance economic competitiveness by improving historic properties and the public realm in the heritage area; and
- Increase public awareness about heritage.

*“Reorganization of urban transport
At the end of the 80’s, the historic centre of Strasbourg was characterized by a relentless stream of motor vehicles and by parking lots that paralysed traffic in the centre of Grande Ile, a site inscribed on the World Heritage List. Apart from the accessibility problems, this traffic was causing air and sound pollution partly responsible for the reduction in the commercial appeal of the district and the degradation of the quality of life of its inhabitants.*

The urban community of Strasbourg then decided to completely revamp the mobility of its city centre to induce new and sustainable behaviours. After considering the creation of a subway crossing the historic centre, in the 90’s the local authorities finally opted for the setting up of a tramway. Then in the years 2000, the adoption of an Urban Travel Plan resulted in a new reinforcement of the Strasbourg public transport network, the pedestrianization of the city centre and the development of connections between the outskirts and the centre.”¹

ACTION 4: Prepare an integrated, urban infrastructure improvement plan for the heritage area

Due to the age of the buildings and public areas, as well as a constant flow of tourist, upgrading infrastructure such as roads or storm water drains can be a challenging task in the heritage area. Rather than undertaking improvements on a case-by-case basis, prepare an integrated improvement plan where infrastructure upgrading is well coordinated across sectors to minimize business disruptions and impact on residents. Engage the residential and business community and historic preservation experts during preparation of the plan and to help with monitoring implementation activities.

Responsible Agencies: MBMB / UPEN / GCAP Committee

Potential Benefits:

- This action has the potential to enhance economic competitiveness by improving infrastructure in the heritage area; and
- Increase public awareness about heritage.

Order-of-Magnitude Cost Estimates

The cost estimates below are rough order-of-magnitude costs and based on an understanding of the effort required for consulting services and don't include infrastructure or installation costs in most cases. Detailed costs for consulting services can be developed once a detailed TOR is prepared for each action.



PROPOSED ACTIONS	ESTIMATED COSTS
ACTION 1: Prepare a tourism plan (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)	0 – 100,000 USD
ACTION 2: Prepare a feasibility study to set up a tax increment financing district (Cost estimate is for cost to prepare the feasibility study; there may be subsequent costs related to the actions recommended in the study)	0 – 100,000 USD
ACTION 3: Set up a comprehensive program to offer incentives to encourage conservation of private properties in the heritage area (Cost estimate is for cost to set up the program and to support preparation of procurement standards and guidelines to prepare waste recycling and reduction programs for individual offices)	0 – 100,000 USD
ACTION 4: Prepare an integrated, urban infrastructure improvement plan for the heritage area (Cost estimate is for cost to prepare the plan; there will be subsequent costs related to the actions recommended in the plan)	100 – 500,000 USD

¹ Organization of World Heritage Cities. “Evolving Historic Cities – Keys to Understand and To Take Actions.” October 2012 (Page 63).

G. IMPLEMENTATION



Melaka is on a path towards becoming a green state. By adopting the Blueprint 2020 and initiating several green measures, the state has demonstrated its commitment towards a green agenda. However, a lot remains to be done. Implementation of the GCAP will require:

- Coordination between multiple government agencies, private sector, community organizations and citizens;
- An adaptive management approach where the actions can be modified if needed (based on monitoring, evaluation of baseline data, and citizen feedback);
- Capacity building efforts;
- Knowledge of funding sources, and facility to raise capital; and
- Tools such as a database to keep track of plan implementation.

Governance - Green City Action Plan Committee

ACTION 1: Establish a Green City Action Plan Committee

Since the actions proposed in the GCAP require a multisectoral approach where numerous agencies and government departments need to take the lead on implementation, an institutional mechanism is required to coordinate efforts and to ensure that actions are undertaken in a timely manner. A new Green City Action Plan Committee should be established, with strong support from the Chief Minister, and be given the responsibility of managing the implementation of the GCAP.

The suggested composition of the committee is as follows:

- It should be an eleven person committee with the CM or his representative as the chair;
- It should include representatives from the Greentech Council, and state departments responsible for environment, transport, energy and technology, urban planning (total of five members);
- One representative from the State Economic Planning Unit;
- One expert in green technology and policy from an academic institute in Melaka (appointed by the CM);
- One member from a local environmental NGO (appointed by the CM);
- One member from the tourism sector in Melaka;
- One at-large member appointed by the CM depending on the needs of the committee (revolving position);

The committee should be housed within the CM's office or in the Greentech Council with strong support from the Chief Minister.

ACTION 2 : Prepare a Green City Knowledge Center

Partner with a local university to set up a Green City Knowledge Center. The research center should be a research arm for the Green City Action Committee and should work collaboratively with the Green Tech Council to research and develop knowledge products and training on green city practices.

Baseline Data, Monitoring and GCAP Update

ACTION 3 : Prepare baseline data

To ensure that Melaka is on track to become a green state, one of the first steps is to establish a baseline of existing conditions. A list of indicators has been identified under each topic area addressed in the GCAP. Under the guidance of the GCAP Committee, and in coordination with existing departments, Melaka should establish a process for collecting data for each indicator. The state may consider engaging a local university or institution with expertise in data management for this task. The data collection should be based on a consistent methodology that can be replicated over time. If needed, modify the identified targets and indicators in the GCAP after baseline data is collected.

ACTION 4: Prepare annual monitoring report

On an annual basis, the GCAP Committee should prepare a brief report on the indicators. The purpose of the report will be to monitor the progress being made as a result of implementing the proposed actions. The report should also address whether the proposed actions need modification (based on data analysis) and if additional actions are needed to reach the targets.

ACTION 5: Update the GCAP

After three years from publication of this action plan, the GCAP Committee should evaluate whether the GCAP needs modification. If needed, the GCAP should be updated to change/delete proposed actions or to include additional actions that may be needed.

Capacity Building and Urban Management Partnerships

ACTION 6: Continue study tours

Lack of experience (or knowledge) remains one of the biggest limitations towards pursuing green actions. Melaka has initiated a series of study tours to increase awareness about technologies and green approaches amongst senior officials. For example, a tour conducted in September 2013 to two cities in Japan (Kitakyushu and Yokohama) provided valuable information about new approaches to address solid waste, generate electricity from sludge waste, smart city projects, as well as urban transformation towards greener cities.

Melaka should continue study-tours as one of the approaches for capacity building and raising awareness about new trends in green cities.

ACTION 7: Pursue Urban Management Partnerships

The ADB is supporting an Urban Management Partnership (UMP) to foster peer-to-peer learning between places that have demonstrated leadership in urban transformation and places that are seeking to pursue similar efforts. Melaka will be one of the first states to benefit from this partnership program.

The purposes of this partnership program will be as follows:

- Develop core capacities at national and local levels;
- Engage “mentors” from “transformed cities”, municipalities, utilities, academia, private sector, local government;
- Share knowledge, practices and processes of change;
- Improve competency in integrated urban & environmental planning, climate resilience, energy efficiency and project management;
- Develop skills and vocational training; and
- Identify innovative financing mechanisms for urban infrastructure.

Annex B (published separately) provides more information about the UMP for Melaka.

Raising Public Awareness

The state needs to partner with residents, the private sector, non-governmental agencies and other institutions to realize the vision for a green Melaka. An important step towards establishing that partnership is raising awareness about the benefits of pursuing a green path in Melaka. There are several ongoing efforts in Melaka. For example, Melaka participates in the Government of Melaka’s Program Rakan Alam Sekitar (or Friends of the Environment) and seeks to create environmental awareness, inoculate a sense of public responsibility and provide a platform for public comments. As part of this engagement, the Department of Environment organizes activities such as beach clean-up, Enviro Run, Environment Week and environmental awareness camps. Melaka also participates in the Sustainable Schools Program Environment Program that

seeks to raise awareness about environmental issues amongst school-aged children.

ACTION 8: Develop a long-term public awareness program

The GCAP Committee should partner with the Department of Environment to establish an expanded and long-term program that seeks to raise public awareness about the action plan. The ongoing programs provide lessons that Melaka can draw upon to develop a long-term program.

ACTION 9: Organize public forums on the GCAP

The GCAP Committee should organize regular public forums to discuss various elements of the action plan. The forums should also provide a platform for engaging residents and institutions in the implementation of some of the proposed actions.

ACTION 10: Set up a project website

Melaka is already accustomed to disseminating public information through dedicated websites. The GCAP Committee, with assistance from the Greentech Council, should consider setting up a website on the GCAP. Information on the status of implementation, public awareness events, data and knowledge products related to the GCAP, and monitoring reports, should be provided on the website.

ACTION 11: Conduct annual public surveys

The GCAP Committee should provide space on the project website for public comments and prepare a monthly summary of the comments received. In addition, the Committee should conduct an annual public survey (through the website) to gather comments on public perceptions and interests related to the implementation of the GCAP. The comments should be incorporated in the annual monitoring reports and should provide valuable information for the update of the GCAP.

Private Sector Engagement

Implementing actions proposed in the GCAP will require participation from both the public and the private sectors. The private sector can be a key partner in pushing innovation, improving environmental performance, and providing financing for green activities. While the government can facilitate private sector participation through the following:

ACTION 12: Increase participation of commercial banks in green projects

Encourage commercial banks to create dedicated lines of credits to green projects. These lines of credits would target small to medium size investments, such as energy efficiency, renewable energy, water saving devices, water treatment (individuals, hotels, etc.), or waste management (recycling, composting, etc.). These funds would be available to individuals and SMEs (hotels, small commercial buildings, etc.). Seek support from multilaterals and bilateral concessional facilities to provide below market rate line of credit for specific green projects. The commercial bank would on-lend to end-users passing on the concessional element and thus lending at below the market rate conditions.



Participation of the private sector will be important in promoting sustainable urban development

ACTION 13: Establish a green city fund

Establish a public green city fund to stimulate investments in green projects. The fund could undertake equity investments (in selected sectors), provide venture capital to innovative SMEs, support equipment leasing for EE or RE, assist SMEs to access long term finance at affordable premiums, and provide technical support for energy audits, feasibility studies and capacity building efforts. The source of capital for the fund could come from government funding, utility companies, multi-lateral financing institutions, interests generated from previous investments, and innovative mechanisms such as tax increases from property development in certain 'special districts'. Text box with example of a TIF.

ACTION 14: Establish ADB support for credit guarantees aimed at green infrastructure projects

Coordinate existing credit guarantee schemes with ADB partial credit guarantee to cover large-scale, green infrastructure projects. ADB could provide initial project preparation support to develop the project and ensure that it meets ADB's policies including those related to safeguards and risk.

ACTION 15: Seek ADB technical support to develop public private partnership (PPP) projects

The PPP model has found success in several countries including Malaysia. Typically PPP has worked on projects that are at a certain scale (typically larger than \$50 million), operate for a long duration, are complex and in need of innovative approaches, clearly definable with measurable outputs, provide opportunities for risk transfer to the private sector, and commercially viable to trigger interest from bidders, financiers and advisors. The ADB could provide technical support to Melaka to develop projects that could be supported by PPP.

H. WAY FORWARD

Critical First Steps

Melaka has started an ambitious program to become a green city. While preparing the GCAP is one of the early efforts in this process, several critical steps are needed in the near future to ensure continued and successful implementation.

ACTION 1: Adopt the GCAP and establish a governance structure to manage implementation

Formally adopt the GCAP. By doing so, Melaka will demonstrate its commitment to implementing the actions recommended in the GCAP. Further, immediately set up a governance structure, as described in Section G (Implementation), to start initiating implementation of the GCAP.

ACTION 2: Advance IMT-GT Green Cities Initiative

The Melaka government should coordinate with the Center of IMT-GT to advance the IMT-GT Green Cities Initiative. As one of the flagship states, Melaka can take a leadership role in demonstrating a commitment to sustainable urban development in the region. By networking and sharing knowledge on green practices with other provinces in the IMT-GT region, Melaka can help to build a stronger constituency for the green agenda.

ACTION 3: Establish Baseline Database

As discussed in Section G (Implementation), establish a baseline database of existing conditions. Undertake a project to start collecting data in a systematic manner. Once a database is in place, Melaka can make more informed decisions about which actions to pursue first and establish a monitoring process to evaluate the impact of actions.

ACTION 4: Prioritize actions

Melaka has limited resources and needs to prioritize key actions from the long list identified in the GCAP. There are several methodologies to prioritize actions, one of which has been developed by the Cities Development Initiative for Asia¹ in a toolkit called “City Infrastructure Investment Programming & Prioritisation Toolkit” (CIIPP).² The toolkit recommends two levels of criteria.

The first level is to identify actions that meet the following criteria:

- An investment project that is not part of routine or annual spending
- An action over which Melaka has some control (not a project that is completely out of Melaka’s control)

At the second level, five main criteria are used to prioritize projects:

- Project Purpose
- Public Response
- Environmental Impact
- Socio-Economic Impact
- Feasibility of Implementation

ACTION 5: Conduct economic analysis and pursue financing opportunities

The actions listed in the GCAP need to be developed in further detail. Once actions have been prioritized, they should be developed further, including an economic analysis to ensure financial viability and sustainability.

Melaka should also coordinate with CIMT to identify potential funding opportunities from donors and funders such as the Global Environment Facility (G.E.F.)³, Climate Investment Funds, as well as the Clean Development Mechanism (CDM).⁴

1 CDIA is an initiative supported by the ADB, amongst other development partners, to assist medium-sized Asian cities to implement infrastructure investments related to their development plans.

2 <http://cdia.asia/resources-and-publications/> [Accessed 1 March 2014]

3 <http://www.thegef.org/gef/home> [Accessed 1 March 2014]

4 http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php [Accessed 1 March 2014]

ACTION 6: Pursue capacity building and knowledge sharing programs

With support from the ADB, Melaka has already initiated an Urban Management Program. Through this program, Melaka will be partnered with another similar city or state that has successfully implemented a green program. Typically, such a partnership will be short-term (1-2 years) and focused on replicating a mentor's best practice(s). To ensure measurable impact in Melaka, and to continue the momentum established during the preparation of the GCAP, the partnership would focus on supporting implementation of one priority initiative (preferably an initiative that Melaka has already initiated). Further details about Melaka's UMP will be provided separately as Annex B (published separately).

In addition to pursuing an UMP, Melaka should consider engaging with institutions such as the Rockefeller Foundation that is an advocate for resilient cities and recently launched the '100 Resilient Cities Centennial Challenge' to "enable 100 cities to better address the increasing shocks and stresses of the 21st century."⁵

ACTION 7: Identify programs and actions that can be funded as part of the Eleventh Malaysia Plan

The Eleventh Malaysia Plan is currently under preparation and will continue the efforts to attain High Income Advanced Nation status by 2020. Economic competitiveness, environmental and resource management, and equity are expected to continue to be strong themes in the plan. Melaka's GCAP has been prepared with a focus on these themes and is timely as it provides a list of actions that can be directly supported by Malaysia's next development plan. The state has already initiated and should continue to coordinate with EPU and CIMT to select actions from the GCAP that can receive support, and further the national government's pursuit of equitable and environmentally responsible growth in the next five-year plan period (2016-2020).

⁵ <http://100resilientcities.rockefellerfoundation.org/pages/about-the-challenge> [Accessed 1 March 2014]

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In addition to the references provided as footnotes in the document, the following publications, reports and online resources were referred during the preparation of the Green City Action Plan for Melaka.

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