



HANG TUAH JAYA

CLIMATE ACTION PLAN 2030



UTM
UNIVERSITI TEKNOLOGI MALAYSIA



Editorial Team

Chin Siong HO
Loon Wai CHAU
Bor Tsong TEH
Levy DANYA

Nurshyla Abdul Rahim MLYSHA
Zulikhram bin Zulibrahim MOHAMAD
Yasmin Ibrahim UMIERA
Sulaiman NURSYAHIDAH
Abdullah ROHAYU

Table of Contents

Chapter 1.0	Introduction	1
Chapter 2.0	Vision And Goals	1
2.1	Broad vision	1
2.2	Mitigation target.....	1
Chapter 3.0	Background	2
3.1	Hang Tuah Jaya and Melaka: The Basics.....	2
Chapter 4.0	Organizational Structure	12
4.1	Climate Action Committee	12
Chapter 5.0	Relevant State, National and Local Policies	13
Chapter 6.0	Approach and Methodology	13
6.1	Global Covenant of Mayors (GCoM).....	13
6.2	Tools used.....	14
6.3	Preparation.....	15
6.4	Stakeholder involvement.....	15
Chapter 7.0	Baseline Emissions Inventory.....	16
Chapter 8.0	Risk and Vulnerability Assessment	17
8.1	Past and Current Climate Hazards, Impacts and Risks	17
8.2	Future Impacts of Climate Hazards	19
Chapter 9.0	Planned Actions	19
9.1	Theme 1: Shifting to Green Economy.....	20
9.2	Theme 2: Sustainable Transport and Logistic	26
9.3	Theme 3: Climate Responsive Infrastructure	31
9.4	Theme 4: Sustainable Community	34
9.5	Relationship between planned actions and GHG emissions sectors and climate hazards for Hang Tuah Jaya	38
Chapter 10.0	Financing	40
Chapter 11.0	Implementation and Monitoring Process.....	40
Appendices.....		41
Appendix A: Relevant National, State and Local Policies		41
Appendix B: Climate projections		47
Appendix C: Aligning Planned Climate Actions with the Low Carbon Cities Framework + Society (LCCF+S)		51

FOREWORD

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
السَّلَامُ عَلَيْكُمْ وَرَحْمَةُ اللَّهِ وَبَرَكَاتُهُ



Salam Sejahtera, Melakaku Maju Jaya,
Rakyat Bahagia, Mengamit Dunia,
Hang Tuah Jaya-Bandaraya Pintar.

Hang Tuah Jaya Municipal Council (MPHTJ) is an important modern, sustainable and economic hub in Melaka, The city faces challenges environmental problems and high carbon emission due to rapid urbanisation and industrialization in last decade. Hence, HTJ Climate Action Plan (CAP), is formulated in order to mitigate greenhouse gases (GHG) emission and adapting to local impacts of climate change.

We are pleased to be one of the cities among 10,000 members cities of Global Covenant of Mayor (GCoM) and chosen as one of the four (4) Malaysian pilot cities to prepare Climate action plans (CAPs) based on GCoM Common Reporting Framework to ensure standardised GHG emission reporting and transparency. The HTJ Climate Action Plan 2030, with its 39 Planned Actions under four (4) main themes namely Shifting to Green Economy, Sustainable Transport and Logistic, Climate Responsive Infrastructure and Sustainable Community will be implemented in a timely and proactive manner, with MPHTJ taking on the leading role.

We wish to thank the UTM-Low Carbon Asia Research Centre, GCoM, CDP and IUC Asia for their support and continuing commitment throughout the formulation of HTJ CAP 2030.

Thank you.

وَبِاللَّهِ التَّوْفِيقُ، وَالْهُدَايَةُ وَالسَّلَامُ عَلَيْكُمْ وَرَحْمَةُ اللَّهِ وَبَرَكَاتُهُ

Datuk Shadan bin Othman,
Yang DiPertua,
Majlis Perbandaran Hang Tuah Jaya

“Hang Tuah Jaya – Perbandaran Rendah Karbon 2030”

PREFACE

Hang Tuah Jaya, which is planned as a modern, sustainable and economic hub in Melaka, needs to reduce the GHG emissions of rapid economic growth, especially in contributing to the achievement of the national target of 45% reduction in GHG emission intensity of GDP by 2030 (compared to the 2005 level). In addition, Hang Tuah Jaya also prepared adaptation efforts in minimizing the exposure of community to the climate related hazards. In order to achieve this national target and improving city resilience, the formulation and implementation of a holistic, scientifically grounded and people-centric city-level climate change plan – the Hang Tuah Jaya Climate Action Plan 2030 (Hang Tuah Jaya CAP 2030) is important.

Hang Tuah Jaya CAP 2030 proposes 39 planned actions for implementation that align with the Low Carbon Cities Framework (LCCF) by the Ministry of Environment and Water, Malaysia (KASA). City Inventory Reporting and Information System (CIRIS) is used to account GHG emissions. The CIRIS result guides Hang Tuah Jaya to focus on the mitigation actions over stationary energy (industry), transportation and waste sector. The potential GHG emissions intensity reduction is expected to be up to 45% by 2030 (compared to the 2010 level), which is equivalent to an absolute reduction of 665 ktCO₂eq from the Business as Usual (BaU) scenario. Meanwhile, the climate adaptation analysis of Hang Tuah Jaya CAP 2030 is based on “Climate Risk and Vulnerability Assessment” (CRVA) is also carried out by Carbon Disclosure Project expert. Three adaptation goals are set by the municipality for Hang Tuah Jaya to be more resilience and prepared for the climate related disaster of monsoon, flood, drought and vector-borne disease. First, The Municipality pledges to reduce property damage due to monsoon and flooding by 50% by 2030 compared to 2010 levels. In terms of drought, HTJ city aims to reduce the number of days of water rationing caused by drought by 50% by 2030 compared to 2017 level. Last but not least, Hang Tuah Jaya aims to reduce the number of dengue cases by 50% by 2030 compared to 2017 level.

Based on two Focus Group Discussion (FGD) workshops, 39 planned actions grouped under 4 main development themes are formulated to achieve the 45% reduction target and the three (3) adaptation goals by 2030. The Hang Tuah Jaya CAP 2030 can serve as important guide for effective and impactful implementation of climate actions towards meeting the city's vision as center for green technology and a world-class intelligent city.

December 2020

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



HANG TUAH JAYA BASIC PROFILE



Function

Home to the *Seri Negeri*, State Government Complex; Modern, sustainable and economic hub of Melaka



Location

The northern portion of Central Melaka District, adjacent to Kota Melaka, as well as some areas of Alor Gajah and Jasin regions
2°16'17.9"N 102°17'11.6"E



Area

144.61 km²



Population

124,000 (2010)



Administrative

Hang Tuah Jaya Municipal Council

Chapter 1.0 Introduction

This report outlines Hang Tuah Jaya's commitment to decarbonizing its economy while simultaneously promoting equitable growth and providing a high quality of life for all its citizens. This climate action plan is prepared following Hang Tuah Jaya joining the Global Covenant of Mayors (GCoM), and is completed according to the requirements for GCoM signatory cities.

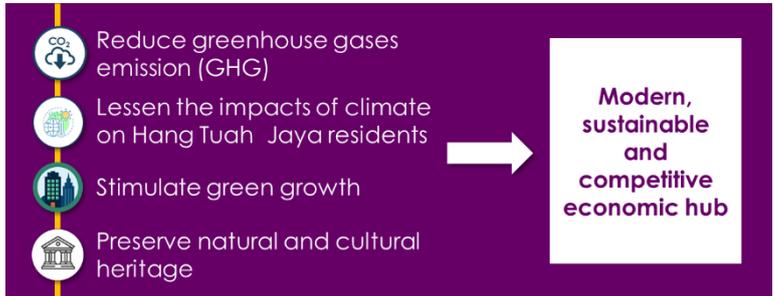


Figure 1 Advantages of environmental actions for HTJCAP 2030

Here, we build on the detailed environmental plans and targets of both Malaysia and Melaka, and describe Hang Tuah Jaya's ambitious climate mitigation target and adaptation goals. The plan proposes 39 actions which, upon implementation, will help reduce emissions of greenhouse gases (GHG), limit the impacts of climate change on Hang Tuah Jaya residents, stimulate green growth and help preserve the Municipality's natural and cultural heritage. These measures will transform Hang Tuah Jaya into a modern, sustainable and competitive economic hub for the State of Melaka.

Chapter 2.0 Vision And Goals

2.1 Broad vision

Hang Tuah Jaya aims to become a leading municipality in carbon mitigation and climate adaptation, and a model of a green city. In doing so, the Council strives to increase economic prosperity, build on local values and traditions relating to coexistence with nature, and to move the municipality towards a simpler lifestyle with a richer quality of life. In the process, key relevant stakeholders have been engaged in planning with implementation in mind, and to ensure sustainable development for future generations in line with the UN's Sustainable Development Goals.

2.2 Mitigation target

Hang Tuah Jaya intends to surpass the commitments and climate plans determined by the Melaka State and Federal Government. The Municipality also aims to fulfill SDG 13, which calls on count urgent actions to combat climate change and its impacts.¹ Malaysia ratified the United Nations Framework Convention on



Figure 2 Mitigation target for HTJ CAP 2030

Climate Change (UNFCCC) in 1994, and committed in 2009 to voluntarily reducing the country's GHG emissions intensity of GDP by up to 40% by the year 2020 compared to 2005 levels. In 2015, at COP 21,

¹ <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Malaysia increased this commitment to 45%, to be achieved by 2030 using the same 2005 baseline, conditional on international financial support.² Hang Tuah Jaya is committed to contributing to the national mitigation target of 45% reduction in emissions intensity of GDP by 2030 relative to the base year 2010 emissions level.

2.2.1 Adaptation goals

Hang Tuah Jaya plans to act according to the Sendai Framework's 2030 targets of substantially reducing mortality, economic losses and damage to infrastructure and services from disasters, as well as the total number of people affected.³ The Municipality pledges to reduce property damage due to monsoon and flooding by 50% by 2030 compared to 2010 levels. In terms of drought, HTJ city aims to reduce the number of days of water rationing caused by drought by 50% by 2030 compared to 2017 level. In addition, HTJ city aims to reduce the number of dengue cases by 50% by 2030 compared to 2017 level.

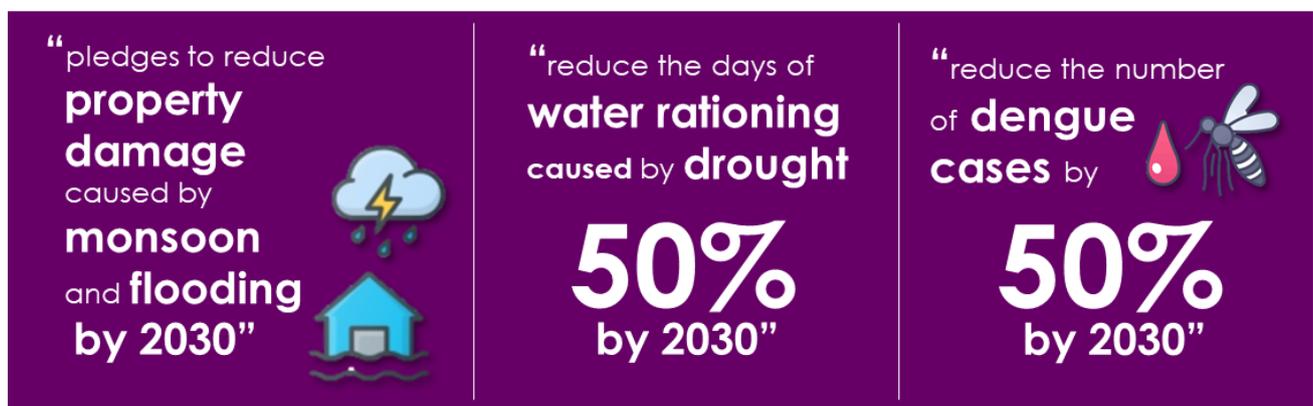


Figure 3 Adaptation goals for HTJ CAP 2030

Chapter 3.0 Background

3.1 Hang Tuah Jaya and Melaka: The Basics

Hang Tuah Jaya is a municipality in the State of Melaka, Malaysia. Melaka, which is located in southern Peninsular Malaysia (see Figure 4), borders the State of Johor to the south and Negeri Sembilan to the north. While it is one of the country's smallest states by area, it is among the most popularly visited, thanks to its steep history, rich heritage architecture and unique mix of cultures.⁴

²<https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Malaysia/1/INDC%20Malaysia%20Final%2027%20November%202015%20Revised%20Final%20UNFCCC.pdf>

³<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

⁴ <http://www.Melaka.ws/>

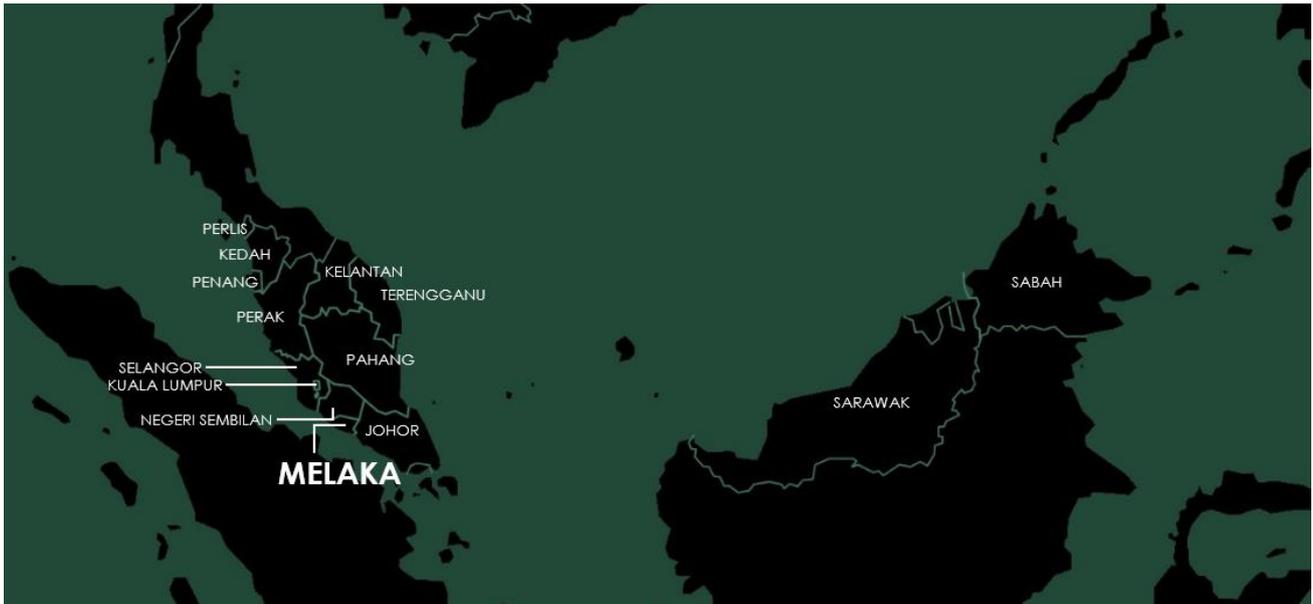


Figure 4 Location of Melaka State in Malaysia

Hang Tuah Jaya is located in the center-south part of the Melaka State, several kilometers from the historic center of Melaka Town (see Figure 5⁵). The Municipality covers 35,733 acres, and is home to the Melaka State Government Complex. Due to this special status, the State Government intends to transform it into an increasingly cosmopolitan area, generating development through the economic, societal, infrastructural and recreational sectors.⁶ Hang Tuah Jaya was carved out of portions of three districts: Alor Gajah, Jasin and Melaka Tengah.⁷ It contains nine *mukim*, or administrative sub-districts, and its citizens are represented by six representatives in the State Legislative Assembly.⁸

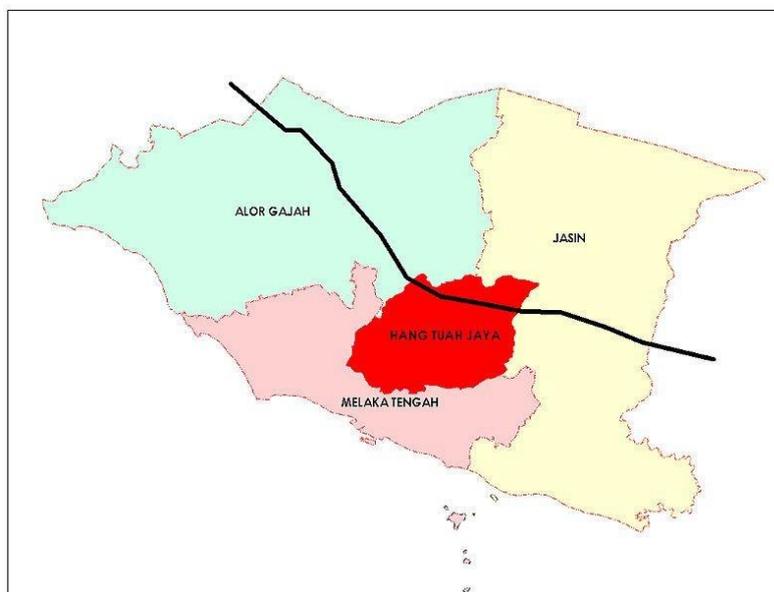


Figure 5 Location of Hang Tuah Jaya Municipality in Melaka State

⁵ https://ms.wikipedia.org/wiki/Hang_Tuah_Jaya#/media/Fail:Hang_Tuah_Jaya.jpg

⁶ <http://www.mphtj.gov.my/en/htj/profile/background>

⁷ <https://www.thestar.com.my/news/nation/2010/01/01/new-hang-tuah-jaya-set-to-become-Melakas-smart-city>

⁸ <http://www.mphtj.gov.my/en/htj/profile/background>

The local government in Hang Tuah Jaya has been involved in green initiatives since its inception in 2010. That year, the Melaka Governor Tun Mohd Khalil Yaakob declared the local government area a municipality, and set it on a path to develop as a modern smart city driven by information and communication technology (ICT).⁹ The municipality's official vision is to make Hang Tuah Jaya a center for green technology and a world-class intelligent city.¹⁰ In 2012, Hang Tuah Jaya joined the Low Carbon Cities Framework (LCCF) Initiative, which provides guidance for local governments in Malaysia to reduce GHG emissions and improve their sustainability. Since then, the city has completed several rounds of data collection and reporting, and in 2016 was the first local council to receive the LCCF Diamond Rating award.¹¹



Photo 1 Masjid Al-Alami, Melaka

3.1.1 History

The Melaka region has a long and steep history. Melaka rose to become a regional centre of trade after Parameswara, a prince from Sumatra, transformed the small fishing village into a strategic port in the 15th Century. The region's vibrant trading economy attracted many settlers,¹² including some from China, who intermarried with the local residents and came to be known as the Baba-Nyonya people, sometimes also called the Straits Chinese or Peranakan. The Baba-Nyonya represent the longest-settled Chinese group in Malaysia, and they developed a unique culture that merges Chinese and Malaysian cultural traditions.¹³

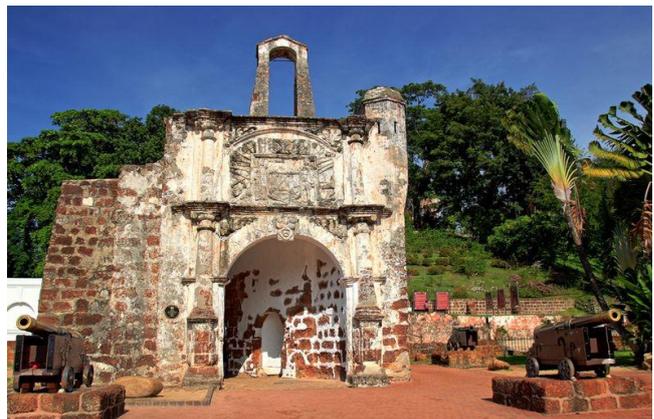


Photo 2 A Famosa

In the early 16th Century, the Portuguese invaded and took control of the city, forcing the Sultan to flee to Johor. The region came under Dutch control in 1641, and remained under their influence for 150 years.¹⁴ The most visible reminder of this period is the Dutch colonial architecture that has become a symbol of Melaka's present-day charm.¹⁵

Influence over the area shifted to the British in the early 1800s; the new rulers, however, primarily

⁹<https://www.thestar.com.my/news/nation/2010/01/01/new-hang-tuah-jaya-set-to-become-malaccas-smart-city/>

¹⁰ <http://www.mphtj.gov.my/en/htj/profile/mission-vision>

¹¹ https://aperc.ieej.or.jp/file/2017/9/20/14201440_Review_Expert_Presentation_Huan+Tuah+Jaya_Lin091_3.pdf

¹² <http://www.Melaka.ws/attractions/melaka-historic-cities.htm>

¹³ <https://www.lonelyplanet.com/malaysia/peninsular-malaysia-west-coast/melaka/history>

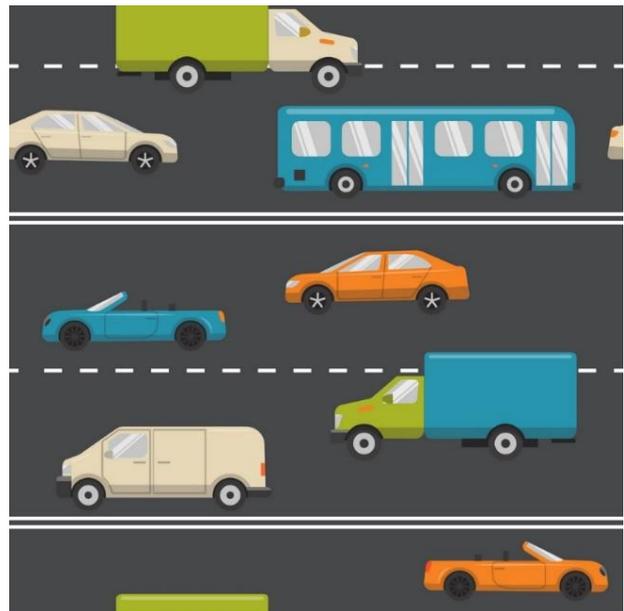
¹⁴ <https://www.lonelyplanet.com/malaysia/peninsular-malaysia-west-coast/melaka/history>

¹⁵ <https://www.thestar.com.my/lifestyle/travel/2016/07/19/follow-the-dutch-heritage-trail-in-Melaka>

focused on developing their other settlements, and the region's prominence declined due to heavy silting of the Melaka estuary, which has also limited modern harbor facilities.¹⁶¹⁷ In 1956, the Prime Minister elect of the Federation of Malaya announced Malaysia's independence at the Padang Bandar Hilir, Melaka.¹⁸ Following independence, the Melaka region has grown as a tourism hub, as well as an exporter of rubber and fruits and an importer of general goods such as sugar and rice.¹⁹ The Hang Tuah Jaya Municipal Council officially began its operations as a municipality on 1st January 2010.²⁰ The Municipality is named after Hang Tuah, a mythical warrior with fierce loyalty to the Sultan.²¹ Melaka was declared a UNESCO World Heritage Site in 2008.²²

3.1.2 Connectivity

The Hang Tuah Jaya Municipality is accessible via the road and air travel. From Kuala Lumpur and further north, drivers can reach the city by following the North-South Expressway (NSE) and exiting the Ayer Keroh Interchange.²³ ²⁴Buses leave frequently in all directions from Melaka Sentral, the city's largest public bus terminal.²⁵ The closest railroad stations is 38 kilometers north of Melaka City at Tampin, with bus and taxi connections available from there, while the Batu Berendam Airport is 9 kilometers from the city center, serving three major airlines: Wings Air, Sky Aviation and Firefly. ²⁶



¹⁶ <https://www.lonelyplanet.com/malaysia/peninsular-malaysia-west-coast/melaka/history>

¹⁷ <https://www.britannica.com/place/Melaka-Malaysia>

¹⁸ <http://www.arkib.gov.my/en/web/guest/pengumuman-kemerdekaan-di-padang-banda-hilir-melaka>

¹⁹ <https://www.britannica.com/place/Melaka-Malaysia>

²⁰ <http://www.mphtj.gov.my/en/htj/profile/background>

²¹ <http://www.Melaka.ws/info/history-legend.htm>

²² <http://www.malacca.ws/attractions/melaka-historic-cities.htm>

²³ <http://www.Melaka.ws/info/gettingthere.htm>

²⁴ https://www.plus.com.my/index.php?option=com_content&view=article&id=27&Itemid=132&lang=en

²⁵ <https://melakasentral.com.my/>

²⁶ <http://www.Melaka.ws/info/gettingthere.htm>

Hang Tuah Jaya is connected to the Melaka Town primarily through the Lebuhraya Ayer Keroh and Jalan Bukit Baru roads. Several bus lines run from the city center to and throughout the municipality.²⁷ Bus service is inconsistent, however, and not commonly used; the reliance on cars has resulted in frequent traffic congestion. In addition, within the municipality the main forms of transport – car, taxi and trishaw – are not well integrated. A recent research analysis of the situation at Ayer Keroh, part of the Hang Tuah Jaya Municipality, recommended creating an integrated transportation terminal, combined with a Park and Ride facility, as well as improving bus services with real-time schedules, charging road users, and providing financial incentives for public transit use, among other suggestions.²⁸

3.1.3 Demographics

When Hang Tuah Jaya was established in 2010, it was estimated by the then Chief Minister Datuk Seri Mohd Ali Rustam to have a population of 124,000 people.²⁹ The municipality has experienced rapid growth in the decade that follows with the population standing at 190,529 in 2018, at an annual growth rate of 6.35%.



3.1.4 Land use

Land use in Hang Tuah Jaya is split between planned housing, residential, commercial, industrial, institutional, open space and recreation, forest reserves and agricultural zones. While agriculture still occupied approximately half of Melaka, and nearly two-thirds of the state were characterized as Environmentally Sensitive Areas due to rich biodiversity and other factors in 2014³⁰, Hang Tuah Jaya was primarily urban in land use distribution. Map 3 depicts the 2007-2020 land use plan for the Municipality.³¹



²⁷ <http://www.mphtj.gov.my/en/visitors/transportation/page/0/2>

²⁸ <https://aip.scitation.org/doi/pdf/10.1063/1.4976917>

²⁹ <https://www.thestar.com.my/news/nation/2010/01/02/malacca-ushers-in-2010-with-new-hang-tuah-jaya-municipality>

³⁰ <https://www.adb.org/sites/default/files/related/41571/imt-gt-green-city-action-plan-melaka-april-2014.pdf>

³¹ <http://i-melaka.blogspot.com/2010/08/hang-tuah-jaya-plan.html>

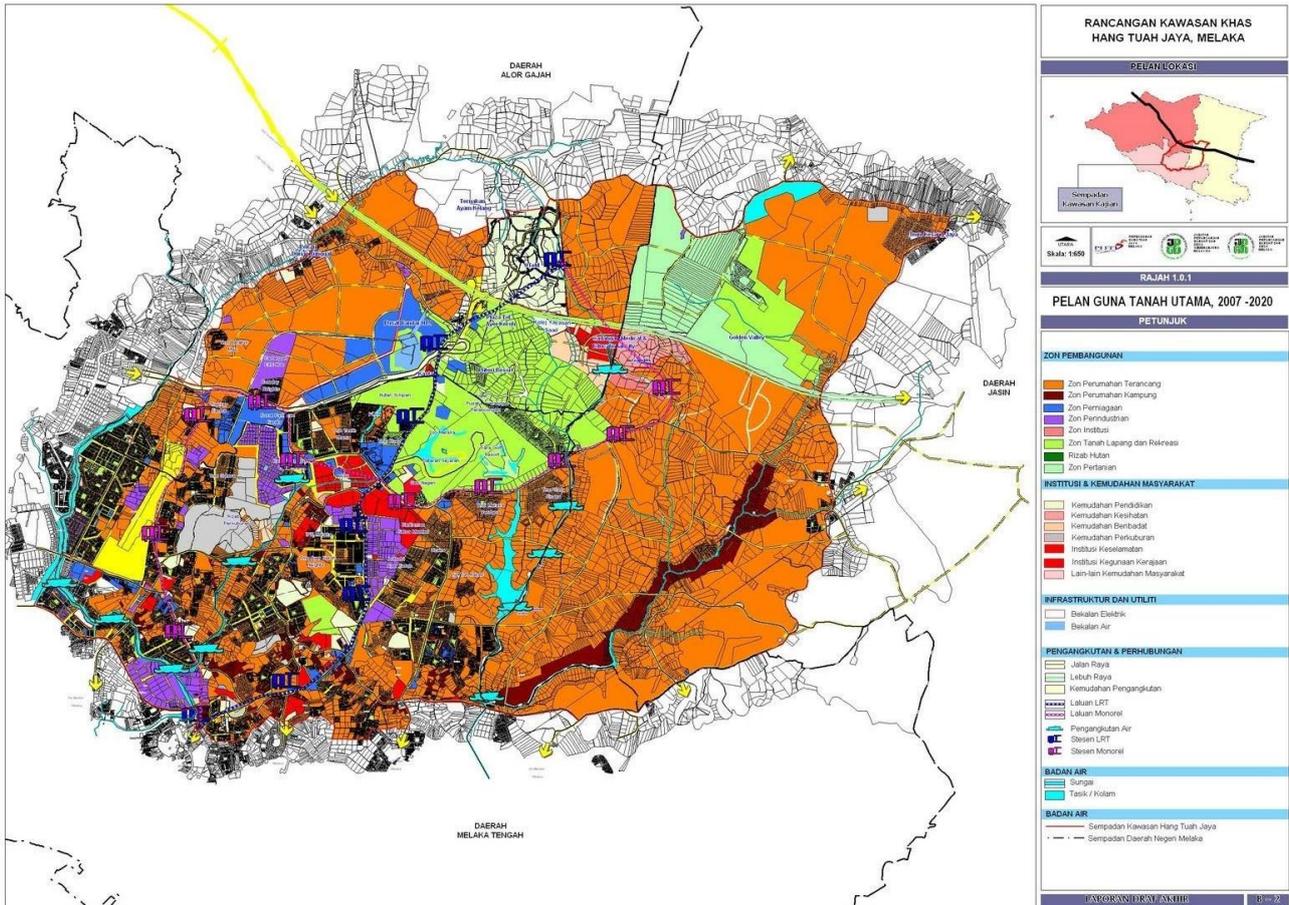


Figure 4 2007-2020 Land Use Plan for Hang Tuah Jaya

3.1.5 Economy

Official economic data specific to Hang Tuah Jaya Municipality is not available. Comparing the land use and urban activity structure of the Municipality and that of the Melaka State, Melaka State's current and targeted economic structure as shown in Figure 9³² may be taken as representative of Hang Tuah Jaya's economic structure.



³² Melaka State Structure Plan 2035

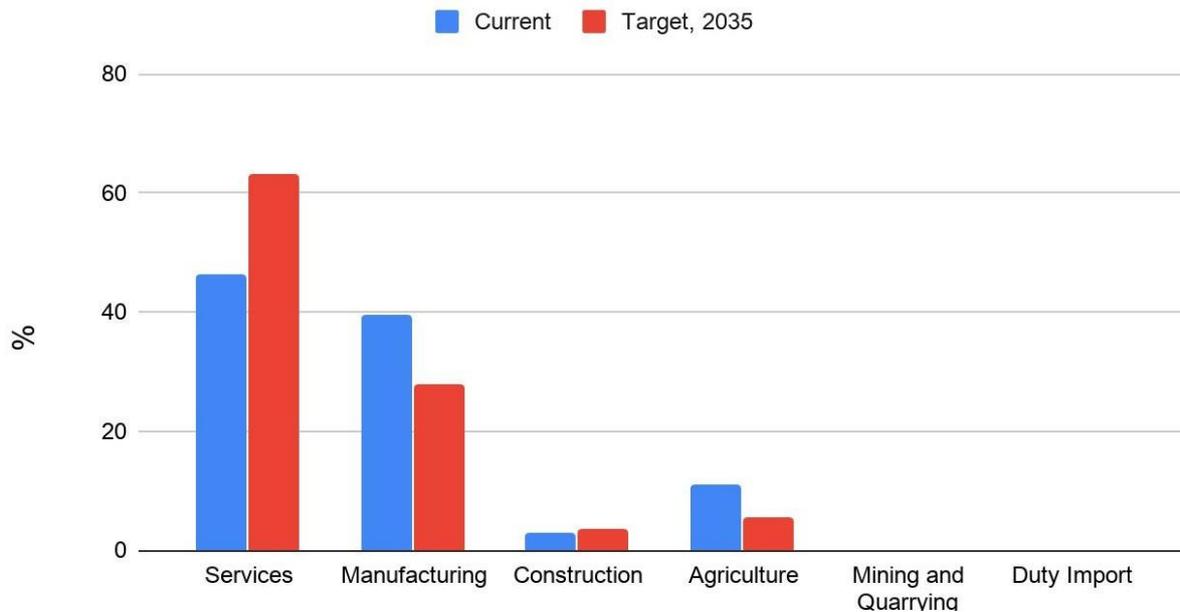


Figure 5 Economic Sectors in Melaka

3.1.6 Governance

Hang Tuah Jaya is governed by the Hang Tuah Jaya Municipal council.³³ Hang Tuah Jaya situated the northern of Central Malacca District and the southern of Alor Gajah District of Malacca, Malaysia. This agency comes under the Malacca state government. MPHTJ are responsible for public health and sanitation, waste removal and management, town planning, environmental protection and building control, social and economic development and general maintenance functions of urban infrastructure. The MPHTJ main headquarters is located at Melaka Mall in Ayer Keroh, Hang Tuah Jaya local government operates according to the structure below



³³ <http://www.mphtj.gov.my/en/htj/profile/background>



Figure 6 Hang Tuah Jaya Government Structure³⁴ (as of November 2020)

The Melaka government has taken many steps towards sustainability in the state. In 2011, the Melaka Green Technology Council was established, and the Melaka Green Technology City State Blueprint for 2020 was published that same year. In 2012, Melaka signed the United Nations Urban Environmental Accords, and was selected for the Indonesia Malaysia Thailand - Growth Triangle Green Cities Initiative. 2013 brought the founding of the Melaka Green Technology Corporation, and in 2014, Melaka produced the Green City Action Plan. The state registered as a member of the International Council for Local Environmental Initiatives (ICLEI) and began working on its Greenhouse Gas Inventory in 2014.³⁵



³⁴<http://webcache.googleusercontent.com/search?q=cache:http://www.mphtj.gov.my/en/node/830>

³⁵http://www.asialeds.org/sites/default/files/resource/file/Green_city_action_plan-Datuk-H.-Kamarudin.pdf

3.1.7 Climate

Similarly, to other parts of Malaysia, Hang Tuah Jaya is located in a tropical climate. Table 1 displays the climate data for Melaka, which is the closest city for which such information is available. As they are only several kilometers apart, the data should be fairly representative of Hang Tuah Jaya's climate.



Table 1 Climate data for Melaka³⁶

Month	Mean Daily Minimum Temperature (°C)	Mean Daily Maximum Temperature (°C)	Mean Total Rainfall (mm)	Mean Number of Rain Days
Jan	22.7	31.8	75.5	6.0
Feb	23.2	32.9	89.7	7.0
Mar	23.4	33.1	141.6	10.0
Apr	23.6	32.7	185.3	12.0
May	23.7	32.2	176.7	11.0
Jun	23.3	31.8	165.0	10.0
Jul	23.0	31.3	178.4	11.0
Aug	22.9	31.3	188.6	13.0
Sep	23.0	31.3	205.7	12.0
Oct	23.2	31.7	194.6	13.0
Nov	23.1	31.4	239.0	17.0
Dec	22.9	31.1	131.7	11.0

3.1.8 Infrastructure

Electricity in Melaka is provided by Tenaga Nasional Berhad (TNB), the main electricity utility company in Peninsular Malaysia. The National Strategic Plan for Solid Waste Management for 2020 envisioned the use of three solid waste facilities in the state: the largest in Alor Gajah, a smaller facility in the Melaka town area, and the smallest in Jasin (see Figure 9³⁷ and 10).

³⁶ WMO World Weather Information Service

³⁷https://jpspn.kpkt.gov.my/resources/index/user_1/PSP/Ringkasan_Eksekutif/10_SWM_Facilities-Melaka.pdf

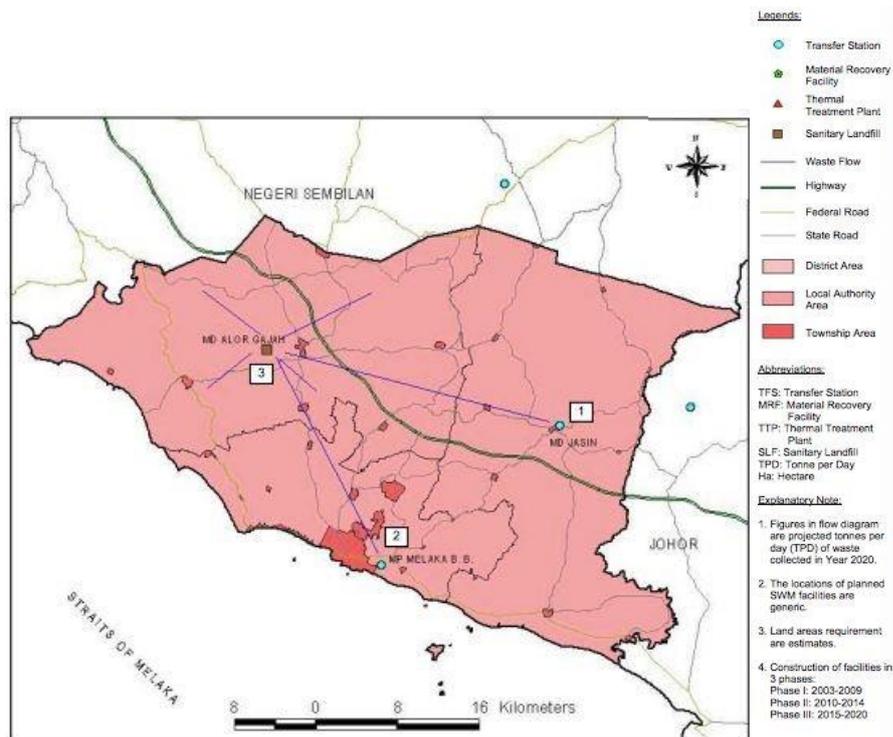


Figure 7 Melaka Solid Waste Management in 2020 as envisioned by the National Strategic Plan for Solid Waste Management³⁷

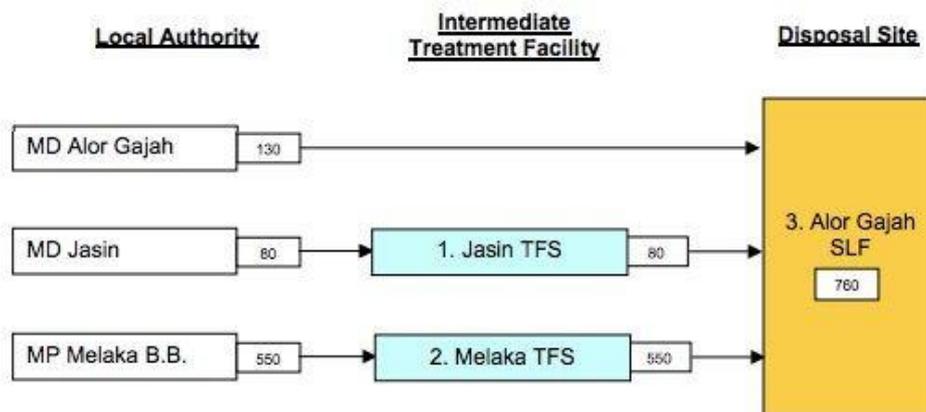


Figure 8 Projected Solid Waste Flow Diagram (in tonnes per day of waste) for 2020

Water in Melaka is supplied by Syarikat Air Melaka Berhad.³⁸ The state has struggled with water supply, especially in urban areas with high tourist activity, and has proposed marking the seafont as a “reservoir” and using it as an alternative water source to solve long-term water issues³⁹. At times, Melaka has had to rely on its neighboring states of Negeri Sembilan and Johor to provide water, an arrangement the state government hopes to avoid in the future.⁴⁰ Flood management in Melaka is provided by the the Department of Irrigation and Drainage, or JPS.⁴¹

³⁸ <https://samb.com.my/>

³⁹ <https://www.nst.com.my/news/nation/2019/10/527096/melaka-government-ministry-ensure-adequate-raw-water-supply>

⁴⁰ <https://www.malaymail.com/news/malaysia/2019/10/07/chief-minister-melaka-wont-let-water-woes-becom-e-annual-affair/1797865>

⁴¹ <https://jps.melaka.gov.my/>

Chapter 4.0 Organizational Structure

4.1 Climate Action Committee

The Climate Action Committee members for Hang Tuah Jaya are:

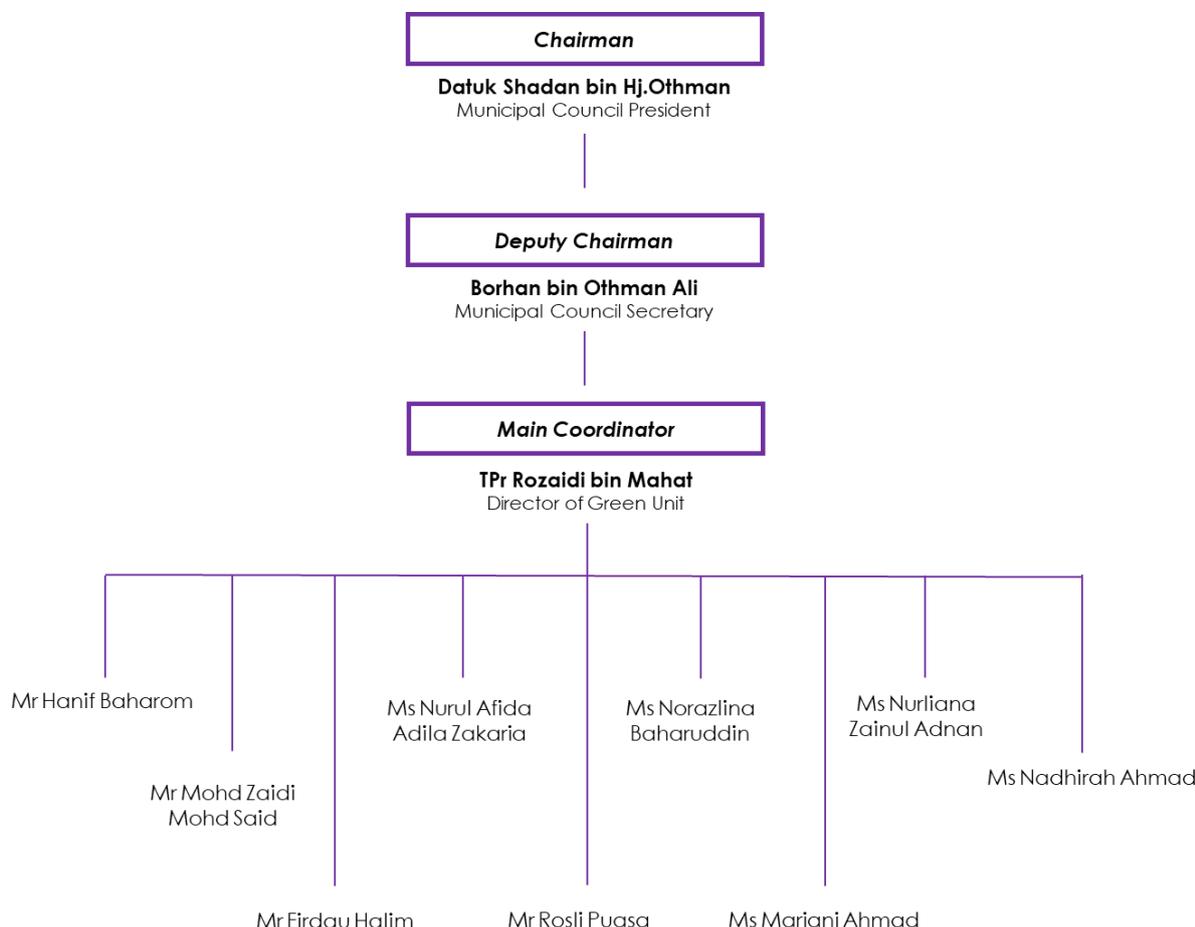


Figure 9 The Climate Action Committee members for Hang Tuah Jaya (as of December 2020)

4.1.1 Coordination with state/national authorities

On the national level, Hang Tuah Jaya will coordinate with the Ministry of Environment and Water (KASA). On the state level, the Municipality will work with the Melaka Green Technology Council (MGTC) and the Melaka Green Technology Corporation. The MGTC was established in 2011, and is chaired by the Chief Minister of Melaka. Members include the State Exco member, local council members, all related government agencies and the Melaka Green Technology Corporation (MeGTC) as secretariat. Objectives of the council include discussing state policies related to green technology, planning and monitoring green technology development and application, and discussing green technology proposals and investments. Hang Tuah Jaya intends to collaborate extensively with the MGTC to promote the use of green technologies in the Municipality.⁴²



⁴²http://www.asialeds.org/sites/default/files/resource/file/Green_city_action_plan-Datuk-H.-Kamarudin.pdf

4.1.2 International involvement

The Hang Tuah Jaya Municipal Council was assisted by the Carbon Disclosure Project (CDP), the International Urban Cooperation, European Union - Asia staff members and UTM-Low Carbon Asia Research Centre throughout the process of filling out the Common Reporting Framework and compiling this CAP. These organizations will continue to support the Hang Tuah Jaya CAC and local staff in implementing the policies and plans laid out in this document. The GCoM staff have also provided considerable support and training.

Chapter 5.0 Relevant State, National and Local Policies

In 2016, the Malaysian government submitted its Nationally Determined Contribution (NDC) in accordance with decisions 1/CP.19 and 1/CP.20 of the UNFCCC. The document outlines Malaysia's intent to reduce greenhouse gas emissions intensity of GDP by 45% by 2030 relative to the emissions intensity of GDP in 2005. 10% of this target is considered conditional upon receipt of climate finance, technology transfer and capacity building from developed countries.

Malaysia's intent to reduce greenhouse gas emissions intensity of GDP by 45% by 2030

The base year emissions calculations include land use, land use change and forestry (LULUCF), and the target covers carbon dioxide, methane, nitrous oxide and economy-wide emissions intensity of GDP. The NDC outlines the actions taken to reduce the use of fossil fuels since the Ninth Malaysia Plan (2006-2010), the barriers for implementation, and the vulnerabilities of the country to climate change.⁴³

Malaysia has a range of national, state and local-level policies instituted to help the country achieve these targets. Many, in fact, predate the Paris Agreement, demonstrating Malaysia's long-term commitment to climate action and sustainability. National-level formal policies include the 11th Malaysia Plan, the most recent of a series of 5-year comprehensive development plans, the Third National Physical Plan (NPP-3) as well as strategies such as the National Policy on Climate Change and policy mechanisms such as the Green Technology Financing Scheme. Melaka also has relevant state-specific policies, and Hang Tuah Jaya has important local plan. Key relevant higher level policy documents are outlined in Appendix A.

Chapter 6.0 Approach and Methodology

6.1 Global Covenant of Mayors (GCoM)

Hang Tuah Jaya has joined the Global Covenant of Mayors (GCoM), a coalition of cities and local governments from around the world committed to advancing climate resilience and lowering greenhouse gas emissions. Committing to GCoM requires the Municipality to advance four goals:

- i. reducing greenhouse gas emissions;
- ii. prepare for the impacts of climate change;
- iii. increase access to secure, affordable and sustainable energy and
- iv. track progress towards these objectives.⁴⁴

⁴³ <https://www4.unfccc.int/sites/NDCStaging/Pages/Party.aspx?party=MYS>

⁴⁴ CRF Guidance Note

The Covenant provides specific structures for cities to adhere to in reporting and planning, and supplies platforms for municipalities to communicate and share best practices.

6.2 Tools used

6.2.1 GCoM Common Reporting Framework

The primary tool used in preparing this report is the GCoM Common Reporting Framework (CRF). This framework allows all cities joining GCoM to use one, standardized reporting system for compiling information on greenhouse gas emissions, climate hazards, targets, government setup, actions and more. The system is not just used in assessing the baseline state, but can also be applied in planning and reporting. Using this universal system among all GCoM signatories allows local governments to compare and learn from other cities around the world facing similar challenges. Signatories of GCoM are required to fill out the CRF within two years of joining the Covenant, and to report every two years from then on. The framework has three levels of reporting: mandatory, recommended and additional options that cities can choose to follow. At a minimum, the inventory covers carbon dioxide, methane and nitrous oxide.⁴⁵

6.2.2 Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC)

The Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) has been used in the implementation and monitoring phase of this Climate Action Plan. The GPC was developed by the World Resources Institute, C40 Cities Climate Leadership Group and ICLEI - Local Governments for Sustainability in order to solve the problem of inconsistent greenhouse gas accounting systems for cities. Their framework covers the seven gases included in the Kyoto Protocol and is designed to calculate emissions for a single reporting year.

The system requires two primary approaches for cataloging emissions. The first details greenhouse gases from production and consumption within the city boundary, and the second measures emissions in three different scopes: emissions from within the city boundary, emissions occurring as a result of the use of grid-supplied energy within the boundary, and all other emissions from outside the boundary as a result of activities within the boundary. City activities emitting greenhouse gases are divided into six sectors: stationary energy, transportation, waste, industrial processes and product use, agriculture, forestry and other land use, and any other emissions occurring as a result of city activities (See Figure 12). The last category is not always covered by the GPC but can be reported separately.⁴⁶

⁴⁵ CRF Guidance Note

⁴⁶https://wriorg.s3.amazonaws.com/s3fspublic/global_protocol_for_community_scale_greenhouse_gas_emissions_inventory_executive_summary.pdf

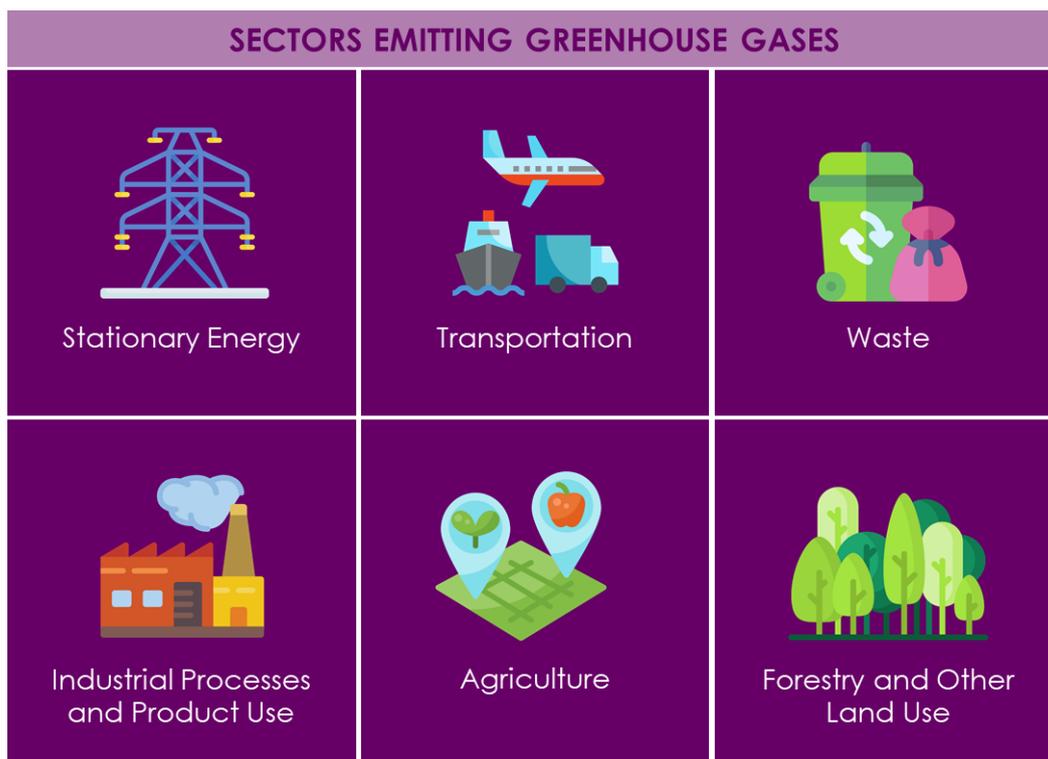


Figure 10 Sectors emitting greenhouse gases

The GHGI results are presented in Section 7 based on the Hang Tuah Jaya Final Greenhouse Gas Inventory Report (2019) whereas the CRVA results are presented in Sections 8 based on findings provided by CDP, and will serve as the basis for formulation of climate mitigation and adaptation actions and strategies for Hang Tuah Jaya in Section 9.

6.3 Preparation

In advance of the process of filling out the Common Reporting Framework and developing this document, representatives of the Hang Tuah Jaya Municipal Council participated in four trainings organized by IUC-Asia and GCoM. These sessions covered adaptation, mitigation, target setting and climate action planning, and climate finance. While these trainings were occurring, the Municipality simultaneously held meetings to lay the foundation for the CAP process and, in January 2020, to officially approve the formation of the Hang Tuah Jaya CAC.

6.4 Stakeholder involvement

Several stakeholder's engagements are carried out in MPHTJ office involving MTHJ officers from relevant units in Jan-Dec 2020 at MPHTJ Office at Ayer Keroh, Malacca. One special workshop on CAP Hang Tuah Jaya was carried out in Johor Bahru on September 2020 to brief the new President of Hang Tuah Jaya and capacity building workshop for the Council officers and Federal and State officers. Three web meetings in August 2020 together with CDP on data collection on mitigation and adaptation actions.

Chapter 7.0 Baseline Emissions Inventory

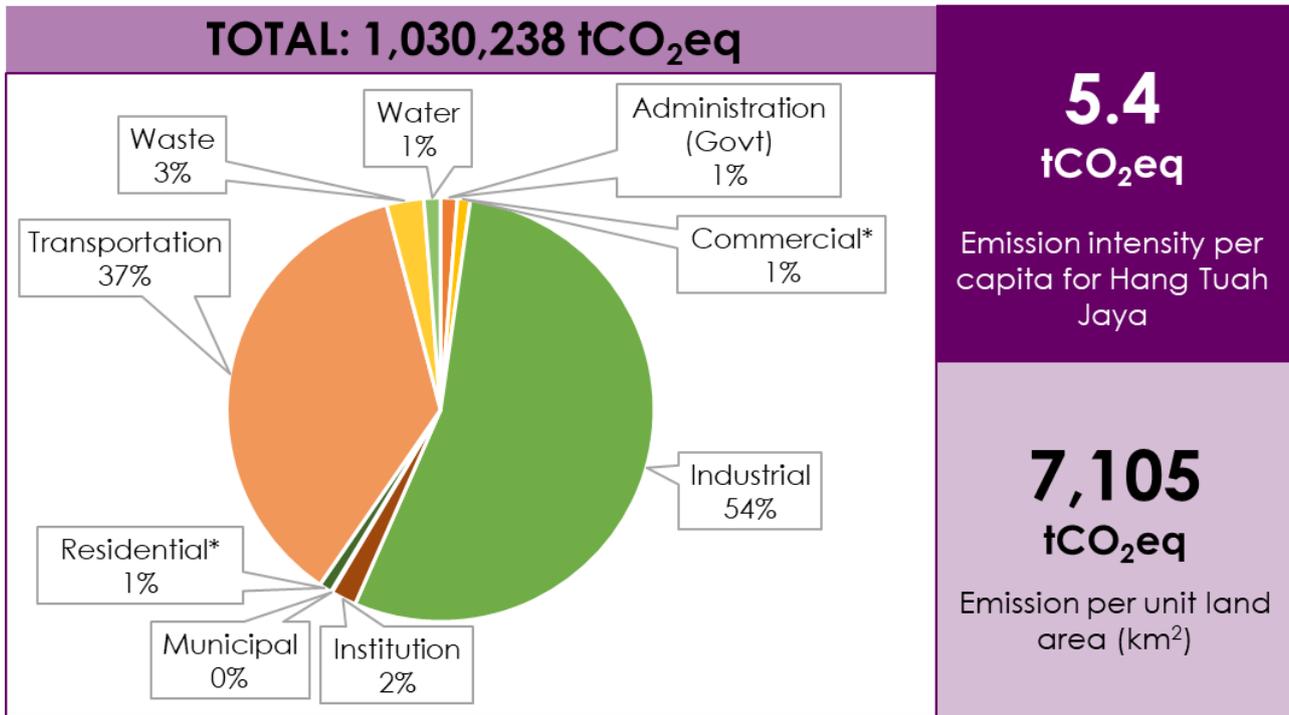


Figure 11 GHG emissions profile of Hang Tuah Jaya in year 2018
(Source: Hang Tuah Jaya Final Greenhouse Gas Inventory Report, 2019)

***NOTE:**

With the limitation of data availability, the GHG emissions for Residential and Commercial sector are mainly involve several neighbourhoods and activity centres.

The total GHG emissions of Hang Tuah Jaya identified from the year 2018 baseline emissions inventory to be 1,030,238 ktCO₂eq. Based on the emission profile, the emission intensity per capita for Hang Tuah Jaya is 5.4 tCO₂eq and the emission per unit land area (km²) is 7,105 tCO₂eq. The proportion of total emissions contributed by each of the three sectors is depicted in Figure 13. Industrial sector makes up the largest portion of the GHG emissions for Hang Tuah Jaya District (54%), followed by transportation (37%).

Government facilities account for 13,433.63 tCO₂eq, with other institutions making up an additional 19,649.55 tCO₂eq, meaning the two sectors combine for about 3.2 % of total emissions. Both sectors are dominated by emissions from grid electricity, constituting over 95% of the sector total. The remaining emissions stem primarily of from company vehicles and staff commutes.

Emissions from residential sector have been estimated only using top-down data from TNB, referring to the report provided on 22nd August 2019, the summary of which can be referred in Appendixes. However, due to TNB's internal systems not tracking municipal boundaries, only estimates for 31 identified neighborhoods totaling 14,317,443 kWh was provided, representing emissions of 9,936.31 tCO₂eq. This estimate is incomplete, and would benefit from close engagement with TNB, to capture the remaining residences in the city.

Industry is by far the largest contributing sector to the emissions of Hang Tuah Jaya, representing emissions of 560,497.62 tCO₂eq, or 54.4% of the estimated total. In addition, other commercial facilities contribute 9,895.74 tCO₂eq, or about 1% of the total. These emissions stem primarily from grid electricity, though 4,358 tCO₂eq come from fuel use, the majority of which is natural gas use from a single industrial facility, and 6,214 tCO₂eq are from Scope 3 emission, primarily staff commutes.

Transportation emissions within the municipal boundary are using the Fuel Sales-method, as described in the WRI Global Protocol for Community-Scale Greenhouse Inventories. Sales data from 9 of the 22 petrol kiosks within the boundary has been reported, totaling 46,318,251 liters of petrol and 16,912,648 liters of diesel. This represents emissions of 153,539 tCO₂eq. Assuming this sample of petrol stations is representative for the stations within Hang Tuah Jaya, the total emissions from transportation is estimated to be 374,822.54 tCO₂eq.

In 2018 and total on 50,084 tonnes of municipal solid waste was collected within the municipal boundary of MPHTJ and deposited at the Sg Udang Sanitary landfill. Based on the waste composition, the organic fraction of each waste type and the current methane management system, as well as the fuel and electricity used to operate the landfill, the total net emissions due to waste is estimated to be 0.57 tCO₂eq per ton of waste, or a total of 28,571.10 tCO₂eq for all the waste deposited in 2018, or roughly 2.8% of all reported emissions.

An estimated total of 30,279,480 m³ of water was supplied to entities within the municipal boundary in 2018. Energy consumption data associated with the delivery of that water was 18,218,136 kWh, representing emissions of 12,643.39 tCO₂eq.

Chapter 8.0 Risk and Vulnerability Assessment

8.1 Past and Current Climate Hazards, Impacts and Risks

Figure 14 shows a summary of the main past and current climate hazards experienced in Hang Tuah Jaya Municipality and their associated risk level posed to the city. The climate hazards posing a medium high level of risk have been identified as monsoon, flash/surface flood, drought and vector-borne disease. A medium level of risk is posed by forest fire, river flood, and vector-borne disease. Finally, coastal flooding is seen to pose a low level of risk to Hang Tuah Jaya Municipality.



Figure 12 Climate Hazards Experienced in Hang Tuah Jaya and Their Associated Risk Level Posed to the City

Table 2 Summary of climate hazards and risks identified in Hang Tuah Jaya Municipality

Climate hazards	Significant impact on the city before 2020?	Current probability of hazard	Current magnitude of hazard	Risk level
Extreme Precipitation > Monsoon	Yes	Medium	Medium	Medium
Water Scarcity > Drought	Yes	Medium	Medium	Medium
Flood and sea level rise > Flash / surface flood	Yes	Medium	Medium	Medium
Biological hazards > Vector-borne disease	Yes	Medium	Medium Low	Medium

Table 3 shows the social impacts of the identified climate hazards in Hang Tuah Jaya Municipality, as well as the most relevant assets and/or services and vulnerable populations affected. An increased demand for public services and healthcare services are seen to be the most widespread social impacts of the identified climate hazards whilst the assets and services affected range from food and agriculture, water supply and sanitation, tourism, industrial, residential, public health, and others. In terms of the vulnerable populations affected by these climate hazards, low-income households have been identified to be particularly affected overall in Hang Tuah Jaya Municipality.

Table 3 Summary of climate hazards, impacts and vulnerable populations affected in Hang Tuah Jaya Municipality

Climate hazards	Social impact of hazard overall	Most relevant assets / services affected overall	Vulnerable populations affected
Extreme Precipitation > Monsoon	<ul style="list-style-type: none"> Increased demand for public services; Increased demand for healthcare services. 	<ul style="list-style-type: none"> Transportation; Food and agriculture; 	<ul style="list-style-type: none"> Low-income households
Water Scarcity > Drought	<ul style="list-style-type: none"> Increased risk to already vulnerable populations; Increased resource demand. 	<ul style="list-style-type: none"> Water supply & sanitation; Food and agriculture; Environment, biodiversity, forestry; Industrial; Tourism 	<ul style="list-style-type: none"> Elderly; with disabilities; Low-income households
Flood and sea level rise > Flash / surface flood	<ul style="list-style-type: none"> Increased demand for public service; Loss and damage. 	<ul style="list-style-type: none"> Transportation; Commercial; Emergency services. 	<ul style="list-style-type: none"> Low-income households.
Biological hazards > Vector-borne disease	<ul style="list-style-type: none"> Increased demand for healthcare services; Increased risk to already vulnerable populations. 	<ul style="list-style-type: none"> Residential; Public Health 	<ul style="list-style-type: none"> Children & youth; Elderly; Persons with chronic diseases

8.2 Future Impacts of Climate Hazards

Table 4 below summaries the expected future impacts of the identified climate hazards in Hang Tuah Jaya Municipality. Most of the hazards are expected to increase in both frequency and intensity with mostly medium high magnitude in the future. The majority of these changes are expected in the immediate future with the exception of monsoon, which is expected in the short-term. Secondary data related to general and basic climate projections in Malaysia and Asia that provide base references to the discussion of future climate hazards are presented in Appendix B.

Table 4 Summary of future impacts of identified climate hazards in Hang Tuah Jaya Municipality

Climate hazards	Future change in frequency	Future change in intensity	Future expected magnitude of hazard	When the city first expects to experience those changes
Extreme Precipitation > Monsoon	Increasing	Increasing	Medium High	Short Term (by 2025)
Water Scarcity > Drought	Increasing	Increasing	Medium High	Immediately
Flood and sea level rise > Flash / surface flood	Increasing	Increasing	Medium High	Immediately
Biological hazards > Vector-borne disease	Increasing	Increasing	Medium High	Immediately

Chapter 9.0 Planned Actions

This section outlines the planned actions for mitigating and adapting to the impacts of climate change in Hang Tuah Jaya Municipality taking into account the geo-physiological, institutional, social and development contexts of the Municipality as well as the CRVA and GHGI findings, and GHG reduction target and climate adaptation goals set in the previous sections. The planned actions have been reviewed and refined through two web meetings involving the Hang Tuah Jaya CCCWG to ensure the climate mitigation and adaptation actions proposed are in line with the Hang Tuah Jaya Municipal Council's development vision, policy direction, priorities as well as institutional capacities. This is reflected in the arrangement of planned actions based on development themes that respond to Hang Tuah Jaya's specific development contexts and scenario, as outlined below.

As an attempt to align the planned climate actions with the Ministry of Energy and Natural Resource's Low Carbon Cities Framework (LCCF) as required by the original Terms of Reference of this project, the theme-based climate actions outlined herein have been coded to suit the LCCF's four main components of Environment (E), Transportation (T), Infrastructure (I) and Building (B). As the people and community are central to the development of a sustainable, low carbon society (LCS) in Hang Tuah Jaya, this climate action plan also features actions that are society-based, thus necessitating the addition of the Society (S) component to the LCCF, resulting in the LCCF+S framework (see Figure 2). For reference to how this climate action plan is aligned with the LCCF+S, please consult Appendix C.

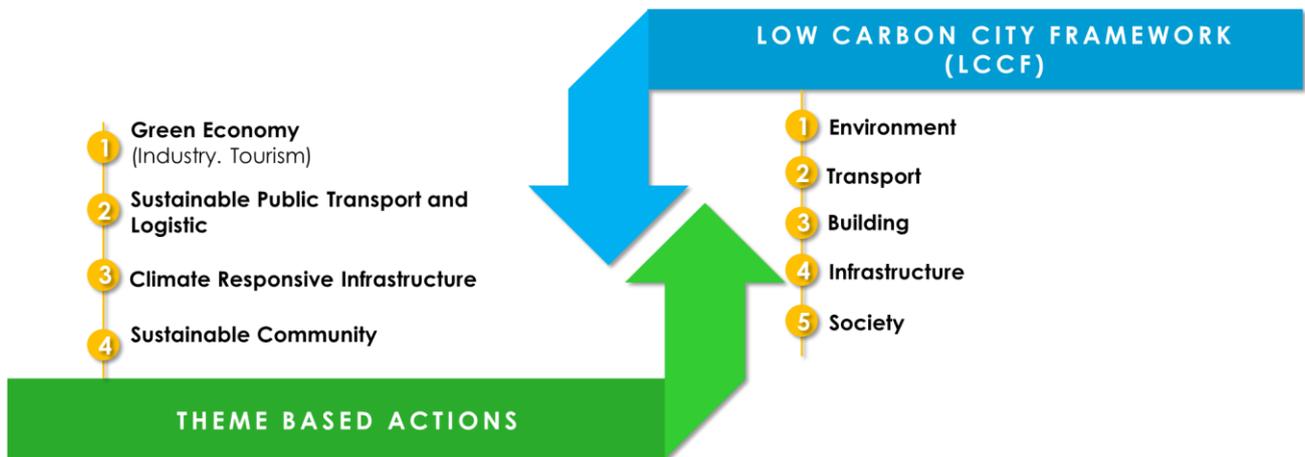


Figure 13 Aligning Hang Tuah Jaya Municipality's climate actions with the national Low Carbon Cities Framework + Society (LCCF+S)

Theme based Actions

- a. Theme 1: Shifting to Green Economy
- b. Theme 2: Sustainable Public Transport and Logistic
- c. Theme 3: Climate Responsive Infrastructure
- d. Theme 4: Sustainable Community

9.1 Theme 1: Shifting to Green Economy

Hang Tuah Jaya aims to be center for green technology and a world class intelligent city. In line with National Green Technology Policy, the application of green technology enhances the economic development of Hang Tuah Jaya shifting to green economy. As a fairly new local authority, Hang Tuah Jaya needs to be competitive in order create jobs and wealth. Shifting to green economy will promote economic growth and help HTJ to achieve sustainable development without degrading the environment. Planned actions in Hang Tuah Jaya Municipal Council related to green economy include greening of existing industries and creation of new green industries by promotion of green production and services as well as green tourism. Proposed Actions to promote use of green technology such as industrial symbiosis, Waste to wealth, use of grey water and Energy efficiency measures will also help to contribute to 45% reduction of carbon intensity target by 2030. MPHTJ may initiates low carbon measures by implementing solar powered street lighting, installing PV roof for MPHTJ assets (office buildings, markets, council housing, etc), impose regulation related to MS1525, rain harvesting, GBI and solar heating.



Table 5 Actions in the Green Economy

Action	Benefits	Responsible department	Key partners	Timeline	
				2020-2025	2026-2030
I1: Conduct feasibility study on industrial symbiosis (including Waste-to-Wealth) for existing industrial area	Mitigation	Corporate Green Technology	SEDA, TNB		▶▶▶
I2: Encourage industry to use grey water for non-potable purposes	Adaptation	Corporate Green Technology	Syarikat Air Melaka Berhad		▶▶▶
I5: Establish tax incentives and low-interest loans to attract and promote green industry	Mitigation	Corporate Green Technology	Private sector		▶▶▶
I6: Establish tax incentives for energy efficiency investments in the production process	Mitigation	Corporate Green Technology	Private sector		▶▶▶
I7: Promote ISO 14000 certification in industry	Mitigation	Corporate Green Technology	Private sector		▶▶▶
S1: Promote low carbon tourism products and services to reduce environmental impacts	Mitigation	Corporate Green Technology	Travel agencies		▶▶▶
B5: Install energy efficiency (EE) equipment and smart meters on commercial buildings as an energy saving initiative	Mitigation	Building; Green Technology; Engineering	Building Owners, Tenaga Nasional Berhad (TNB)	▶▶▶	
B2: Promote the use of natural ventilation by implementing MS1525	Mitigation	Building	Private sector	▶▶▶	
B3: Promote Photovoltaic (PV) for new buildings	Mitigation	Corporate; Green Technology; Engineering	SEDA, TNB	▶▶▶	
B4: Ensure new developments are integrated with rainwater harvesting systems and grey water recycling for non-potable usage	Adaptation	Building; Green Technology; Engineering	Developers, Building Owners		▶▶▶

Action	Benefits	Responsible department	Key partners	Timeline	
				2020-2025	2026-2030
B6: Promote green building assessment	Mitigation	Building; Green Technology; Engineering	Building Owners	»»»	
B10: Promote solar water heaters in new developments	Mitigation	Building; Green Technology; Engineering	Private sector		»»»
I4: Install solar-powered street lights throughout the municipality (3)	Mitigation	Corporate; Engineering; Green Technology	Private sector	»»»	
B1: Promote Photovoltaic (PV) and solar thermal systems on MPHTJ assets	Mitigation	Corporate; Green Technology; Engineering;	SEDA, TNB, MTGCC	»»»	

9.1.1 Description of Planned Actions

I1: Conduct feasibility study on industrial symbiosis (including Waste-to-Wealth) for existing industrial area

Industrial symbiosis is an idea that calls for collaboration among industry enterprises to recycle and exchange their by-products in achieving higher resource efficiency, waste minimization and hence reducing negative impact on the environment. In order to achieve this sustainable approach, feasibility study is needed to identify the potential of types of industries that can contribute to exchange their by-products to a useful waste.



Photo 3 Industrial Park

I2: Encourage industry to use grey water for non-potable purposes

Grey water is a used water without any mix of toxic and excrement that comes from baths, sinks, washing machines, and other kitchen appliances. In industrial scale, the waste water can be reused for non-potable purposes such as toilet flushing, irrigation and cooling systems. In results, fresh water from the city's water supply had been reduced by over 75% and decreases energy costs associated with pumping.



Photo 4 Greywater treatment plant

15: Establish tax incentives and low-interest loans to attract and promote green industry

Tax exemption and allowances has been established by Malaysian Investment Development Authority (MIDA) for businesses related to environmental management and energy conservation, or generally, in Green Initiatives. The range of tax exemption range from 60% to 100% depending on sectors. Hang Tuah Jaya local authority should ensure that industrial investor in HTJ take part in these initiatives. Figure 14 shows the list of incentives available that been provided from MIDA.

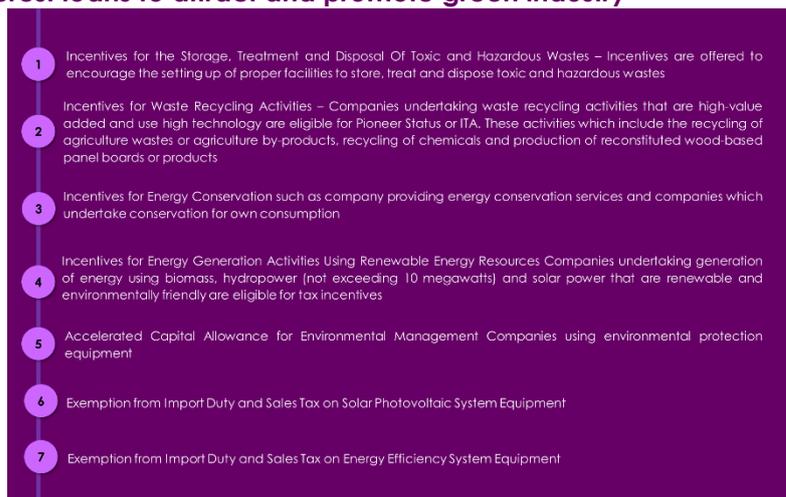


Figure 14 Incentives provided by MIDA

16: Establish tax incentives for energy efficiency investments in the production process

These businesses are eligible for tax incentives, i.e. pioneer status (PS), investment tax allowance (ITA) and the exemption of import duty and sales tax depending on how the RE generated is allocated (i.e. injection to utility grid, self-consumption or sales to other companies) (Pusat Tenaga Malaysia, 2009). To complement these tax incentives, Hang Tuah Jaya local authority will work with Malaysian Investment Development Authority (MIDA), Malaysian Green Technology and Climate Change Centre (MGTCCC) and related agencies to identify the suitable approach for the provision of incentives.

17: Promote ISO 14000 certification in industry

ISO 14000 is defined as a series of international environmental management standards, guides, and technical reports. The standards specify requirements for establishing an environmental management policy, determining environmental impacts of products or services, planning environmental objectives, implementing programs to meet objectives, and conducting corrective action and management review. ISO 14000 is a family of standards related to environmental management that exists to help organizations (a) minimize how their operations (processes, etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements; and (c) continually improve in the above.



S1: Promote low carbon tourism products and services to reduce environmental impacts

Tourism products need become more sustainable and less carbon to attract more discerning consumers, to help generate new sources of value and reduce environmental impacts. A successful transition to low carbon tourism involves careful designing and accepting changes in the use of local social, environmental and economic resources.



Photo 5 Low carbon tourism package tour

One of initiatives that can be done is promoting low carbon tour package options. The local authority can collaborate with responsible agencies such as the state tourism department to develop viable package options for the tourists, based on its GHG emission intensity. Besides, it is important that to conduct a study and develop a Low Carbon Tourism Action Plan for HTJ to identify for example feasible potential challenges and way forward for tourism industries in this region. This action plan also helps MPHTJ to identify potential stakeholders as well as to develop policy related and financial mechanism (aid) to accommodate and accelerate the industry.

B5: Install energy efficiency (EE) equipment and smart meters on commercial buildings as an energy saving initiative

The smart meters are electric-powered reading meters that allow daily electricity consumption to be recorded and converted into data which can be monitored by consumers. Tenaga Nasional Bhd (TNB) plans to install the advanced metering infrastructure (AMI) or smart meters in 8.3 million households across the country by 2021. Malaysia's largest utility company already roll out the first phase of its AMI implementation to 30,000 household in Melaka. ⁴⁷ This approach will be extended to commercial areas to encourage energy efficiency systems throughout Malacca, especially in HTJ boundaries (see Photo 6). ⁴⁸



Photo 6 Smart meters application

B2: Promote the use of natural ventilation by implementing MS1525

Natural ventilation is one of the passive design solutions to reduce the usage of energy use especially on air-conditioning system by using fresh air of sufficient volume to control the temperature in buildings. Fresh air helps to alleviate odours and improve the environmental quality. According to MS1525:2014 Clause 4.6.3, air speed of 0.5–1.0 m/s is generally pleasant, but depending on the consistency level of air movement. The required air movement can be achieved with provision of window openings facing outward directions, use of fans, ventilators, wing walls or solar chimneys. Thus, the use of natural ventilation shall be promoted in common areas such as lift lobbies, corridors and staircases. Evidence through building layout design (such as provision of window openings) or ventilation simulation shall be submitted upon building plan submission to HTJ local authority.

⁴⁷ https://www.st.gov.my/ms/contents/files/download/112/Energy_Malaysia_Volume_19.pdf

⁴⁸ Fathiyyah Yusp

B3: Promote Photovoltaic (PV) for new buildings

In contributing to a cleaner power generation for electricity usage, HTJ should initiate an effort in promoting the use of photovoltaic system, especially in new buildings. Among different types of renewable technologies for electricity generation, photovoltaic system is a feasible option for HTJ to minimise the unfavourable environmental impacts caused by the power generation sector that uses non-renewable sources.

B4: Ensure new developments are integrated with rainwater harvesting systems and grey water recycling for non-potable usage

Rainwater harvesting system have potential to cut down the water usage resources in the city. A study from United Kingdom has shown that the usage of rainwater and greywater application can reduce the operational energy and carbon intensities to 40% and 100% respectively (Bristol Environment Agency, 2010). Rainwater shall be captured and reused in the building; while greywater shall be captured for the use of irrigation. In adaptation perspective, rainwater harvesting systems and grey water recycling for non-potable usage can support community to address water rationing problem during the drought season.

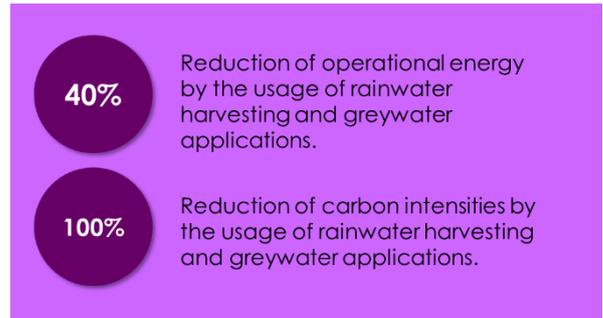


Figure 15 Benefit of rainwater harvesting and greywater application

B6: Promote green building assessment

Various green building assessments and ratings by both the government and private sectors should be recognised and encouraged by HTJ to promote the growth of certified green buildings. Recognising various low carbon green building assessments and rating tools such as Green Building Index (GBI, MyCREST (CIDB-JKR), GreenRE (REHDA), Penarafan Hijau (JKR) and CIS 20 - GreenPASS (CIDB), to facilitate and monitor the development of green buildings in HTJ area.



Photo 7 Green Building

B10: Promote solar water heaters in new developments

HTJ shall refine a promotional scheme for installation of Solar Water Heating System (SWHS), which provides soft loans to the users under the interest subsidy scheme via a network of financial institutions, public/private sector banks, scheduled co-operative banks, and the

HTJ approved non-banking financing companies. Interest subsidy is provided to the consumers through various financial intermediaries so that an effective interest rate works out to 2% for domestic users, 3% for institutional users and 5% for industrial /commercial users respectively. Interest free loans are available to domestic users, which fall under B40 household category.



Photo 8 Solar water heaters

I4: Install solar-powered street lights throughout the municipality

A unit of street light can consume up to 150-500 W of power, which is equivalent to 1.8-6 kWh per day. Hence, energy saving of up to 0.66–2.19 MWh/year is can be achieved through using the PV integrated street light system. The electricity generated by these facilities can be stored in batteries, to be used as lighting the night (see Photo 9). Apart from using it locally, the electricity generated by PV can be injected into the grid directly or used for charging electric vehicles.



Photo 9 Solar-powered street lighting

B1: Promote Photovoltaic (PV) and solar thermal systems on MPHTJ assets

PV modules consist of many arrays of PV which can be adjusted in many sizes from as large as a solar farm requiring 1 hectare of land to a single PV array of less than 0.0001 hectare. But, the small PV systems are more suitable to be implemented within HTJ area as long as the sun light towards the location is not constantly overshadowed by objects.



Photo 10 Solar system in Melaka

Other than houses and buildings, solar PV panels can also be mounted on the MPHTJ assets such as bus stops, street lightings, sheltered carpark, canopies, and any other private buildings that contains a roof or is tall and high (as to avoid shadows by other structures or trees). The electricity generated by these facilities can be stored in batteries, to be use locally especially for lighting during the night. Incentives also should be given by providing rebates towards the purchase of PVs, providing information about technologies and benefits for individuals.

9.2 Theme 2: Sustainable Transport and Logistic

Transit-oriented development (TOD) is defined as compact, mixed-use, higher-density development within walking distance of a bus / transit facility. As HTJ is a highly urbanized local authority served by fairly good network of public buses, it is important to integrate the network with pedestrian and cyclist lane to promote sustainable public transport system.

Planned actions such as development of activity area at pedestrian zones, walkable city facilities, free parking for low carbon vehicles and real time online information for bus arrival are important low



Photo 12 Pedestrian zones



Photo 13 Low carbon vehicle parking



Photo 11 Real time information for public transport

carbon measures. One of quick win actions is by the converting HTJ municipal owned vehicles to low carbon vehicles (hybrid, electric or use of Natural gas or Biofuel).

Table 6 Actions in the Sustainable Transport and Logistic

Action	Benefits	Responsible department	Key partners	Timeline	
				2020-2025	2026-2030
T1: Implement Transit Oriented Development (TOD)	Mitigation	Town Planning, OSC Engineering Green Technology	JKR		▶▶▶
T2: Provide comprehensive public transport network	Mitigation	Town Planning, Green Technology	JKR	▶▶▶	
T8: Provide real-time online information about bus locations and arrivals	Mitigation	Engineering Green Technology	Bus operators		▶▶▶
T3: Provide user friendly pathways for pedestrians and cyclists	Mitigation	Town Planning, Green Technology Landscape	PLANMalaysia @ Melaka	▶▶▶	
T4: Increase potential activity centres for pedestrian zones	Mitigation	Town Planning, Green Technology Landscape	JKR	▶▶▶	
T5: Provide a 'Park-and-Walk / Cycle' zone as an initiative for drivers to park outside commercial areas	Mitigation	Town Planning, Green Technology Landscape	JKR	▶▶▶	
T6: Run District buses on recycled oil from food courts	Mitigation	Engineering Town Planning, Green Technology	Private sector, NGOs		▶▶▶
T7: Promote cycling as a healthy and environmentally friendly form of transport	Mitigation	Engineering, Town Planning, Green Technology	NGOs, Cycling Clubs	▶▶▶	
T9: Convert District vehicle fleet to hybrid and electric	Mitigation	Corporate, Green Technology	Private sector	▶▶▶	
T10: Establish unlimited free parking for low-carbon vehicles	Mitigation	Engineering, Green Technology	Private sector	▶▶▶	

9.2.1 Description of Planned Actions

T1: Implement Transit Oriented Development (TOD)

Transit-oriented development (TOD) is defined as integrated development within a walking catchment environment of a transit transport terminal / hub / stop. Walking catchment refers to a journey of between 5 to 10 minutes walking, which is approximately 400 meters to 800 meters from the transit hub / terminal / stop.

The criterias for the development of TOD are: There are high and medium capacity transit transport services, high frequency and preferably separate corridors or routes from other traffic.

There are at least two modes of public transport, one of which should be high or medium capacity transit mode, high frequency and preferably separate from other traffic, while the other provides support connection services to local and local areas.



Photo 14 Transit Oriented Development (TOD)

T2: Provide comprehensive public transport network

Public transport network improvement includes route network expansion planning. The development of integrated public transport relies on the overall system improvement to make it successful. The improvement of network coverage and connectivity through route network planning and expansion will encourage people, especially commuters from urban fringe areas to use the public transport. Key stations that have been identified in the long-term plan are important areas that need connectivity due to their value of activity as well as their development intensity.

In line with the increasing travel demand, extended bus services into district centres by improving bus services are important. It is necessary for public transport agencies of Hang Tuah Jaya and Melaka to identify the potential new dedicated bus lanes along the major transit corridors that will need the integrated public transportation services in order to meet the future travel demand. The proposed extension of bus network should focus on major employment centres, which currently are highly dependent on roads and highways to access the city centre. It is important to ensure a greater coverage and continuous network for bus services.

T8: Provide real-time online information about bus locations and arrivals

As promoting the use of public transportation especially buses will improve Hang Tuah Jaya residents' accessibility, it is important to have reliable information of the services. Real time arrival information also benefits passengers with respect to improve public transport availability and usability. The most prevalent medium used for the distribution of real-time bus arrival information is the electronic sign, also known as the Dynamic Message Sign (DMS), located at bus stations, bus stops, and rail stations (refer Photo 15).



Photo 15 Real time information for bus services

T3: Provide user friendly pathways for pedestrians and cyclists

Comfort and safety factors need to be considered for walking or cycling from the public transport stop to their final destination. This plan proposes that initiatives to provide comfortable and safe pedestrian and bicycle lanes be given priority in the context of achieving the goals of community and low carbon cities.

A few approaches can be done by providing bicycle rental center and adequate bicycle parking, complete disabled facilities such as textured paths (block tactile, ramps and railing, providing bicycle and pedestrian stop area as a shelter when it rains and a place to rest with the proper lighting to ensure safety.

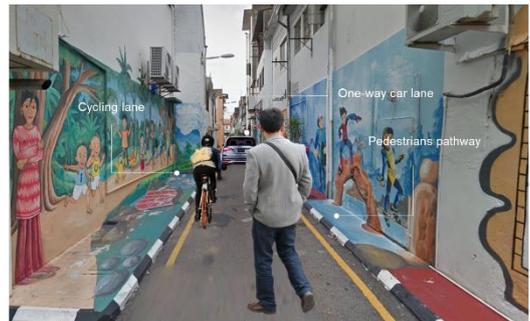


Photo 16 Pedestrians pathway and cycling lane

T4: Increase potential activity centres for pedestrian zones

Plans to restrict car use in parts of city centre area to a designated pedestrian zones (also known as car free zones) have become more common in big sustainable cities like Venice, Paris, Seattle, Florence, London, and Copenhagen. Pedestrian zones of certain areas in city centre usually aims to provide a better accessibility and mobility for pedestrians, indirectly enhancing the volume of shopping and other key activities in the selected area.

Pedestrian zones could potentially attract other man-powered vehicles, such as bicycles and reduce the amount of CO₂ emission from engine-powered vehicles like buses and private cars. A few initiatives can be implemented for these zones such as restrict private vehicles to enter the particular area and only allow certain vehicles such as taxi, bicycle and emergency services. Other than that, provide special paving and landscaping to reduce land for parking and provide pedestrian amenities such as sidewalk benches, and safe lightings at appropriate areas.



Photo 17 Pedestrian zones

T5: Provide a 'Park-and-Walk / Cycle zone as an initiative for drivers to park outside commercial areas

Park-and-walk / cycle and park-and-ride facilities are developed to reduce the impact of private vehicle traffic and urban sustainability. With this facility, visitors to HTJ city center no longer have to rely entirely on their private vehicles to get to all the particular destinations. Instead, they only need to drive to the city center and then park their vehicles in the facilities provided. After that, visitors can continue their journey to their destination by either walking or cycling. With the special pedestrian and bicycle paths, as well as the improvement of pedestrian crossing facilities, the walking or cycling activities will be more comfortable and safe. The same concept as park-and-walk / cycle is also practiced in the park-n-ride facility. Visitors who drive will park their vehicles and then continue their journey using public transport services.



Photo 18 Park-and-ride at bus terminal area

T6: Run District buses on recycled oil from food courts

Cooking oil is a waste material that can be found everywhere in Hang Tuah Jaya and for which collection schemes and recovery options are not sufficiently developed. Cooking oil is generally recycled and disposed at wastewater treatment plant. However, because of recent legislative developments, this practice may not be possible in the near future. Therefore, it is necessary to find another recovery option and an outlet for waste cooking oil. The common method of depositing the oils in the sewage system is an illegal practice that causes many problems. The oils clog the sewage systems causing malfunctions in the filters and oil / water separators. Cooking oils can be recycled into an environmentally friendly fuel and could then be used by public transport in Hang Tuah Jaya.

The main objective of the project is to put Hang Tuah Jaya's large volume of used cooking oils to good use. The project will develop a pilot scheme, the results of which will serve as a starting point for setting up an adequate collection system for waste vegetable oils. This system will collect not only domestic oils, but also those coming from the catering sector – the collection procedure involves oils used in the frying process from food courts. All collaborating establishments are identified with a sticker, and they are given containers for the collection of used oil. Subsequently the oil collected in this way is processed in a plant that transforms it into biodiesel fuel, which is then used in Hang Tuah Jaya's district bus fleet. In this way, the project will also help reduce the amount of hazardous and polluting emissions, thus improving air quality in Hang Tuah Jaya.

T7: Promote cycling as a healthy and environmentally friendly form of transport

Cycling activities could create an active lifestyle which reduces the society's dependency on conventional transportation such as private vehicles and eventually reduces the carbon footprint. It can be either for recreational or commuting purposes to nearby markets, schools and offices. To encourage this activity as healthy and environment-friendly form of transport, enhancing cycling networks and build quality of urban spaces are the way of it. (see Figure 16).



Figure 16 Example of master plan for cycling network

T9: Convert District vehicle fleet to hybrid and electric

Converting district vehicle fleet is a way to help reducing carbon emission and simultaneously supporting the government's pledge to transform public transport into sustainable energy in Melaka.

As a first step, electric-powered buses will begin their services from Melaka Sentral and pass through nine or 14 stations covering tourist areas in HTJ city, including the Melaka Zoo, Taming Sari Tower, Unesco World Heritage Site around Banda Hilir, before heading for Klebang.⁴⁹



Photo 19 Electric buses in Melaka

⁴⁹ <https://www.freemalaysiatoday.com/category/nation/2020/12/11/electric-buses-for-melaka-tourists-next-month/>

T10: Establish unlimited free parking for low-carbon vehicles

MPHTJ can make an effort to introduce free parking for residents who own low emission vehicles (LEV). LEV includes electric powered and hybrid vehicles that run on electricity and diesel or petrol which produce no or few harmful pollutants. Providing charging points and benefits like free parking can give customers an option to switch to lower emission vehicles. It is hoped that the offer of free parking will help encourage drivers to go green and participate in reducing carbon emission.



Photo 20 Free parking for low emission vehicles

9.3 Theme 3: Climate Responsive Infrastructure

Climate change impact requires municipal council to rethink about the design of green infrastructure. In the case of MPHTJ, the green infrastructure related to flood mainly refer to water storage (retention ponds) and drainage system, existing forest, urban green and street trees. MPHTJ should embrace the effective planning and design of green urban spaces and water body provide benefits through ecosystem services in regulating microclimate of urban areas. This is be done through monitoring and development control on the flood prone area. Provision of green area, landscaping and tree planting to increase green cover will improve shade and also provide thermal comfort. MPHTJ must work with premises/ homes owners on flood prone areas on flood response plan to reduce impact.



Table 7 Actions in the Climate Responsive Infrastructure

Action	Benefits	Responsible department	Key partners	Timeline	
				2020-2025	2026-2030
E1: Improve monitoring and development control around Flood risk areas	Adaptation	Green Technology Engineering	NAHRIM	➤➤➤	
B8: Promote measures to make homes safer in flood conditions	Adaptation	Building; Green Technology; Engineering	Private sector	➤➤➤	
I8: Encourage premises in flood prone areas to create response plans for flash flooding	Adaptation	Corporate; Green Technology; Engineering	Private sector	➤➤➤	
E3: Protect all existing green spaces and establish new multi-purpose green spaces that cannot be developed	Adaptation and Mitigation	Town Planning, Green Technology Landscape	Private sector developers	➤➤➤	

Action	Benefits	Responsible department	Key partners	Timeline	
				2020-2025	2026-2030
E4: Organize 'One Resident, One Tree' program	Mitigation and Adaptation	Landscape Corporate	Schools	»»»	
E5: Plant trees to increase shade in downtown areas	Mitigation and Adaptation	Town Planning, Green Technology Landscape	NGOs	»»»	
E6: Launch corporate sector adoption of green spaces	Mitigation and Adaptation	Landscape Corporate	Private sector	»»»	
B7: Implement new policies to incentivize construction of green roofs and green vertical landscaping	Mitigation and Adaptation	Building; Green Technology; Engineering	Private sector	»»»	

9.3.1 Description of Planned Actions

E1: Improve monitoring and development control around Flood risk areas

Flood is one of the main climate hazards that often occurs and it causes inconveniences to economic activities, property and financial losses. Floods cause a range of adverse impacts, including human injuries and property damage. In order to reduce the occurrence of this event, monitoring and development control of flood-prone areas need to be done. A few approaches can be achieved by controlling the land use activities around flood risk areas to reduce water-impermeable areas, establishing Low Impact Development (LID) concept (see Figure 17) to new development areas and providing subsurface drains to suitable locations.

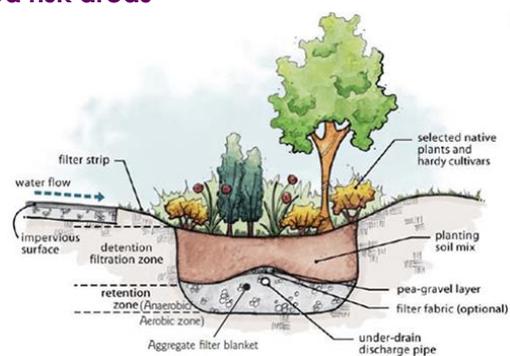


Figure 17 Low Impact Development (LID) concept

B8: Promote measures to make homes safer in flood conditions

Often, the flood occurrence affects the residential neighborhood of Hang Tuah Jaya. Measures can be implemented to make homes safer in flood conditions which include retrofitting, floodproofing based on construction material, improve home elevation, making barriers and protecting service equipment. Thus, improvements in construction practices and regulations have potential for the new homes less prone to flood damage.

I8: Encourage premises in flood-prone areas to create response plans for flash flooding

Premises in flood-prone areas are more likely to face the flood hazard. Response plans such as flood risk management need to be established. Some initiatives are through property owners to use water-resistant materials to reduce damage in lower levels of the home and only use those floors for storage (wet floodproofing). Another option is to seal the building's exterior and use removable barriers to keep lower levels dry even in flood events (dry floodproofing).

E3: Protect all existing green spaces and establish new multi-purpose green spaces that cannot be developed

Green spaces exist in a great variety of shapes, structures and types within the city or urban fabric. The successful protection, creation, and development of the spaces is one of the key elements required to achieve sustainable urban development. Green spaces provide carbon sink, cooling through shading and enhanced evapotranspiration, thus reducing the heat island effect. Green spaces can also have positive effects for human climate change adaptation. The capacity of vegetation to retain water is an important flood prevention feature that can reduce peak discharges.

E4: Organize 'One Resident, One Tree' program

In order to have more trees by 2030, each resident in HTJ should be encouraged to plant trees within their residential areas or to take part in the planting activities organized in the city. Hence, one resident, one tree program is a simple and effective method which can be introduced in HTJ. By getting them involved in tree planting activities, residents will understand the importance and value of trees as asset (not liability) in a city environment. This can help to improve their awareness on preserving trees and to conserve green cover (forest) in the city (see Photo 21).⁵⁰



Photo 21 One resident one tree in neighborhood area

E5: Plant trees to increase shade in downtown areas

In order to achieve concept of Walkable City, tree planting initiative should be promoted because tree planting can provide attractive greenery view in the city, act as shades and promote walkable communities, reducing air pollution and air temperature (see Photo 22).⁵¹ Shades also function to purify polluted air as well as provide natural scenery to the urban dwellers in the area, which can improve their mental stress.



Photo 22 Trees as shades at pedestrians area

E6: Launch corporate sector adoption of green spaces

Providing green spaces for inner city residents is increasingly challenging by the limited amount of available park space in urban areas. In the meantime, local authority itself is struggling to maintain public parks in the city with its limited budget. Cooperation from corporate sector is much needed to maintain the green spaces. HTJ shall encourage and cooperate with businesses and NGOs to increase green cover by granting and engaging in parks or green space adoption programs. Private sectors can manage the parks on a lease-based manner under their corporate social responsibility (CSR) programs.

E7: Implement new policies to incentivize construction of green roofs and green vertical landscaping

Revision of green area requirement for new development is needed to increase the green covering in buildings, to mitigate urban heat island (UHI) phenomenon. As the land area in HTJ City Centre is scarce, other means of substituting the green area on ground onto buildings surface are alternative strategies to increase the green area in the city. The current requirement of green area on the ground for a new building development in Malaysia is generally 10% of the site area. In this program, the requirement by MPHTJ should be revised and be increased to 30% for large scale development (100 acres). However, an exemption of up to two-thirds of the requirement can be permitted with the use

⁵⁰ PropSocial

⁵¹ Chan Tak Kong, The Star

of green rooftop, sky terraces or vertical green on building façade, subject to an approval from MPHTJ. Furthermore, an addition of every 8% of green area on the ground plus more than 2,000 m² perimeter planting and 16% of building podium should be entitled for an additional plot ratio. As for existing buildings, incentives in the form of development charge exemption shall be rewarded to the efforts of replacing buildings' surfaces with high-albedo materials as well as replanting or provision of new green spaces and installation of new rooftop or vertical green. This program is in line with various incentives given by different countries worldwide. Thus, this proposed program shows MPHTJ's initiative for improving the covering and greening the existing buildings in HTJ.

9.4 Theme 4: Sustainable Community

MPHTJ can leverage on community led sustainability transition to Low carbon community. As this required societal and behaviour change, stakeholder effective engagement is important. Common community activities such as urban farming, composting, 3Rs activities, Low carbon community Association, and dengue prevention measures can be incorporated as low carbon actions and MPHTJ's LA21 program. MPHTJ may also engage with private sector to promote Energy efficiency, waste to wealth, tree planting and low carbon activities where private sector can participate as CSR program.



Table 8 Actions in the Sustainable Community

Action	Benefits	Responsible department	Key partners	Timeline	
				2020-2025	2026-2030
E2: Promote urban farming and involve the community	Adaptation	Town Planning, Green Technology	Local residents, farmers	➤➤➤	
I3: Establish decentralized and community-oriented composting sites	Mitigation	Corporate, Green Technology, Public Health	NGOs	➤➤➤	
I9: Implement a 'pay-as-you-throw' waste system	Mitigation	Corporate, Green Technology, Public Health	Private sector		➤➤➤
S4: Promote community recycling of used cooking oil	Mitigation	Corporate, Green Technology	Local residents, NGOs	➤➤➤	
S2: Set up Low Carbon Residential association	Mitigation	Corporate, Engineering, Green Technology	Local residents	➤➤➤	
S3: To raise community awareness on prevention of dengue	Adaptation	Corporate, Engineering, Green Technology	Local residents, NGOs		➤➤➤

Action	Benefits	Responsible department	Key partners	Timeline	
				2020-2025	2026-2030
B9: Encourage major commercial/institution establishments to post energy efficiency data publicly at entrance	Mitigation	Building, Green Technology, Engineering	Private sector		➤➤➤

9.4.1 Description of Planned Actions

E2: Promote urban farming and involve the community

A community should be encouraged to involve in community farming within their neighbourhoods. Planting edible plants, such as fruit trees and vegetables, will help to increase the greenery of the neighbourhood and provide organic food to the communities. In addition, these parks or gardens can function as an educational and learning ground for students and attract visitors.



In response to the potential shortage of local authority to initiate; manage and harvest urban farming, a setup of Community Garden Association to promote collaboration and participation from the local community is vital in order to improve and sustain the urban farming practice. This Community Garden Association can be initiated together by HTJ Local Authority and the respective residential associations. Interested local citizens shall be encouraged to join the association whereby HTJ Local Authority shall focus on providing a professional assistance and technical support to the urban farming project.

Following the establishment of the Community Garden Association, a local community is given the responsibility to cultivate and manage an urban farming site. The establishment of Community Garden Association will benefit the urban farming by providing the people needed for the farming activities. Community Garden Association will also serve as a social learning platform for experience sharing among the local community members as well as serve as knowledge sharing centre to the local community. The best urban farming site should be nominated and awarded; this will encourage more neighbourhoods to participate in such programs.

I3: Establish decentralized and community-oriented composting sites

Decentralized composting, also known as community composting, refers to a community-scale network in a specific neighborhood that diverts and composts biowaste in a controlled operative environment. The main advantages of decentralized composting over centralized systems are the transportations and maintenance costs are relatively low. Furthermore, it also low skills and required with simple technology equipment.

Most of the countries such as Spain, Dublin and Lithuania implemented this composting in residential area and processed this waste collection from kitchen waste,



Photo 23 Decentralized composting

organic waste and biodegradable waste.⁵² By community composting, local resources community participation can be established.

To encourage the collection of organic wastes from household, an awareness campaign to deliver the information and knowledge on handling these organic wastes at source is the initial step for this program. The awareness program may involve knowledge sharing among the experts and residents on the processes of composting and turning the compost into fertilizer. Then, Hang Tuah Jaya local authority shall provide and set up a composting facility within participating neighbourhoods. A reward system such as award badge should be introduced which will further motivate the public to be active in waste collection and composting activities.

19: Implement a 'pay-as-you-throw' waste system

The "Pay as You Throw" (PAYT) program is based on a concept of usage-pricing when disposing municipal solid waste. It imposes charges on households for solid waste collection based on the amount of waste being thrown away (EPA, 2016). The goal is to create a financial incentive which encourages residents to recycle, thus lessening the volume of waste sent to landfills and incinerators. The implementation of PAYT programs requires minimal operational changes and costs in which the established solid waste collection routes and fee exemption for waste producer exist if waste is sent for recycling or composting.

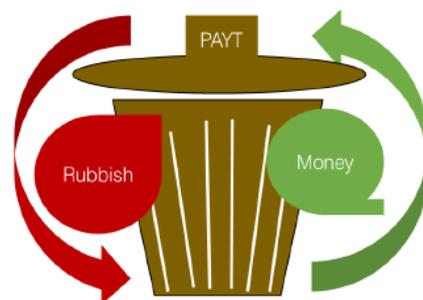


Figure 18 Illustration of PAYT program

S4: Promote community recycling of used cooking oil

Used cooking oil can be divided into yellow grease or brown grease. Yellow grease is recovered from restaurants and food-processing industries whereas brown grease is from the grease traps from kitchen sinks and floor drains. Brown grease collected from sink may have solids and unwanted materials, thus reducing its potential to be recycled (refer Photo 24). By promoting Waste to Wealth, residents may collect their used cooking oil and stored in containers and sent to designated collection location. Residents also should be informed that the used cooking oil can be used to produce value-added products, such as biodiesel, lubricants, soaps and candles.

Apart from used cooking oil, household food waste and garden waste have a great potential to be converted into fertiliser. These organic wastes can be utilised in a wealth creation program rather than being sent to landfill. Organic waste can be diverted to a composting facility in order to produce fertiliser for agriculture harvesting as well as feedstock for power generation.



Photo 24 Recycling of used cooking oil

⁵² <https://encyclopedia.pub/986>

S2: Set up Low Carbon Residential association

Low carbon residential association aims to foster awareness and behavior among residents on the importance of preserving the environment and thus reducing pollution. It is vital to empower the community a low-carbon lifestyle by managing effective programs such as plogging activities in residential area and low carbon initiatives program in neighborhood areas and city centre. The implementation of this proposal will foster community awareness on aspects of cleanliness, well-being and the importance of the environment in daily life.



Photo 25 Plogging activities in neighborhood area

S3: To raise community awareness on prevention of dengue

Creating a sense of community awareness is the first step in fostering the prevention of dengue among the residents in Hang Tuah Jaya. Dengue prevention needs to be channeled to locals in order to encourage locals to increase the awareness of dengue. An accurate yet accessible information channel in disseminating information related to dengue is vital in creating such awareness and empowering the community to prevent of dengue. The distribution of information can be done via using mass media, social marketing approach and collaboration with relevant stakeholders in educating the public.

B9: Encourage major commercial/institution establishments to post energy efficiency data publicly at entrance

Improving energy efficiency of the commercial and infrastructure building is a crucial aspect of any national energy policy. The Commercial Building Energy Consumption Survey (CBECS) were conducted by the U.S. Energy Information Administration (EIA) to capture commercial building and institutional building on sector energy consumption and expenditures. However, this approach requires the building owner, operator, or manager to measure the building's energy performance. This information can be used to identify cost-effective opportunities for improvements and also made available to the marketplace through a direct disclosure to stakeholders such as a tenant, investor, lender or by publication on a publicly accessible web sit

9.5 Relationship between planned actions and GHG emissions sectors and climate hazards for Hang Tuah Jaya

This section illustrates the relationship between planned actions with GHG emissions sectors and climate hazards of Hang Tuah Jaya. The planned actions are obtained from the series of stakeholder engagement with MPHTJ, technical agencies and NGOs. Based on focused acceleration guidance proposed by C40, the targeted reduction potential from the planned action formulated is based on 60% reduction from stationary sector, 30% from transportation sector and 10% from waste and other sector.

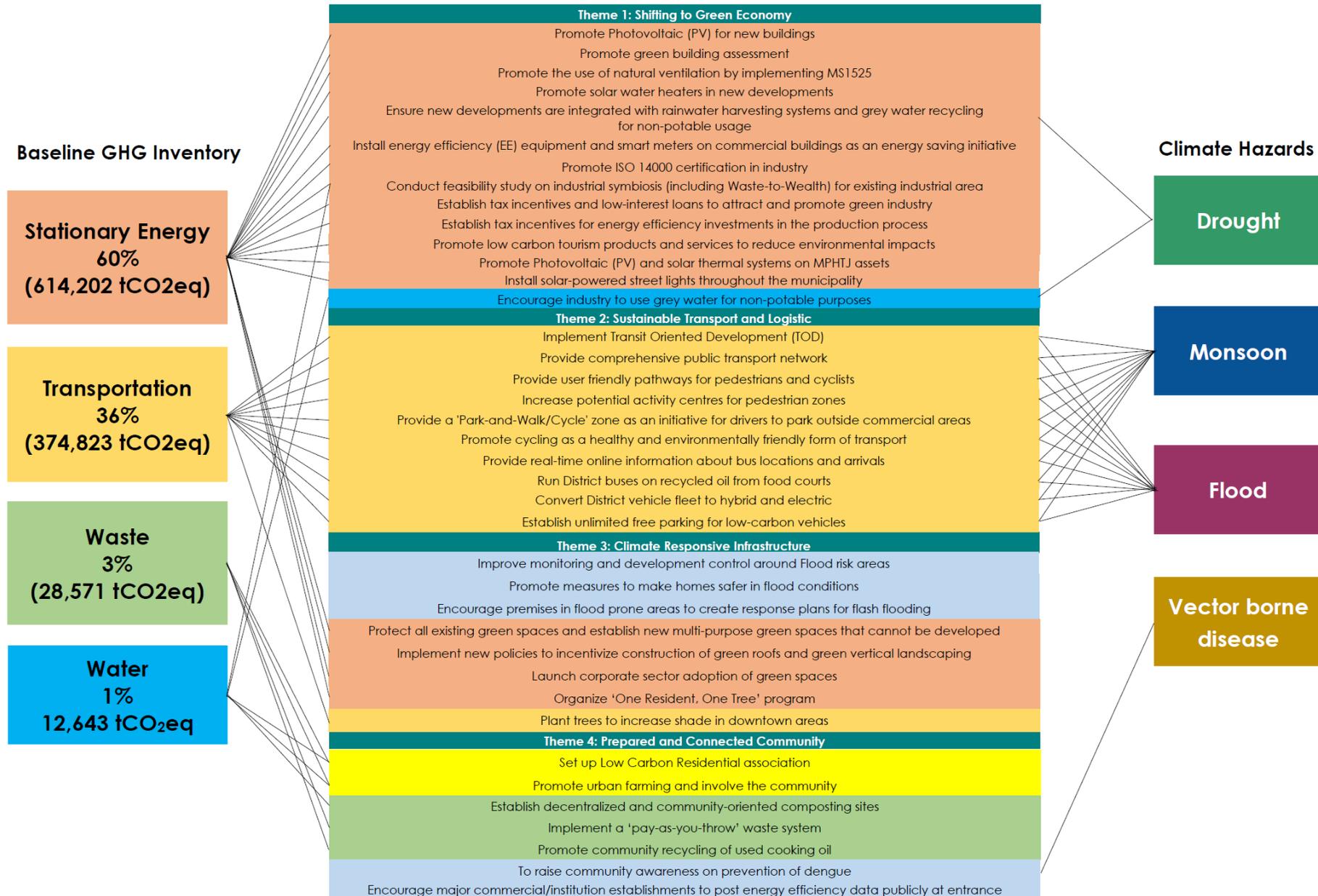


Figure 19 Relationship between planned actions and GHG emissions sectors and climate hazards for Hang Tuah Jaya

Chapter 10.0 Financing

Hang Tuah Jaya aims to seek local, state, national and international funding sources in order to finance this Climate Action Plan. The Municipal Council itself will fund local-level projects such as tree planting, drainage maintenance, street lighting, building of pedestrian walkways, and solid waste management. State funding will be sought for larger infrastructure projects, and the Council will apply for national and international co-financing for more ambitious initiatives.



Chapter 11.0 Implementation and Monitoring Process

The implementation and monitoring process will utilize the GCoM CRF and GPC tools (described previously) in order to track changes greenhouse gas emissions in HangTuah Jaya. The CAC will meet annually in order to review and approve each year's climate-related programs and budget, and more frequently – approximately four times a year – in order to monitor progress. Accordingly, with GCoM's requirements, the CCCWG will report any updated targets and major changes in city governance as soon as possible, as well as submit an updated greenhouse gas inventory and risk and vulnerability assessment biennially. Progress towards the climate action plan and details on specific actions and their costs will also be reported on a two-yearly basis, which is in line with GCoM requirement, although taking inventories on an annual basis may be recommended.⁵³

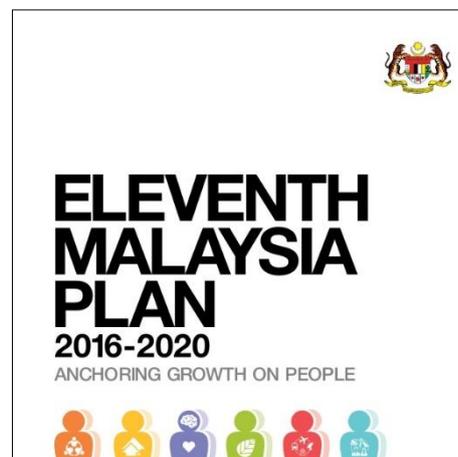
⁵³ GCoM CRF Guidance Note

Appendices

Appendix A: Relevant National, State and Local Policies

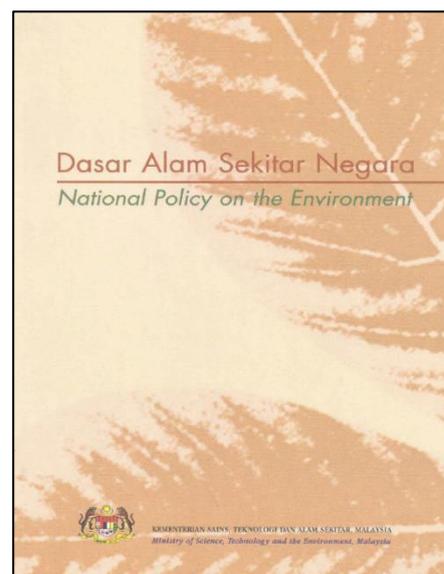
a. 11th Malaysia Plan

The 11th Malaysia Plan, covering 2016-2020, is the most recent of Malaysia's 5-year development plans. With a focus on achieving Vision 2025, the aspiration laid out in 1991 of achieving full development in Malaysia, the legislation lays out plans for productivity and innovation based on six Strategic Thrusts: enhancing inclusivity, improving wellbeing, accelerating human capital development, pursuing green growth, strengthening infrastructure and re-engineering economic growth. The plan outlines goals for energy access including 99.9% electrification, and energy efficiency policies including introducing labeling and standards as well as public awareness programs. The renewables policies in the plan include exploring wind, geothermal and ocean energy, implementing net energy metering and spreading public awareness, with renewables sources projected to make up 7.8% of total capacity in Malaysia by 2020. The plan outlines improvements in public transportation and allocates RM 2.3 billion to support low-carbon technology projects.⁵⁴⁵⁵



b. National Policy on the Environment

Established in 2002, the National Policy on the Environment details strategies for sustainable exploitation of Malaysia's natural resources in order to foster increased economic growth and improve quality of life.⁵⁶ The policy details measures for conserving natural areas, particularly to protect indigenous flora and fauna, sustainable energy production and water and forest management.⁵⁷ 8 principles are centered: stewardship of the environment, conservation of nature's vitality and diversity, continuous improvement of the quality of the environment, sustainable use of natural resources, integrated decision-making, role of the private sector, commitment and accountability, and active participation in the international community.⁵⁸



⁵⁴ <https://globalchange.mit.edu/publication/p2p-asean>

⁵⁵ <https://policy.asiapacificenergy.org/node/2508>

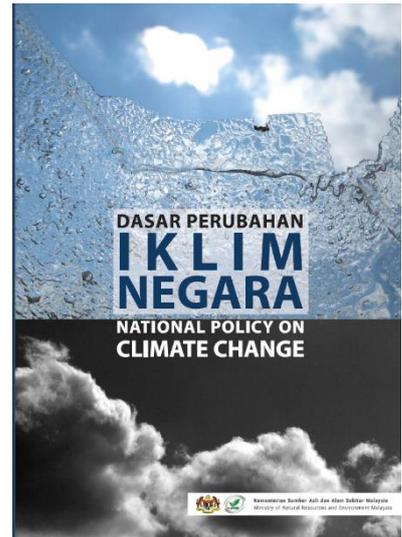
⁵⁶ <https://theredddesk.org/countries/policies/national-policy-environment-malaysia>

⁵⁷ KK CAP

⁵⁸ <https://www.doe.gov.my/portalv1/en/tentang-jas/pengenalan/dasar-alam-sekitar>

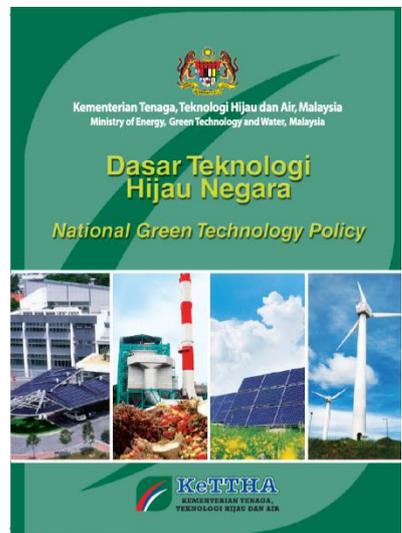
c. National Policy on Climate Change

The National Policy on Climate Change, enacted in 2009, provides a system for government agencies and other stakeholders to address climate impacts. This legislation aims to mainstream climate concerns and mitigation efforts into all national policies and plans, as well as to enhance institutional capacity for climate policy responses. The policy relies on five key principles: development on a sustainable path; conservation of environment and natural resources; coordinated implementation; effective participation; and common but differentiated responsibilities and respective capabilities. Key actions include prioritizing climate change in the National Development Planning Council, establishing an inter-ministerial committee on climate change, developing national carbon accounting systems, investing in research and development, and others.⁵⁹



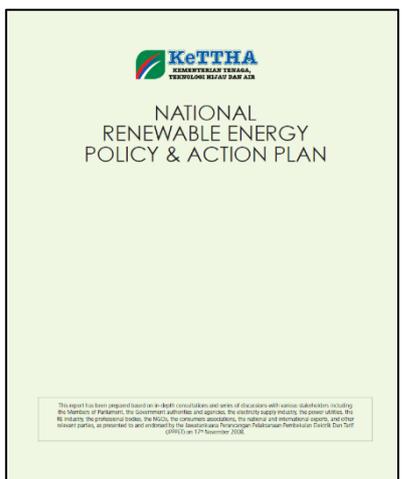
d. National Green Technology Policy

The National Green Technology Policy was launched in 2009 in order to minimize energy consumption while maximizing economic development, facilitate the growth of green technology industry and increase national capacity and competitiveness for green technology innovation. The legislation also aimed to ensure sustainable development and spread public awareness. Key actions under the Policy include the formation of a government and legal mechanisms for the advancement of green technology, providing access to financing and supporting partnerships between the government, industries and research institutions. The GTFS falls under this legislation.⁶⁰



e. National Renewable Energy Policy and Action Plan

The National Renewable Energy Policy and Action Plan (NREPAP) was introduced in 2009 to address renewable energy market failures and devise a coherent set of renewable energy policies in order to stop sending mixed signals to the business community. The NREPAP identified existing implementation issues in increasing renewable energy usage in Malaysia and analyzed policy solutions with a target of 34% renewable capacity by 2050, which would avoid the emission of 16 million tons of carbon dioxide.



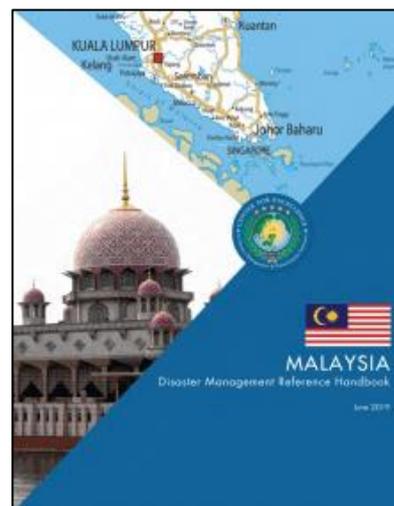
⁵⁹ <https://www.pmo.gov.my/2019/07/national-policy-on-climate-change/>

⁶⁰ <http://dev-gerbang.ppi.gov.my/storage/pdf/20/20.pdf>

The stated objectives of the policy are to increase RE contribution in the national power generation mix; facilitate the growth of the RE industry; ensure reasonable RE generation costs; conserve the environment for future generations; and enhance awareness on the role and importance of RE. The strategic thrusts of the policy include introducing a regulatory framework, providing a conducive environment for businesses, developing human capital, investing in research and development and implementing a renewable advocacy program.^{61,62}

f. Policy and Mechanism on National Disaster and Relief Management

Following a series of disasters that struck Malaysia in the 1990s, National Security Council Directive No. 20, also known as the Policy and Mechanism on Disaster and Relief Management, was put into force. The directive aims to outline policy on land-based disaster relief by establishing mechanisms for all stages of disaster management, and coordinating responsibilities between government agencies, the private sector and voluntary bodies. Directive No. 20 applies to all kinds of disasters, not just natural ones, but does have important applications for climate-related calamities, such as floods and haze. In 2015, following devastating floods in the state of Kelantan, the Malaysian government established the National Disaster Management Agency (NADMA) to take over from the National Security Council and fully focus on disaster relief. NADMA's primary objective is to carry out Directive No. 20, and the agency has proceeded to develop early warning systems and disaster response mechanisms.⁶³



g. National Biofuel Policy of 2006 and National Biofuel Industry Act of 2007

The 2006 National Biofuel Policy is the primary policy vehicle for the biofuel industry in Malaysia. The legislation sets specifications for 5% biodiesel blends and mandates its usage, promotes public awareness of and access to biodiesel, facilitates production and aims for gradual increases of the palm oil proportion in biodiesel blends.⁶⁴ The Biofuel Industry Act of 2007 regulates biofuels licensing, and built on these policies by reducing administrative barriers and setting further requirements for the share of palm biodiesel in transportation fuel; this percentage was increased to 7% in 2014.^{65,66}

⁶¹ <https://policy.asiapacificenergy.org/sites/default/files/NREPAP.pdf>

⁶² <http://www.seda.gov.my/policies/national-renewable-energy-policy-and-action-plan-2009/>

⁶³ [https://www.adrc.asia/acdr/2017/documents/7%20Malaysia%20National%20Disaster%20Management%20Agency%20\(NADMA\)%20and%20its%20philosophy,%20Mr.%20Zainal%20Azman%20Bin%20Abu%20Seman,%20Deputy%20Director%20General,%20NADMA.pdf](https://www.adrc.asia/acdr/2017/documents/7%20Malaysia%20National%20Disaster%20Management%20Agency%20(NADMA)%20and%20its%20philosophy,%20Mr.%20Zainal%20Azman%20Bin%20Abu%20Seman,%20Deputy%20Director%20General,%20NADMA.pdf)

⁶⁴ <https://www.iea.org/policiesandmeasures/pams/malaysia/name-147424-en.php>

⁶⁵ <https://globalchange.mit.edu/publication/p2p-asean>

⁶⁶ <https://www.iea.org/policiesandmeasures/pams/malaysia/name-147425-en.php>

h. Green Technology Master Plan

The Green Technology Master Plan (GTMP), created for the years 2017-2030, builds on the Eleventh Malaysia Plan's emphasis on green growth. The primary goal of the plan is to mainstream green technology into the country's development. The GTMP focuses on six sectors: energy, manufacturing, transportation, building, waste and water. The policy develops targets for each of these sectors, and aims to mainstream them into Malaysia's National Development Plans. Implementation relies on several key strategic directions: the government leading the way in adopting green technology; mainstreaming green technology in markets; nurturing research, development and commercialization; and human capital development.⁶⁷



i. Renewable Energy Act 2011

The Renewable Energy Act of 2011 established a feed-in tariff (FIT) system to encourage the generation of renewable energy. Under the system, sustainable energy developers can apply for approval from the Sustainable Energy Development Authority in order to benefit from the Act's economic incentives. The costs are transferred onto energy consumers, who pay a 1% fee towards the Renewable Energy Fund on top of their normal electricity bill. The original policy covers solar, mini hydro, biomass and biogas systems, and aims to make long-term renewable projects of these types economically viable. In 2014, lower feed-in tariffs were announced, and in 2015, the government launched geothermal feed-in tariffs.⁶⁸

j. Green Technology Financing Scheme

The Green Technology Financing Scheme (GTFS) was established during the 2010-2017 time period to funnel RM 3.5 billion towards green technology innovations in industry.⁶⁸ The scheme channels financial support towards initiatives approved by GreenTech Malaysia in the energy, water, building, transport, waste and manufacturing sectors. An extension of GTFS, to be known as GTFS 2.0, was approved March 2019 with a budget of RM 2.0 billion for the period until the end of 2020.⁶⁹



k. Malaysian Urban Indicator Network



The Malaysian Urban Indicator Network (MURNInet) was developed by the Federal Department of Town and Country Planning Peninsular Malaysia in order to measure and evaluate the sustainability of towns and cities in Malaysia. The system includes a set of Urban Indicators which can be used to evaluate the quality of life in municipalities across the country. The indicators span 11 planning components: demography, housing, economy, utility and infrastructure, public facility, environment, sociology and social impact, land use, tourism and heritage, transportation and accessibility, and management and

⁶⁷ <https://www.pmo.gov.my/2019/07/green-technology-master-plan-malaysia/>

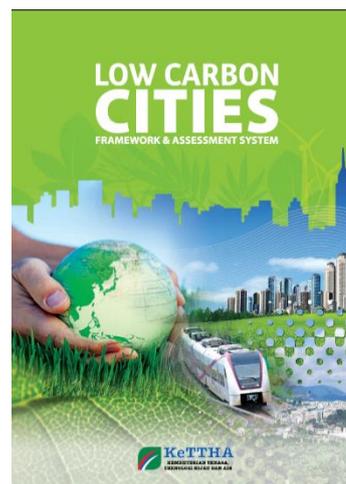
⁶⁸ <https://www.iea.org/policiesandmeasures/pams/malaysia/name-24984-en.php>

⁶⁹ <https://globalchange.mit.edu/publication/p2p-asean>

finance.⁷⁰

I. Low Carbon Cities Framework

Powered by GreenTech Malaysia, a government agency promoting sustainable technological solutions, the Low Carbon Cities Framework (LCCF) is an information portal providing guidance for Local Authorities, universities, and other small-scale entities on how to reduce greenhouse gas emissions. The framework addresses emissions in four main categories: urban environment, urban infrastructure, urban transportation and urban buildings. Several cities, such as Seberang Perai, Hang Tuah Jaya and Subang Jaya, have already implemented the framework and used it to make their cities more sustainable through action such as installing solar panels and replacing indoor lights.⁷¹



m. Green Building Index

The Green Building Index (GBI) is a rating system used across Malaysia to promote the design and construction of water-efficient and energy-saving buildings that improve human health and are built with sustainable materials. Project designs are assessed, ideally before construction, and graded according to the GBI score sheet; following completion, buildings are verified and given a final award. Projects are then reassessed every three years in order to preserve their rating.⁷²

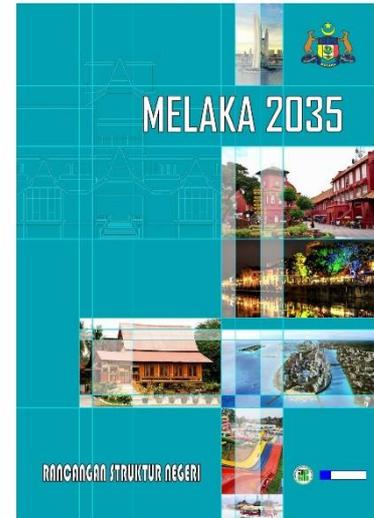
⁷⁰ http://mirror.unhabitat.org/downloads/docs/MURNInet-Malaysia_SubmissionDetails.pdf

⁷¹ <https://www.greentechmalaysia.my/our-services/low-carbon-cities-framework/>

⁷² <https://new.greenbuildingindex.org/>

n. Melaka State Structure Plan 2035

The Melaka State Structure Plan, published this year, consists of the state authority's proposals for the development and use of Melaka's land through 2035. The plan has four primary goals: resilient economy, green city state, sustainability and inclusivity, and Melaka identity. 87 policies and 397 implementation initiatives are laid out to achieve these targets. The plan aims to grow the state's population to 1.5 million, and visitors to 25 million, with a state GDP of USD 26,626. The document also targets shifting to 60% public transportation, decreasing water usage, implementing green technology policies, and improving forest conservation. A proposal is included for Hang Tuah Commercial Center (HTMCC), which is intended to be 30% commercial/institutions, 30% residential, 25% infrastructure/utility, and 15% public open spaces.⁷³



o. Melaka Green City Action Plan

Melaka's Green City Action Plan, a flagship project for the Indonesia-Malaysia-Thailand Growth Triangle Green Cities Initiative, outlines the state's commitment to decarbonization, economic development, and supporting Malaysia's NDC. The plan focuses on balanced growth, with an emphasis on integrating urban development and environmental planning in order to manage rapid urbanization and environmental challenges. Key issues identified in the report include coastal development without climate change risk assessments, traffic congestion, balancing tourism and heritage conservation, scaling up green activities and decoupling population and economic growth from emissions. The plan covers water management, energy efficiency, renewable energy, green transportation, zero waste, urban forestry and agriculture, and cultural heritage and tourism. Specific actions include converting the public fleet to fuel-efficient vehicles, creating integrated transit blueprints, expanding the centralized sewerage system, and others. The Hang Tuah Jaya Green City project, under the Low Carbon Cities Framework (LCCF), is identified as an important project for increasing density, creating walkable areas and improving green buildings by using LEED and GBI certifications.

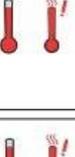
⁷³https://www.thegpsc.org/sites/gpsc/files/partnerdocs/gpsc_delhi_meeting_melaka_2035_plan-final2-31101_7.pdf

Appendix B: Climate projections

Climate Change 2014: Impacts, Adaptation, and Vulnerability represents the most recent assessment of the Intergovernmental Panel on Climate Change (IPCC) of the literature on the expected impacts of global warming. The report builds on its previous iteration, Climate Change 2007, and notes that the amount of relevant research more than doubled in between the release of the two editions. One can assume that publication of work on climate impacts, adaptation and vulnerability has continued to grow in the years since Climate Change 2014 was published, with the next assessment due in 2021. As a result, we have considered the findings from the latest assessment, analyzed some literature published since then, and will await the findings of the next report. We have also examined more targeted research of the sort that would not be covered in the Impacts, Adaptation and Vulnerability text.

The IPCC report finds that climate change is already having considerable effects on natural systems, and impacts of less magnitude on human systems. Key risks for Asia⁷⁴ (see table 9) as a whole include increased flooding, sea level rise, heat-related mortality and drought-related water and food shortages.⁷⁵ The phenology, growth rate and distribution of plant species are expected to shift across the continent, and there are high confidence that coastal and marine systems will experience increasing stress from both climatic and non-climate drivers. More frequent extreme climate events and rapid urbanization, industrialization and economic development are likely to exacerbate the challenges Asia already faces.⁷⁶ Overall, more research, especially using high-resolution climate models, is needed in order to create more detailed predictions due to the high localization of climatic phenomena in the region.

Table 9 Key climate risks in Asia

Asia				
Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation
Increased riverine, coastal, and urban flooding leading to widespread damage to infrastructure, livelihoods, and settlements in Asia (<i>medium confidence</i>) [24.4]	<ul style="list-style-type: none"> Exposure reduction via structural and non-structural measures, effective land-use planning, and selective relocation Reduction in the vulnerability of lifeline infrastructure and services (e.g., water, energy, waste management, food, biomass, mobility, local ecosystems, telecommunications) Construction of monitoring and early warning systems; Measures to identify exposed areas, assist vulnerable areas and households, and diversify livelihoods Economic diversification 			Very low Medium Very high
			Present	
			Near term (2030–2040)	
			Long term (2080–2100) 2°C 4°C	
Increased risk of heat-related mortality (<i>high confidence</i>) [24.4]	<ul style="list-style-type: none"> Heat health warning systems Urban planning to reduce heat islands; Improvement of the built environment; Development of sustainable cities New work practices to avoid heat stress among outdoor workers 			Very low Medium Very high
			Present	
			Near term (2030–2040)	
			Long term (2080–2100) 2°C 4°C	
Increased risk of drought-related water and food shortage causing malnutrition (<i>high confidence</i>) [24.4]	<ul style="list-style-type: none"> Disaster preparedness including early-warning systems and local coping strategies Adaptive/integrated water resource management Water infrastructure and reservoir development Diversification of water sources including water re-use More efficient use of water (e.g., improved agricultural practices, irrigation management, and resilient agriculture) 			Very low Medium Very high
			Present	
			Near term (2030–2040)	
			Long term (2080–2100) 2°C 4°C	

⁷⁴ Climate Change 2014: Impacts, Adaptation, and Vulnerability Summary for Policymakers

⁷⁵ Climate Change 2014: Impacts, Adaptation, and Vulnerability Summary for Policymakers

⁷⁶ Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

The figure below, from the National Hydraulic Research Institute of Malaysia (NAHRIM), depicts the predicted effects of climate change in Malaysia. More detailed information about climate projections is categorized below (see Figure 21⁷⁷).

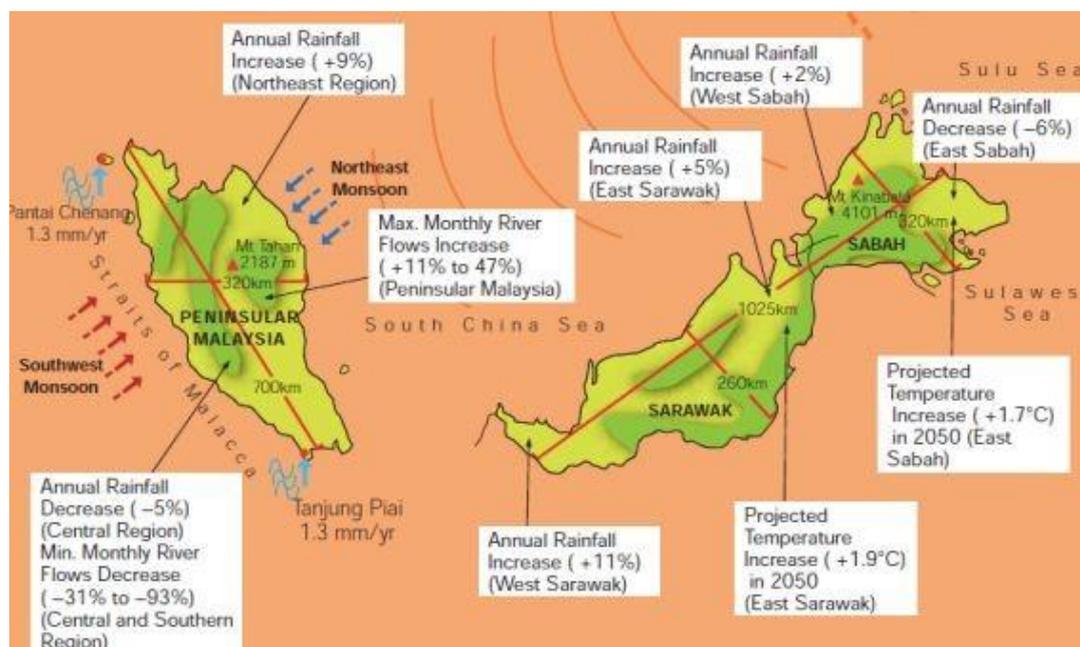


Figure 20 Projected Climate Change in Malaysia

a. Temperature

According to the assessment, temperatures throughout Southeast Asia have been climbing by 0.14 - 0.20 C per decade since the 1960s, and the number of hot days and warm nights is on the rise.⁷⁸ By the end of this century, median temperature increases for the highest emissions scenario tested are likely to exceed 3 C. Under the lowest emission scenario, that amount is less than 1C.⁷⁹ Downscaling General Circulation Models, the global simulations used to create large-scale climate projections, to regional climate models of Peninsular Malaysia demonstrates that mean annual temperatures over watersheds may increase 2.50-2.95 C during the 21st century.⁸⁰

b. Precipitation

Annual total wet-day rainfall in Southeast Asia has been increasing by 22 mm per decade, and by 10 mm per decade for extreme rain days, with a rising ratio of rainfall in the wet to dry seasons between 1950 and 2005; this varies, however, geographically and by season. In Peninsular Malaysia specifically, where precipitation is largely dependent on the Maritime continent monsoon, changes are observed to vary based on the season.⁸¹ Total rainfall and frequency of wet days appears to be decreasing during the southwest monsoon, with increasing rainfall intensity. During the northeast monsoon, on the other hand, rainfall, the frequency of extreme rainfall events and rainfall intensity are all on the rise.⁸² The downscaled regional climate models previously cited confirm that mean

⁷⁷http://www.ukm.my/seaclid-cordex/files/second_workshop/PDF_DAY2/Malaysia_Syazwan_SEACLID_Bangkok.pdf

⁷⁸ Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

⁷⁹ Climate Change 2013: Physical science basis

⁸⁰ Kavvas, M. L., et al. "A Study of the Climate Change during 21st Century over Peninsular Malaysia Watersheds." *AGU Fall Meeting Abstracts*. 2016.

⁸¹ Climate Change 2013: Physical science basis

⁸² Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

annual precipitation is expected to increase over watersheds.⁸³

c. Sea level rise

Climate change-induced rising sea levels are predicted to overrun low-lying parts of Asia. Approximately a million people living on the coasts of South and Southeast Asia are expected to be at risk. In addition to causing displacement, sea level rise may decrease the available amount of fertile land, reducing the food supply.⁸⁴ While Malaysia may be considerably less vulnerable than other countries in the region, the risks are still alarming. The country may face increased flooding, coastal erosion, wetland loss, and saline intrusion, with coastal erosion predicted to cause the most severe impacts; agriculture is likely to be the most threatened human activity.⁸⁵

d. Freshwater resources

Water demand is expected to increase throughout Asia due to population growth and rising standards of living and consumption per capita. As a result, even historically water-abundant regions are projected to experience water stress.⁸⁶ Johor is no exception. Water has been plentiful in the past, but in recent years, the state has been forced to request water supplies from Singapore, ration water usage and undertake extensive water infrastructure projects, including near Hang Tuah Jaya.⁸⁷ While there is generally low confidence in specific predictions about precipitation and water availability on the local level in Asia, growth levels in Hang Tuah Jaya are likely to necessitate smart water management strategies.⁸⁸⁸⁹

⁸³ Kavvas, M. L., et al. "A Study of the Climate Change during 21st Century over Peninsular Malaysia Watersheds." *AGU Fall Meeting Abstracts*. 2016.

⁸⁴ Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

⁸⁵ Midun, Zamali, and Say-Chong Lee. "Implications of a greenhouse-induced sea-level rise: A national assessment for Malaysia." *Journal of Coastal Research* (1995): 96-115.

⁸⁶ Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

⁸⁷ https://www.iseas.edu.sg/images/pdf/ISEAS_Perspective_2016_47.pdf

⁸⁸ Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

⁸⁹ https://www.iseas.edu.sg/images/pdf/ISEAS_Perspective_2016_47.pdf

e. Biodiversity

Changes in drought frequency and intensity are expected to have impacts on flowering patterns in lowland rainforests in Southeast Asia. Research predicts declines in bat species richness, northward shifts for many species, and reductions in the distributions of most species. Increases in water temperature, sea level rise and saltwater intrusion threaten inland water-dwelling organisms; coastal erosion may also spread. Forests may become vulnerable due to more frequent droughts, temperature highs, logging, fragmentation, fire, tree mortality, deforestation and smoke aerosols. There is also high confidence that coral reefs in the region are declining due to increased water temperatures. Temperature changes may lead to increased biodiversity of marine life in tropical areas of Asia, but tropical biodiversity overall is likely to fall. Other impacts due to shifts in climate beyond the current normal range are expected but details can be difficult to anticipate.⁹⁰

f. Agriculture and fisheries

Crop production is likely to experience generally negative impacts due to climate change in Asia. Sea level rise, high temperatures and flooding in particular are likely to hurt yields. Possible positive outcomes are possible, however, in some regions due to higher atmospheric CO₂ concentrations enhancing photosynthesis. Fisheries in the tropics are likely to decline due to higher water temperatures, changing flow regimes and the vulnerability of coral reefs. Under high emission scenarios, average maximum body weight of marine fish is likely to decline by 14-24% by 2050. While rice yield is likely to decline across Asia, Southeast Asia is not one of the most vulnerable regions.⁹¹ If, however, temperatures increase by 2 °C or more, rice yields in Malaysia could drop by 13 percent, and floods and droughts early in the growing season could lead to a drop of 80 percent.⁹² Rubber crops are at risk, with annual temperatures above 30°C leading to a 10 percent yield reduction, and precipitation interfering with tapping activities, although further study is needed.⁹³ ⁹⁴The primary concern for cocoa farmers is drought, as production could decrease drastically if annual rainfall falls below 1500 mm. High rainfall, on the other hand, can increase fungus incidence. And, should temperatures increase by 2 °C and rainfall decrease by 10 percent, oil palm yields could decrease by 30 percent.

⁹⁰ Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

⁹¹ Climate Change 2014: Impact, Adaptation and Vulnerability, Asia

⁹²http://www.ukm.my/seaclid-cordex/files/second_workshop/PDF_DAY2/Malaysia_Syazwan_SEACLID_Bangkok.pdf

⁹³ <https://iopscience.iop.org/article/10.1088/1755-1315/169/1/012053/pdf>

⁹⁴http://www.ukm.my/seaclid-cordex/files/second_workshop/PDF_DAY2/Malaysia_Syazwan_SEACLID_Bangkok.pdf

g. Public health

Climate change-exacerbated flooding is expected to worsen human health risks in Asia due to poor water quality and increased exposure to pathogens. Climbing temperatures and air pollution are expected to increase mortality in the region, and in Southeast Asia specifically, droughts are predicted to cause wildfires and smoke exposure. Increased temperatures and precipitation may worsen the toll of both water-borne and vector-borne disease. Mosquitoes' ability to transmit malaria is shown to increase with temperature, with a 15% increase in malaria cases expected to result from 1.5 C temperature jump. Dengue cases are also expected to increase with temperature, and food and water-borne diseases may increase due to lack of clean water access during droughts. In addition, traumatic experiences caused by weather events such as drought and flooding are likely to have negative impacts on mental health.

Appendix C: Aligning Planned Climate Actions with the Low Carbon Cities Framework + Society (LCCF+S)

a. Environment Sector

Table 10 Actions in the Environment Sector

Action
E1: Improve monitoring and development control around Flood risk area
E2: Promote urban farming and involve the community
E3: Protect all existing green spaces and establish new multi-purpose green spaces that cannot be developed
E4: Organize 'One Resident, One Tree' program
E5: Plant trees to increase shade in downtown areas
E6: Launch corporate sector adoption of green spaces

b. Transportation Sector

Table 11 Actions in the Transportation Sector

Action
T1: Implement Transit Oriented Development (TOD)
T2: Provide comprehensive public transport network
T3: Provide user friendly pathways for pedestrians and cyclists
T4: Increase potential activity centres for pedestrian zones
T5: Provide a 'Park-and-Walk/Cycle' zone as an initiative for drivers to park outside commercial areas
T6: Run District buses on recycled oil from food courts
T7: Promote cycling as a healthy and environmentally friendly form of transport
T8: Provide real-time online information about bus locations and arrivals
T9: Convert District vehicle fleet to hybrid and electric
T10: Establish unlimited free parking for low-carbon vehicles

c. Infrastructure Sector

Table 12 Actions in the Infrastructure Sector

Action
I1: Conduct feasibility study on industrial symbiosis (including Waste-to-Wealth) for existing industrial area
I2: Encourage industry to use grey water for non-potable purposes
I3: Establish decentralized and community-oriented composting sites
I4: Install solar-powered street lights throughout the municipality
I5: Establish tax incentives and low-interest loans to attract and promote green industry
I6: Establish tax incentives for energy efficiency investments in the production process
I7: Promote ISO 14000 certification in industry
I8: Encourage premises in flood prone areas to create response plans for flash flooding
I9: Implement a 'pay-as-you-throw' waste system

d. Building Sector

Table 13 Actions in the Environment Sector

Action
B1: Promote Photovoltaic (PV) and solar thermal systems on MPHTJ assets
B2: Promote the use of natural ventilation by implementing MS1525
B3: Promote Photovoltaic (PV) for new buildings
B4: Ensure new developments are integrated with rainwater harvesting systems and grey water recycling for non-potable usage
B5: Install energy efficiency (EE) equipment and smart meters on commercial buildings as an energy saving initiative
B6: Promote green building assessment
B7: Implement new policies to incentivize construction of green roofs and green vertical landscaping
B8: Promote measures to make homes safer in flood conditions
B9: Encourage commercial establishments to post energy efficiency data publicly at entrance
B10: Promote solar water heaters in new developments

e. Society Sector

Table 14 Actions in the Society Sector

Action
S1: Promote low carbon tourism products and services to reduce environmental impacts
S2: Set up Low Carbon Residential association
S3: To raise community awareness on prevention of dengue
S4: Promote community recycling of used cooking oil

Research Project Team Member

Hang Tuah Jaya Municipal Council (MPHTJ)

TPr Rozaidi bin Mahat

LAr. Mohammad Norfadzly bin Mohammad Sharif

Mohd Fildaus bin Abd Halim

Mohd Zaidi bin Mohd Said

Nurul Afida Adila binti Zakaria

Rosli bin Puasa

Nur Dalilah binti Mohd Zamri

Norasyikin binti Md. Salleh

Dayang Nor Aisyah binti Mohd Firdaus

Norazlina binti Baharuddin

Mariani binti Ahmad

Nurliana binti Zainul Adnan

Nadhirah binti Ahmad

Universiti Teknologi Malaysia (UTM)

Ho Chin Siong

Chau Loon Wai

Teh Bor Tsong

Mlysha Nurshyla Abdul Rahim

Mohamad Zulikhram bin Zulibrahim

Umiera Yasmin Ibrahim

Nursyahidah Sulaiman

Rohayu Abdullah

Danya Levy

Carbon Disclosure Project (CDP)

Hanah Paik

Sandy Morris

International Urban Cooperation European Union-Asia (IUC Asia)

Pablo Gandara